The American Society of Breast Surgeons
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2020 Virtual Scientific Session

Scientific Session Awards

Abstracts presented at the Society's virtual scientific session will be considered for the following awards:

- The **George Peters Award** recognizes the best presentation by a breast fellow. In addition to a plaque, the winner receives $1,000. The winner is selected by the Society's Publications Committee.

  The award was established in 2004 by the Society to honor Dr. George N. Peters, who was instrumental in bringing together the Susan G. Komen Breast Cancer Foundation, The American Society of Breast Surgeons, the American Society of Breast Disease, and the Society of Surgical Oncology to develop educational objectives for breast fellowships. The educational objectives were first used to award Komen Interdisciplinary Breast Fellowships. Subsequently the curriculum was used for the breast fellowship credentialing process that has led to the development of a nationwide matching program for breast fellowships.

- The **Scientific Presentation Award** recognizes an outstanding presentation by a resident, fellow, or trainee. The winner of this award is also determined by the Publications Committee. In addition to a plaque, the winner receives $500.

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Contents

Scientific Oral Presentations I

Saturday, May 23, 2020 12:00 pm–1:10 pm
Moderators: Sarah Blair, MD; Henry Kuerer, MD, PhD

785368 - The Role of Emotion in Decisions About Contralateral Prophylactic Mastectomy: A Randomized Controlled Trial

Andrea Merrill[1], Michael Silverstein[2], Ellen Peters[2], Laura Scherer[3], Crystal Phommasathit[1], Clara Lee[1]

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Background/Objective: Rates of contralateral prophylactic mastectomy (CPM) in women with early-stage breast cancer are rising rapidly. In retrospective studies, patients have reported that negative emotions (e.g., fear, anxiety) greatly influenced their decisions about CPM. The specific mechanisms for this influence, however, remain unclear. Based on principles of decision psychology, we hypothesized that negative emotion toward breast cancer leads to choice of CPM by 1) increasing perceived risk of future breast cancer and 2) increasing positive emotion toward CPM.

Methods: A 3-arm randomized controlled trial was conducted among women aged 30-59 with no personal or family history of breast cancer or BRCA mutation. The experiment was conducted online through Dynata, a global online survey sampling company. Participants were randomized to read 1 of 3 narratives about being diagnosed with breast cancer and deciding about surgery. The narratives were designed to invoke very negative, negative, or less negative emotion about breast cancer and were based on real-life patient online stories. Each participant completed questions assessing comprehension, emotion about breast cancer, emotion about treatment options (lumpectomy vs. mastectomy vs. CPM), perceived risk of future breast cancer, and perceived risks of surgery. The Holistic, Unipolar, discrete Emotions measure (HUE) and the Self-Assessment Manikin (SAM) scales were used to assess emotions - a higher number indicates more negative emotions. The responses were analyzed using linear and logistic regression.

Results: There were 1030 women included in the analysis. Mean age was 44 (range 30-59) years. Mean comprehension was 7.52 correct out of 12 questions (SD 2.57). Participants assigned to the less negative scenario reported less negative emotion about breast cancer (lower HUE scores) compared to those assigned to the negative and very negative scenarios (respective means 3.09 vs. 3.25 vs. 3.29, $F(2, 1024) = 9.17$, $p<.001$). More negative emotion about breast cancer resulted in greater perceived risk of ipsilateral recurrence following lumpectomy ($b=0.18$, $p<.001$), greater perceived risk of contralateral cancer following lumpectomy ($b=0.19$, $p<.001$), and greater perceived risk of contralateral cancer following unilateral mastectomy ($b=0.15$, $p<.001$). Based on SAM scores, participants in the very negative condition also felt calmer about CPM ($F(2, 1021)=3.15$, $p=.04$), although they did not report more positive feelings toward CPM ($p=.39$). With respect to surgical decision making, those in the less negative condition (versus negative or very negative) were less likely to choose CPM ($b=0.44$, $p=0.01$).

Conclusions: Negative emotions about breast cancer cause women to perceive higher risks of future breast cancer following lumpectomy or mastectomy and to choose CPM more often. Future efforts to counsel women about CPM should address negative emotions, potentially through psychosocial interventions and empathic communication.

787899 - Axillary Response in Patients Undergoing Neoadjuvant Endocrine Treatment for Node-Positive Breast Cancer

Arielle Stafford[1], Kahyun Yoon-Flannery[2], Constanza Cocilovo[3], Kirsten Edmiston[3], Sara Bruce[3], Robert Cohen[3], Nadia Nocera[4], Lucy De La Cruz[3]

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Background/Objective: Several studies have proven that neoadjuvant endocrine therapy (NAE) has a similar beneficial therapeutic effect in estrogen-positive breast cancer (BC) with improved breast conservation rate in patients undergoing NAE versus chemotherapy. The impact of axillary complete pathologic response (pCR) is less clear. We evaluate the impact of NAE on axillary downstaging and surgical management.

Methods: Using the National Cancer Database, we identified all patients with node-positive (N+), estrogen (ER) positive BC undergoing NAE. We stratified patients by nodal response (pN0 versus pN+), and compared demographics, tumor characteristics, and surgical management.

Results: A total of 24,453 patients were identified, with a mean age of 54.4 years, and the majority were white (77.4%) and treated at a comprehensive community practice (38.1%). Most patients had T2 (42.4%), moderately differentiated (44.0%), invasive ductal carcinoma (74.6%) with N1 disease (77.0%). Complete pathologic response in the nodes was noted on 5,148 (21.1%) of patients versus 19,305 (78.9%) who remained N+ after NAE. Patients who had axillary pCR were significantly more likely to be younger, have T2, N1, be poorly differentiated, and have ductal histology. Patients with nodal pCR were less likely to undergo mastectomy (N0 66.4% vs N+ 77.0%; <0.001) and axillary lymph node dissection (N0 51.3% vs N+ 67.7%; <0.001).

Conclusions: We found that 21% of patients who underwent NAE had pCR in the nodal basin, which is higher than previously reported. Although NAE is not a common treatment option for women with N+ ER-positive breast cancer, it may be a suitable option for axillary downstaging. Appropriate drugs and duration of NAE have yet to be established, but future studies will be helpful in elucidating this topic.

Table: Axillary response in women with clinically node-positive breast cancer undergoing neoadjuvant endocrine therapy

			Overall	Post-Neoadjuvant Axillary Status		
				pN0	pN+	p
n			24453	5148	19305	
Age			54.4 ± 12.5	52.2 ± 12.2	55.0 ± 12.5	<0.001
Race						
	White		18932 (77.4)	3779 (73.4)	15153 (78.5)	<0.001
	Black		4040 (16.5)	1039 (20.2)	3001 (15.5)	
	Other		1276 (5.2)	291 (5.7)	985 (5.1)	
	Unknown		205 (0.8)	39 (0.8)	166 (0.9)	
Comorbidity score						
	0		21049 (86.1)	4516 (87.7)	16533 (85.6)	0.002
	1		2820 (11.5)	521 (10.1)	2299 (11.9)	
	2		449 (1.8)	83 (1.6)	366 (1.9)	
	3+		135 (0.6)	28 (0.5)	107 (0.6)	
Median income						
	<$38,000		4001 (16.4)	869 (16.9)	3132 (16.2)	0.27
	$38,000-$47,999		5239 (21.4)	1107 (21.5)	4132 (21.4)	
	$48,000-$62,999		6523 (26.7)	1399 (27.2)	5124 (26.5)	
	$63,000 +		8625 (35.3)	1759 (34.2)	6866 (35.6)	
	Unknown		65 (0.3)	14 (0.3)	51 (0.3)	
Percentage with no high school diploma						
	>=21%		4160 (17.0)	897 (17.4)	3263 (16.9)	0.21
	13.0-20.9%		6131 (25.1)	1331 (25.9)	4800 (24.9)	
	7.0-12.9%		7846 (32.1)	1638 (31.8)	6208 (32.2)	
	< 7.0%		6256 (25.6)	1270 (24.7)	4986 (25.8)	
	Unknown		60 (0.2)	12 (0.2)	48 (0.2)	
Hospital category						
	Community		1833 (7.5)	338 (6.6)	1495 (7.7)	0.26
	Comprehensive community		9327 (38.1)	1912 (37.1)	7415 (38.4)	
	Academic		7411 (30.3)	1502 (29.2)	5909 (30.6)	
	NCI		2900 (11.9)	587 (11.4)	2313 (12.0)	
Clinical tumor stage						
	T1		3180 (13.0)	708 (13.8)	2472 (12.8)	<0.001
	T2		10363 (42.4)	2397 (46.6)	7966 (41.3)	
	T3		6024 (24.6)	1186 (23.0)	4838 (25.1)	
	T4		4374 (17.9)	757 (14.7)	3617 (18.7)	
	Unknown		512 (2.1)	100 (1.9)	412 (2.1)	
Clinical nodal stage						
	N1		18817 (77.0)	4108 (79.8)	14709 (76.2)	<0.001
	N2		3582 (14.6)	618 (12.0)	2964 (15.4)	
	N3		2054 (8.4)	422 (8.2)	1632 (8.5)	
Tumor grade						
	Well-differentiated		2047 (8.4)	307 (6.0)	1740 (9.0)	<0.001
	Moderately-differentiated		10748 (44.0)	1614 (31.4)	9134 (47.3)	
	Poorly differentiated		9516 (38.9)	2764 (53.7)	6752 (35.0)	
	Unknown		2142 (8.8)	463 (9.0)	1679 (8.7)	
Tumor histology						
	Ductal		18237 (74.6)	4193 (81.4)	14044 (72.7)	<0.001
	Lobular		2682 (11.0)	339 (6.6)	2343 (12.1)	
	Other/Unknown		3534 (14.5)	616 (12.0)	2918 (15.1)	
Surgery						
	Breast					
		Lumpectomy	6122 (25.0)	1718 (33.4)	4404 (22.8)	<0.001
		Mastectomy	18283 (74.8)	3419 (66.4)	14864 (77.0)	
		Other/Unknowr	48 (0.2)	11 (0.2)	37 (0.2)	
	*Axilla (*2012 and later)*					
		None	142 (0.8)	59 (1.6)	83 (0.6)	<0.001
		Biopsy	109 (0.6)	32 (0.9)	77 (0.6)	
		Sentinel Lympl	2243 (13.1)	1148 (30.5)	1095 (8.2)	
		Axillary Lymp	10962 (64.1)	1928 (51.3)	9034 (67.7)	
		SLN + ALND	3650 (21.3)	592 (15.7)	3058 (22.9)	

786855 - TARGIT-R (Retrospective): Five-year Follow-up on Intraoperative Radiation Therapy (IORT) for Breast Cancer Performed in North America

Stephanie Valente[1], Andrew Ashikari[2], Kevin Bethke[3], Kristy Broman[4], Nimisha Deb[5], Eric Donnelly[3], Jamie Escallon[6], Anthony Fyles[6], Gregory Graves[7], Jeannine Graves[7], Stephen Grobmyer[8], Michael Hassell[9], Ulrich Hermanto[10], Richard Hoefer[11], Song Kang[11], Pond Kelemen[2], Christine Laronga[4], Natalie Lockney[12], S. Chace Lottich[13], David McCready[6], Aaron Pederson[9], Lee Riley[5], Nitin Rohatgi[7], Darrel Ross[13], Ray Rudolph[9], Christiana Shaw[12], William Small[14], Eleni Tousimis[15], Chao Tu[1], Shawna Willey[16], Rahul Tendulkar[1], Sheen Cherian[1], Chirag Shah[1]

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Background/Objective: Intraoperative radiation therapy (IORT) with Intrabeam™ delivered as a single-dose during lumpectomy is a treatment option for patients with low-risk early-stage breast cancer. Initial reports focusing on local control have been promising, but long-term follow-up with the technique has been limited. TARGIT-R (Retrospective) evaluated the experience of 19 North American institutions (prior to August 2013) to provide long-term outcomes in patients treated in "real-world" clinical practice with IORT. This analysis presents a 5-year follow-up report of these initial patients who received IORT.

Methods: A multi-institutional retrospective registry was created in 2013 to collect data on patients treated with lumpectomy and IORT in North America. The initial TARGIT-R group consisted of 935 women treated, and reported on 822 who had at least 6 months of follow-up. A 5-year follow-up analysis of the initial patients enrolled was performed by 12 institutions. Data collected included patient and tumor characteristics, as well as treatment, recurrence, and survival details. Patients were divided into IORT treatment types including primary (IORT at time of lumpectomy), secondary (IORT as a second surgery, post-pathology), and as a boost (IORT followed by whole-breast radiation (WBRT)). Ipsilateral in-breast tumor recurrence (IBTR) was defined as local recurrence (LR) if at the lumpectomy site, or a new primary if in a different quadrant. Kaplan-Meier estimates were used to determine cumulative incidence for recurrence. Multivariate analysis (MVA) was used to identify factors for recurrence.

Results: The 5-year follow-up cohort consisted of 667 patients. Median follow-up for this cohort was 5.2 years (quartile range 4.5-6.3 years), and mean patient age was 67 years (38-88 years). Primary IORT was performed in 72% (477) of cases and as a second surgery in 3% (20). IORT was performed as a boost in 25% of cases with 8% (54) as an intentional boost and 17% (116) as planned primary IORT but followed by WBRT. Patients who received primary IORT plus

unplanned WBRT did so for various reasons (final pathology margins, tumor type or lymph node status) at the discretion of the treating physicians. In the primary IORT-only group, 76% had invasive ductal carcinoma, and 94% were estrogen receptor (ER)-positive with a median tumor size of 1 cm (range 0.03-50 mm). In ER-positive patients, 76% received endocrine therapy, of which 15% had discontinued it prior to completing 5 years, and 24% declined endocrine therapy. At 5 years, there were no IBTR in the secondary IORT or intended boost IORT patients. In patients who received IORT plus unplanned WBRT, there were 2 IBTR (1.7%). For the 477 patients treated with primary IORT only, IBTR rate (including LR (5.8%) and new breast primary (1.9%) was 7.6% (95 % CI, 4.99%, 10.3%). The MVA for LR showed that estrogen- and progesterone-positive patients were less likely to have LR (p=0.002, p=0.027), as well as patients who had completed 5 years of endocrine therapy compared to those who did not (p=0.027). Increasing tumor size was also associated with higher LR risk (p=0.011). Overall survival in this group was 99.6% at 5 years.

Conclusions: At 5-year follow-up, in this retrospective registry, the in-breast failure rate after primary IORT was 7.6%, with overall survival of 99.6%. Appropriately selected patients with small, hormone-positive cancers who completed 5 years of endocrine therapy had the lowest risk of recurrence. Care must be taken in interpreting these results, as TARGIT-R is not a clinical trial, and many patients included in this cohort were not treated according to current selection criteria and protocols for partial breast irradiation with IORT.

777909 - Changing the Default: A Prospective Study of Reducing Discharge Opioid Prescription After Lumpectomy and Sentinel Node Biopsy

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Background/Objective: Patients undergoing lumpectomy/sentinel node biopsy procedures (Lump/SLNB) routinely receive opioids at discharge, but whether opioids are necessary for adequate pain control is unclear. We hypothesized that most Lump/SLNB patients could be discharged without opioids with a failure rate of <10%. This study prospectively examined outcomes following a change in standard discharge prescription from an opioid/acetaminophen to non-steroidal anti-inflammatory drug/acetaminophen (NSAID).

Methods: Standard discharge orders included opioids in the first 3-month study period; discharge pain meds were changed to NSAID in the second 3-month period. Anesthetic management was not changed during the study. Patient-reported narcotic consumption and pain scores were collected from a post-discharge survey sent on postoperative days (POD) 1-5. Frequency of discharge with opioid, NSAID failure rate (number of patients prescribed opioid

after discharge), patient-reported narcotic use, and pain scores were compared using Wilcoxon rank-sum, Fisher's exact, and chi-square tests.

Results: Six hundred sixty-three patients had Lump/SLNB from May-October 2019 - 371 in the opioid and 292 in the NSAID study period. There were no differences in demographic and perioperative characteristics between the study periods (Table). In the opioid period, 92% (342/371) of patients were prescribed an opioid; of 142 patients who documented narcotic use on the survey, 86 (61%) used 0 opioid tablets, and among the 56 (39%) who took them, the median number taken by POD 5 was 4. After the change to NSAID, rates of opioid prescription decreased to 14% (41/292), and most opioid prescriptions were for medical contraindication to NSAID. NSAID failure rate was 2% (5/251). Among survey respondents, there was no significant difference in the maximum reported pain scores (POD 1-5) between the opioid vs NSAID period (p=0.7); none-mild in 58% vs 61%, moderate in 37% vs 34%, and severe or greater in 6% vs 6%, respectively.

Conclusions: In Lump/SLNB patients, a change to default discharge with NSAID resulted in a 78% absolute reduction in opioid prescription with a failure rate of 2% and no difference in patient-reported pain scores. Most patients having Lump/SLNB can be discharged with NSAID, reducing the number of unused opioids in the community.

Table: Demographic and perioperative treatment characteristics. Abbreviations: MME, morphine milligram equivalents; NSAID, non-steroidal anti-inflammatory drug; IQR, interquartile range; BMI, body mass index; ASA, American Society of Anesthesiologists; MAC, monitored anesthesia care; *Percentages reflect survey responders only

Demographic/perioperative Variables	Opioid study period (n=371)	NSAID study period (n=292)	P-value
Age, median (IQR)	60 (51,68)	58 (51,66)	0.6
BMI (kg/m2), median (IQR)	27 (24,31)	27 (24,31)	0.4
ASA score			0.8
1	1%	2%	
2	61%	60%	
3	38%	38%	
Anesthesia type			0.9
General	31%	30%	
MAC	69%	70%	
Intraoperative surgeon administered lidocaine 1%, ml (IQR)	11 (10,18)	11 (10,20)	0.5
Intraoperative surgeon administered bupivacaine 0.5%, ml (IQR)	10 (10,20)	10 (10,20)	0.6
Intraoperative acetaminophen			0.6
Yes	98%	97%	
Intraoperative ketorolac (mg)			0.07
0	20%	26%	
15	30%	33%	
>15	50%	41%	
Total perioperative narcotic(MME) (IQR)	20(15,30)	20(15,28)	0.3
Prescribed opioid	92%	14%	<0.001
Post-op survey variables*			
Survey response	50%	55%	0.2
Narcotic taken after discharge (tablets)			<0.001
0	61%	84%	
1-4	26%	10%	
5-10	11%	6%	
>10	2%	0%	
NSAID/Acetaminophen taken after discharge			0.9
(tablets)	14%	11%	
0	26%	27%	
1-4	45%	45%	
5-10	15%	17%	
>10			
Maximum pain score POD 1-5			0.7
None (0)	8%	9%	
Mild (1-3)	50%	52%	
Moderate (4-6)	37%	34%	
Severe (7-8)	6%	5%	
Very Severe (9-10)	0%	1%	

786264 - Trends in Utilization of Contralateral Risk-reducing Mastectomy in Breast Cancer Patients Who Undergo Panel Testing

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Background/Objective: With the increased performance and scope of genetic testing, a greater number of breast cancer patients are being identified as germline mutation carriers. In an initial study from our group, we identified comparable rates of contralateral risk-reducing mastectomy (CRRM) in BRCA and non-BRCA germline mutation carriers. We sought to determine whether such trends continue to be prevalent.

Methods: All women >18 years of age with a history of unilateral breast cancer who underwent panel testing using between 1/1/2014 and 8/1/2019 at our academic institution were identified using an institutional database. A review of the electronic medical record was performed to collect patient, tumor, and treatment factors. Patients without surgical information and those with bilateral cancer were excluded, as well as patients who had a contralateral risk-reducing mastectomy (CRRM) prior to genetic testing results. Univariate and multivariable analyses were performed to compare factors associated with performance of contralateral risk-reducing mastectomy.

Results: We identified 863 patients who met inclusion criteria, with 221 (25.7%) patients having undergone a CRRM. Median follow-up was 3.8 years. At last follow-up, 87.5% of patients were alive without disease, 5.8% were alive with disease, 4.3% were deceased without disease, and 2.4% were deceased with disease. Of patients who had a CRRM, surgery was performed at the time of therapeutic mastectomy for the index cancer in the majority of cases, 181 (81.9%). One hundred forty-six patients experienced a second in-breast event; 42 patients who had undergone initial segmental mastectomy subsequently underwent a CRRM at time of second event. On univariate analysis, average patient age at time of genetic testing was younger for patients who underwent CRRM than those who did not (46.3±11.4 years vs 55.6±12.5 years, $p<0.0001$). A greater proportion of patients with a BRCA 1/2 mutation underwent CRRM than those with a non-BRCA mutation, or no genetic mutation (65.8% vs 38.0% vs 13.4%, $p<0.0001$). There was no significant association between the performance of CRRM and clinical tumor size or clinical nodal status. A greater proportion of patients with triple-negative disease underwent CRRM than hormone receptor-positive disease (34.8% vs. 24.6%, $p=0.03$). There was no significant difference in performance of CRRM based on family history of breast cancer. (Table) On multivariable analysis, factors associated with performance of a CRRM included age less than 50, type of genetic mutation, triple-negative breast cancer, receipt of chemotherapy, second breast cancer event, as well as initial therapeutic mastectomy for the index cancer. Patients with a BRCA mutation were 8.27 times more likely to undergo CRRM than those without a genetic mutation, whereas those with a non-BRCA mutation were 3.37 times as likely, $p<0.0001$. (Table)

Conclusions: In patients with a history of unilateral breast cancer who undergo broad-based genetic testing, rates of CRRM are greatest in patents with a BRCA 1/2 mutation, although a sizeable number of women with a pathogenic non-BRCA germline finding are also opting for

CRRM. Given that the risk of contralateral breast cancer in women with most pathogenic mutations other than BRCA 1/2 remains poorly characterized, these data have implications for both risk counseling in patients and for ascertaining the true risks of contralateral breast cancer.

Table: Factors associated with contralateral risk-reduction mastectomy

		Univariate			Multivariable			
Characteristic	Total N= 863	No CPM N= 642	CPM N =221	p-Value	Odds Ratio	95% Confidence Interval		p-Value
Age at Genetic Testing								
mean ± standard deviation	53.3 ± 12.9	55.6 ± 12.5	46.3 ± 11.4	<0.0001				
Range	20-87	25-87	20-87					
≥50 years	499	426 (85.4%)	73 (14.6%)	<0.0001	Ref			
<50 years	364	216 (59.3%)	148 (40.7%)		2.79	1.90	4.11	<0.001
Panel Testing Result				<0.0001				
BRCA Mutation	76	26 (34.2%)	50 (65.8%)		8.27	4.49	15.25	<0.001
Non-BRCA Pathogenic Mutation	266	165 (62.0%)	101 (38.0%)		3.37	2.27	4.99	<0.001
No Mutation	521	451 (86.6%)	70 (13.4%)		Ref			
Clinical Tumor Category				0.60*				NS
0	126	96 (76.2%)	30 (23.8%)					
1	259	190 (73.4%)	69 (26.6%)					
2	283	203 (71.7%)	80 (28.3%)					
3	57	38 (66.7%)	19 (33.3%)					
4	26	21 (80.8%)	5 (19.2%)					
Unknown	112	94	18					
Clinical Nodal Status				0.3*				NS
Negative	555	411 (74.0%)	144 (26.0%)					
Positive	196	137 (69.9%)	59 (25.9%)					
Unknown	112	94	18					
Tumor Biology				0.03*				
HR+/HER2-	430	324 (75.4%)	106 (24.6%)		Ref			
HER2+	112	75 (67.0%)	37 (33.0%)		1.58	0.91	2.74	0.11
TNBC	135	88 (65.2%)	47 (34.8%)		1.77	1.02	3.07	0.04
Unknown	186	155	31					
Breast Procedure at index diagnosis				<0.0001*				
Mastectomy	421	244 (38.0%)	177 (80.1%)		5.0	3.33	7.50	<0.001
Segmental	440	398 (62.0%)	42 (19.0%)		Ref			
None	2	0	2					
Any Chemotherapy				0.12*				
No	284	220 (77.5%)	64 (22.5%)		Ref			
Yes	535	388 (72.5%)	147 (27.5%)		0.47	1.20	3.13	0.002
Unknown	34	10						
2nd Breast Cancer Event				0.17				
No	717	540 (75.3%)	177 (24.7%)		Ref			
Yes	146	102 (69.9%)	44 (30.1%)		1.94	1.20	3.13	0.007
Family History Breast Cancer				0.80*				NS
Yes	580	434 (74.8%)	146 (25.2%)					
No	277	205 (74.0%)	72 (26.0%)					
Unknown	6	3	3					

*p value calculated after unknown values were excluded
NS = Not significant, not included in multivariable analysis

844332 – High-resolution Full 3D Specimen Imaging for Lumpectomy Margin Assessment

Swati Kulkarni[1], Ingrid Reiser[2], David Schacht[1], Sonya Bhole[1], Kirti Kulkarni[2], Hiroyuki Abe[2], Jean Bao[2], Kevin Bethke[1], Nora Jaskowiak[2], Seema Khan[1], Jennifer Tseng[2], Nora Hansen[1], Buxin Chen[2], Zheng Zhang[2], Jennifer Pincus[1], Jeffrey Mueller[2], Xiao Han[3]
[1]Northwestern University, Chicago, IL, [2]University of Chicago, Chicago, IL, [3]Clarix Imaging, Chicago, IL

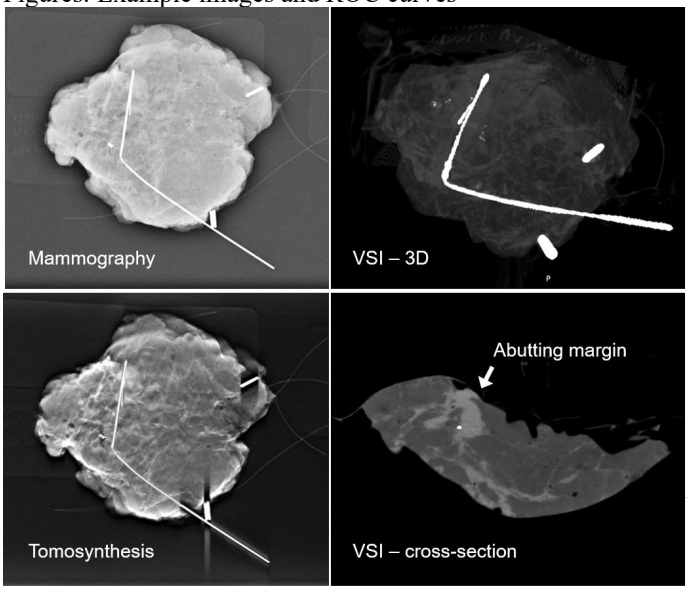
Background/Objective: Reducing re-excision rates is of high clinical interest for breast surgeons. The availability of accurate intraoperative margin assessment is essential to achieving this goal. Current 2D and tomosynthesis imaging yields image data that lack high-depth resolution leading to the need for additional surgery. Recently, the volumetric specimen imager (VSI) has been developed to provide full-3D and thin-slice cross-sectional visualization at 360-degree view angle, allowing more precise localization and orientation of problematic margins. In this multi-institutional prospective clinical trial, we hypothesize that VSI allows us to obtain intraoperative margin status that better correlates with final pathologic margin status compared to currently available imaging modalities.

Methods: Patients undergoing wire or seed localized lumpectomy for benign or malignant disease were accrued from 2 different institutions, with a target accrual of 200 patients. To date,

we have accrued 43 benign and 76 malignant cases. After standard-of-care specimen imaging and interpretation was performed, the lumpectomy specimen is imaged with the VSI device before pathology evaluation. A reader study was carried out for the first 20 cases containing malignant lesions. Image interpretation was performed post-surgery by 3 radiologists based on 2D specimen mammography, tomosynthesis, Faxitron, and VSI. For each specimen, the radiologist assigned a likelihood value for each of the 6 margins being a positive margin, where 0% indicates "definitely negative margin", and 100% indicates "definitely positive margin." Final histopathology margin status was obtained from surgical pathology reports, which was used for calculating true positives and false positives in the imaging-based margin assessment results. Finally, true positive rates and false positive rates were computed, and the data were plotted in a receiver operating characteristic (ROC) curve for each modality. Area-under-the-curve (AUC) was computed to characterize the performance of the imaging modality interpreted by each user.

Results: Of the 20 specimens included in the study, 120 margins were interpreted by the readers. The figure shows example images of mammography, tomosynthesis, and VSI, along with sample ROC curves from 1 reader. It can be observed that VSI's ROC curve is considerably higher than that of other modalities under comparison. The AUC values of VSI for 3 readers are 0.905, 0.885, and 0.968, which show relative improvement of 42.1%, 40.1%, and 53.0% over AUCs of standard of care. The VSI has sensitivity ranging 85.7% - 100%, specificity 73.2% - 91.5%, positive predictive value 26.9% - 55.6%, and negative predicative value 98.5% - 100%.
Conclusions: The study demonstrated that full-3D specimen imaging can improve correlation between intraoperative margin status and final pathology results. The results suggest that using this new device as a clinical tool for performing intraoperative margin assessment, which, when used in conjunction with shave margin techniques, could further reduce the re-excision rates.

Figures: Example images and ROC curves



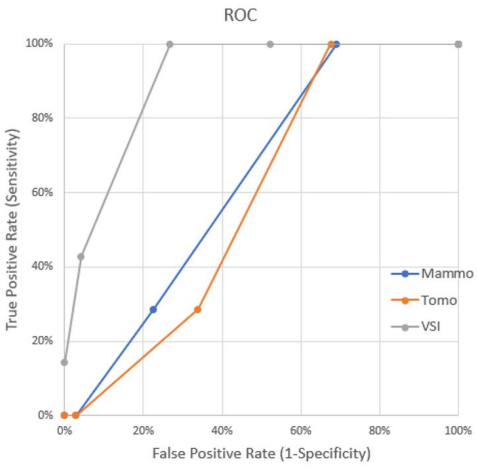


Figure 1. Left: Example images of a lumpectomy specimen acquired by mammography, tomosynthesis, and VSI (3D rendering and cross-section). Right: ROC curve from one reader for all three modalities.

Scientific Oral Presentations II

Saturday, May 23, 2020 1:25 pm – 2:25 pm
Moderators: Henry Kuerer, MD, PhD; Elizabeth Shaughnessy, MD

785044 - Development and Prospective Validation of a Risk Calculator That Predicts a Low-risk Cohort for Atypical Ductal Hyperplasia Upstaging to Malignancy: Evidence for a Watch-and-wait Strategy of a High-risk Lesion

Daniel Lustig[1], Michael Guo[1], Claire Liu[1], Urve Kuusk[2], Carol Dingee[2], Jin-Si Pao[2], Rebecca Warburton[2], Leo Chen[1], Elaine McKevitt[2]
[1]University of British Columbia, Vancouver, BC, Canada, [2]Providence Health Care, Vancouver, Canada

Background/Objective: Atypical ductal hyperplasia (ADH) is a precursor to breast cancer and is a common entity identified on core needle biopsy (CNB). Guidelines recommend surgical excision due to the concern of missing a malignancy as a consequence of CNB undersampling, which occurs in approximately 20% of cases. Studies have suggested that women with a low risk of upstaging may be offered short-term observation as opposed to surgery. The purpose of this study was to determine clinical, radiological, and pathological variables associated with ADH upstaging to cancer and to develop a predictive risk calculator capable of identifying women who are at low oncological risk of upstaging.

Methods: A large prospectively collected database from our tertiary breast referral center was queried for all women having surgery for a high-risk lesion between January 2013 and December 2017. Patients who were diagnosed with ADH on CNB and were treated by surgical excision at our center were included in our study. Patients were excluded if: (1) ADH was not the predominate or final diagnosis from CNB; (2) they had a current diagnosis of ductal carcinoma in situ (DCIS) or breast cancer in the ipsilateral breast regardless of whether it was treated; (3) there were incomplete or missing electronic medical records for the variables described below. Logistic regression analysis was performed to identify clinical, radiological, and pathological variables predictive of ADH upstaging to cancer. Significant variables ($p \leq 0.05$) were then used to develop a 5-point risk calculator that predicts ADH upstaging to carcinoma, which was subsequently validated in a prospective cohort between January 2018 and December 2018.

Results: A total of 1,986 patients underwent surgery for a high-risk lesion diagnosed on CNB between January 2013 and December 2017. Among the 1,986, we identified 318 (16.0%) patients who had ADH identified on their CNB - of which 290 met the inclusion criteria for our study. The patient population was exclusively women with a mean age of 56.8 ± 10.6 years (range 22 – 87). The upstage rate was 24.8% (n=72/290). Five variables were associated with upstaging and included in our calculator: (1) lesion >5 mm on ultrasound ($p = 0.005$, OR 2.9, 95% CI 1.67-5.75); (2) lesion >5 mm on mammogram ($p < 0.01$, OR 2.1, 95% CI 1.13-4.02); (3) 1 or more "high-risk" lesion(s) on CNB ($p < 0.001$, OR 3.6, 95% CI 1.93-6.77); (4) pathological suspicion for cancer ($p < 0.001$, OR 9.5, 95% CI 4.86-19.2) and; (5) incomplete removal of calcifications on CNB ($p = 0.005$, OR 2.2, 95% CI 1.28-3.92). Patients with a score of 0 were deemed "low-risk" and had a 2% risk of being upstaged to cancer with a negative predictive value of 98.4%. There were 17.2% of patients categorized as low risk (n=50/290). Having a

score of 1 or more conferred a 17.4% – 100% risk of detecting a malignancy following surgical excision. The calculator was applied, validated, and prospectively demonstrated similar results against the derivation cohort (R2 = 0.96), where 0% (n=0/62) of patients in the low-risk cohort were upstaged to cancer.

Conclusions: Patients with ADH on CNB can be accurately stratified into a low oncological cohort who have a 2% risk of being upstaged to carcinoma. In the future, low-risk patients may be offered observation as an alternative to surgery. Currently, a multicenter study is externally validating this prediction tool prior to widespread clinical application.

787976 - Has Breast Surgery Shattered the Glass Ceiling? Trends in Female Representation at The American Society of Breast Surgeons Annual Meeting from 2009-2019

Jenny Chang[1], Nikita Kadakia[2], Laurel Nelms[2], Cyrus Nguyen[2], Sharon Lum[3]
[1]Loma Linda University School of Medicine, Dept of Surgery, Los Angeles, CA, [2]University of California, Riverside, School of Medicine, Riverside, CA, [3]Loma Linda University School of Medicine; University of California, Riverside, School of Medicine, Loma Linda, CA

Background/Objective: Although the percentage of women surgeons has increased from 3.6% in 1980 to 25% in 2019, the proportion of women in general surgical leadership and research has been increasing at a disproportionately slower rate. However, the field of breast surgery is unique due to increased patient demand for female surgeons as the majority of patients with breast diseases are female. Prior studies have shown that while two-thirds of female patients attending a breast clinic have no preference in surgeon gender, one-third prefer only female breast surgeons. Our study sought to evaluate the temporal representation of gender at the largest breast surgery meeting in the United States organized by The American Society of Breast Surgeons (ASBrS).

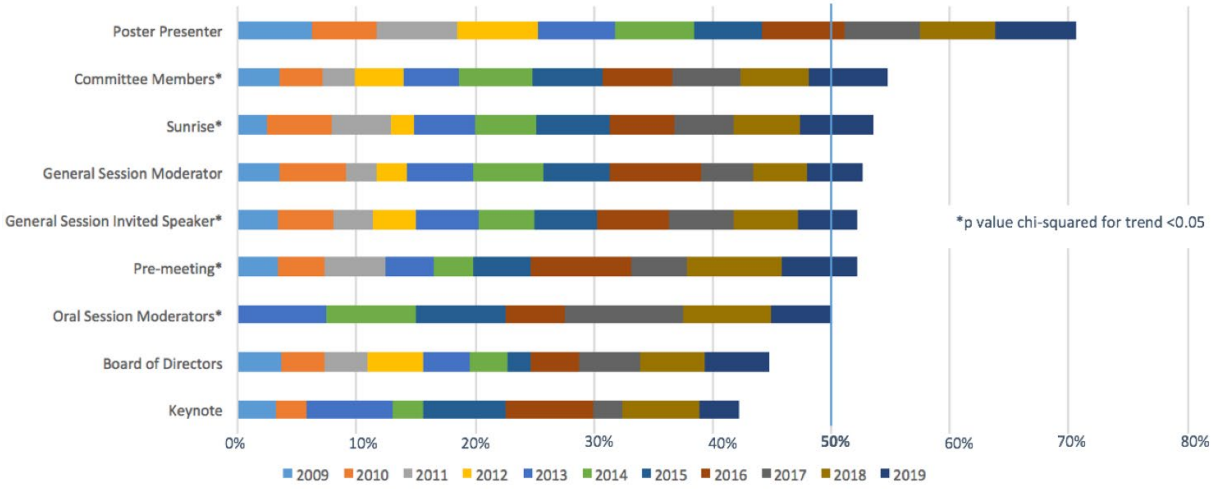
Methods: ASBrS meeting programs from 2009-2019 and verified professional profiles were reviewed to determine gender representation in meeting committee leadership, all scientific presentations (oral, quickshot, and poster presentations), and other meeting sessions including the pre-meeting courses, sunrise workshops, and general session lectures and presentations. Industry-supported symposia were excluded from analysis. Standard descriptive and Chi-square for trend analyses were performed.

Results: The ASBrS Board of Directors comprised 44.8% females during the study period. Overall, 54.8% of all committee members including the Annual Meeting, Continuing Medical Education, and Ethics Committees were female, and 41.7% of the chairs of these committees were female. Significant annual increases in the proportion of female committee members and chairs were observed (3.2%, p=0.005 and 5.9%, p=0.03). For scientific presentations, female participation was the majority in all domains - 50.0% of oral, 56.2% of quickshot presentation moderators were female; 76.6% of oral, 74.4% of quickshot presentation presenters were female; 75.0% of oral, 75.2% of quickshot, and 70.6% poster presentation first authors were female; and 69.5% of oral, 67.0% of quickshot, and 60.2% poster presentation last authors were female in the study period. Significant annual increases in the proportion of female involvement were noted in oral presentation moderators (8.1%, p=0.0009) and quickshot first authors (4.5%, p=0.002), with

no statistically significant annual changes in other categories. Females were also the majority of pre-meeting course moderators (52.2%), sunrise workshop moderators (53.5%), general session invited speakers (52.5%), and general session moderators (52.7%). Females represented 42.2% of keynote speakers.

Conclusions: Although women surgeons remain a minority at most surgical conferences, females have represented the majority of participants in committees, scientific presentations, courses, and workshops at the ASBrS annual meeting over the past 10 years. However, leadership positions, such as board of director membership, committee chairs, and keynote speakers, still lag in gender equity. Regardless of whether female breast surgeon engagement is driven by patient preference or surgeon initiative, gender diversity should continue to be encouraged, not only in breast surgery, but also in all surgical specialties.

Figure: Proportion of female participants, 2009-2019



769595 - The Diminishing Impact of Margin Width on Local Recurrence Rates Following Breast-conserving Therapy for Early-stage Invasive Cancer: A Meta-analysis

Chirag Shah[1], Brian Hobbs[2], Frank Vicini[3], Zahraa Al-Hilli[2], Bindu Manyam[4], Vivek Verma[4], Xuefei Jia[2], Neal Goldstein[5], Abram Recht[6]

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Background/Objective: The optimal tumor-free margin width for patients treated with breast-conserving surgery and radiation therapy for early-stage invasive cancers has been controversial. However, there are limited data as to how improvements over time in surgical technique, pathologic assessment, radiation therapy, and systemic therapy may have influenced the importance of margin width. We performed an updated meta-analysis with additional studies and patients to re-evaluate the impact of margin width on local recurrence (LR) rates as well as to evaluate how the impact of margin width on LR has changed over time.

Methods: We included 38 studies with 54,502 patients treated from 1968-2010; inclusion criteria included patients undergoing breast-conserving therapy with a minimum follow-up of 50 months, with pathologic definition of margin status and LR data. These studies reported LR in 119 patient cohorts divided into 1 of 9 margin groups: positive (n=26), >0-1 mm (n=7), >0-2 mm (n=17), >0-5 mm (n=8), <5 mm (n=5), >0 mm (n=14), >2 mm (n=13), >5 mm (n=10), and unknown (n=19). A Bayesian logistic regression model evaluated the risk of LR in relation to both margin status and enrollment periods. Statistical estimation reports risk of LR rates by posterior median and 95% highest posterior density (HPD) interval. Each study was assigned as contributing a specific year (the midpoint).

Results: Median follow up was 7.25 years. The table presents the posterior median risk of LR with 95% HPD interval. Absolute LR rates decreased over time for each margin width group with maximum differences of a few percent between groups for the most recent enrollment period. However, relative rates of increase in LR between different margin groups remained stable over time. For example, the relative increase when comparing the group defined as no tumor on ink (>0 mm) to the group with margin width >5 mm was 1.62, 1.68, 1.67, and 1.67 for the 4 enrollment periods, respectively; for >0-1 mm as compared to >0-2 mm, the relative increase for each enrollment period were 1.19, 1.19, 1.21, and 1.19, respectively; and the relative increase for >0-1 mm compared to >0-5 mm groups was 1.19, 1.19, 1.21, and 1.19, respectively.

Conclusions: With an additional 22,000 patients and 6 studies compared to the previous meta-analysis, these findings support the 2016 SSO and ASTRO consensus guidelines of “no tumor on ink” as being sufficient for the majority of patients seen today; additionally, this updated meta-analysis further addresses concerns regarding previous studies that demonstrated a LR benefit with wider margins by demonstrating the impact in margin width over time. Although achieving adequate margins is still important in the management of patients, the absolute impact of margin width on LR rates has declined substantially over time, with very small differences between the narrowest and widest margin groups - and even positive and unknown margins - for the most recent enrollment period. Hence, older studies appear to have limited value to inform current management guidelines. Finally, the data presented demonstrates consistent relative rates of LR between margin widths over time allowing for extrapolation between studies using various margin widths.

Table: Risk of local recurrence estimated over time and margin interval

				Risk of local recurrence (95% highest posterior density interval)		
Margin Interval (mm)	# studies	# patients	1980	1990	2000	2005
Positive	26	3072	15.9 (12.7, 19.3)	10.1 (8.3, 12.0)	6.2 (4.7, 7.9)	5.1 (3.6, 6.7)
>0-1	7	608	12.1 (4.3, 20.5)	7.5 (2.7, 13.1)	4.6 (1.5, 8.3)	3.7 (1.1, 6.9)
>0-2	17	2144	10.2 (6.6, 14.3)	6.3 (4.2, 8.6)	3.8 (2.4, 5.3)	3.1 (1.9, 4.4)
>0-5	8	2321	10.2 (7.1,13.9)	6.3 (4.7, 8.0)	3.8 (2.9, 4.8)	3.1 (2.0.3, 4)
<=5	5	1123	7.3 (0.0, 27.4)	4.5 (0.0, 18.1)	2.7 (0.0, 11.6)	2.2 (0.0, 9.6)
>0	14	11749	6.8 (5.0, 8.8)	4.2 (3.0, 5.3)	2.5 (1.7, 3.4)	2.0 (1.3, 2.9)
>2	13	10563	6.7 (2.9, 11.4)	4.1 (1.8, 6.9)	2.4 (1.0, 4.3)	2.0 (0.8, 3.5)
>5	10	18345	4.2 (1.6, 7.4)	2.5 (1.0, 4.3)	1.5 (0.6, 2.6)	1.2 (0.5, 2.1)
Unknown	19	4147	13.3 (10.5, 16.3)	8.3 (6.5, 10.2)	5.1 (3.6, 6.7)	4.1 (2.8, 5.8)

788184 – Pre-operative Marking of Sentinel Nodes with Superparamagnetic Iron Oxide (SPIO) Nanoparticles May Allow for Accurate Delayed Sentinel Lymph Node Biopsy in Patients with a Pre-operative Diagnosis of DCIS. The SentiNot Study

Andreas Karakatsanis[1], Lida Pistioli[2], Roger Olofsson Bagge[3], Ava Kwong[4], Guyla Nagy[5], Staffan Eriksson[6], Fredrik Wärnberg[7]

[1]Department for Surgical Sciences, Faculty of Medicine, Uppsala University and Section for Breast Surgery, Uppsala University Hospital, Uppsala, Uppsala Lan, Sweden, [2]3Institute of Clinical Sciences - Sahlgrenska Academy,University of Gothenburg, Gothenburg, Sweden, [3]Sahlgrenska Academy / Sahlgrenska University Hospital, Gothenburg, Sweden, [4]The University of Hong Kong, Queen Mary and Tung Wah Hospital and The University of Hong Kong-ShenZhen Hospital, Hong Kong, Hong Kong, [5]Linköping University Hospital, Linköping, Sweden, [6]Västmanlands Hospital and Västerås Center for Clinical Research, Uppsala University, Västerås, Sweden, [7]Uppsala University, Uppsala, Sweden

Background/Objective: SPIO is a Sentinel Lymph Node Biopsy (SLNB) tracer that may reside in the tissue for several weeks after injection. The SentiNot 1.0 study seeks to capitalize on this property to avoid upfront SLN dissection (SLND) in women with DCIS. A published interim analysis of the study has already demonstrated feasibility of the "delayed SLND" using SPIO. We herein present final results.

Methods: Patients with DCIS grade 2 and size >20mm, any DCIS grade 3, mass-forming DCIS planned-for breast-conserving therapy (BCT), and any DCIS planned-for mastectomy (Mx) were

included. SPIO was injected interstitially at the primary operation. If invasive cancer was found in the specimen, a "delayed" SLNB was performed in another session, with the additional use of isotope and blue dye. We examine how many unnecessary SLNDs are avoided, SLN detection rates at reoperation, and concordance between SPIO and isotope.

Results: In 230 patients (mean age 60 years, mean DCIS size 37 mm, Mx in 34.5%), invasive cancer was found in 58 (25.2%) at final pathology. Age, size, nuclear grade, mass-forming lesion, and mastectomy were not associated with upgrade to invasive cancer. Seven patients had microinvasive cancer, and delayed SLN was not performed. SLND was performed in 51 patients at a median of 28 days after the first operation. SPIO outperformed detection Tc in detection as sole tracer (92 vs 51%, $p<0.001$) and with blue dye (98 vs 51, $p<0.001$). The results were similar when comparing per type of breast operation (Mx vs BCT), with 94 vs 33% ($p=0.003$) after Mx and 100 vs 58% ($p<0.001$) after BCT. The addition of BD enhanced SPIO detection rate by 6% (92 to 98%, $p=0.25$). SPIO retrieved more SLNs (1.6 vs 1, $p=0.002$), whereas only 47% of SLNs retrieved were detected by both SPIO and Tc. The concordance was 66% after BCT and 22% after Mx. In this patient cohort, 78.2% of patients were spared upfront SLND, avoiding potential morbidity. Moreover, incremental costs were reduced by an average of 996 Euro (or ca 24%, $p=0.002$) for patients who would have otherwise undergone unnecessary upfront SLND.

Conclusions: Marking the SLN with SPIO seems to be an efficient technique to avoid upfront SLND for patients with a preoperative diagnosis of DCIS where SLND would be otherwise considered. The addition of blue dye may be of value for successful detection until the surgeon becomes familiar with the technique. The low nodal concordance between SPIO and Tc may imply that, when a tracer is injected after a diagnostic excision, the lymphatic outflow is disturbed, possibly resulting in a SLND with lower detection rate and higher risk for false negatives. The SentiNot study is currently redesigned and recruiting from more centers in Europe, Asia, and the USA, with an aim to investigate these differences in detection rates and SLND accuracy, especially in the setting of mastectomy for DCIS. Hopefully, this may provide a reliable technique to avoid overtreatment in patients with DCIS.

787690 - Phone-call and Linkage-to-care-based Intervention Increases Mammography Uptake Among Primary Care Patients at an Urban Safety-net Hospital

Asha Nanda[1], Melissa Mann[2], Carmella Cooper[2], Melinda Frederick[2], An-Lin Cheng[1], Jill Moormeier[1], Nasim Ahmadiyeh[1]

[1]University of Missouri Kansas City School of Medicine, Kansas City, MO, [2]Truman Medical Centers, Kansas City, MO

Background/Objective: Our urban safety-net hospital (SNH) has very low mammography compliance within its primary care clinics. Only 42% of women aged 50 or older get mammograms at least once every 2 years. Despite our Commission on Cancer (CoC) accreditation, we still see nearly 3 times more Stage III and IV breast cancer patients at diagnosis than other CoC sites across the country. A multiple regression analysis looking at the socio-demographic-biologic factors associated with late-stage breast cancer at our SNH confirmed that lack of screening mammography within 2 years prior to diagnosis was the most significant factor ($p<0.0001$, OR 7.3, CI= 3.4, 15.8) associated with late-stage at diagnosis. Meta-analyses show

phone-based reminders and linkage-to-care increase mammography among low-income women by 8.9% (Gardner MP, et al. *PLoS One.* 2013;8(2):e55574). We sought to determine the effect of this intervention in an urban-safety net population.

Methods: Twenty percent of women aged 50 and older who were overdue for biennial mammograms and who were established within 1 of 5 primary care clinics at an urban SNH were randomized to the intervention group (n=440), and 20% were randomized to usual care control group (n=440). A nurse navigator (RN), medical assistant (MA), or mammography technologist called each patient in the intervention group and offered to schedule a mammogram at time of phone call. A total of 3 attempts were made to contact patients; voicemail was left for patients and was considered a contact. Primary outcome measured was mammography completion 3 months after first phone call. Secondary outcome measures were how many patients were successfully contacted, whether appointments made at time of phone call increased compliance, whether effectiveness of intervention was dependent on who made the phone call, and whether there were any differences across the 5 clinics represented.

Results: Patients receiving the phone-call based and linkage to care intervention were significantly more likely to get mammograms within 3 months than those in the usual care control group (17% and 6%, respectively; chi2 = 27.597, $p < 0.0001$). There were 82.8% of patients who were either spoken with or had voicemails left for them, with the others having non-working numbers. There were 32.9% who made appointments for mammograms, of which 47.1% kept those appointments. Of patients who were successfully contacted, those who made an appointment at time of phone call were significantly more likely to get their mammograms within 3 months than those who did not make an appointment (chi2 95, $p < 0.001$). Finally, mammography compliance did not differ by clinic or by the person who made the phone call.

Conclusions: Phone-call with linkage-to-care-based interventions are effective in increasing mammography uptake among primary care clinic patients in an urban safety-net setting and may be applicable to other urban safety-net hospitals around the country. This intervention could be integrated into the flow of clinic operations within primary care by use of medical assistants. If equally effective once fully integrated, we can expect our mammography uptake rate at our SNH primary care clinics to increase by ~ 11% (from 42% to about 53%). This still falls short of the national average of 73% or the Healthy People 2020 goal of 81%. Safety-net patients themselves likely hold the key to better understanding what would increase mammography uptake among the safety-net population. Future studies will use a community-based participatory research approach to design more effective interventions tailored to this population with unique needs.

788207 - Cosmetic Outcomes Following Breast Conservation Surgery and Radiation for Multiple Ipsilateral Breast Cancer: Data from the Alliance Z11102 Study

Kari Rosenkranz[1], Karla Ballman[2], Linda McCall[3], Colleen McCarthy[4], Armando Giuliano[5], Kimberly Van Zee[4], Kelly Hunt[6], Judy Boughey[7]

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Background/Objective: With improved imaging modalities, the diagnosis of multiple synchronous breast cancers (multiple ipsilateral breast cancer - MIBC) is rising. Historically, the primary treatment for MIBC has been mastectomy due both to concerns about in-breast recurrence risk and poor cosmetic outcomes in women requiring larger volume or multiple sites of excision. The Alliance Z11102 study prospectively assessed patient and surgeon perceptions of cosmesis in women with MIBC treated with breast-conserving therapy (BCT).

Methods: The study was a multicenter trial enrolling women with 2 or 3 separate sites of biopsy-proven malignancy separated by >2 cm within 1 breast. Cosmetic outcome was a planned secondary endpoint of the trial. Surgeon perception of cosmesis was assessed at 30 days post-operatively. Patients were administered surveys post-operatively at the following time points: 30 days, 6 months, 12 months, 18 months, 24 months, 36 months, 48 months and 60 months. Surveys assessed cosmesis on a 4-point Likert scale with 1 representing excellent cosmesis, 2 good, 3 fair, and 4 poor, as well as the Breast Q, a validated assessment tool, to measure patient satisfaction. All patients undergoing successful breast-conserving therapy were treated with whole-breast radiation. Associations were assessed with chi-square or Fisher's exact tests as appropriate.

Results: Of 270 women enrolled, 54 were excluded due to ineligibility or conversion to mastectomy. Cosmetic outcome data is available on the 216 eligible women who completed breast conservation. Thirty days post-operatively, surgeons were more likely to rate cosmetic outcome good or excellent compared to patients: 95.2% versus 86.8% ($p = 0.001$ by Fisher exact testing), respectively. Two years post operatively, of the 136 patients who completed the survey, 76.6% felt the result was good or excellent, while 3.7% felt the result was poor. We found no significant differences in patient-reported cosmetic outcomes when stratifying by patient age, number of lesions (2 or 3), number of incisions, number of lumpectomies, or size of largest area of disease. Median satisfaction score on the Breast Q was 76.3 post-operatively with slight decrease to 73.7 by 3 years after surgery (Table). The most common reports of adverse effects of radiation were noted on the 6 months post-surgery survey with improvement at later intervals.

Conclusions: BCT performed in women with MIBC results in good or excellent cosmesis for the majority of women, similar to that seen in unifocal disease treated with BCT. Patients should be cautioned that the breast appearance may change with time, and perceptions of cosmesis may decline in the months or years following treatment. Over time, the adverse effects of radiation lessen, and patient physical well-being improves. Support: U10CA180821, U10CA180882; ClinicalTrials.gov Identifier: NCT01556243

Table: Assessment of cosmetic outcome over time

	5-30 days post-surgery (N=216)	6 months post-WBI* (N=205)	12 months post-WBI (N=199)	18 months post-WBI (N=196)	24 months post-WBI (N=194)	36 months post-WBI (N=165)	48 months post-WBI (N=93)	60 months post-WBI (N=44)
Patient Breast Cosmesis Score								
Excellent	89 (51.7%)	49 (32.5%)	43 (30.1%)	46 (33.1%)	44 (32.4%)	37 (36.6%)	20 (38.5%)	4 (21.1%)
Good	60 (34.9%)	71 (47.0%)	64 (44.8%)	64 (46.0%)	52 (38.2%)	34 (33.7%)	17 (32.7%)	10 (52.6%)
Fair	21 (12.2%)	28 (18.5%)	30 (21.0%)	24 (17.3%)	35 (25.7%)	23 (22.8%)	13 (25.0%)	5 (26.3%)
Poor	2 (1.2%)	3 (2.0%)	6 (4.2%)	5 (3.6%)	5 (3.7%)	7 (6.9%)	2 (3.8%)	0 (0.0%)
Missing or Not Done	42	54	56	57	58	64	41	25
Surgeon Breast Cosmesis Score								
Excellent	104 (54.7%)							
Good	76 (40.0%)							
Fair	10 (5.3%)							
Poor	0 (0.0%)							
Missing or Not Done	26							
BreastQ Score: Satisfaction with Breast								
N	175	159	148	143	143	101	54	17
Mean (SD)	76.3 (18.2)	77.2 (19.0)	75.7 (17.5)	76.1 (18.9)	74.9 (17.2)	73.7 (20.1)	77.0 (17.5)	71.1 (12.7)
BreastQ Score: Adverse Effects of Radiation								
N	61	158	149	140	142	97	54	17
Mean (SD)	95.7 (13.3)	86.1 (16.8)	88.7 (15.5)	91.1 (14.6)	92.4 (11.9)	91.1 (13.1)	93.9 (11.6)	94.3 (10.1)
BreastQ Score: Physical Well-Being								
N	171	158	147	142	142	99	54	17
Mean (SD)	58.6 (23.1)	67.6 (28.2)	73.2 (27.4)	75.4 (27.9)	77.7 (25.5)	77.7 (27.0)	80.4 (25.5)	72.8 (30.7)

Quickshots

Saturday, May 23, 2020 2:40 pm–3:40 pm
Moderators: Oluwadamilola Fayanju, MD; Brigid Killelea, MD

787554 - Population Trends in Lobular Carcinoma of the Breast: The Ontario Experience

Lisa Findlay-Shirras[1], Isac Lima[2], Glenys Smith[2], Mark Clemons[3], John Hilton[3], Angel Arnaout[4]

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Background/Objective: Lobular breast cancer is less common that ductal carcinoma, and can be more difficult to diagnose by both physical examination and mammography. Previous studies have shown a general increase in lobular breast cancer rates over the 1980s-1990s; however, this was during a time when the use of combined hormone replacement therapy (CHRT) – a known risk factor for breast cancer – was significantly increased. As CHRT use has declined since the mid-2000s, this study endeavored to evaluate current trends in the incidence of invasive lobular carcinoma (ILC) in women diagnosed with breast cancer, and to describe the 5-, 10-, and 15-year survival probabilities for women diagnosed with ILC in Ontario.

Methods: This retrospective cohort analysis included all women aged 18 and older diagnosed with breast cancer between January 1991 and December 2015. Health administrative data from the institution and the Ontario Cancer Registry was used to identify all breast cancer cases. Age-adjusted incidence rates were plotted by year of diagnosis and adjusted to the 2011 female Ontario population. Crude proportions were plotted by year of diagnosis for stage and hormone receptor status. Kaplan-Meier Survival curves were generated to determine the 5-, 10-, 15-year survival probabilities for ILC and invasive ductal carcinoma (IDC).

Results: From 1991 to 2015, there were 194,065 cases of breast cancer in Ontario, Canada, including 28,561 cases (14.7%) of ILC. In 1991, ILC comprised 10.7% of breast cancer cases, compared to 15.9% in 2015. The age-adjusted incidence rate of breast cancer increased 1.04-fold from 1991 to 2015 (168/100,000 to 175/100,000). In comparison, ILC incidence rates increased 1.53-fold (86/1000 to 132/1000), and rates increased across all age groups. All cases of bilateral breast cancer diagnosed from 2010 to 2015 in Ontario were of lobular origin. The proportion of Stage 1 ILC decreased (39% to 34%) from 2007 to 2015, while the proportion of Stage 2-4 ILC increased (34.8 to 38.9%; 14.6 to 16.3%; 3.9 to 5.7%). The 5-, 10-, and 15-year survival probabilities for women diagnosed with ILC from 1991 to 2010 were 82.7% (95% CI 82.2-83.2), 65.3% (95% CI 64.6-66.0), and 50.2% (95% CI 49.4-51.1) respectively.

Conclusions: This study contains the largest population dataset of lobular breast cancer evaluated to date. While total breast cancer incidence rates in Ontario have remained largely unchanged between 1991 and 2015, invasive lobular carcinoma incidence rates continue to increase steadily. When stratifying by stage at diagnosis, there appears to be a general trend towards the diagnosis of ILC at later stages of disease. These trends highlight the ongoing diagnostic and treatment challenge ILC presents for clinicians today.

788193 - Single Hormone Receptor-Positive Breast Cancers Have Distinct Characteristics and Survival

Christine Dauphine, Rowan Chlebowski, Ashkan Moazzez, Jasmin Neal, Junko Ozao-Choy
Harbor-UCLA Medical Center, Torrance, CA

Background/Objective: Estrogen (ER) and progesterone (PR) receptor status is routinely used in conjunction with that of the human epidermal growth factor 2 (HER2) receptor to group patients with invasive breast cancer into prognostic subtypes. Often, ER-positive (ER+) and PR-positive (PR+) are considered nonspecifically as "hormone receptor-positive" even if only one value is positive. Prior studies of single hormone receptor-positive breast cancer (ER+PR- and ER-PR+) report conflicting results with respect to survival outcomes. This study aims to evaluate and characterize ER+PR- and ER-PR+ breast cancer subtypes in a national database.

Methods: Data for female patients with invasive breast cancer were analyzed from a Participant User File of the National Cancer Database (NCDB) from 2010 to 2015. HER2-negative cases were grouped into ER+PR+, ER-PR+, ER+PR-, and ER-PR- subtypes to determine differences in age at diagnosis, race, tumor grade, lymph-vascular invasion (LVI), cancer stage, pattern of metastatic disease, multigene assay results, and overall survival.

Results: A total of 826,599 cases were available after excluding HER2+ cases (n=140,331; 14.5%). Of these, 619,050 (74.9%) were ER+PR+; 79,777 (9.7%) ER+PR-; 7,006 (0.8%) ER-PR+; and 118,136 (14.3%) ER-PR-. Data were not available for 2,630 (0.3%), and these were excluded from further analysis. Cumulative survival according to stage demonstrated worse outcomes for the ER+PR- subtype than in ER+PR+ cases ($p<0.001$), but did not differentiate ER-PR+ from ER-PR- cancers.

Conclusions: Single hormone receptor-positive breast cancer subtypes (ER+PR- and ER-PR+) are more likely to be high grade, have higher multigene assay scores, present with Stage IV disease, and have worse survival than the ER+PR+ subtype, with the ER-PR+ subtype having more similar outcomes to ER-PR- cancers. Representing 10% of HER2-negative breast cancer, single hormone receptor-positive subtypes should be considered distinct from ER+PR+ disease, and PR-negative status should be taken into consideration when making decisions regarding adjuvant systemic therapy in ER-positive breast cancer.

Table: Comparison of characteristics associated with hormone receptor subtypes

Factor	ER+PR+	ER+PR-	ER-PR+	ER-PR-
Age at diagnosis (y, median)	63	64	58	59
Non-hispanic white race	81.8%	77.8%	69.5%	68.7%
Black Race	8.9%	13.3%	21.0%	21.5%
Grade - poorly differentiated	15.0%	31.6%	73.9%	74.0%
Lymph-vascular invasion	17.9%	19.6%	23.0%	23.6%
Stage I at diagnosis	59.2%	51.2%	42.5%	42.0%
Stage IV at diagnosis	3.6%	5.9%	6.7%	5.5%
Oncotype DX® Score (median)	15	25	35	45
Overall Survival	90.6%	83.8%	78.1%	78.7%

787716 - Value of Predictive Models for Nodal Eradication of Disease in Patients with Node-Positive Breast Cancer Treated with Neoadjuvant Chemotherapy Varies by Tumor Biology

John Davis[1], Tanya Hoskin[2], Coutney Day[2], Abigail Caudle[3], Mara Piltin[2], Judy Boughey[2]
[1]Mayo Clinic, Tempe, AZ, [2]Mayo Clinic, Rochester, MN, [3]MD Anderson Cancer Center, Houston, TX

Background/Objective: Several trials have suggested that patients who convert to pathologically node-negative (ypN0) disease with neoadjuvant chemotherapy (NAC) could potentially forego axillary lymph node dissection (ALND) in place of sentinel lymph node (SLN) biopsy. Many nomograms have been developed to predict axillary response to NAC in patients with cN+ disease that could assist in surgical decision-making. Our goal is to compare the performance of 3 such published nomograms that used available clinical variables to assess performance and clinical utility.

Methods: With IRB approval, patients with cT1-T4, cN1-N3 breast cancer who underwent surgical treatment with axillary staging after NAC at our institution from 2008-2019 were reviewed. Patient with distant metastasis or prior history of breast cancer were excluded. Predicted probability of ypN0 status was estimated using all 3 published nomograms. All models included cT category, grade, ER, PR, and HER2 status, while model 1 added age, histology, and cN category, model 2 added multifocal/multicentric disease and number of pre-treatment sonographically suspicious nodes (<4 vs ≥4), and model 3 was model 2 plus histology without the number of suspicious nodes. The area under the curve (AUC) was estimated and compared across models. Calibration was assessed by comparing observed versus predicted probabilities of ypN0 status.

Results: A total of 581 patients (median age 50) met study inclusion criteria, 253 (43.5%) were ypN0, and 328 (56.5%) were ypN+. Biologic subtype distribution was 268 (46.1%) ER+/HER2-, 190 (32.7%) HER2+, and 123 (21.2%) ER-/HER2-; ypN0 status varied substantially by subtype and was 23.9% for ER+/HER2-, 68.9% for HER2+, and 47.2% for ER-/HER2-. Overall, the 3 predictive nomograms had very similar AUC values ranging from 0.761-0.769 ($p=0.80$) (Table). There were differences with respect to calibration, however; the predicted probability from model 1 (mean 0.349) was significantly lower ($p<0.001$) than the actual probability of ypN0 status in the cohort (0.435), while model 2 and 3 predicted probabilities (mean 0.423 and 0.417) were similar to the actual probability. At a predicted probability threshold of 50%, model 1 did better at assigning a probability of ypN0 status <50% to ypN+ patients (294/328=89.6%) compared to models 2 and 3 (251/328=76.5%), $p<0.001$. Models 2 and 3 each identified 157/253 (62.1%) ypN0 patients as having ≥50% probability of negative nodes, whereas model 1 identified only 103/253 (40.7%), $p<0.001$. Assessing model performance separately by biologic subtype, AUCs were similar for the 3 models. Using ≥50% predicted probability, model 2 identified 107/131 (81.7%) of HER2+ and 45/58 (77.6%) ER-/HER2- patients with ypN0 status, while model 1 identified 78/131 (59.5%) and 25/58 (43.1%), respectively. For the 64 ER+/HER2- patients with ypN0 status, none of the models identified them well at the ≥50% threshold (specificity 0-9.4%).

Conclusions: The 3 models to predict nodal response to NAC all performed well with respect to discrimination, demonstrating their clinical utility to select patients likely to benefit from SLN surgery, especially patients with ER-/HER2- or HER2+ disease. At a 50% threshold, model 2 and 3 had better specificity than model 1; however, model 1 had better sensitivity, but none of the models performed well for ER+/HER2- patients.

Table: Performance of predictive models overall and separately by tumor biology

		Performance at nominal threshold of ≥50% predicted probability *y*pN0	
	AUC (95% CI)	**Sensitivity[1]**	**Specificity[2]**
Entire cohort			
Model 1	0.761 (0.722, 0.800)	89.6	40.7
Model 2	0.768 (0.730, 0.807)	76.5	62.1
Model 3	0.769 (0.731, 0.807)	76.5	62.1
ER+/HER2-			
Model 1	0.669 (0.592, 0.746)	100	0
Model 2	0.702 (0.632, 0.771)	96.6	7.8
Model 3	0.704 (0.636, 0.772)	96.1	9.4
HER2+			
Model 1	0.655 (0.572, 0.739)	66.1	59.5
Model 2	0.636 (0.549, 0.723)	39.0	81.7
Model 3	0.652 (0.566, 0.738)	37.3	81.7
ER-/HER2-			
Model 1	0.659 (0.563, 0.755)	78.5	43.1
Model 2	0.678 (0.584, 0.772)	47.7	77.6
Model 3	0.664 (0.568, 0.759)	50.8	75.9

[1]Sensitivity defined as the percent of ypN+ patients with predicted probability of negative nodes < than threshold.
[2]Specificity defined as the percent of ypN0 patients with predicted probability of negative nodes ≥ than threshold.

788223 - Factors Associated with Pathologic Node Negativity in Inflammatory Breast Cancer: Are There Patients Who May Be Candidates for Sentinel Lymph Node Biopsy or Targeted Axillary Dissection?

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Background/Objective: Axillary lymph node dissection is the standard of care for patients undergoing surgery for inflammatory breast cancer (IBC). While axillary staging with sentinel lymph node biopsy (SLNB) and targeted axillary dissection (TAD) after neoadjuvant chemotherapy (NAC) in clinically node-positive breast cancer has been increasingly adopted, the impact of these techniques in IBC patients with similar nodal burden is not well understood. A pilot study of SLNB in IBC patients showed low rates of axillary drainage of tracer agents, which may complicate de-escalating nodal surgery in IBC. To inform patient selection for further

study of SLNB or TAD in IBC, we aimed to describe the frequency of pathologic node negativity (ypN0) and factors associated with pathologic nodal status in this patient population.

Methods: An institutional prospective clinical database of patients with IBC (2006-2019) was queried to identify patients who received NAC followed by modified radical mastectomy (MRM) and postmastectomy radiation. Patient demographics, clinicopathologic features, tumor subtype, and nodal status were collected and reviewed. Patients with ypN0 were compared to those who had pathologically positive nodes. Factors associated with pathologic nodal status were assessed by logistic regression analysis.

Results: During the study period, 452 patients, all women, met the inclusion criteria. The mean age was 51 +/- 12 years. Thirty-four percent of patients (n=152) had an axillary pCR (ypN0). Prior to the receipt of NAC, 20 patients (4%) were clinically N0 (cN1: n=171, 38%; cN2: n=38, 8%; cN3: n=200, 44%; unknown: n=23, 5%). Of the 20 cN0 patients, 45% were found to be pathologically node-negative at the time of axillary dissection (n=9). After NAC, 147 (32%) were clinically N0 (ycN1: n=154, 34%; ycN2: n=3, 1%; ycN3: n=46, 10%; unknown: n=102, 23%). For patients who were ycN0, 46% (n=67) were ypN0. Univariate binary logistic regression analysis was conducted to identify preoperative factors associated with pathologic nodal positivity. Higher ycN-stage, HER2 negativity, hormone receptor (HR) positivity, and decreased nuclear grade were associated with nodal positivity (Table). BMI, age, and presence of distant metastases were not associated with ypN status. Increasing ycN-stage, HER2, and HR status persisted on multivariable analysis as factors independently associated with pathologic node positivity (Table).

Conclusions: One-third of patients with IBC who received NAC followed by MRM had pathologically negative axillary lymph nodes. Factors associated with ypN0 status included clinically node-negative status after NAC, HR-negative, and HER2-positive subtypes. Identification of patients in these subgroups of IBC may potentially avoid axillary dissection after NAC. Large, prospective TAD studies are needed to investigate the feasibility of alternative nodal evaluation strategies specifically in IBC, where successful axillary lymphatic mapping is less likely.

Table: Factors associated with pathologic node positivity in inflammatory breast cancer treated with neoadjuvant chemotherapy and modified radical mastectomy

a. Univariate Binary Logistic Regression to Assess Factors Associated with Pathologic Node Positivity			
Variable	*Odds ratio*	*95% Confidence Interval*	*p-value*
Body mass index	0.98	0.96-1.02	0.42
Age	1.01	0.99-1.03	0.15
ycNodal stage			
N0 (reference)			
N1	1.69	1.06-2.70	**0.03**
N2/3	3.27	1.52-7.03	**0.002**
Distant metastasis	1.27	0.78-2.06	0.34
HR positive	3.00	2.00-4.50	**<0.001**
Her2 positive	0.33	0.22-0.50	**<0.001**
Triple negative	1.22	0.77-1.93	0.40
Tumor subtype			
Triple negative (reference)			
HR+/Her2+	1.10	0.59-2.06	0.77
HR-/Her2+	0.22	0.22-0.39	**<0.001**
HR+/Her2-	1.76	1.01-3.06	**0.046**
Nuclear grade			
2 (reference)			
3	0.54	0.33-0.89	**0.02**
b. Multivariable Binary Logistic Regression to Assess Factors Associated with Pathologic Node Positivity			
Variable	*Odds ratio*	*95% Confidence Interval*	*p-value*
ycNodal stage			
N0 (reference)			
N1	1.81	1.07-3.04	**0.03**
N2/3	4.24	1.80-10.02	**0.001**
Nuclear grade			0.40
2 (reference)			
3	0.78	0.43-1.40	
Tumor subtype			
Triple negative (reference)			
HR+/Her2+	1.66	0.77-3.57	0.19
HR-/Her2+	0.29	0.15-0.58	**0.001**
HR+/Her2-	2.14	1.11-4.12	**0.02**

yc: clinical post-neoadjuvant chemotherapy, HR- hormone receptor (estrogen and/or progesterone recepto

787548 - Lymphedema Prevention Surgery: Improved Operating Efficiency Over Time

Kristina Shaffer, Cagri Cakmakoglu, Graham Schwarz, Ayat Elsherif, Zahraa Al-Hilli, Risal Djohan, Diane Radford, Steven Grobmyer, Steven Bernard, Andrea Moreira, Alicia Fanning, Chao Tu, Stephanie Valente
Cleveland Clinic, Cleveland, OH

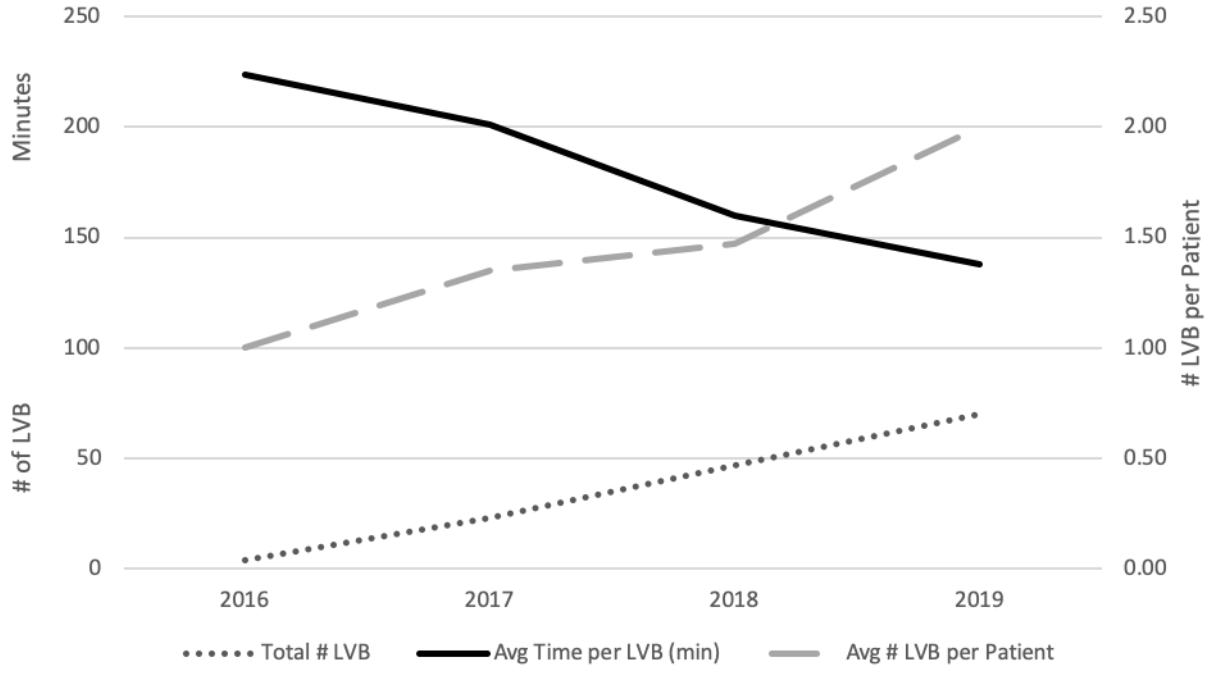
Background/Objective: Breast cancer (BC) patients with locally advanced axillary disease requiring lymph node dissection are at increased risk of developing lymphedema. Lymphedema-prevention surgery (LPS) is a technique to identify and restore lymphatic flow via microscopic anastomosis of 1 or more lymphaticovenous bypasses (LVB). Early studies have shown that LPS decreases lymphedema. However, as with the implementation of any new operating technique, there is required additional operating room (OR) time and coordination. This study sought to evaluate the improvement of LPS technique and OR duration over time.

Methods: An IRB-approved prospective database of all patients at our institution who underwent LPS for BC from 2016-2019 was queried. LPS was performed by 5 breast surgeons and 4 reconstructive surgeons during this time. Data collected included type of breast and reconstruction surgery performed, number of LVB completed per patient and OR estimate times for each procedure. LPS details and time were compared for each surgical/reconstructive group and by year. Pearson tests were used to determine the trend in OR durations over time.

Results: From 2016 to 2019, 94 patients underwent LPS for BC at our institution, and 88 had complete OR time data available for analysis. The average patient age was 51 years and BMI 28, with an average of 15 lymph nodes removed. Treatment groups consisted of LPS plus mastectomy with prosthetic reconstruction 56% (49), oncoplastic reduction with lumpectomy 10% (9), and lumpectomy without reconstruction 34% (30). The number of LPS performed increased from 4 patients in 2016 to 35 in 2019. During this time, the average number of lymphatic anastomoses performed per patient (# of LVB per patient) doubled from 1 to 2 (Table). In those patients without reconstruction, the average time for LPS improved significantly from 211 to 86 minutes from 2016 to 2019 ($p=0.015$) and similarly in patients undergoing LPS with prosthetic reconstruction from 238 to 153 minutes ($p=0.023$).

Conclusions: Axillary reverse mapping with lymphaticovenous bypass is an important and emerging surgical technique to prevent lymphedema. It does require additional surgical time, but our results show that with surgeon improvement and refinement of technique, over 4 years, we were able to efficiently perform double the number of LVB per patient in half the OR time.

Figure: Trend in # of LVB and time per LVB by year



787161 - How Effective Is Neoadjuvant Endocrine Therapy (NET) in Downstaging the Axilla and Achieving Breast-conserving Surgery (BCS)?

Giacomo Montagna, Monica Morrow, Melissa Pilewskie
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Background/Objective: NET has been shown to be effective in downstaging large operable or locally advanced ER-positive breast cancers (BC) and increasing rates of BCS, but data regarding nodal pCR is sparse. We sought to compare nodal and breast downstaging with NET.

Methods: Consecutive patients with Stage I-III breast cancer treated with NET who underwent breast and axillary surgery from 5/2008 to 9/2019 were identified from a prospective database. BCS-eligibility was prospectively determined by the treating surgeon. We studied rates of nodal pCR and rates of conversion from BCS ineligibility to BCS eligibility. Patients were treated with 1 or more of the following drugs: tamoxifen, letrozole, anastrozole, and fulvestrant. Thirty patients were enrolled on 2 randomized controlled trials (RCT) testing a PI3K inhibitor (taselisib) and a non-steroidal antiandrogen (enzalutamide) in combination with letrozole and fulvestrant, respectively. Three of the 16 patients enrolled in the fulvestrant +/- enzalutamide trial were premenopausal and were given concomitant GnRH analogue. Descriptive statistics were used to describe rates of BCS conversion and nodal pCR.

Results: Eighty-nine patients (91 cancers) were included. Sixty-four (73%) patients received a single drug, 7 (8%) received 2 drugs, and 3 (3%) received 3 drugs. Since the letrozole +/- taselisib trial was double-blind, the randomization arm for the 14 (16%) patients enrolled is unknown. Clinicopathological features are shown in the Table. Nodal pCR was achieved in 12%

(4/34) of patients with biopsy-proven nodal disease, while no patients achieved breast pCR. Forty percent (20/50) of the initially cN0 patients were found to be nodal-positive on final pathology. Altogether, 39 (43%) were BCS ineligible pre-NET due to unfavorable tumor-to-breast ratio (UTBR), 23 (59%) were non-BCS candidates, and 16 (41%) were borderline candidates. Of non-BCS candidates, 11 of 23 (48%) became BCS eligible, and 10 of 11 (91%) underwent BCS with a success rate (defined as BCS as the final surgical procedure) of 100%. Of borderline BCS candidates, 14 of 16 (88%) became BCS eligible, of whom 13 (93%) underwent BCS with 92% success rate.

Conclusions: Although nodal pCR is more frequent than breast pCR, NET is more likely to be successful in de-escalating breast surgery than axillary surgery if rules developed for neoadjuvant chemotherapy (NAC) are applied to N+ patients, and nodal pCR is required to avoid axillary lymph node dissection. However, with a nodal pCR rate of 12%, NET remains an option for downstaging cN+ patients not eligible for NAC.

Table: Clinicopathological features

Clinicopathological features	Overall n = 91	Downstaged to BCT n = 25	Nodal pCR n = 4
Age at diagnosis, years median (range)	67 (42 – 93)	68 (50 - 88)	70.5 (65 – 88)
Clinical T at presentation			
T1	18 (20%)	-	2 (50%)
T2	50 (55%)	17 (68%)	2 (50%)
T3	13 (14%)	8 (32%)	-
T4	9 (10%)	-	-
TX	1 (1%)	-	-
Clinical tumor size, cm Median (range)	3.5 (occult – 12)	4 (2 – 8)	2.5 (1 – 3.5)
Clinical N at presentation			
cN0	50 (55%)	16 (64%)	-
cN+	41 (45%)	9 (36%)	4 (100%)
Histology			
Ductal	51 (56%)	11 (44%)	3 (75%)
Lobular and mixed	37 (41%)	14 (56%)	-
Other	3 (3%)		1 (25%)
Receptor status			
ER	91 (100%)	25 (100%)	4 (100%)
PR	79 (87%)	21 (84%)	4 (100%)
HER2	3 (3%)	-	-
Nuclear grade			
G1	7 (8%)	1 (4%)	-
G2	69 (76%)	21 (84%)	4 (100%)
G3	15 (16%)	3 (12%)	-
Length of treatment, days Median (range)	110 (27 – 1187)	182 (84 -1187)	167.5 (72 - 326)

787902 - Critical Examination of a Single Institution Outcome: Do African American Women with TNBC Have a Better Overall and Recurrence-Free Survival Compared to the National Standard?

Caroline Schreeder, Christopher Gallagher, Marc Boisvert, Renee Thibodeau
Georgetown University, Washington, DC

Background/Objective: African American (AA) women have been documented to have worse outcomes after breast cancer. The goal of the study was to describe the outcomes of US women treated for triple-negative breast cancer (TNBC) in this group, compared with a national cohort.

Methods: A single-institution breast cancer registry was queried for all TNBC patients from 1997-2017. The Surveillance, Epidemiology, and End Results Program (SEER) database was reviewed for women with TNBC from 2010-2016. Overall survival and recurrence-free survival curves were generated. A direct comparison was then made between the African American patients treated at the single institution and in the SEER database.

Results: A total of 571 women with TNBC were identified in the institutional cohort from 2004-2017. Query of the SEER database revealed 45,511 women with TNBC from 2010-2016. Eighty-nine percent of the single- institution population identified as African American versus 20% in the SEER database. The SEER database cohort had more women with earlier-stage disease and more patients diagnosed at age 39 or younger and diagnosed at age 69 and older. The institutional cohort was more likely to receive radiation (64% vs 46%) and chemotherapy (81% vs 72%) when compared the SEER cohort ($p < 0.01$). Median follow-up was 58 months in the institutional cohort versus 35 months in the SEER database. Ten-year recurrence free survival was 83%, and overall survival was 61% in the institutional cohort. Comparison of overall survival curves using Log-Rank, Wilcoxon, and -2Log(LR) tests revealed no statistically significant difference between the groups. Between the institutional cohort of African American women and that same group of the SEER database, the differences in stage and age were no longer evident. Overall survival was not significantly different in patients with Stage I and II disease. However, on 1 of the 3 tests (-2Log(LR)) performed for survival analysis, the institutional African American patients with Stage III and IV disease had significantly improved survival. The institutional cohort of African American patients was more likely to receive chemotherapy (80% vs 76%; $p<0.01$) and radiation (65% vs 49%; $p=0.03$).

Conclusions: There are few descriptive analyses that demonstrate survival curves with a predominantly African American population. The single-institution TNBC patients presented at a later stage fared better in overall survival as compared to the SEER group, possibly due to more aggressive delivery of chemotherapy and radiation. Interpretation of SEER chemotherapy and radiation rates are limited, and significant discrepancies exists between the SEER and Medicare/Medicaid data. Further investigation is warranted to examine how breast cancer specialists can maintain equivalent outcomes among disadvantaged populations.

787570 - Effect of Age in Patients Undergoing Radiation Therapy After Mastectomy for Breast Cancer

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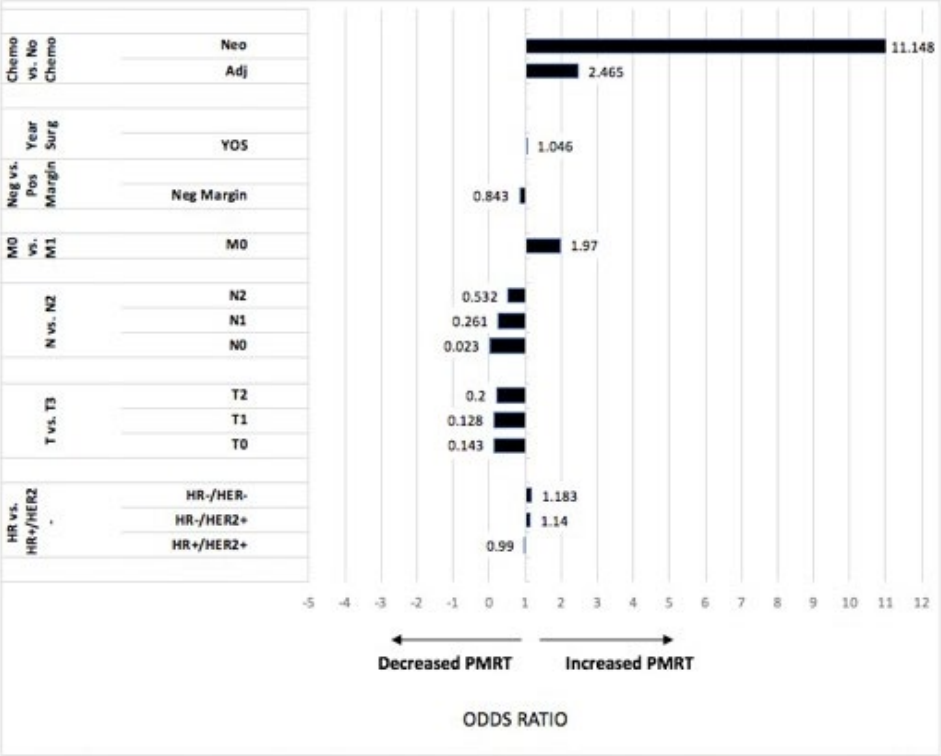
Background/Objective: Post-mastectomy radiation therapy (PMRT) reduces locoregional recurrence (LRR) and improves overall survival in patients with breast cancer. Traditional indications for PMRT have included patients with tumors ≥5 cm, ≥4 positive axillary nodes, and close/positive margins. More recently, indications for PMRT and regional nodal irradiation (RNI) have evolved to include factors that pose an increased risk of LRR, including younger age. The objective of this study was to evaluate the use of PMRT based on age.

Methods: Our tumor registry was queried for patients with breast cancer who had a mastectomy from 2010-2018. We included women >18 years, +/- PMRT, +/- RNI (def: radiation to the axilla or supraclavicular nodes), with known stage, hormone receptors, margins, and chemotherapy use. We excluded males and those with missing radiation and clinicopathological data. Univariable and multivariable models, controlling for clinicopathological factors and year of surgery, were used to estimate association of age with PMRT +/- RNI. Subgroup analyses of patients with RNI (all ages) or PMRT <50 years, was performed using multivariable logistic regression models to estimate association of PMRT and/or RNI with hormone status (HS), stage, use of chemotherapy, and year of surgery (YOS).

Results: Of the 4303 registry patients, 2607 met criteria. The median age was 56 years (IQR 47-67); 888 (34%) were < 50 years, and 43% (1111) of all patients who underwent PMRT. For patients <50 years, 451 (50.8%) received PMRT, compared to 660 (38.4%) ≥50 years. On univariate analysis, patients <50 years were 66% more likely to have PMRT than patients ≥50 years (p<.0001, OR 1.66 CI 1.41-1.95). Age was not a predictor for RNI (n=708; p=0.245). On multivariable analysis, patients <50 years were 29% more likely to have PMRT compared to ≥ 50 years (p=0.042, OR 1.29 CI 1.01-1.64). Multivariable analysis of RNI patients showed increased use of RNI with neoadjuvant chemotherapy (NAC) (p<.0001, OR 4.26 CI 2.02-8.95), adjuvant chemotherapy (AC) (p<.000 OR 4.88 CI 2.43-9.80), and later YOS (p=0.009, OR 1.15 CI 1.04-1.28). RNI use was decreased for lower TN stage (T1/T2 vs T3; N1vs N2) (p<.004), and not associated with HS (p=07). For patients <50 years with PMRT, multivariant analysis showed that use of PMRT was increased for patients with NAC (p<.0001, OR 11.1 CI 6.3-19.7) or AC (p=.001, OR 2.5 CI 1.4-4.3). PMRT use was decreased for lower TN stage (T0/T1/T2 vs T3; N0/N1 vs N2) (p<.0002). HS did not impact use of PMRT in patients <50 years (p=0.90) (Figure).

Conclusions: Patients <50 years who underwent a mastectomy for breast cancer were more likely to receive PMRT but not RNI when compared to patients >50 years. For patients <50, the use of PMRT was increased with chemotherapy, and decreased for smaller tumors with lower nodal burden. Age <50 years impacts treatment indications for PMRT outside of traditional guidelines.

Figure: Risk factors for use of PMRT in patients <50 years undergoing mastectomy for breast cancer



844525 - Nipple-sparing Mastectomy Versus Skin-Sparing Mastectomy: Short- and Long-term Patient Satisfaction Results

Bridget Kelly, Jenna Korotkin, Barbara Smith, Heather Faulkner, Michelle Specht, Michele Gadd, Kevin Hughes, T. Salewa Oseni, Amy Colwell, Suzanne Coopey
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Background/Objective: Nipple-sparing mastectomy (NSM) is an oncologically safe alternative to skin-sparing mastectomy (SSM), and an increasing number of women undergoing mastectomy are opting to save their nipples. We evaluated whether NSM patients were more satisfied with their post-operative appearance than SSM patients in short and long-term follow-up.

Methods: Women who underwent NSM or SSM between 2009-2018 at 2 institutions within 1 health care system were eligible for completion of the BREAST-Q Postoperative Scale survey. Surveys were administered at regularly scheduled follow-up appointments and/or emailed to eligible patients between May 2019-January 2020. Patient age at time of surgery, reconstruction type, BMI, menopausal status, diabetes, hypertension, and smoking status, indication for surgery, prior radiation, post-operative complications, and receipt of chemotherapy, radiation, and endocrine therapy were collected and compared for NSM and SSM patients who completed the survey between 1-5 years and 6-10 years after their original breast reconstructive surgery. Patients with distant and local recurrences were excluded from this study.

Results: A total of 352 women completed the BREAST-Q Postoperative Scale survey: 231 patients had NSM, and 121 patients had SSM. Median age at time of surgery was 46 years (range 26-73) for NSM patients and 53 years (range 19-72) for SSM patients ($p<0.001$). There were 71.9% of NSM patients and 61.2% of SSM patients who underwent bilateral procedures ($p=0.041$). SSM patients had significantly more co-morbidities than NSM patients, such as higher BMI, diabetes, and hypertension. However, oncologic treatments were similar between groups (Table). Implant-based reconstruction was the most common reconstruction type in both groups, but the SSM group underwent significantly more autologous flap reconstructions. SSM patients had significantly more unplanned procedures for complications and/or cosmesis than NSM patients. BREAST-Q Physical Well-Being, Satisfaction with Breasts, and Effects of Radiation scores were similar between groups for both 1-5 years and 6-10 years follow-up. Sexual Well-Being scores were significantly higher for NSM patients than SSM patients ($p=0.008$). Psychosocial Well-Being scores were also significantly higher for NSM patients than SSM patients in the 1-5-year group, but not overall between NSM and SSM patients ($p=0.031$; $p=0.166$, respectively). Interestingly, when asked "Would you choose the same operation again?" and "Would you advise other women to get this operation?", NSM patients had significantly higher responses than SSM patients ($p=0.002$; $p<0.001$, respectively).

Conclusions: NSM patients 1-5 years out from surgery had significantly higher sexual well-being scores and psychosocial well-being scores than SSM patients. However, we found that these trends did not persist in the cohort of patients who were farther out from surgery. Future studies focusing on which patient factors impact long-term satisfaction with nipple sparing could inform decision aids for patients and providers for shared decision-making.

Table: Patient characteristics and survey results

	NSM n=231	SSM n=121	p-value
Age (median, years)	46	53	<0.001
BMI (kg/m^2)	24.48	27.71	<0.001
Time since surgery n (%)			
1-5 years	140 (60.6%)	50 (41.3%)	<0.001
6-10 years	91 (39.4)	71 (58.7%)	<0.001
Menopause status			
Pre- or Peri-	149 (64.5%)	60 (49.6%)	0.007
Post-	82 (35.5%)	61 (50.4%)	
Current smoker	8 (3.5%)	5 (4.1%)	0.752
Diabetes	3 (1.3%)	6 (5.0%)	0.039
Hypertension	23 (10.0%)	25 (20.7%)	0.005
Prior Conditions			
Prior breast surgery	84 (36.4%)	42 (34.7%)	0.759
Prior breast cancer	26 (11.3%)	19 (15.7%)	0.235
Prior radiation	21 (9.1%)	12 (9.9%)	0.801
Indication			
Invasive carcinoma ± DCIS	156 (67.5%)	89 (73.6%)	0.023
DCIS ± microinvasion	44 (19.1%)	27 (22.3%)	
Prophylactic	31 (13.4%)	5 (4.1%)	
Laterality			
Bilateral	166 (71.9%)	74 (61.2%)	0.041
Unilateral	65 (28.1%)	47 (38.8%)	
Treatment			
Radiation therapy	53 (22.9%)	34 (28.1%)	0.287
Neoadjuvant Chemotherapy	31 (13.4%)	18 (14.9%)	0.708
Adjuvant Chemotherapy	82 (35.5%)	44 (36.4%)	0.872
Endocrine therapy	142 (61.5%)	86 (71.1%)	0.073
Reconstruction Type			
Autologous Flap	6 (2.6%)	16 (13.2%)	<0.001
Tissue Expander	59 (25.5%)	44 (36.4%)	
Implant	166 (71.9%)	61 (50.4%)	
Unplanned Surgeries	67 (29.0%)	48 (39.7%)	0.043
BREAST-Q Scores mean (N)			
Psychosocial Well-Being			
All	76.3 (229)	73.34 (121)	0.166
1-5 years	76.1 (138)	69.66 (50)	0.031
6-10 years	76.6 (91)	75.93 (71)	0.828
Sexual Well-Being			
All	56.2 (218)	49.25 (110)	0.008
1-5 years	55.7 0(134)	45.61 (46)	0.010
6-10 years	57.0 (84)	51.88 (64)	0.174
Satisfaction with Breasts			
All	64.6 (222)	60.96 (114)	0.104
1-5 years	65.0 (135)	60.77 (47)	0.194
6-10 years	64.0 (87)	61.10 (67)	0.367
Physical Well-Being: Chest			
All	21.2 (224)	19.9 (119)	0.519
1-5 years	21.6 (136)	20.7 (49)	0.785
6-10 years	20.7 (88)	19.3 (70)	0.625
Effects of Radiation			
All	19.8 (48)	20.9 (34)	0.809
1-5 years	17.5 (28)	17.5 (10)	1.000
6-10 years	22.9 (20)	22.4 (24)	0.932

DCIS= Ductal carcinoma in-situ

Virtual Posters

Clinical Trials

787578 - Cost Superiority of MarginProbe to Current Standard of Care: A Nationwide Assessment

Richard Gilmore, Robert Dembinski, Mehran Habibi, Yannis Reissis, Khalil Shehadeh, Marissa White
Johns Hopkins University School of Medicine, Baltimore, MD

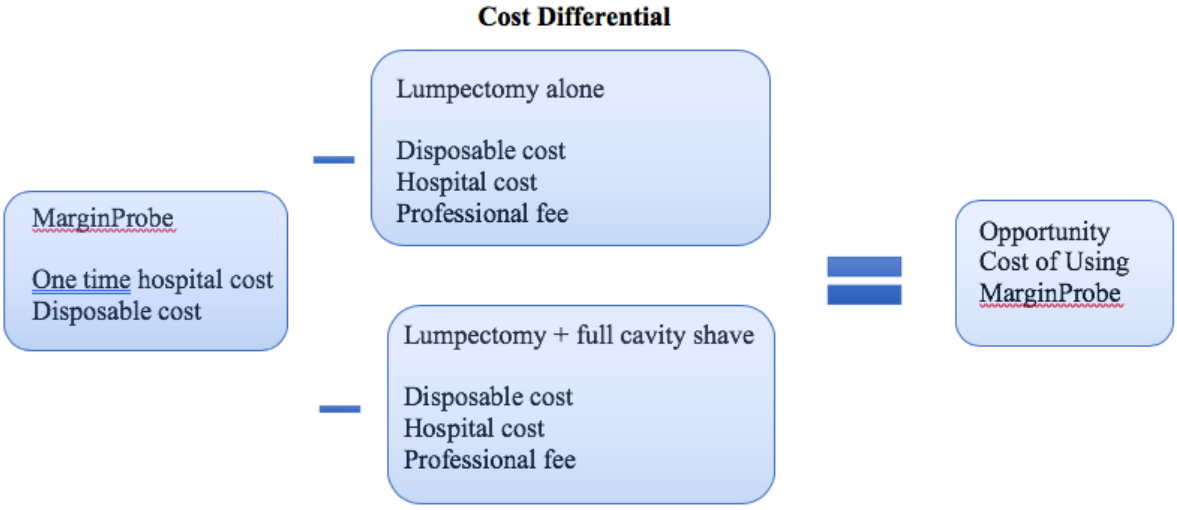
Background/Objective: About 1 in 5 patients will have to go back to the operating room for a re-excision. Historically, one way that breast surgeons have dealt with this issue is simply to take additional margins in all directions at the time of surgery. Some have shown that re-operation rates are lower if additional cavity margins are taken during the initial surgery, leading to a lower risk of recurrence. This "full-cavity shave" technique has been shown to decrease re-excision rates by up to 50%. However, the downside of this approach is that the greater volume of tissue removed may affect the cosmetic outcome. MarginProbe (Dune Medical Devices, Paoli, PA, USA) is a hand-held intraoperative device used to identify positive margins intraoperatively, such that the surgeon can perform immediate additional shaves to obtain negative margins, negating the need for a subsequent operation. It uses radiofrequency spectroscopy to differentiate tumor cells from normal breast tissue. Prospective randomized controlled trials have shown that MarginProbe decreases re-excision rates by greater than 50%, and some have even shown rates as high as 62%. The device has also maintained excellent cosmetic outcomes as reported by patients and surgeons. Assuming that MarginProbe is able to decrease the rate of re-excision by 50% or greater, utilization of this device as compared to a full cavity shave approach may result in less re-excisions overall and improved cosmetic outcome.

Methods: The MarginProbe cost superiority study is a multicenter, prospective, observational trial for breast cancer patients undergoing: 1) lumpectomy with the use of MarginProbe, 2) lumpectomy alone, or 3) lumpectomy with full cavity shave.

Results: Patients undergoing lumpectomy for breast cancer.

Conclusions: To determine whether MarginProbe is cost superior to current standards of care, including lumpectomy alone and/or lumpectomy with full cavity shave.

Figure: MarginProbe cost differential diagram



788292 - De-escalating Radiotherapy with MammaPrint

Mehran Habibi, Robert Dembinski
Johns Hopkins University School of Medicine, Baltimore, MD

Background/Objective: There is an increased awareness of potential overtreatment in the management of breast cancer patients, especially in subgroups with low-risk disease. Although radiotherapy is associated with more favorable outcomes with regards to local recurrence, recent data suggest the benefits associated with radiotherapy are not equivalent across all subgroups, and the benefits of radiotherapy in terms of survival is limited to the groups with high risk of local recurrence. However, there is currently insufficient evidence to support de-escalation of radiotherapy in subgroups of patients with a favorable prognosis.

Methods: During the initial consultation visit and/or visit following successful breast-conserving surgery, eligible patients will be approached by a study team member to inform and educate them about this trial. After providing informed consent, the MammaPrint assay will be run on the patient's tumor sample. Patients deemed low risk by MammaPrint will be enrolled in the study. All patients will receive systemic therapy at the discretion of their medical oncologist. The patients assigned to the control arm will receive radiotherapy based on institutional standard protocols. The patients in the de-escalation arm will forgo radiotherapy but will receive systemic therapy at the discretion of their medical oncologist. All patients will be followed for 5 years with standard laboratory and imaging to monitor disease progression. Quality of life will be assessed. We will also assess acceptability of omission of radiotherapy in the investigational arm in a group of enrolled patients and clinicians. We will study the percentage of the patients willing to have the MammaPrint test to be done for them and also their choice of XRT or de-escalation after the results share with them. With the similar fashion, we would study the willingness of the clinician to offer the study to the patients and their recommendation behavior after the test result is reported. Study participation will end if there is evidence of locoregional or distant recurrence, failure to comply with the trial treatment plan, or patient withdrawal of consent.

Results: Postmenopausal female patients <75 years of age with histologically confirmed ER+ early-stage breast cancer who are undergoing breast-conserving surgery (i.e., lumpectomy) will be recruited to participate. Recruitment will occur at the Johns Hopkins Hospital and affiliated hospitals, and we can potentially open the study to other centers.

Conclusions: The primary objective is to evaluate the risk of locoregional recurrence at 5 years. Secondary objectives: a. To evaluate disease-free survival at 5 years in the enrolled participants. b. To measure overall survival at 5 years in the enrolled participants. c. To measure rate of salvage therapy in the enrolled participants. Other objectives: a. Acceptability of omission of radiotherapy in patients. b. Acceptability of omission of radiotherapy in clinicians (surgical, medical, and radiation oncologists). c. Quality of life in enrolled patients.

788305 - Investigating the Microbiome of Breast Cancer

Mehran Habibi, Robert Dembinski
Johns Hopkins University School of Medicine, Baltimore, MD

Background/Objective: Recent studies have shown that the breast tissue is host to a diverse and unique microbial community, yet relatively little is known about the connection between the microbiome and breast cancer. Accumulating data suggest a link between microbiome composition and clinical outcomes and therapeutic response in cancer patients. The primary objective of this research is to identify microbiome signatures correlated with clinical phenotypes and response to treatment in patients with breast cancer receiving neoadjuvant chemotherapy and surgical treatment.

Methods: Fifty female patients with aggressive breast cancer receiving neoadjuvant chemotherapy will be identified and enrolled. Only treatment-naïve patients with no past history of cancer and without use of antibiotics or systemic steroids in the previous 3 months will be included. The skin and gut microbiome of these patients will be examined before chemotherapy, after chemotherapy, and after surgery. The breast microbiome will be sampled at the time of surgery. In addition to microbiome analysis, blood will be collected from patients to evaluate cytokines, and circulating tumor cells. These 2 measures have been found to strongly influence tumor development and disease-free survival. The protocol for this study has been approved by an Institutional Review Board.

Results: Inclusion Criteria: Women between the ages of 18-100, with Stage I/II breast cancers: ER+/PR+, triple-positive, triple-negative, and lobular carcinoma; ten healthy controls (breast reduction patients). Exclusion Criteria: Men, patients with Stage III or higher breast cancer.

Conclusions: 1. Determine the microbiome composition of skin, gut, and breast in breast cancer patients (n=50) receiving neoadjuvant chemotherapy and surgery, before and after therapy. 2. Evaluate the association between microbiome composition (skin, gut, and breast) and clinical phenotypes and therapeutic response in breast cancer patients receiving neoadjuvant chemotherapy and surgery.

785859 - KEYNOTE-756: A Randomized, Double-blind, Phase 3 Study of Pembrolizumab or Placebo with Neoadjuvant Chemotherapy and Adjuvant Endocrine Therapy for High-Risk, Early-Stage, ER+/HER2− Breast Cancer

Kim Hirshfield[1], Fatima Cardoso[2], Aditya Bardia[3], Fabrice Andre[4], David Cescon[5], Heather McArthur[6], Melinda Telli[7], Sherene Loi[8], Javier Cortes[9], Peter Schmid[10], Nadia Harbeck[11], Carsten Denkert[12], Christian Jackisch[13], Liyi Jia[1], Vassiliki Karantza[1]

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Background/Objective: A high-risk subpopulation of ER+/HER2− breast cancer (BC) is characterized by high-grade tumors, decreased sensitivity to endocrine therapy (ET), higher responsiveness to chemotherapy (CT), and worse prognosis. Prior studies suggest that increased pathologic complete response (pCR) rates after neoadjuvant CT may have a substantial impact for patients with high-risk, early-stage, HR+/HER2− BC. KEYNOTE-756 (ClinicalTrials.gov, NCT03725059) is a global, randomized, double-blind, phase 3 study of pembrolizumab (vs placebo) + CT as neoadjuvant treatment followed by pembrolizumab (vs placebo) + ET as adjuvant treatment for patients with high-risk, early-stage, ER+/HER2− BC.

Methods: Patients will be stratified by lymph node involvement (positive vs negative), tumor PD-L1 status (positive [CPS ≥1] vs negative [CPS <1]), ER positivity (ER+ ≥10% vs ER+ <10%), and anthracycline dosing schedule (every 3 weeks [Q3W] vs Q2W), then randomized 1:1 to neoadjuvant treatment with pembrolizumab 200 mg Q3W or placebo combined with paclitaxel (80 mg/m2 Q1W) for 4 cycles followed by doxorubicin (60 mg/m2) or epirubicin (100 mg/m2), each with cyclophosphamide (600 mg/m2) Q2/3W for 4 cycles. After definitive surgery (± radiation therapy, as indicated), patients will receive adjuvant treatment of pembrolizumab (200 mg Q3W) or placebo for 9 more cycles combined with ET, which can be given for up to 10 years. Adjuvant ET and radiotherapy are administered per local standard of care. No crossover between treatment cohorts is allowed.

Results: Adult patients with cT1c-T2 (tumor ≥2 cm) cN1-cN2 or T3-T4 cN0-cN2, grade 3, invasive, ductal ER+/HER2− BC.

Conclusions: Dual primary endpoints are pCR rate (ypT0/Tis ypN0) and event-free survival (EFS). Secondary endpoints include ypT0/Tis and ypT0 ypN0 pCR rates in all patients and all 3 pCR definitions in those with PD-L1+ tumors, EFS in patients with PD-L1+ tumors, overall survival, safety, and health-related quality of life.

787943 - A Large-scale Multicenter Phase II Study Evaluating the Protective Effect of a Tissue Selective Estrogen Complex (TSEC) in Women with Newly Diagnosed Ductal Carcinoma In Situ (DCIS)

Swati Kulkarni[1], Geoffrey Greene[2], Thea Tlsty[3], Luis Blanco[1], Judy Garber[4], Al George[1], Alfred Rademaker[1], Seema Khan[1], Nora Hansen[1], Kevin Bethke[1], Rebecca Aft[5], Julia Tchou[6]

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Background/Objective: TSECs were developed to treat menopausal symptoms after progesterone-containing hormone replacement therapy was found to significantly increase the risk of invasive breast cancer (IBC). The first of this class of agents combines conjugated estrogens (CE), a collection of steroidal estrogens that collectively have both estrogen receptor (ERα) agonistic and antagonistic activity, and bazedoxifene (BZA), a third-generation selective estrogen receptor modulator that does not stimulate the mammary gland or endometrium. The FDA approved CE/BZA for treatment of menopausal symptoms and osteoporosis after 5 randomized placebo-controlled trials demonstrated the safety, efficacy, and tolerability of CE/BZA in postmenopausal women. Since then, a substantial body of evidence has emerged suggesting that CE/BZA may have additional therapeutic benefits. It is widely accepted that progression to IBC occurs through both epithelial and stromal mechanisms. Recent in vitro and in vivo data provide support that CE/BZA prevents progression to IBC through its effects on both epithelium and stroma. In epithelial cells, CE/BZA antagonizes estrogen-induced proliferation and expression of markers of ERα activity and also degrades ERα protein. In the stroma, CE/BZA increases expression of the scavenger receptor CD36 and consequently, reduces expression of extracellular matrix proteins (ECM) and pro-inflammatory cytokines that have been shown to contribute to the development of pro-tumorigenic microenvironment. Based on this data, we hypothesized that CE/BZA will have an anti-tumorigenic effect in the breast. Our ultimate objective is to provide postmenopausal women diagnosed with DCIS a novel and safe therapeutic option to prevent progression to IBC.

Methods: We are currently conducting a multicenter randomized placebo-controlled window of opportunity trial with CE/BZA in post-menopausal women with DCIS, a non-obligate precursor to IBC. The duration of intervention is 28 ± 7 days prior to surgical resection to enable comparison of CE/BZA on the breast using diagnostic core biopsy and surgical sample.

Results: Post-menopausal women between 18-79 years of age diagnosed with ER (+) DCIS (>1cm on imaging) undergoing surgery are eligible. Women must not be on current hormonal therapy, have a current or past diagnosis of IBC, other ER sensitive tumors or have recurrent DCIS.

Conclusions: Aim 1: To assess epithelial contributions by determining if a short intervention of CE/BZA will have antagonistic activity in breast epithelium of postmenopausal women with ER + DCIS. Aim 2: To assess stromal contributions by determining if a short intervention of CE/BZA will alter expression of stromal markers of progression in breast tissue of

postmenopausal women with ER + DCIS. Aim 3: To determine if a short intervention of CE/BZA is well tolerated and safe in postmenopausal women with ER + DCIS.

788236 - The PREDICT Registry: A Prospective Registry Study to Evaluate the Effect of the DCISionRT Test on Treatment Decisions in Patients with DCIS Following Breast-conserving Therapy

Steven Shivers[1], Pat Whitworth[2], Rakesh Patel[3], Troy Bremer[1], Charles Cox[4]
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Background/Objective: The benefits of adjuvant radiation therapy (RT) in patients with ductal carcinoma in situ (DCIS) treated with breast-conserving surgery (BCS) remains controversial. Although there is level I evidence supporting the role of RT in reducing the risk of local recurrence, the incremental absolute benefit is variable. Current treatment guidelines generally recommend RT for all patients having BCS. When considered in the context of the economic, health-related, and quality-of-life costs associated with RT, it is critical to identify patients who are at low enough risk to consider foregoing RT. It is important to develop prognostic tools to better assess risk and understand the impact such a tool would have on treatment decisions. The DCISionRT™ Test (PreludeDx, Laguna Hills, CA) is a biologic signature that provides a validated score for assessing 10-year risk of recurrence and RT benefit using individual tumor biology in conjunction with clinical and pathologic risk factors.

Methods: This is a prospective cohort study for patients diagnosed with DCIS of the breast. Treating physicians complete a treatment recommendation survey before and after receiving DCISionRT test results. Test results, treatment recommendations, patient preferences and clinicopathologic features are stored in a de-identified registry for future analysis of data across participating institutions from a variety of geographic regions in the US. The study will also collect 5- and 10-year recurrence and survival data.

Results: The study includes females over the age of 25 who are candidates for BCS and eligible for RT and/or systemic treatment with sufficient tissue to generate test results. Subjects must not have been previously treated for DCIS or have previous or current invasive or micro-invasive breast cancer.

Conclusions: The primary objective of this study is to create a de-identified database of patients, test results, treatment decisions and outcomes that can be queried to determine the clinical utility of the DCISionRT Test in actual clinical use for the management of DCIS. The primary endpoints are changes in treatment recommendations for surgical, radiation, and hormonal therapy after the physician and patient have reviewed the DCISionRT test results, including subgroup analysis by physician type (surgeon, radiation oncologist or tumor board). Secondary endpoints are identification of the key drivers for treatment recommendations, including age, size, grade, architecture, necrosis, palpability, presentation, hormone receptor status, race, ethnicity, family history, etc.

787246 - The FLEX Real-World Data Platform: Investigator-initiated Protocols Study Gene Expression and Neoadjuvant Therapy in Early-stage Breast Cancer

Pat Whitworth[1], Mehran Habibi[2], Ian Grady[3], Thomas Lomis[4], Jennifer Crozier[5], Gordan Srkalovic[6], Adam Brufsky[7], Charles Cox[8], Nina D'Abreo[9], Sarah Untch[10], Erin Yoder[10], Heather Kling[10], William Audeh[10], Bastiaan van der Baan[10]

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Background/Objective: Genomic signatures are revolutionizing the definition, identification, and treatment of breast cancer. To precisely stratify breast cancers into actionable subgroups, full genome (FG) expression data and matching clinical data must be aggregated into a large, real-world dataset. Such a dataset will accelerate research and discovery, especially for smaller patient subsets that are not as widely represented within the current body of literature. MammaPrint and BluePrint are used in the neoadjuvant setting as well as the clinical trial setting, such as I-SPY 2 and NBRST.

Methods: FLEX is a multicenter, prospective, population-based observational platform trial for patients with Stage I, II, and III breast cancer. All patients with Stage I to III breast cancer who receive MammaPrint (MP), with or without BluePrint (BP) on a primary breast tumor are eligible for enrollment. Patients will be followed from diagnosis through 10 years of follow-up. The FLEX collaborative platform allows participating investigators the opportunity to author their own sub-study protocols, as approved by the FLEX Review Committee of their peers. Sub-studies are added as appendices to the baseline protocol. Fourteen sub-studies have already been identified and approved (Table). Two of those sub-studies focus on gene expression and neoadjuvant therapy. The first investigates genomic reclassification of large tumors in patients eligible to receive neoadjuvant therapy (Whitworth). The second is a protocol examining the gene expression profiles of patients receiving short-course endocrine therapy prior to surgery (Habibi).

Results: The study will enroll a minimum of 10,000 patients aged ≥18 years with histologically proven invasive Stage I, II, or III breast cancer. Patients enrolled in the initial study are also eligible for inclusion in sub-studies for which they meet all criteria and additional consent is not required.

Conclusions: The study's primary aim is to create a large scale, population-based registry of full genome expression data matched with clinical data to investigate new gene associations with prognostic and/or predictive value in a real-world setting. Secondary objectives include utilizing the shared study infrastructure to examine and generate hypotheses for targeted subset analyses and/or trials based on full genome expression data.

Table: FLEX investigator-initiated sub-studies

PI	INSTITUTION	TYPE	ADDITIONAL CONSENT	ARM(S)	DESCRIPTION
Mehran Habibi	Johns Hopkins	Local Substudy	Yes	Neoadjuvant	Comprehensive gene expression profiling of breast cancer in patients receiving short-course endocrine therapy prior to surgery
Mehran Habibi	Johns Hopkins	Local Substudy	Yes	All	Correlation of the microbiome with breast cancer gene expression
Mehran Habibi	Johns Hopkins	Local Substudy	Yes	All	Determine if radio-therapy can be safely de-escalated in patients with genomically low-risk breast cancer after breast-conserving surgery.
Thomas Lomis	Valley Breast Clinic	Collaborative group substudy	Yes	Neoadjuvant	Complementary data collection for patients participating in the ODM-201 trial. FLEX will provide gene expression profiling for exploratory and signature discovery purposes
Ian Grady	North Valley Breast Care	Substudy	No	All	Impact of genomic risk classification on travel time to receive breast cancer care: a QOL study
Pat Whitworth	Nashville Breast Center	Substudy	No	Neoadjuvant	Genomic reclassification of large tumors in patients eligible to receive neoadjuvant therapy
Adam Brufsky	University of Pittsburgh Medical Center	Substudy	No	Neoadjuvant, adjuvant	Response to standard chemotherapy regimens in clinically ER+/PR+/HER2+ (triple positive) patients according to BluePrint molecular subtypes
Adam Brufsky	University of Pittsburgh Medical Center	Substudy	No	All	Expression signatures by response to bisphosphonates in ER+ patients receiving adjuvant therapy (SOC option), or for osteoporosis after primary treatment
Adam Brufsky	University of Pittsburgh Medical Center	Substudy	No	All	Gene expression in breast cancer patients with obesity
Jennifer A. Crozier	Baptist MD Anderson Cancer Center	Substudy	No	All	MP and BP in male breast cancer
Jennifer A. Crozier	Baptist MD Anderson Cancer Center	Substudy	No	All	MP and BP evaluation in breast cancer patients ≥70
Jennifer A. Crozier	Baptist MD Anderson Cancer Center	Substudy	No	All	FG evaluation in invasive lobular carcinoma
Jennifer A. Crozier	Baptist MD Anderson Cancer Center	Substudy	No	All	MP and BP relation to clinical PR positivity
Jennifer A. Crozier	Baptist MD Anderson Cancer Center	Substudy	No	All	MP and BP relation to clinical Ki67 score
Jennifer A. Crozier	Baptist MD Anderson Cancer Center	Substudy	No	All	MP and BP in metaplastic breast cancer

Age Extremes

788226 - MammaPrint and BluePrint as Prognostic Indicators for Elderly Patients with Early-stage Breast Cancer

Peter Blumencranz[1], Mehran Habibi[2], Lisa Blumencranz[3], Andrea Menicucci[3], William Audeh[3], Erin Yoder[3], Steve Shivers[4], Geza Acs[5], Charles Cox[4]

[1]Morton Plant Hospital, Clearwater, FL, [2]Johns Hopkins Medicine, Baltimore, MD, [3]Agendia, Irvine, CA, [4]University of South Florida, Tampa, FL, [5]Florida Hospital Tampa, Tampa, FL

Background/Objective: Evidence regarding treatment options and outcomes in elderly patients is lacking and prognostic multigene assays have not been comprehensively studied in this population. A recent study in patients 65-89 years old with an Oncotype DX recurrence score >=26 concluded that gene expression profile testing on tumors should only be used for patients aged 65-74 with no/low to moderate comorbidities and not for patients >=75. In the current study, the 70-gene signature MammaPrint (MP) and 80-gene molecular subtyping signature BluePrint (BP) were evaluated in both the neoadjuvant and adjuvant settings. In the neoadjuvant setting, MP/BP were evaluated as prognostic factors to predict pathological complete response (pCR) and nodal downstaging in patients >=70. In an adjuvant cohort, we assessed the addition of MP to the SSO Choosing Wisely guidelines to predict lymph node (LN) positivity as well as recurrence risk and survival in elderly patients.

Methods: This analysis included 517 early-stage breast cancer patients with 0-3 positive LN who enrolled in the community-based cohort study (COPPER) from 2009-2016. Patients were treated following standard of care. Patients were divided into age at diagnosis groups: <65, 65-74, and >74. We also reviewed 211 breast cancer patients classified as cT2-4N0-3M0 (T2 >3.5cm if N0) who received neoadjuvant chemotherapy and enrolled in the Multi-Institutional Neoadjuvant Therapy MammaPrint Project (MINT) study from 2011-2016. LN involvement was established following neoadjuvant treatment. The SSO clinical rule was applied (clinical low risk patients are grade1, cT1mi-T1c or grade2, cT1mi-T1b) in patients >=70 years old. Genomic risk and molecular subtype were determined by MP and BP respectively.

Results: From the COPPER cohort, 67% of MP high-risk (HR) patients 65-74 years old received chemotherapy (CT), and 5 had events (distant metastases), while 80% of low-risk (LR) patients omitted CT and had 1 event (Table). Of patients >74 years, 30% were MP HR and received CT with no metastasis events. There were 73% of patients who were MP LR, did not receive CT, and had 2 events. There was no significant difference in OS or DMFS between age groups. Of note, MP provided better separation in OS (p=0.053) and DMFS (p=0.067) at age 65. From the MINT study, 16 patients were >=70 years old; 15 of these were clinical high risk, and 10 were LN-positive (Table). There was a high degree of concordance (86%) between MP and the SSO clinical rule in identifying high-risk patients. pCR was achieved in 43% of concordant clinical and MP high-risk patients and in the clinical low-risk patient who had a MP HR result. Furthermore, nodal downstaging was reported in 80% of LN-positive patients who were both clinical and MP HR, of whom 63% (5/8) achieved pCR. Importantly, MP was associated with nodal downstaging, and the rate of downstaging was correlated with pCR by BluePrint subtype in both young and elderly patients.

Conclusions: MP HR patients >=65 years have good survival outcomes. The SSO Choosing Wisely guideline accurately predicted LN positivity in patients >=70 years and is valuable in surgical decision making. Addition of MP and BP to the SSO clinical rule can identify women >=70 years at high risk who are likely to achieve nodal downstaging and pCR. These data suggest that, independent of patient age, MP and BP elucidate information about tumor biology and provide prognostic value in informing treatment decisions.

Table: Summary of results

COPPER cohort								
	65-74 years				> 74 years			
	MP HR		MP LR		MP HR		MP LR	
	# of patients	Events	# of patients	Events	# of patients	Events	# of patients	Events
CT (w/ or w/o ET)	55	5	10	2	6	0	3	0
No CT (ET or untreated)	22	1	52	1	8	1	27	2
Unknown	5	0	3	0	6	0	7	3
Total	82	6	65	3	20	1	37	5
	<65 years (n=313)				≥ 65 years (n= 204)			
	MP HR		MP LR		MP HR		MP LR	
DMFS probability (6 year)	87.5%		98.0%		86.4%		92.4%	
OS probability (6 year)	92.9%		100.0%		91.6%		95%	
MINT cohort								
	< 70 years				≥ 70 years			
	Clinical-HR MP HR	Clinical-HR MP LR	Clinical-LR MP HR	Clinical-LR MP LR	Clinical - HR MP HR	Clinical-HR MP LR	Clinical-LR MP HR	Clinical-LR MP LR
# of patients	162	25	3	5	14	1	1	0
% of patients with pCR	34.5% (56/162)	0% (0/25)	0% (0/3)	0% (0/5)	43% (6/14)	0% (0/1)	100% (1/1)	0%
# of LN+ patients	110	20	3	3	10	0	0	0
% of LN+ patients with nodal downstaging	49% (54/110)	20% (4/20)	0% (0/3)	0% (0/3)	80% (8/10)	0%	0%	0%
% of LN+ patients with pCR and nodal downstaging	65% (35/54)	0%	0%	0%	62.5% (5/8)	0%	0%	0%

781807 - Breast Reconstruction in Women 70 and Older: An Analysis of the National Cancer Database (NCDB)

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Background/Objective: Breast cancer is the most common cancer in women in the US, and its incidence in women over the age of 70 continues to rise. Previously published literature on reconstruction in this group is largely confined to single institution studies. As the incidence of breast reconstruction increases and the population ages, it is imperative to examine factors influencing decisions regarding reconstruction in the elderly.

Methods: We performed a retrospective review on breast cancer patients age 70 and older who underwent mastectomy in the National Cancer Database patient registry from 2004-2015. Patients with Stage 4 disease, T4 tumors, male sex, and those without ductal carcinoma in situ (DCIS) or non-invasive tumors were excluded. Analytical statistics on factors that may influence reconstruction, and 30- and 90-day mortality rates were performed using Chi-squared tests.

Results: The cohort consisted of 73,973 patients, and 6% (4,552) underwent reconstruction. Of those who underwent reconstruction, 74% (3,346) had unilateral reconstruction, and 26% had bilateral reconstruction (1,206). Data on type of reconstruction was available in 3,732 (82%) patients, of whom 36% had tissue reconstruction, 49% had implant-based reconstruction, and 15% had combined tissue-implant reconstruction. All variables queried in the dataset (except for tumor laterality) demonstrated significant association with whether patients underwent reconstruction or not. These included facility type and geographic location, age, race, insurance status, facility setting, diagnosis after 2009, Charlson/Deyo-Score (CDS), DCIS vs invasive cancer (IC), tumor size, estrogen and progesterone receptor (ER/PR) status, nodal status, and if patients received radiation therapy (RT) or chemotherapy (Table). Factors that were significant predictors of whether a patient underwent unilateral or bilateral reconstruction included facility type and geographic location, age, race, insurance status, facility setting, diagnosis after 2009, primary tumor size and stage, nodal disease burden, and RT. Those that were not significant included CDS, DCIS vs IC, ER/PR status, or if patients received chemotherapy. Patients who had bilateral surgery had a significantly higher rate of 30-day unplanned readmission rates; however, 30- and 90-day mortality rates were higher in those who had unilateral reconstruction. Significant factors that influenced the type of reconstruction patients received (tissue, implant, or combined) included facility type and geographic location, race, age, insurance status, diagnosis after 2009, nodal status, RT, and stage. Tumor receptor status, chemotherapy, and facility setting were not predictive. Thirty-day unplanned readmission rates and 90-day mortality rates were not different between the 3 groups.

Conclusions: Overall, we found that in patients age 70 and older who are younger, treated after 2009, with a lower CDS, smaller tumors, node-negative, and earlier stage are more likely to undergo reconstruction and have bilateral reconstructive surgery. White females with private insurance were more likely to undergo reconstruction compared to other races with governmental or no insurance. These findings suggest that a health disparity may exist, and further subset

analysis is required to examine our findings. Patient selection for reconstruction in the elderly remains complex and requires a multidisciplinary approach.

Table: No reconstruction vs reconstruction

No Reconstruction vs Reconstruction						
		No Reconstruction *n* (%) 62,421 (93.2)		Reconstruction *n* (%) 4,552 (5.8)		*p* value
Facility Type						<0.0001
	Community	2,844	(90.6)	295	(9.4)	
	CCC	37,093	(94.3)	2,240	(5.7)	
	Academic	14,963	(91.4)	1,411	(8.6)	
	INCC	7,521	(92.5)	606	(7.5)	
Geographic Location						<0.0001
	Northeast	27,052	(92.5)	2,195	(7.5)	
	Midwest	19,079	(94.9)	1,027	(5.1)	
	South	12,635	(95.1)	650	(4.9)	
	West	10,655	(94.0)	680	(6.0)	
Age Group						<0.0001
	70 - 74	23,703	(88.5)	3,093	(11.5)	
	75 - 79	20,376	(94.9)	1,106	(5.1)	
	80 - 84	15,174	(98.2)	283	(1.8)	
	85 - 90	10,168	(99.3)	70	(0.7)	
Race						<0.0001
	White	59,909	(93.7)	4,052	(6.3)	
	Black	6,686	(95.1)	345	(4.9)	
	Other	2,826	(94.8)	155	(5.2)	
Insurance Status						<0.0001
	Not Insured	318	(97.2)	9	(2.8)	
	Private Insurance	6,950	(92.2)	586	(7.8)	
	Government Provided	61,343	(94.0)	3,922	(6.0)	
	Unknown	810	(95.9)	35	(4.1)	
Facility Setting						<0.0001
	Metropolitan	55,158	(93.3)	3,991	(6.7)	
	Urban	10,755	(96.4)	398	(3.6)	
	Rural	1,660	(97.1)	49	(2.9	
Charlson/Deyo-Score						<0.0001
	0	50,908	(93.3)	3,568	(6.7)	
	1	14,226	(95.1)	733	(4.9)	
	2+	4,247	(96.3)	161	(3.7)	
Diagnosis Year						<0.0001
	< 2009	36,415	(96.3)	1,416	(3.7)	
	> 2009	33,006	(91.3)	3,136	(8.7)	
Tumor Laterality						1
	Unilateral	69,406	(93.8)	4,551	(6.2)	
	Bilateral	15	(93.8)	1	(6.2)	
DCIS vs IC						<0.0001
	DCIS	7,434	(89.9)	833	(10.1)	
	Invasive Cancer	61,987	(94.3)	3,719	(5.7)	
Tumor Grade						<0.0001[a]
	Grade 1	12,560	(93.4)	884	(6.6)	
	Grade 2	29,484	(93.7)	1,998	(6.3)	
	Grade 3	21,664	(94.6)	1,243	(5.4)	

	Grade 4	485	(93.1)	36	(6.9)	
	Unknown	5,228	(93.0)	391	(7.0)	
Tumor Size						<0.0001[a]
	< 2cm	32,273	(92.6)	2,571	(7.4)	
	2 – 5cm	28,172	(95.3)	1,400	(4.7)	
	> 5cm	6,268	(95.1)	323	(4.9)	
	Unknown	2,708	(91.3)	258	(8.7)	
Nodal Status						
	Negative	41,259	(93)	3,126	(7)	<0.0001[a]
	Positive	23,426	(95.2)	1,191	(4.8)	
	Unknown	4,736	(95.3)	235	(4.7)	
Stage						<0.0001
	0	7,568	(89.8)	855	(10.2)	
	1	23,464	(92.6)	1,864	(7.4)	
	2	28,231	(95.2)	1,415	(4.8)	
	3	10,158	(96)	418	(4)	
ER Status						<0.0001[a]
	ER (-)	13,144	(94.6)	751	(5.4)	
	ER (+)	52,962	(93.6)	3,634	(6.4)	
	Unknown	3,315	(95.2)	167	(4.8)	
PR Status						<0.0001[a]
	PR (-)	21,543	(94.5)	1,243	(5.5)	
	PR (+)	43,965	(93.4)	3,091	(6.6)	
	Unknown	3,913	(94.7)	218	(5.3)	
30-Day Readmission						<0.0001[a]
	None	65,965	(93.8)	4,335	(6.2)	
	Readmission	1,875	(92.5)	153	(7.5)	
	Unknown	1,581	(96.1)	64	(3.9)	
Radiation Therapy						0.05 [b]
	No RT	57,573	(93.8)	3,837	(6.2)	
	Received RT	10,890	(94.3)	662	(5.7)	
	Unknown	958	(94.8)	53	(5.2)	
Chemotherapy						<0.0001[a]
	No Chemotherapy	52,813	(94.2)	3,270	(5.8)	
	Received Chemotherapy	14,108	(92.6)	1,130	(7.4)	
	Unknown	2,500	(94.3)	152	(5.7)	
30-Day Mortality						<0.0001[a]
	Alive	63,737	(94.2)	3,934	(5.8)	
	Died	196	(99.5)	1	(0.5)	
	Unknown	5,488	(89.9)	617	(10.1)	
90-Day Mortality						<0.0001[a]
	Alive	63,179	(94.2)	3,920	(5.8)	
	Died	571	(98.8)	7	(1.2)	
	Unknown	5,671	(90.1)	625	(9.2)	

a) *p* value remains significant at <0.05 when controlling for unknowns
b) p value becomes 0.036 when controlling for unknowns

786648 - The Use of Hormone Therapy and Radiation after Breast-conserving Therapy for Estrogen-positive Tumors in Women 65 Years of Age and Older: A National Cancer Database Study

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Background/Objective: The CALGB 9343 trial and PRIME II trials suggest radiation therapy (RT) may be safely omitted after breast-conserving therapy (BCT) and hormone therapy (HT) in women >65 years old with early-stage, estrogen receptor-positive (ER+) breast cancers. While prior studies demonstrated radiation usage decreased after the CALGB 9343 trial, radiation therapy is often still recommended as compliance with endocrine therapy may be difficult. We aim to reassess practice patterns and influences on usage of radiation and/or endocrine therapy using the updated National Cancer Database (NCDB).

Methods: The NCDB was retrospectively reviewed from 2004-2015 for patients who underwent BCT for pathologic stage T1-2, ER+ breast cancers, and women 65 years of age and older. The types of treatment combinations include surgery alone (S), S + RT, S + HT, and S + RT + HT. Patients undergoing neoadjuvant chemotherapy were excluded. Facility type, age, Charlson Comorbidity Index (CCI), race, income, insurance type, pathologic stage, tumor size, grade, and adjuvant chemotherapy were also assessed using a multinomial logistic regression model. Overall survival (OS) was analyzed using multivariate cox regression model comparing all 4 treatment combinations.

Results: There were 88,287 patients identified, as seen in the Table. There were 7,777 (8.8%) who underwent S, 9,050 who underwent S + RT (10.3%), 14,046 who underwent S + HT (15.9%), and 57,414 (65%) who underwent S + RT + ET. Patients at community programs (CP) were less likely to undergo S+HT and S+HT+RT than at academic programs (AP) ($p<.0001$). As patients increased in age, they are less likely to undergo any additional RT or HT ($p<.0001$). Patients of a race other than black are less likely undergo S+RT and S+RT+HT than white patients ($p<.0001$). Patients with higher incomes are more likely undergo S+RT and S+RT+HT ($p<.0001$). Medicare patients are more likely undergo treatment with S+RT+HT ($p<.0001$). Higher pathologic stage p1B and p1C are more likely to undergo S+HT and S+HT+RT ($p<.0001$). Patients who underwent adjuvant chemotherapy are more likely undergo S+RT and S+RT+HT ($p<.0001$). OS was longest in S+RT+HT followed by S+RT, S+HT compared to S alone ($p<.0001$).

Conclusions: Analysis of the NCDB reveals that there is beginning to be a shift with the omission of RT from practice patterns. However, S +RT + HT remains the most common treatment combination. This study reveals improved OS with S+RT+HT compared to CALBG, and PRIME II trials have demonstrated the omission of RT does not affect OS benefit in early stage, ER+ breast cancer in women >65 years of age. As the omission of RT becomes a more common practice in the coming years, we may gain more data regarding OS in S+RT+HT compared to S+RT and S+HT. This will help guide us on the most optimal treatment pattern for this patient population.

Table: General characteristics

Variable	n	%
Facility Type		
Community Cancer Program	9,125	10.3%
Comprehensive Community Cancer Program	42,876	48.6%
Academic/Research Program	23,433	26.5%
Integrated Network Cancer Program	12,853	14.6%
Age, median (IQR)	73 (69, 78)	
Distance from Hospital, median (IQR)	7.4 (3.6, 15.2)	
Race		
White	79,625	90.2%
Black	5,664	6.4%
Other	2,422	2.7%
Unknown	576	0.7%
Charlson		
0	69,029	78.2%
1	15,351	17.4%
2	3,064	3.5%
3 +	843	1.0%
Income		
Less than $40,227	12,123	13.7%
$40,227 - $50,353	18,075	20.5%
$50,354 - $63,332	21,035	23.8%
$63,333 +	35,978	40.8%
Unknown	1,076	1.2%
Insurance		
Not Insured	299	0.3%
Private Insurance / Managed Care	12,242	13.9%
Medicaid	1,036	1.2%
Medicare	73,532	83.3%
Other Government	325	0.4%
Insurance Status Unknown	853	1.0%
Path Stage (T)		
p1	2,776	3.1%
p1A	9,303	10.5%
p1B	27,869	31.6%
p1C	36,724	41.6%
p2	11,615	13.2%
Tumor Size		
0: <= 10 mm	38,501	43.6%
1: > 10 mm but <= 20 mm	37,984	43.0%
2: > 20 mm but <= 30 mm	9,335	10.6%
3: > 30 mm but <= 40 mm	1,821	2.1%
4: > 40 mm but <= 50 mm	559	0.6%
9: Unknown	87	0.1%
Grade		
Well differentiated, differentiated, NOS	31,543	35.7%
Moderately differentiated, moderately well differentiated, intermediate differentiation	42,487	48.1%
Poorly differentiated	10,691	12.1%
Undifferentiated, anaplastic	61	0.1%
Cell type not determined, not stated or not applicable, unknown primaries, high grade dysplasia	3,505	4.0%
Surgery Type		
Partial mastectomy, NOS; less than total mastectomy, NOS	15,092	17.1%
Partial mastectomy WITH nipple resection	558	0.6%
Lumpectomy or excisional biopsy	64,703	73.3%
Segmental mastectomy (including wedge resection, quadrantectomy, tylectomy)	7,934	9.0%
Post Op Chemo		
No	79,951	90.6%
Yes	6,394	7.2%
Unknown	1,942	2.2%
Any Rad		
No	21823	24.7%
Yes	66464	75.3%
Hormone Therapy		
No	16827	19.1%
Yes	71460	80.9%

788200 - Management of Triple-negative Breast Cancer in Octogenarians: A Population-based Evaluation

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Background/Objective: There is a paucity of data to guide the management of women over 80 years of age with triple-negative breast cancer (TNBC). There may be a reluctance to recommend surgery or cytotoxic chemotherapy, which may adversely affect quality of life, in the absence of clear data to suggest an associated survival advantage. This study examines the treatment patterns and outcomes for a large, population-based cohort of elderly patients with Stage I-III TNBC.

Methods: All women ≥80 diagnosed with breast cancer between 2004-2015 were identified from the Alberta Cancer Registry, a population-based cancer registry of all incident cases of malignancy in Alberta, Canada. Descriptive statistics were used to determine patterns of care. Patients were followed during routine follow-up or until death.

Results: Of 1741 patients, 4.5% (78) had TNBC with a mean age of 85.2 (SD 4). Of these, 91% (71/78) underwent surgery, of whom the majority (62%) underwent mastectomy. Only 29.5% and 3.8% of women received radiotherapy or chemotherapy, respectively. At a mean follow-up of 21.6 months (SD 16.5), overall survival was 56.4% with a breast cancer-specific mortality of 23.1%. The mean age of breast cancer-specific death (84.9 years, SD 4.1) was lower than the mean age of non-breast cancer-specific death (87.2 years, SD 4.2, p=0.08). Among women 81-85 years of age with TNBC, 52.4% of deaths were breast cancer related. Breast cancer-specific survival was significantly improved in patients who received surgery (HR 0.04, 95% CI 0-0.41) compared to no surgery (p=0.006). On univariate analysis, receipt of systemic chemotherapy was not associated with an improvement in disease-specific survival.

Conclusions: In this population-based study, we examine the treatment patterns and outcomes for one of the largest-known series of TNBC in elderly women. The breast cancer-specific mortality was elevated, particularly in women 81-85. Further analyses, including disease-free survival and a multivariate analysis to examine the relationship between chemotherapy and survival is needed in this cohort to better guide management. Our study suggests that women ≥80 with TNBC may benefit from more aggressive multimodality management, while keeping in mind patient-directed treatment preferences.

787537 - A National Cancer Database Analysis of Women with Breast Cancer Under Age 40

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Background/Objective: Breast cancer diagnosed in patients under age 40 represents approximately 7% of cases. There is an overall worse outcome for this group of patients despite having access to the same treatment options as the patients older than age 40. Breast cancer in young women is more likely to present at a higher stage with more aggressive features including HER 2 overexpression. Our goal with this study was to analyze the stage at presentation, tumor biology (including HER 2 status, which has not been analyzed in a large data set), treatments performed, and outcomes of patients under age 40 with breast cancer compared to patients older than age 40. We hypothesized patients under age 40 presented at a later stage with worse features and overall are more likely to receive aggressive therapy. We sought to answer if this patient population benefited from more aggressive treatment.

Methods: The National Cancer Database was queried to identify female breast cancer patients from 2010-2014 with known HER 2 receptor status. Among 54,799 women diagnosed with breast cancer who were eligible for analysis, 26,262 were <40 years of age, and 28,537 were aged ≥40 years. Statistical methods used were Pearson's Chi-square test and logistic regression.

Results: Across the 3 staging systems (AJCC Clinical Stage Group, AJCC Pathologic Stage Group, and NCDB Analytic Stage Group), there were statistically significant associations between age and presenting stage ($p<.0001$); women under the age of 40 had greater odds of presenting at a later stage compared to those who were ≥40 years [(OR=2.13; 95% CI: 2.03 – 2.25), (OR=2.01; 95% CI: 1.95 – 2.08), and (OR=1.76; 95% CI: 1.68 – 1.84) respectively]. In comparing tumor grades between the 2 age groups, the likelihood of having: (i) moderately differentiated (Grade II) tumors; (ii) poorly differentiated (Grade III) tumors; and (iii) undifferentiated (Grade IV) tumors vs well-differentiated tumors is significantly greater for patients under the age of 40 years [(OR=1.95; 95% CI: 1.85 – 2.07), (OR=4.55; 95% CI: 4.30 – 4.81) and (OR=5.72; 95% CI: 4.06 – 8.04) respectively].Women in the younger age group were also less likely to have ER-positive breast cancer and to have received hormone therapy [(OR=0.49; 95% CI: 0.47 – 0.51) and (OR=0.64; 95% CI: 0.61 – 0.67) respectively]. However, patients under the age of 40 were significantly more likely to have HER2-positive breast cancer (OR=1.89; 95% CI: 1.81 – 1.98). Furthermore, the results showed that the proportion of patients who received chemotherapy and radiation treatments differs significantly by age. Patients <40 years had a significantly greater likelihood of receiving chemotherapy relative to patients ≥40years (OR=6.93; 95% CI: 6.65 – 7.22). Conversely, patients ≥40 years had greater odds of receiving radiation therapy (OR=1.15; 95% CI: 1.11 – 1.19). However, there was no significant association between age and surgical treatment of breast cancer. Additionally, there was no significant difference in mortality between the 2 age groups.

Conclusions: Our database has one of the largest number of patients and also includes HER 2 receptor status. Our data is consistent with other reports that patients under the age of 40 present at a later stage with more aggressive features including hormone receptor-negative, HER 2 positivity, and with a higher grade compared to patients over the age of 40. Patients under the

age of 40 years with breast cancer did not have an overall worse survival despite presenting at a later stage. These unique features suggest this patient population should be treated as its own entity. Limitations include the lack of information regarding genetics and knowledge of other risk factors, which is important in the development of breast cancer in this patient population.

788130 - Surgical Management of Breast Cancer in the Elderly

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Background/Objective: Breast cancer is diagnosed after the age of 65 in 44% of cases. There is controversy regarding the optimal management of breast cancer diagnosed after the age of 70, when co-morbidities can often limit treatment options. The aim of this study was to examine outcomes of a modern cohort of Irish women diagnosed with breast cancer aged ≥70 who underwent surgical resection

Methods: A retrospective review of a prospectively maintained database of all new breast cancers from January 2009 to December 2014 in an Irish tertiary referral symptomatic breast centre was performed. We included all patients aged ≥70 at diagnosis who underwent resection of their primary tumour. We excluded patients with a prior history of breast cancer. Patient and tumor characteristics, treatment, and outcomes were analysed.

Results: Between January 2009 and December 2014, 539 primary breast cancers were diagnosed in 488 patients aged ≥70 at diagnosis. There were 297 patients who had surgical resection of their primary tumour. The mean age was 75.89 years (range 70 – 92). The mean tumour size was 2.52cm (range 0.2 – 13cm). The majority of tumours were ER-positive (84.7%) and PR-positive (67.7%). HER2 was overexpressed in 11.8%. There were 130 (43.8%) patients who underwent mastectomy, and 160 (53.9%) had breast-conserving surgery. There were 185 (62.3%) patients who had a sentinel lymph node biopsy, and 78 (26.3%) had an axillary lymph node dissection. The remaining 32 (10.8%) patients had no axillary procedure. Hormonal therapy was prescribed for 223 (75.1%), and chemotherapy was prescribed for 80 (26.9%). Radiation therapy was received by 197 (66.3%). During follow-up, 98 (32.9%) died. There were no mortalities within 30 days of surgery. Among those who died, the mean time from surgery to death was 51 months (range 51 days to 112 months).

Conclusions: Breast cancer diagnosed at an older age is often treated less aggressively. This study shows that breast surgery carries a low risk of peri-operative mortality, even in elderly patients, suggesting that with careful patient selection, therapeutic surgery can be a safe and effective option. Further research is needed to determine the optimal treatment of these patients.

788678 - Endocrine Therapy Persistence Among Elderly Breast Cancer Patients: Impact on Survival

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Background/Objective: Management of breast cancer (BC) in elderly women (≥70 years old) is complex, owing to the presence of comorbidities, reduced tolerability of therapy, and demonstrated underrepresentation in clinical trials. Current literature suggests an improved overall survival in elderly patients with hormone receptor (HR)-positive, early-stage BC patients receiving surgical intervention with endocrine therapy (ET), compared to those receiving ET alone. Whether this survival benefit is associated with differences in adherence to ET currently remains unclear.

Methods: Women ≥70 years old, diagnosed with early-stage invasive BC between January 2008 and December 2013, with tumor size T1 or T2, minimal nodal involvement (N0 or N1), endocrine and/or progesterone receptor positive, were identified using the Surveillance, Epidemiology, and End Results (SEER)-Medicare linked datasets. Endocrine therapy was identified using outpatient prescription fills for Anastrozole, Exemestane, Fulvestrant, Letrozole, Raloxifene, Tamoxifen, and Toremifene; the first fill date was used as treatment initiation date. Time to first endocrine therapy fill (among those who initiated within first year after diagnosis) and endocrine therapy persistence were measured. Persistence was measured by calculating the proportion of days covered (PDC) (total number of days' supply for all endocrine prescription fills and divided by their total follow-up time), PDC after first fill (PDC-AFF) (number of days' supply for all fills the number of days they could have been covered (i.e., start date until end of follow-up) and continuous use period (no gaps >10 days in endocrine therapy). Women with no gaps during their first year (i.e., continuous coverage after their first fill) as well as women with ≥80% PDC and PDC-AFF were defined as persistent users. Multivariable Cox proportional hazard regression was used to estimate the association between undergoing surgery and 5-year all-cause mortality among persistent users, after adjusting for patient demographics, comorbidities, and clinical cancer characteristics. Similar methods were used to assess 5-year cancer-specific mortality, where non-cancer mortality was treated as a competing risk.

Results: There were 8,006 (91%) patients who received surgery with ET, and 778 (9%) received ET alone. Median follow-up time was 1,248 days (IQR 790 – 1766, range 366 – 2556). The median time to initiation of endocrine therapy was 77 days (IQR 45 – 135, range 0 - 363) in patients receiving ET alone, compared to 103 days (IQR 70 – 148, range 0 – 364) in those receiving surgery and ET. There was no significant difference in PDC across groups (median 76% vs 75%, p=0.74), but PDC-AFF was slightly higher in women who underwent surgery (median 88% vs. 84%, p=0.002). Women undergoing surgery were more likely to be consistent, persistent users (28% vs. 24%, p=0.03). Overall, the 5-year survival was 89%; there were 619 deaths, and 19% were cancer-related deaths (n=117). After adjustment, among ET persistent users, the 5-year overall mortality was lower among women undergoing surgery with ET,

compared to those receiving ET alone (HR 0.36, 95% CI 0.22, 0.60). Similar results were found when looking at 5-year cancer-specific mortality (HR 0.43, 95% CI 0.11, 0.75)

Conclusions: Overall, the persistence of ET among all elderly breast cancer patients with early-stage, hormone receptor-positive disease is low, with less than 30% patients consistently receiving their outpatient ET refill. Minimal differences are observed in endocrine therapy persistence among those receiving surgery with ET, compared to those receiving ET alone. This study suggests that the significant survival benefit observed in patients receiving surgery is not associated with differences in ET use, reflecting the importance of surgical intervention for eligible elderly breast cancer patients for improved overall survival. This study also highlights the need for improved patient education on the benefits of ET as well as the need for further research to elucidate the reasons for low compliance of ET among elderly BC patients.

787733 - Young Women with Breast Cancer: Factors Associated with Early Distant Recurrence

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Background/Objective: Breast cancer is the leading cause of cancer-related death in women age 40 and younger. Younger age at diagnosis has been reported to be a risk factor for earlier locoregional and distant recurrence as well as decreased overall survival. These worse outcomes cannot be explained alone by pathologic features known to be associated with poor prognosis, such as tumor grade and receptor status. The objective of this study was to evaluate factors, not previously reported, that may aid in the prediction of early recurrence - specifically whether indeterminate findings on staging imaging predict early distant recurrence in young women with breast cancer.

Methods: A retrospective chart review was completed. Women with breast cancer between the ages of 18 and 40 years referred to a regional breast cancer center between January 1, 2012 and December 31, 2018 were included. Patients with metastatic disease at presentation, recurrent breast cancer, ductal carcinoma in situ, bilateral breast cancer, previous cancer at another site or no staging imaging were excluded. Patient, treatment, and pathology details were recorded. Staging, imaging, and indeterminate findings were also recorded. Locoregional recurrence, distant recurrence and death were collected. Indeterminant findings were defined as non-specific findings reported on staging imaging for which no final characterization was achieved prior to initiating treatment. Descriptive statistics were performed on the entire cohort comparing patients who developed any distant recurrence versus those who did not.

Results: Overall, 110 young women with breast cancer underwent treatment and completed staging imaging during the study period. Staging imaging was most commonly performed in the pre-operative setting (65.4% of patients), and 51% of imaging identified an indeterminate finding. Seventeen (16%) of the patients developed distant metastases during the follow-up period. Median time to distant recurrence was 33 months (range, 7-85) with a median follow-up of 48 months. There were 5 deaths during the study period. Indeterminant findings on staging scans were not identified more frequently in patients who developed distant metastases (p=0.22).

Patients who developed distant recurrence were more likely to have an in-breast recurrence (p=0.002), disease requiring neoadjuvant chemotherapy (p<0.001), pre-treatment nodal involvement (p=0.006), node-positive pathology (p=0.021) and increasing tumour size on final pathology (p=0.002).

Conclusions: Indeterminate findings on staging scans are not associated with a higher incidence of early distant recurrence in this population of young women with breast cancer. Indeterminant findings should not impact decision making regarding treatment for young women presenting with breast cancer. More advanced disease at presentation and on final pathology are more so associated with early distant recurrence in young women, and these factors should be taken into consideration when counseling young women regarding prognosis. The benefits and risks of more intense surveillance within this sub-group of breast cancer patients should be explored.

Table. Young women with invasive breast cancer - comparison of distant recurrence versus no distant recurrence: patient and pathology

Overall	n=110	Patients without distant recurrence (n=93)	Patients with distant recurrence (n=17)	p-value
Mean age [SD]	35.3 [4.5]	35.4 [4.3]	34.7 [5.6]	0.79
Pre-treatment biopsy proven node positive	39 (35.5)	28 (30.1)	11 (64.7)	0.006
Pathology				
Median tumour size [range] (cm)	2.20 (0-18.0)	2.2 [0-12.1]	2.5 [0-18.0]	0.42
T-stage on final pathology				
T0	18 (16.4)	17 (18.3)	1 (5.9)	0.002
Tis	3 (2.7)	3 (3.2)	0	
T1	32 (29.1)	26 (28.0)	6 (35.3)	
T2	42 (38.2)	37 (39.8)	5 (29.4)	
T3	12 (10.9)	10 (10.8)	2 (11.8)	
T4	3 (2.7)	0	3 (17.6)	
N-stage on final pathology				
N0	56 (50.9)	52 (55.9)	4 (23.5)	0.021
N1	41 (37.3)	32 (34.4)	9 (52.9)	
N2	7 (6.4)	6 (6.4)	1 (5.9)	
N3	6 (5.5)	3 (3.2)	3 (3.2)	
Histology				
Invasive ductal carcinoma	101 (91.8)	84 (90.3)	17 (100.0)	
Invasive mixed (ductal and lobular)	0	0	0	0.62
Classica invasive lobular carcinoma	3 (2.7)	3 (3.2)	0	
Pleomorphic invasive lobular carcinoma	4 (3.6)	4 (4.3)	0	
Unknown	0	0	0	
Other	2 (1.8)	2 (2.2)	0	
Median number of positive lymph nodes [range]	0 [0-22]	0 [0-19]	1 [0-22]	0.014
Median number of lymph nodes removed [range]	7 [1-35]	6 [1-35]	10 [3-26]	0.007
ER Positive	79 (73.2)	69 (75.8)	10 (58.8)	0.15
PR positive	64 (59.3)	54 (59.3)	10 (58.8)	0.97
HER-2 positive	26 (24.1)	23 (25.3)	3 (17.6)	0.5
Tumour grade				
Grade 1	4 (3.6)	4 (4.3)	0	0.21
Grade 2	32 (29.1)	28 (30.1)	4 (23.5)	
Grade 3	54 (49.1)	42 (45.2)	12 (70.6)	
Not recorded	20 (18.2)	19 (20.4)	1 (5.9)	
Lympho-vascular invasion on final pathology	46 (41.8)	36 (38.7)	10 (58.8)	0.26

788142 - Primary Hormonal Therapy for Women Diagnosed with Breast Cancer ≥70

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Background/Objective: Breast cancer is the most common invasive cancer in Ireland. Patients over the age of 65 account for 36% of all patients diagnosed and 61% of breast cancer deaths. Recent international and European guidelines recommend surgery as treatment in all non-metastatic breast cancer in older women. However, in elderly women, who have limited life expectancy or significant co-morbidities, primary hormonal therapy is often used to control disease. However, there is limited data looking at long-term outcomes of patients treated with hormonal therapy only. This study aims to examine the profile and outcomes of a cohort of patients diagnosed with breast cancer aged >70, treated with primary endocrine therapy (PET).

Methods: A retrospective review of a prospectively maintained database of all newly diagnosed invasive breast cancers from January 2009 to December 2014 in a single tertiary referral centre was performed. We included all patients aged ≥70 at diagnosis, treated with PET. We excluded patients with a prior history of breast cancer. We analysed patient demographics, tumour characteristics, endocrine treatment regime, failure of treatment, and survival.

Results: In total, 166 patients were treated with PET. Of this, there were 165 females and 1 male with a mean age of 82.17. Of this cohort, 52 (31.3%) patients were prescribed an aromatase inhibitor (femara, exemestane or anastrazole) and tamoxifen was prescribed to 46 (27.7%) patients. The hormonal therapy was unspecified for the remainder. The mean tumour size at diagnosis was 2.6cm (range 0.31-16.0 cm). The majority of tumours (99%) were ER-positive and PR-positive (98%). Only 7 (5%) were reported as HER2-positive. Five patients (3%) had documented evidence of failed primary endocrine therapy and proceeded to have surgery. Four of these patients were commenced on 2 available endocrine options prior to surgical intervention. Surgical procedures included 3 wide local excisions, 1 mastectomy and axillary clearance, and 1 central resection. Three of these 5 patients died, with mean of 14 (range 5-26) months to death from surgery date. Patients were followed up for a mean of 39.3 months (range 1 - 122 months). During follow-up, 112 (68%) of patients died. The mean time to death was 35.17 months (range 1-108). Those who survived were followed for a mean of 47.24 months (range 1 - 122).

Conclusions: The results of this study show that there is a high mortality rate associated with elderly patients treated with PET. This may be due to patient selection. Very few patients in this study required surgery for local control while being treated with PET. Further prospective studies with astringent follow-up are needed to generate quality data, which can be used to counsel patients.

788029 - Secondary Breast Cancer Sociodemographic Characteristics and Survival by Age Group

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Background/Objective: Secondary cancers account for 16% of all new cancer diagnoses, with breast cancer (BC) being the most common. We have shown that secondary BC has unique characteristics and decreased survival in adolescent and young adult cancer patients. However, similar data has not been looked at in middle-aged and elderly breast cancer populations.

Methods: Female patients (age ≥15 years) diagnosed with primary BC during 1991-2015 (n=377,167) were obtained from the California Cancer Registry and compared with secondary BC patients (n=37,625) grouped by age (15-39, 40-64, ≥65 years). We compared sociodemographic and clinical characteristics of women with primary and secondary BC using multivariable logistic regression. We also assessed the impact of secondary (vs primary) BC, race/ethnicity, tumor size, lymph node (LN) status, grade, and tumor receptors on BC specific survival (BCSS) by age group using multivariable Cox proportional hazards regression.

Results: Of the cohort of secondary BC patients, most were of older age (15-39, n=777; 40-64, n=15,848; ≥65, n=21,000), but less likely to be non-Hispanic (nH) Black, Hispanic, or Asian/Pacific Islander as age increased. As the secondary BC patients aged, the tumors were more likely to be lower grade, lobular histology, smaller in size, lymph node negative, ER/PR negative, and HER-2 negative. At all ages, secondary BC patients were more likely to be treated with mastectomy and less like to receive chemotherapy or radiation. In multivariable logistic regression models, secondary BCs were more likely to have lobular histology, be smaller in size, be lymph node-negative, and be ER/PR-negative than primary BCs across all ages. HER-2 status was similar for women with primary and secondary BC by age. In multivariable survival models, all secondary BC patients showed decreased BCSS compared with primary BC patients, but the impact on survival diminished with age (15-39 Hazard Ratio (HR): 2.09, 95% confidence interval (CI) 1.83-2.39; 40-64 HR: 1.51; 95% CI 1.44-1.58, ≥65 HR: 1.14; 95% CI 1.10-1.19) even when considering other causes of death as a competing risk. All women, no matter the age, showed worse BCSS for large tumor size, higher grade, LN involvement, and tumor marker negativity. Tumor size and receptor status most strongly affected survival in those ≥65. The effect of race/ethnicity on BCSS also differed by age. BCSS was increased for Asian/Pacific Islanders at all ages and Hispanic women ≥40, while BCSS was decreased for nH Black women <65 (vs. nH White women).

Conclusions: We found that BCSS is significantly decreased among all women diagnosed with secondary (vs primary) BC even with adjustments for tumor characteristics, with the strongest impact on survival seen in the 15-39 age group. Women diagnosed with primary BC are known to have decreased BCSS within this age group as well, which appears only multiplied by the secondary nature of the tumor. Given this decreased BCSS after both primary and secondary BC in women ≤40 years, more work is needed to determine if this additive effect in secondary BCs is due only to the age of diagnosis or due to latency from original diagnosis.

787350 - Implementation of the Choosing Wisely® Campaign in Early Breast Cancer Patients Over 70 in a Large Integrated Health Care System

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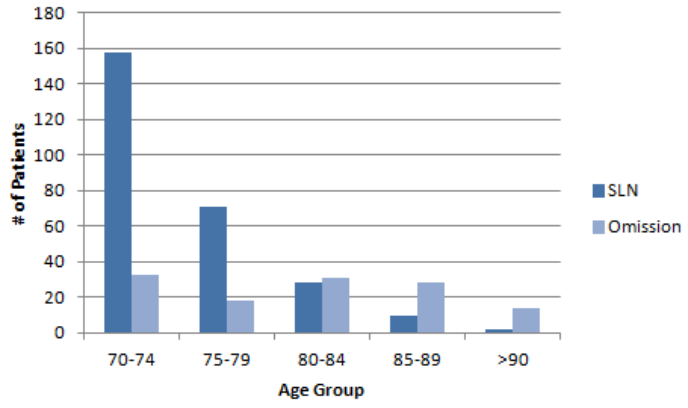
Background/Objective: The Choosing Wisely® Campaign recommends omission of sentinel lymph node biopsy (SLN) in patients ≥70 years of age with early hormone receptor-positive breast cancer. As a large integrated health care system with 16 breast cancer programs, we initiated a systemic effort through annual webinars from 2016 to 2018 to educate the breast cancer treatment teams. Our aim is to evaluate treatment patterns in 2018 after the introduction of multidisciplinary webinars.

Methods: A retrospective review was performed of breast cancer patients who were ≥70 years, T1a-T1c, hormone-positive, and HER2-negative treated in 2016 and 2018. The rate of SLN omission was compared using chi-square analysis. Using logistic regression analysis, a subgroup analysis of patients in 2018 was done to evaluate associated factors with omission of SLN.

Results: Between 2016 and 2018, there was no significant change in the overall rate of patients who underwent SLN (74% to 70%, p=0.16), although we saw a trend towards a decreased rate in 9 out of 15 hospitals. Among 398 patients who met criteria in 2018, 93% of the tumor was grade 1-2 (n= 369). The median age at diagnosis was 74 years (70-95). Increasing age and comorbidities were associated with omission of SLN (p=0.03). Grade and size (T1a-T1c) did not change the rate of SLN omission (p>0.05). In an internal survey of the 2018 webinar participants, lack of a clear shared decision-making tool was identified as a barrier for adopting the SLN omission guidelines in eligible patients.

Conclusions: After a series of multidisciplinary webinars discussing the Choosing Wisely Campaign for omission of SLN patients ≥70 years, there was a trend towards decreasing rate in many of our hospitals. Omitting SLN in elderly patients is most closely associated with age and comorbidities. Further adoption of the Choosing Wisely® campaign on omission of SLN will require development of a shared decision making tool in patients ≥ 70 years of age.

Figure: Rates of sentinel lymph node biopsy



788085 - Are We Omitting the 21-gene Recurrence Score, Sentinel Lymphadenectomy and Radiation in Octogenarians with Early-stage, Hormone Receptor-positive Breast Cancer?

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Background/Objective: As the population ages, the number of elderly patients diagnosed with breast cancer has also increased. The ASBS/SSO has endorsed the "Choosing Wisely" practice guidelines to avoid overtreatment of patients age >=70 who are more likely to have significant medical comorbidities. Specifically, for women 70 years and older with early-stage, hormone receptor-positive (HR+), HER2-negative (HER2-) breast cancer, prospective studies have shown that the omission of sentinel lymphadenectomy (SNB) and radiation therapy (RT) does not impact survival. Whether the use of 21-gene recurrence score or OncotypeDx (oDX) assay is omitted in elderly patients is unknown. We aim to assess practice patterns related to oDX use in octogenarians to understand the national practice patterns and trends in adopting strategies associated with treatment de-escalation.

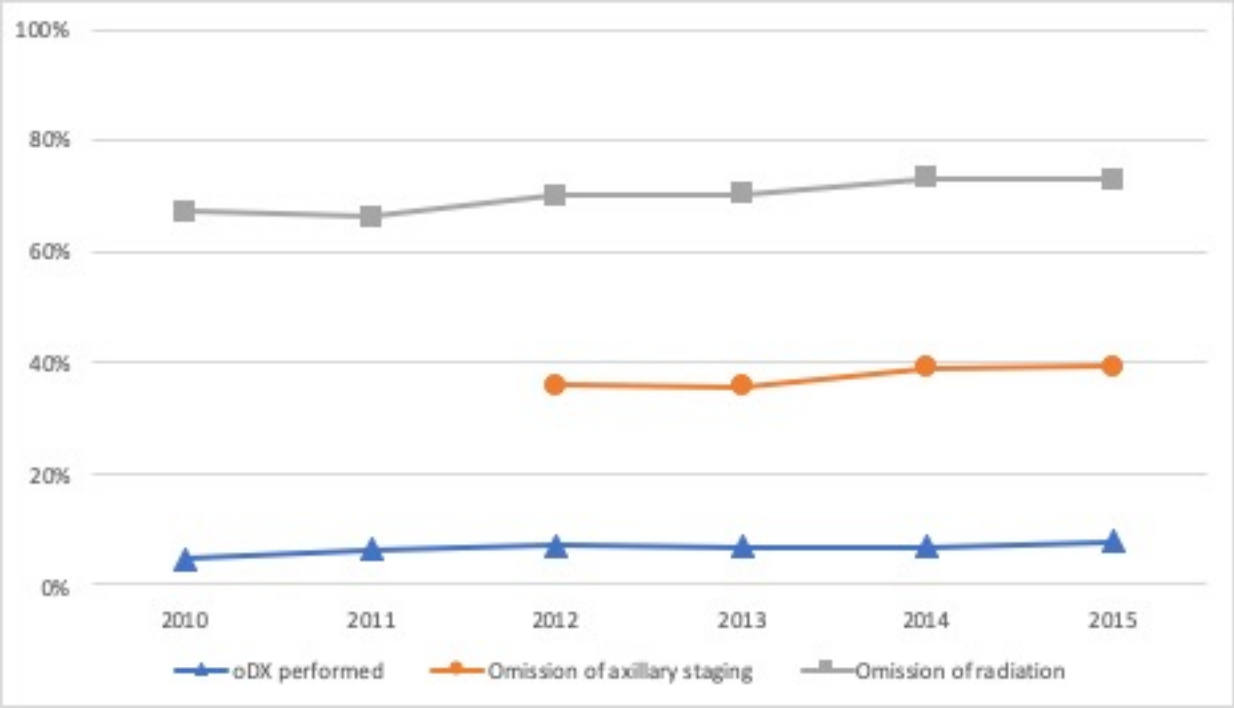
Methods: From the National Cancer Database, we identified women 80 years or older with T1/2, cN0, HR+, HER2- breast cancer from 2010-2015. We assessed demographic and cancer-specific factors, in addition to treatment modalities used. A subset analyses was performed to assess the rates of the use of oDX and the distribution of recurrence scores (RS). Next, we evaluated the type of axillary staging used in patients treated from 2012-2015, and the use of RT in the entire cohort. Finally, we used inverse probability weighting (IPW) to control for potential confounders (age at diagnosis, race, comorbidity, insurance, SES, geographic location, hospital type, tumor stage and grade, surgery, and adjuvant therapies) in calculating overall survival (OS) by SNB, radiation therapy, and oDX use.

Results: A total of 54,293 women 80 years or older with T1/2, cN0, HR+, HER2- breast cancer were identified, 1521 (2.8%) of which underwent no treatment at all. Almost half (41.8%) did not have surgery and underwent treatment with either chemotherapy or radiation (or both). Lumpectomy (63.6%) and SNB (44.1%) were the most common surgical approaches to the breast and axilla, respectively. Only 6.6% of patients underwent oDX testing; those who had oDX testing and those with a high RS (>25) receiving chemotherapy at higher rates when compared with other patients (both $p<0.001$). Related to axillary staging, the highest proportion of patients had a SNB (44.2%), while 37.5% had no staging procedure. The majority of patients (70.1%) did not undergo RT. Trends over time for these are shown in the Figure. When analyzing OS, patients who had oncotype testing had a higher OS with a positive gain of 2.80 months (95% CI 0.29-5.32, $p=0.03$). Patients who had SNB also had a higher OS with a positive gain of 2.33 months, (95% CI 1.07-3.60, $p<0.001$), as did those who underwent radiation therapy with a positive gain of 4.41 months (05% CI 2.97-5.85, $p<0.001$).

Conclusions: National trends reveal a rise in various breast cancer treatment omission in elderly patients with favorable tumor subtypes. However, the use of oDX has increased over the same period and appears to increase the likelihood of receiving chemotherapy which may lead to over-treatment in these patients without improvement of disease-specific outcomes. Our results did show small, but significant improvements in overall survival when oDX, SNB and RT are used

which may reflect selection bias. Our results support an updated recommendation in national practice guidelines in the omission of oDX in elderly patients.

Figure. Trends in care of octogenarians with T1/2, cN0, HR+, HER2- breast cancer. Each series demonstrates a significant increase over time (all $p<0.001$).



Benign

756513 - Ipsilateral and Concurrent Breast Cancer and Atypical Ductal Hyperplasia: Does Atypia Also Need Surgical Excision?

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Background/Objective: Standard of care for the management of atypical ductal hyperplasia (ADH) identified on percutaneous biopsy is surgical excision. However, multiple studies have identified features of ADH that are associated with the lowest risk of upgrade, allowing those patients to be offered observation over excision. The presence of an ipsilateral breast cancer is an exclusion criterion for consideration of observation of ADH in these studies. There is no data on upgrade rate of ADH with a concurrent ipsilateral breast cancer. We hypothesized that having an ipsilateral breast cancer does not significantly increase the risk of upgrade at the site of ADH. Secondarily, as with ADH alone, features of the ADH or the cancer may help stratify which patients are at highest risk for upgrade, and which can be considered for observation over excision.

Methods: This is a retrospective single institution review including women with both a breast cancer and ADH in the same breast at separate sites diagnosed on percutaneous biopsy, who underwent excision of both of these areas from 2008-2018. Imaging characteristics and pathologic features were reviewed from the biopsy, as well as the final surgical pathology at the site of ADH to determine features associated with ADH upgrade.

Results: Sixty-two women met study criteria over the 10-year period. The overall upgrade rate at the site of ADH was 17.7%: 9 to ductal carcinoma in situ (DCIS) and 2 to invasive breast cancer (IBC). Upgrade was more likely if the ipsilateral malignancy was DCIS over IBC ($p=0.034$), if ADH biopsy was performed using ultrasound guidance ($p=0.019$), and if ADH had individual cell necrosis ($p=0.039$). Preoperative MRI was performed in 47 (76%), and 38 (81%) had enhancement at the site of ADH. Two who upgraded did not have MRI, and 1 who upgraded did not have enhancement at ADH site (negative predictive value of 89%). Neither the radiographic size of the ADH nor the distance between ADH and cancer sites were associated with upgrade. The group at lowest risk for upgrade had stereotactic biopsy of the site of ADH and did not have necrosis with ADH (0% upgrade).

Conclusions: The presence of an ipsilateral breast cancer is not a significant risk factor for upgrade of ADH when compared to the well-described upgrade rate of 10-30% for ADH alone. If breast conservation to treat the ipsilateral breast cancer is desired, avoidance of excision at the site of ADH can safely be considered for those with low risk features after strict multidisciplinary review.

Table: Patient demographics, radiographic, and pathologic features

	All patients with ADH and ipsilateral malignancy	Upgrade group	No upgrade group	P value
No. of patients (%)	62 (100)	11 (17.7)	51 (82.3)	
Age at diagnosis, years [mean(std)]	59.2 (11.08)	57.3 (12.53)	59.7 (10.84)	0.215
Family history of breast cancer	27 (43.5)	4 (36.4)	28 (54.9)	0.742
Personal history of breast cancer	3 (4.8)	0	3 (4.9)	1.000
Ethnicity				0.166
Caucasian	46 (74.2)	6 (54.5)	40 (78.4)	
African American	9 (14.5)	3 (27.3)	6 (11.8)	
Hispanic	2 (3.2)	1 (9.1)	1 (2.0)	
Asian/Middle eastern	5 (8.1)	1 (9.1)	4 (7.8)	
Surgery type				0.381
Mastectomy	35 (56.5)	7 (63.6)	28 (54.9)	
Lumpectomy x1	11 (17.7)	3 (27.3)	8 (15.7)	
Lumpectomy x2	16 (25.8)	1 (9.1)	15 (29.4)	
Clinical tumor size, cm [mean (std)] *	2.03 (1.79)	2.56 (2.57)	1.92 (1.61)	0.115
Histologic tumor type				**0.034**
IDC/ILC	45 (72.6)	5 (45.5)	40 (78.4)	
DCIS	18 (29)	6 (54.5)	12 (23.5)	
DCIS present with IBC (n=45)	26 (57.8)	4 (80.0)	22 (55.0)	0.378
Tumor histological grade				0.905
I	20 (32.2)	3 (27.3)	17 (33.3)	
II	33 (53.2)	6 (54.5)	27 (52.9)	
III	9 (14.5)	2 (18.2)	7 (13.7)	
HR+**	54 (87.1)	9 (81.8)	45 (88.2)	0.302
HER2+ IBC (n=43)**	3 (7.0)	0	3 (7.9)	1.000
Distance between ADH and cancer, cm [mean (std)]***	4.55 (2.44)	4.39 (2.32)	4.58 (2.49)	0.397
ADH target size, cm [mean (std)]***	1.77 (2.06)	0.99 (0.41)	1.91 (2.21)	0.962
Biopsy modality of ADH				**0.019**
Stereotactic	21 (33.9)	1 (9.1)	20 (39.2)	
US	21 (33.9)	8 (72.7)	13 (25.5)	
MRI	20 (32.3)	2 (18.2)	18 (35.3)	
Extensive ADH ≥3 foci ***	16 (25.8)	4 (36.4)	12 (23.5)	0.462
ADH micropapillary features***	4 (6.7)	0	4 (7.8)	1.000
ADH cell necrosis***	5 (8.3)	3 (27.3)	2 (3.9)	**0.039**

788244 - Launching Virtual Care in a Benign Breast Surgery Clinic

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Background/Objective: Telemedicine is increasingly utilized in medicine, and benefits to patients can include decreased travel time, ease of access, less time off work, and less time waiting in clinics. The aim of this study is to assess the success of implementation of a telemedicine clinic in a benign breast surgery practice, and the hypothesis was that some women may feel uncomfortable virtually discussing breast complaints and problems.

Methods: Women seen as new patients in the benign breast surgery clinic and scheduled for surgery in an urban hospital were identified. Demographic information was collected. They were asked if they were interested in having their post-operative visit performed virtually versus a traditional in-office visit. If women declined the virtual post-operative visit, they were questioned why. Data was collected when the virtual visits were completed.

Results: Twelve women were identified who were seen as new patients and scheduled for surgery. Ages ranged from 24 to 77 years, and distance from the hospital ranged from 4.3 miles to 14.3 miles. Of the 12 women surveyed, 8 women were interested in the telemedicine visits. The 4 women that declined were either not active on the patient portal, not active on the computer, or without access to a computer, and their ages ranged from 52-77. The 8 women that were interested in telemedicine ranged in age from 24-67, which was a younger group overall. There was no significant difference in distance from the hospital within the 2 groups. Of the 8 women who were interested in telemedicine, 2 have completed the post-operative virtual visit without requiring an in-person visit and were satisfied with their virtual visits.

Conclusions: There is an opportunity for use of telemedicine in the benign breast clinic for routine post-operative visits. The hypothesis that women would be reluctant to participate due to concerns about privacy or discomfort with discussing breast problems virtually was not demonstrated. In fact, the major limitation seemed to be comfort with or access to computer technology. Telemedicine visits can be an important way to personalize care for patients and increase satisfaction.

788164 - Upgrade Rate and Long-term Outcomes of Lobular Neoplasia of the Breast

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Background/Objective: Lobular neoplasia is a pathological diagnosis that refers to a uniform intralobular epithelial proliferation of dis-cohesive cells. It describes findings consistent with either atypical lobular hyperplasia (ALH) or non-pleomorphic lobular carcinoma in situ (LCIS) where there is not a sufficiently large sample of tissue to reach a conclusive differentiation. Patients with a diagnosis of LN on CNB are routinely offered excision due to the risk of upgrade to invasive carcinoma. The rate of upgrade of these lesions is variable across the literature. Although these lesions are thought to be associated with increased risk of the future development of breast cancer, the reported risk is variable, and so the optimal follow-up of these women is unknown. Our aim was to analyse upgrade rates of these lesions and then to report the risk of subsequent development of breast cancer.

Methods: We conducted a retrospective review of a prospectively maintained database containing all patients with a lesion of uncertain malignant potential (B3 lesion) on identified on CNB in an Irish screening centre from 2005 to 2012. Following this, we selected out all patients with a finding of lobular neoplasia (atypical lobular neoplasia and non–pleomorphic lobular carcinoma in situ). We excluded patients who had other high-risk lesions such as atypical intraductal epithelial proliferation (AIDEP) and papilloma with atypia co-existing on CNB. All patients not upgraded on diagnostic excision were offered surveillance in the form of annual

mammography for 5 years post-operatively. We recorded patient demographics and clinicopathological characteristics, along with rates of upgrade to invasive and in situ carcinoma and rate of subsequent development of breast cancer during follow-up.

Results: A total of 425 patients were diagnosed with lesions of uncertain malignant potential during the study period. Of these, 68 patients were diagnosed with LN on CNB (64 patients with ALH and 4 non-pleomorphic LCIS); in 2 cases, this finding of LN co-existed with a finding of AIDEP, and these patients were excluded leaving 66 patients suitable for inclusion. All 66 patients proceeded to diagnostic excision, and the overall rate of upgrade was 15.15% (10/66). Four (6.1%) were upgraded to invasive carcinoma, and 6 (9.1%) to ductal carcinoma in situ (DCIS). All cases of upgrade occurred in patients diagnosed with ALH on CNB. Of the 56 patients not upgraded on diagnostic excision, 42 (75%) had findings of atypia on diagnostic excision, while the other 25% yielded benign tissue only. In those patients who had findings of atypia on diagnostic excision 31 (73.8%) had findings consistent with ALH, 7 (16.7%) had ALH and LCIS, 2 (4.8%) had LCIS alone, and 2 (4.8%) had AIDEP. There were 7.1% (4/56) of non-upgraded patients who went on to develop DCIS during follow-up. None developed invasive cancer. One quarter (25%) of patients with LCIS on original CNB developed subsequent DCIS. There were 3/52 (5.7%) of patients with ALH on original CNB who were not upgraded and developed subsequent DCIS. The mean time to diagnosis of these subsequent cancers was 59.6 months (range 10.5-124.4 months).

Conclusions: Our rate of upgrade for lobular neoplasia (15%) is consistent with reported rates in the literature. This rate of upgrade is sufficiently high to support the current practice of routine excision of these lesions. This data suggests that women with a diagnosis of LN are at increased risk of future breast cancer, and that many of these cancers develop outside of the standard 5 years of increased surveillance. This suggests that these women have an increased lifetime risk of breast cancer and should be offered increased surveillance.

779991 - Rate of Upstaging for Papillary Neoplasms and Complex Sclerosing Lesions/Radial Scars Identified on Core Needle Biopsy

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Background/Objective: Roughly 37 million screening mammograms are performed each year. The current standard of care for a suspicious lesion identified on exam/imaging is a percutaneous core needle biopsy. Studies demonstrate that at least 10% of core needle biopsies reveal a papillary lesion or complex sclerosing lesion/radial scar. Published studies demonstrate upstaging rates ranging from 9-29%. While there is no absolute consensus on the management of these lesions, most guidelines recommend complete surgical excision due to the risk of upstaging to malignancy.

Methods: This is a retrospective chart review of patients who had papillary neoplasm (PN) or complex sclerosing lesion (CSL)/radial scar (RS) on core needle biopsy at a high-volume, large community hospital who underwent subsequent complete surgical excision from 2014-2017. Rates of upstaging to either a high-risk lesion (atypia, LCIS) or malignancy (invasive

ductal/lobular cancer, DCIS) were determined. In additional, clinicopathologic factors that could be predictive of upstaging were collected, and multivariate analysis was performed.

Results: During the study period, a total of 569 patients with core needle biopsy demonstrating PN, CSH/RS were identified from the hospital pathology database. Of these, 433 patients underwent surgical excision, and these formed the study population. Upstaging rates are noted in the table below. Clinicopathologic factors associated with increased upstaging rates to malignancy included concurrent cancer (OR=3.19, p=0.02), palpable disease (OR 3.5, p=0.04), atypia on core biopsy of PN (OR 10.45, p<0.001), and atypia on core biopsy of CSL (OR 5.35, p=0.001). Papillary neoplasm size >10 mm was associated with a higher upstaging rate (9.7% vs. 21.9%, p=0.01). Complex sclerosing lesion size >10 mm was also associated with a higher upstaging rate (6.7% vs 24.3%, p=0.01)

Conclusions: Upstaging rates from papilloma and complex sclerosing lesions/radial scars to DCIS/LCIS or invasive cancer were 11-13%, with a substantial number of additional patients who had high-risk lesions identified. Not surprisingly, the presence of atypia on core needle biopsy increased the likelihood of upstaging, up to 5-10 fold. In additional, patients with lesions >10 mm, a concurrent diagnosis of breast cancer, and palpable lesions have a 2- to 3-fold higher risk of upstaging and should always be excised.

Table: Rate of upstaging

	Benign	High risk lesion (Atypia, LCIS)	Breast Cancer (DCIS , Invasive)
CSL (n=130)	73.8%	16.1%	11.5%
CSL with atypia (n=30)	23.3%	40%	53.2%
PN (n=217)	73.3%	12.3%	13.8%
PN with atypia (n=75)	16%	21.3%	62.6%

787800 - It's Not Yeast: Re-classification of Candida Diagnoses in the Lactating Breast

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Background/Objective: Health care providers treating lactating women for nipple and breast pain often attribute symptomatology to superficial or intraductal Candida infection. However, no definitive scientific evidence exists to support Candida as an etiologic agent in this population. Multiple other diagnoses may present with pain, erythema, and pruritis. We sought to determine the frequency of accurate diagnosis of Candida in symptomatic breastfeeding women and evaluate patterns of alternative diagnoses.

Methods: We conducted a retrospective chart review of women referred for evaluation during lactation to a single breast surgeon between July 2016 and August 2019. Women who presented with a referring diagnosis of "yeast" were included in the analysis.

Results: Of 214 women referred during the study period, 25 women met inclusion criteria. The mean age was 32 (range 24-43); mean weeks postpartum at presentation was 21 (range 2-72). Fifteen patients (60%) were white, while 7 (28%) were Hispanic, 2 (8%) Asian, and 1 (4%) Middle Eastern. Patients had been diagnosed with Candida for the following complaints: nipple and/or breast pain (n=17), white nipple lesion (n=8), skin erythema and pruritis (n=4), and/or infant diagnosis of thrush (n=7). Eleven had overlapping conditions. All reported minimal to no improvement on any anti-fungal therapy including topical nystatin (n=11), topical miconazole (n=5), gentian violet (n=3), coconut oil (n=3), all-purpose nipple ointment (n=7), and/or oral fluconazole (n=13). Ten patients were using more than one agent; 1 woman had used 6 anti-fungals prior to referral. Due to lack of resolution and 1 patient's concern for Paget's disease, patients were referred for further evaluation. In addition to history and physical examination, milk culture was obtained in 4 women, punch biopsy in 1, and core needle biopsy in 1. No woman was confirmed to have a diagnosis of superficial nor intraductal Candida. Diagnosis was changed to the following: subacute mastitis (n=8), multifocal bleb (n=3), focal nipple bleb (n=3), dermatitis (n=6), vasospasm (n=2), milk crust (n=1), hyperlactation (n=1), and postpartum depression (n=1). Treatment included discontinuation of anti-fungals as well as the following interventions: antibiotics and probiotics for subacute mastitis; 0.1% triamcinolone cream for nipple blebs and dermatitis; heat therapy for vasospasm; discontinuation of pumping for hyperlactation and milk crust; and, anti-depressant and counseling referral for postpartum depression. All women experienced resolution of symptoms on definitive therapy (range 2-42 days).

Conclusions: While lactation consultants and physicians traditionally have attributed persistent nipple and breast pain in breastfeeding to a diagnosis of Candida, this cohort demonstrates that clinicians should consider multiple other conditions in their differential, both at presentation and when patients fail anti-fungal therapy. Common diagnoses include subacute mastitis, blebs, dermatitis, and vasospasm. Accurate, timely diagnosis is crucial as pain is a risk factor for premature cessation of breastfeeding, and prompt symptomatic resolution occurs on appropriate therapy.

787923 – Breast Assured: Development of a Shared Medical Appointment Model for Patients with Benign Breast Pain

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Background/Objective: Most women will develop breast pain at some point in their lifetime. Because of the fear of malignancy, patients with breast pain are often referred to breast surgeons for evaluation. However, the role of surgery is limited as the cause of mastodynia is multifactorial and can be a manifestation of psychological stress. The efficacy of shared medical appointments (SMA) has been investigated in primary care clinical settings and has been shown to decrease appointment wait times, improve patient understanding of chronic diseases, and provide support. We sought to utilize the SMA model in the development of an integrative care clinic to manage patients with benign breast pain and maximize efficiency in clinic workflow.

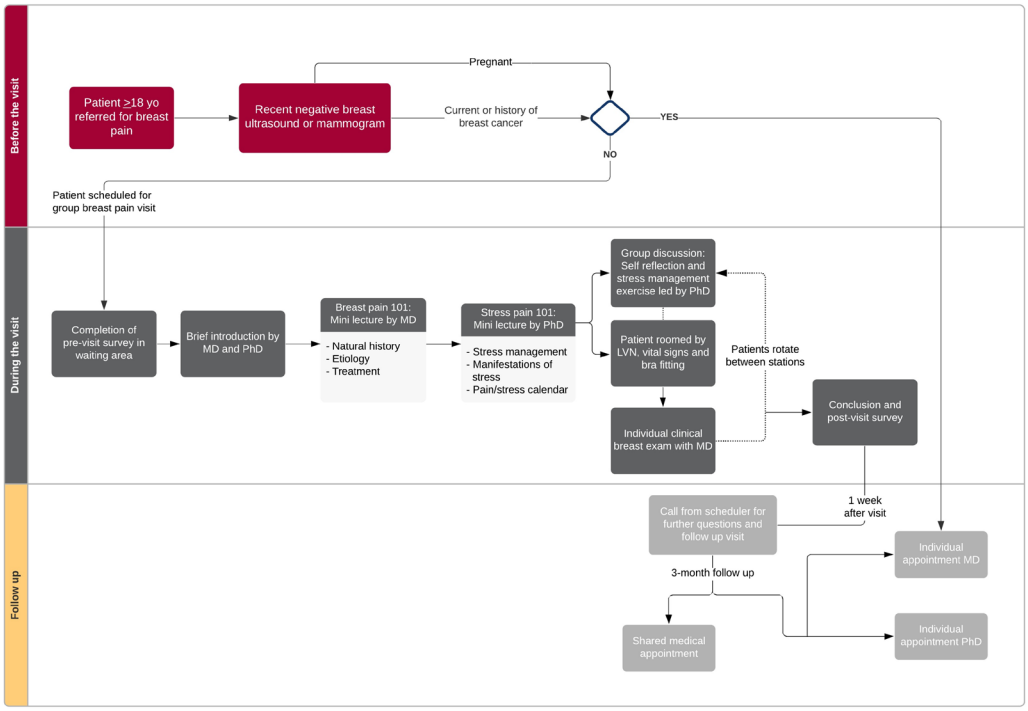
Methods: The clinic design was based on existing group medical visit models. The session format was developed through a collaborative process utilizing patient focus groups, clinic nursing staff, a social worker, coders, a psychologist PhD, and a breast surgeon. Those who were pregnant, minors, or had a current or prior history of breast cancer were excluded. Patients were required to have a recent negative mammogram or ultrasound prior to enrollment. All new referrals for breast pain were diverted to the group breast pain clinic starting 06/2019. A mock trial run of the clinic was conducted prior to the launch of the first visit. Pre- and post-visit questionnaires were created to evaluate breast pain, patient views and understanding of the pain, psychological stress, patient satisfaction, and feedback of the visit. The pre-visit survey was modified from validated instruments utilizing elements from the McGill Pain Questionnaire and Perceived Stress Scale. The post-visit survey consisted of Noffsinger Likert-style questions assessing overall satisfaction with the SMA, as well as questions comparing the experience to an individual clinic visit and measuring the proportion of patients who preferred an individual visit versus SMA for follow-up with the breast surgeon and/or psychologist. Each clinic visit was 2 hours, anticipating a maximum patient capacity of 10. See figure for details of clinic flow.

Results: Three breast pain clinics were held from 08/2019 – 10/2019 with N=8 pre-visit surveys and N=9 post-visit surveys (including N=1 observer). Patients ranged from ages 37 to 70. On pre-visit survey, the majority of patients aimed to gain insight into the etiology of breast pain. During the clinic sessions, multiple patients reported anxiety that the pain was due to underlying breast cancer. Post-visit survey feedback included statements such as, “visit was informative,” “peace of mind that it is not cancer,” “good insight to stress management,” and wish “that there were more people.” Post-visit survey responses included: I heard answers to questions that I did not think to ask (Yes = 77.7%, No = 11.1%, Not sure = 11.1%), I felt comfortable with the handling of confidentiality and privacy (Yes = 100%), I would have preferred today’s visit to have been an individual visit (Yes = 11.1%, No = 66.6%, Not sure = 22.2%).

Conclusions: Group visits have been increasingly utilized in the management, treatment, and education for different chronic diseases and show promise for management of mastodynia. The

effectiveness of the shared medical appointment model should be further investigated in patients with benign breast pain.

Figure: Breast pain clinic flowchart



788296 - Impact of Hormonal Contraceptive Use and Menstrual Irregularities on Early Complications Following Reduction Mammaplasty in Adolescents

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Background/Objective: Undergoing reduction mammaplasty during adolescence is becoming increasingly common to mitigate the negative physical and psychosocial effects of breast hypertrophy earlier in life. It has been hypothesized that hormonal fluctuation in women may increase the risk of developing a postoperative complication, namely hematomas. With contraceptives becoming increasingly prevalent among adolescents, this study seeks to examine the impact of hormonal contraception and menstrual irregularity on the early postoperative outcomes of adolescents undergoing reduction mammaplasty.

Methods: Medication and medical history, perioperative details, and postoperative outcomes data were collected from young women between the ages of 12-21 years undergoing reduction mammaplasty.

Results: A total of 313 subjects were included in analyses. The mean age of surgery was 18 ± 1.6 years, with almost two-thirds of patients (66.1%) characterized as overweight or obese. The majority of patients identified as white (50.4%), followed by black/African American (14.7%) and Hispanic/Latino (5.4%). Approximately 1390 grams of tissue was resected from each patient

(range=375-5695 grams). Fewer than 4% of all patients experienced complications, most notably wound dehiscence (3.5%), suture granuloma or abscess (2.9%), seromas or hematomas (1.6%), minor infection (1.6%), and skin necrosis or loss (0.3%). No patients experienced serious complications such as major infections, fat necrosis, deep vein thrombosis, or pulmonary embolism. A total of 38% of subjects were on some form of hormonal contraception, and 46% had a documented menstrual irregularity, most commonly irregular periods (78%), PCOS (7%), dysmenorrhea (5%), endometriosis (3%), amenorrhea (1%), and abnormal uterine bleeding (1%). Neither hormonal contraceptive use nor having a menstrual irregularity increased the likelihood of developing an early postoperative complication ($p>0.05$, all).

Conclusions: This study is among the first to examine the role of hormonal contraceptive use and menstrual irregularity on developing an early postoperative complication following adolescent reduction mammaplasty. Our sample findings demonstrate that reduction mammaplasty is a relatively safe procedure and that hormonal contraceptive use or menstrual dysregulation should not preclude adolescents from the positive benefits of breast surgery.

786851 - Decoding Idiopathic Granulomatous Mastitis: Have We Reached the End of the Tunnel?

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Background/Objective: To compare the outcomes of different modalities of treatments in IGM and to establish the standard of care

Methods: A prospective randomized trial was conducted. Seventy cases of histopathologically proven granulomatous mastitis were taken up. Fifteen cases with diagnosis of tuberculosis received antitubercular therapy and were excluded from the study. The remaining 55 cases were randomized into 3 groups - Group A (steroid therapy), Group B (wide local excision), and Group C (wide local excision with total duct excision).The cases were followed up for a period of 3 to 8 months. The results were statistically evaluated.

Results: The 3 groups were equally matched regarding age, pregnancy, lactation, significant hyperprolactinaemia, and reactive arthritis. The recurrence rate in Groups A, B, and C were 26%, 75%, and 0% respectively. Superiority of Gr C over Gr B was statistically significant ($p=0.0003$). In 10 out of 13 cases of Gr C , ductal communication was histopathologically evident.

Conclusions: IGM is initiated by ductal leakage leading to prolactin (cytokine-like immunomodulatory function)-induced periductal parenchymal destruction. Recent evidences strongly supports this newly found role of prolactin (caused due to polymorphism of prolactin gene). IGM, therefore, is a disease of the mammary ducts, and enbloc duct excision is curative. Emperical steroid and immunomodulator use is not without side effects and comes at the cost of poor patient compliance. Localised IGM without gross infection is best treated by wide local excision with partial or total duct excision.

Complications

786918 - Surgical Correction of Adolescent Gynecomastia: Complications and Their Impact on Health-related Quality of Life

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Background/Objective: Surgical correction of gynecomastia (male breast gland hypertrophy) improves adolescents' postoperative health-related quality of life (HRQoL). However, operating on adolescents remains controversial. This study examines the frequency of complications in adolescents following gynecomastia repair and measures their impact on patients' postoperative HRQoL.

Methods: The following validated surveys were administered to patients between 12-21 years old undergoing surgical correction of gynecomastia: the Short Form-36v2 (SF-36), Rosenberg Self-Esteem Scale (RSES), and the Eating Attitudes Test (EAT-26). Surveys were completed at baseline, at 6 months, and at 1, 3, 5, and 7 years postoperatively.

Results: Fifty-two patients were included, with a mean age at surgery of 16.8 years and median follow-up time of 17.7 months. Approximately a quarter of the cohort experienced a postoperative complication, most commonly: seroma/hematoma (21%), nipple or breast hypoesthesia (4%), and hypertrophic scarring (4%). Postoperative survey scores did not significantly vary by complication status across all survey measures ($p>0.05$, all). Patients without a complication showed significant postoperative improvements in 4 SF-36 domains (physical functioning, bodily pain, social functioning, and role emotional; $p<0.05$, all). Additionally, patients who experienced at least 1 complication demonstrated significant postoperative improvements in the vitality SF-36 domain, and on the RSES and EAT-26 ($p<0.05$, all).

Conclusions: Complications following gynecomastia repair are common. However, developing a complication does not appear to impact adolescents' overall postoperative HRQoL. Patients largely experience postoperative gains in psychosocial wellbeing regardless of complication status. Fear of potential complications should not preclude otherwise healthy adolescents from enjoying the benefits of surgical gynecomastia correction.

788031 - Opioid Usage in Women Who Undergo Multiple Breast Surgeries Following Therapeutic and Prophylactic Mastectomies for Breast Cancer

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Background/Objective: Women who undergo therapeutic or prophylactic mastectomy for breast cancer are subjected to multiple subsequent surgeries/procedures to achieve the desired cosmetic outcome. The objective was to study the pattern of opioid usage in a population of patients with planned multiple operations.

Methods: We performed a retrospective study on 66 consecutive patients who underwent therapeutic or prophylactic mastectomy 2014-2016 for breast cancer undergoing reconstruction using an implant-based, sub pectoral approach. To study the correlation between factors, we performed the statistical analysis using Analysis of variance method. We evaluated the prescription profile using the facility EMR to extract data on opioid usage in the follow-up period. Chronic opioid use was defined as use past 6 weeks of an operative date.

Results: Patient factors are available in the Table. Average number of surgical procedures performed in a patient were 6.9 (2 to 17). Sixty-four out of 66 patients were opioid naïve. Oxycodone was the most commonly prescribed opioid (62.1%). Correlation between total oral morphine equivalent (OME) prescribed for the first surgery (mean of 327.9) and total OME prescribed for subsequent surgeries (mean of 1233.1) were statistically significant ($p<0.0001$). However, there was no statistically significant association found between Total OME used in the first surgery/subsequent surgeries to chronic opioid usage in the follow-up period ($p=0.96$). One patient in the study became a chronic opioid user following the first surgery (was not opioid naïve) and 7 patients during subsequent surgeries.

Conclusions: Patient's clinical factors such as age, indication of surgery (prophylactic vs therapeutic), stage of cancer, prior opioid use, psychiatric disorder, chemotherapy, endocrine therapy, or radiation do not correlate with increased, or prolonged opioid usage (>6weeks post-op) in the follow-up period. Six of 64 opioid-naïve patients had documented use of opioid in the past 6 weeks. We conclude that the increased number of surgical procedures to which this population is subjected to places them at high risk for chronic opioid usage.

Table: Patient characteristics

Patient characteristics	TOTAL (n=66)
Age, mean (min, max)	47.2 (68, 46)
Indication	
Malignant	26 (39.4%)
Prophylactic	13 (19.7%)
Both	26 (39.4%)
Other	1 (1.5%)
Total # of surgeries, mean (min, max)	6.9 (2, 17)
Type of opioid Rx for periop pain	
Oxycodone	41 (62.1%)
Hydrocodone	19 (28.8%)
Tramadol	3 (4.6%)
Dilaudid	3 (4.6%)
Total OME of periop Rx, mean (min, max)	327.9 (60, 1800)
Total OME of periop prescription for subsequent surgeries	1233.1 (225, 7344)
History of Alcohol Abuse	0 (0%)
History of Drug Use - Opioid	2 (3.0%)
History of Drug Use – Non-Opioid	1 (1.5%)
Use of Preop Opioid	3 (4.6%)
Opioid use beyond 6 wks of 1st surgery	1 (4.0%)
Opioid use beyond 6 wks of subsequent surgeries	8 (12.3%)
1st surgery- mastectomy	
Overnight stay	31 (47%)
Same day surgery	35 (53%)

787983 - The Decline of Axillary Lymph Node Dissection Rates: Implication on Operative Times and Outcomes

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Background/Objective: Management of the axilla in invasive breast cancer (IBC) has shifted away from more radical surgery such as axillary lymph node dissection (ALND), towards less invasive procedures, such as sentinel lymph node biopsy. A previous study utilizing the ACS-NSQIP database showed an overall national downward trend in ALND procedures being performed from 2007-2014. We hypothesized that there continues to be a downward trend in percentage of ALNDs performed for IBC and that this decline may correlate with an increase in operative time and morbidity.

Methods: Patients with IBC were identified in the ACS-NSQIP database from 2007 to 2017. Patients with ICD-9 and ICD-10 codes of malignant neoplasm of female breast and malignant neoplasm of male breast were included. Patients with the following primary CPT codes were identified: partial mastectomy with axillary lymphadenectomy (19302), modified radical mastectomy (19307), superficial axillary lymphadenectomy (38740), and complete axillary

lymphadenectomy (38745). This number was divided by total cases of IBC reported to give us the percentage of patients with IBC undergoing these procedures per year. The average operative time for each procedure was determined by year. Operative times of 0 minutes were excluded. We specifically looked at the operative times of cases involving residents from the years 2007-2012, as resident data was not available after 2012. We determined the 30-day mortality, superficial and deep incisional surgical site infection, wound dehiscence, transfusion requirements, and length of stay (calculated by days from operation to discharge) for each procedure by year. A Cochran-Armitage trend test and linear regressions were used to determine if there was any significant increase or decrease in the included variables over the included years.

Results: The percentage of patients with IBC undergoing ALND significantly decreased over the study period ($p<0.001$). There was no significant trend in rates of superficial or deep surgical site infection, wound dehiscence, or 30-day mortality. Results showed a statistically significant decrease in reoperation rates ($p<0.001$) and a statistically significant increase in perioperative transfusions ($p<0.001$) over the 10-year period. When looking at cases independent of resident involvement, there was no significant change in average operative times over the 10-year period. When looking at cases involving residents, there was a significant increase in the average operative time of modified radical mastectomy ($p<0.001$), but not for the other 3 procedures.

Conclusions: Our study demonstrates that the decline in ALNDs performed for IBC does not correlate with an increase in surgical morbidity or mortality within the NSQIP population, which contradicts our hypothesis. There has not been a clear change in operative times over the last 10 years, suggesting that surgeons are still performing these procedures efficiently. There has been an increase in perioperative transfusions, but the significance of this finding remains unclear. As fewer patients undergo ALND, the patients selected for these procedures likely have higher stage cancer with more axillary metastases, which could possibly contribute to outcomes; however, future research will be needed to assess this hypothesis.

Table: Patient surgical outcomes

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	*p-value*
ALND	3578 (33.2%)	4196 (33.48%)	4585 (30.04%)	4200 (27.87%)	3631 (23.66%)	3967 (22.12%)	4191 (20.11%)	3946 (18.51%)	3020 (17.02%)	4226 (16.33%)	4087 (14.9%)	**<0.001**
SSI	67 (1.87%)	91 (2.17%)	99 (2.16%)	89 (2.12%)	89 (2.45%)	87 (2.19%)	81 (1.93%)	99 (2.51%)	64 (2.12%)	95 (2.25%)	90 (2.2%)	0.4
Infection	20 (0.56%)	29 (0.69%)	36 (0.79%)	29 (0.69%)	30 (0.83%)	27 (0.68%)	31 (0.74%)	15 (0.38%)	24 (0.79%)	35 (0.83%)	23 (0.56%)	0.848
Wound Dehiscence	9 (0.25%)	18 (0.43%)	23 (0.5%)	11 (0.26%)	10 (0.28%)	18 (0.45%)	21 (0.5%)	17 (0.43%)	12 (0.4%)	25 (0.59%)	14 (0.34%)	0.225
Death	3 (0.08%)	5 (0.12%)	3 (0.07%)	9 (0.21%)	6 (0.17%)	4 (0.1%)	5 (0.12%)	1 (0.03%)	1 (0.03%)	1 (0.02%)	4 (0.1%)	0.117
RTOR	306 (8.55%)	278 (6.63%)	314 (6.85%)	231 (5.5%)	165 (4.54%)	174 (4.39%)	191 (4.56%)	124 (3.14%)	116 (3.84%)	158 (3.74%)	131 (3.21%)	**<0.001**
Transfusion	5 (0.14%)	6 (0.14%)	4 (0.09%)	55 (1.31%)	70 (1.93%)	71 (1.79%)	68 (1.62%)	54 (1.37%)	39 (1.29%)	58 (1.37%)	42 (1.03%)	**<0.001**

ALDN- Axillary Node Dissection, SSI- Surgical Site Infection, RTOR- Return To Operating Room

787729 - Adjuvant Chemotherapy Is Not Associated with Increased Rate of Surgical Site Complications Following Intraoperative Radiation Therapy

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Background/Objective: Single-dose intraoperative radiotherapy (IORT) has emerged as an alternative to standard whole-breast radiotherapy as a component of breast-conserving therapy (BCT) for early-stage breast cancer. Because IORT is reserved for patients with biologically favorable tumors, the need for adjuvant chemotherapy is uncommon, and its impact on frequency of wound complications and radiation recall is uncertain. The aim of this study is to determine if adjuvant chemotherapy is associated with an increased rate of complications in patients treated with IORT.

Methods: This retrospective study used data derived from a prospective database of patients receiving single-dose IORT as a component of BCT between Jan 1, 2012 and Oct 31, 2016. Patients with unifocal tumors ≤3cm, cN0 disease, and no evidence of lymphovascular invasion on core needle biopsy were offered partial mastectomy and IORT. Based on final pathology and Oncotype DX score, select patients were also offered adjuvant chemotherapy. Patients who received whole-breast radiotherapy were excluded. Endocrine therapy was recommended to patients with hormone receptor-positive tumors. Surgical site complications including minor dehiscence, superficial wound infections, seroma, and fat necrosis were evaluated during post-operative clinic visits. Incidents of radiation recall were noted during chemotherapy. Major complications were defined by need for hospitalization or reoperation. Minor complications were defined as wounds requiring local wound care or observation.

Results: A total of 178 patients were identified: 20 (10.7%) patients were treated with IORT and chemotherapy (chemo group), and 167 patients with IORT alone (IORT group). Patient age, BMI, histologic type, incision type, and skin bridge thickness were similar between groups. Tumor size was significantly larger in the chemo group (chemo 1.66 vs 1.29 cm, p=0.02) and receptor status was statistically different between the 2 groups (ER+:chemo 75% vs IORT 96%, p<0.001; PR+:chemo 60% vs IORT 85.6%, p=0.01;HER2+ chemo 25% vs IORT 3.6%, p<0.001). Receipt of endocrine therapy was statistically different between groups (chemo 60.0% vs IORT 80.1%, p=0.04). No major complications or radiation recall were noted in either group. There was no significant difference in the rate of minor complications (16.7% chemo vs 13.2% IORT; p=0.18), the rate of complications requiring interventions (chemo 10% vs IORT 6.6%; p>0.99), or types of complications between the 2 groups (Table). One recurrence was noted in the chemo group (5%), and 4 were noted in the IORT group (2.4%) at an average follow-up of 49.8 months (p=0.32).

Conclusions: IORT is a safe and effective treatment option for patients with early-stage breast cancer. The addition of chemotherapy is not associated with an increased rate of complications. These finding may help in the decision making process for patients considering IORT and alleviate concerns regarding use of chemotherapy after IORT.

Table: Clinicopathological features and complication rates in patients undergoing IORT alone and those undergoing IORT followed by adjuvant chemotherapy

Clinicopathologic Features	IORT alone N=167 (%)	IORT + chemo N=20 (%)	p value
Age (years)	63 ± 8.6	60 ± 7.4	0.06
BMI (kg/m^2)	28.8 ± 7	29.2 ± 6.8	0.76
Tumor size (mm)	12.9 ± 0.7	16.6 ± 1.3	0.02
Histologic type:			
Invasive ductal carcinoma	116 (69.5%)	16 (80.0%)	
Invasive lobular carcinoma	6 (3.6%)	0	0.6
Invasive carcinoma with ductal and lobular features	40 (24.0%)	3 (15.0%)	
Other	5 (3.0%)	1 (5.0%)	
Skin bridge thickness (mm)	11.6 ± 0.3	11.2 ± 0.6	0.53
Receptor Status			
ER Positive	160 (95.8%)	15 (75.0%)	<0.001
PR Positive	143 (85.6%)	12 (60.0%)	0.01
Her 2 Positive	6 (3.6%)	5 (25.0%)	<0.001
Triple Negative	4 (2.4%)	4 (20%)	<0.001
Complication (any)	22 (13.2%)	5 (16.7%)	0.18
Complication type:			
Dehiscence	9 (5.4%)	1 (5.0%)	0.62
Infection	0	1 (5.0%)	0.19
Fat necrosis	2 (1.2%)	0	>0.99
Seroma	4 (2.4%)	1 (5.0%)	>0.99
Skin Necrosis	0	1 (5.0%)	0.19
Multiple	7 (4.2%)	1 (5.0%)	>0.99
Intervention required	11 (6.6%)	2 (10.0%)	>0.99
Intervention performed			
Aspiration	1 (9.1%)	1 (50.0%)	
Oral antibiotics	1 (9.1%)	0	0.15
Local wound care/debridement	6 (54.5%)	1 (50.0%)	
Combination	3 (27.3%)	0	

CPM

782944 - Comparative Trends in Contralateral Prophylactic Mastectomy Between County and Private Hospital Settings

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Background/Objective: Contralateral prophylactic mastectomy (CPM) has been extensively studied and found to prolong survival only in patients with deleterious genetic mutations or lobular histology, and use should be limited to these clear indications (Hunt et al, Arpino et al). Despite these recommendations, rates of unindicated CPM have been rising in America (Yao et al). We hypothesized that our county safety-net hospital has different approaches to CPM, genetic testing, patient and tumor demographics, and use of reconstructive surgery compared to a private hospital setting and aim to evaluate these.

Methods: All patients who underwent bilateral mastectomy during a 66-month period from July 2013 to December 2018 at a county hospital (CH) and neighboring private hospital (PH) were identified. Patients with a preoperative diagnosis of bilateral breast cancer were excluded. Patient demographics, ipsilateral tumor characteristics, pre-operative work up, reason for CPM, final pathology, and reconstruction data were collected via retrospective chart review. This study was approved by our institutional review boards.

Results: One hundred patients were included in final analysis: 24 from the PH and 76 from the CH. Results are displayed in the Table. Patient demographics were not statistically different except CH patients were younger (54.8 PH vs 46.7 CH, $p=0.002$) and had less private insurance (82% PH vs 24% CH, $p<0.01$). The PH treated more ER+/PR+ tumors (96/91% PH vs 70/70% CH, $p<0.05$), but HER2/Neu status was similar, and patients were treated with neoadjuvant therapy at the same rate. Genetic testing was more common in the CH group (25% PH vs 63% CH, $p<0.01$), but the rate of positive results was the same. Preoperative MRI was more common at the CH (17% PH vs 62% CH, $p<0.01$), but the rate of suspicious MRI results in the CPM breast was the same. The overall rate of unindicated CPM was not significantly different but trended towards higher at the PH (71% PH vs 55% CH, $p=0.08$). Personal preference as the sole determinant for CPM occurred more often at the PH (67% PH vs 32% CH, $p<0.01$), and suspicious MRI findings were cited more often at the CH (0% PH vs 17% CH, $p<0.01$). Reconstruction rates were similar, but immediate reconstruction was more common at the PH (91% PH vs 50% CH, $p<0.01$).

Conclusions: We were able to study and compare trends in CPM between private and safety-net county hospital settings. This is the first study, to our knowledge, of this type. Overall, the rate of unindicated CPM in both hospital systems was high, consistent with prior literature (Jagsi et al, Yao et al). More patients in the CH underwent genetic testing and MRI prior to CPM surgery, likely reflecting the younger population with denser breasts and more aggressive tumors. MRI should be used with caution, however, as its positive predictive value in our study was only 16% and yet drove 17% of CH patients to seek unindicated CPM. Two-thirds of PH patients had unindicated CPMs based solely on patient preference seemingly demonstrating that private

hospital systems are more prone to “patient-driven medicine”; one-third of the CH CPM patients were also in this group demonstrating safety-net systems are not immune to this phenomenon. Community-education goals should focus on genetic testing indications and implications, dangers of MRIs’ low predictive value, and discrepancy in the use of immediate reconstruction. Weaknesses of our study include small sample size and the retrospective nature.

Table: Patient comparison factors

Factor	Private Hosptial	County Hospital	Z Value	P Value
Average Age (years)	54.8	46.7		0.002
Caucasian	83%	87%	0.46	NS
English as Primary Language	96%	83%	1.6	NS
Married	65%	47%	1.41	NS
Family History of Breast Ca	33%	17%	1.51	NS
Private Insurance	82%	24%	4.66	<0.01
Ipsilateral Tumor Size (cm)	2.65	2.25		0.18
Ipsilateral Tumor ER +	96%	70%	2.39	<0.05
Ipsilateral Tumor PR +	91%	70%	1.96	0.05
Ipsilateral Tumor Her2/Neu +	86%	75%	1.15	NS
Ipsilateral Lobular Tumor	12%	13%	0.1	NS
Neoadjuvant Therapy	21%	34%	1.2	NS
Preoperative MRI	17%	62%	3.84	<0.01
Suspicous MRI Findings	25%	60%	1.36	NS
Peroperative Genetic Testing	25%	63%	3.26	<0.01
Positive Genetic Testing Result	66%	54%	0.6	NS
Rate of Unindicated CPM	71%	55%	1.39	NS
CPM Reason: Personal Preference	67%	32%	3.05	<0.01
CPM Reason: Suspicious MRI findings	0%	17%	2.16	<0.01
Reconstruction Rate	46%	47%	0.09	NS
Immediate Reconstruction Rate	91%	50%	2.43	<0.01

787740 - Decreasing Trend in Contralateral Prophylactic Mastectomy Rate in Average-risk Women with Unilateral Breast Cancer

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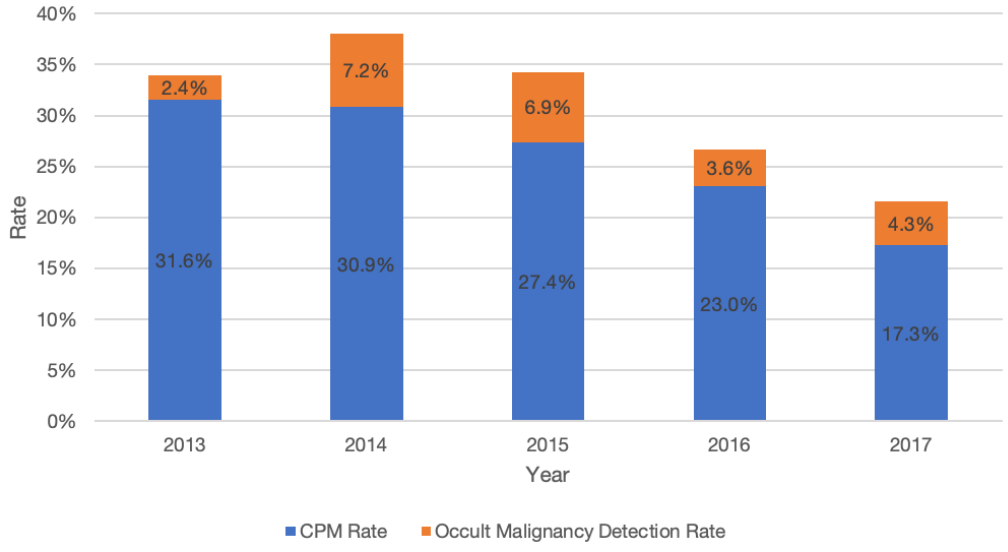
Background/Objective: Despite lack of evidence for survival benefit, recent studies have shown increasing rates of contralateral prophylactic mastectomy (CPM) among women with unilateral breast cancer. To reduce unnecessary surgery and prevent overtreatment of early-stage breast cancer, there is consensus to counsel the average-risk patient about the limited benefit compared to risks of CPMs. In 2012, review of our practice revealed higher-than-expected CPM rates. Our first objective was to evaluate pathological findings in CPM specimens at our institution to assess the rate of occult malignancy and high-risk lesions. We hypothesized that there will be a low risk of malignancy in CPMs. Our second objective was to evaluate the trend in CPM rates over 5 years.

Methods: All patients who received a breast cancer surgery between 2013 to 2017 were identified using our institution's prospective clinical database. Patients with unilateral breast cancer who were treated with total mastectomy and CPM were included, and patients with BRCA or other genetic predispositions were excluded. CPM, pathology, and reconstruction data were prospectively collected and verified by chart review. Where appropriate, logistic or Poisson regression models were constructed for statistical analyses using R.

Results: Between 2013 to 2017, 3076 patients underwent breast cancer surgery, and 357 met inclusion criteria. In review of our CPM pathology, occult malignancy was identified in 5.04% of cases. The occult malignancy detection rate did not statistically change over the 5-year period ($p=0.826$). Additionally, 5.6% of cases identified benign pathologies, including ADH, ALH, or radial scar. The vast majority of CPMs contained benign breast tissue. Over the 5-year period, CPM rates significantly decreased from 31.6% to 17.3% ($p<0.001$) (Figure). Using a Poisson regression model, on average the CPM rate decreased by 13.2% each year. The reconstruction rate in patients who received a CPM was 68.8%, compared to 45.1% in patient who did not receive a CPM, and this difference was statistically significant ($p<0.001$). The reconstruction rates in patients who received a CPM did not significantly change over the 5-year period ($p=0.551$).

Conclusions: Our results support findings in the literature that there is a low risk of malignancy in CPMs, and thus warrants continued advocacy and patient education to reduce the number of CPMs performed. In contrast to literature from the U.S., our institution showed a decreasing trend of CPMs over this 5-year period after identifying a high CPM rate in 2012. Our results suggest that CPM rates may offer an actionable opportunity to de-escalate surgery for breast cancer, prevent overtreatment of early-stage breast cancer, and could potentially serve as a quality indicator for institutions to monitor breast cancer care. Interestingly, reconstruction rates were higher among patients who received a CPM than patients overall, perhaps identifying a factor in patient's decision-making. Future studies should focus on prospectively collected data on patient's reasons for CPM to identify opportunities to further reduce the number of CPMs performed.

Figure: CPM rates in average-risk patients with unilateral breast cancer and occult malignancy detection rate by year



787944 - Contributing Factors to Persistent Rates of Contralateral Prophylactic Mastectomy in Breast Cancer Patients

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Background/Objective: In 2016, at the urging of The American Society of Breast Surgeons (ASBrS), a multidisciplinary panel outlined definitive guidelines for contralateral prophylactic mastectomy (CPM). Despite this statement, rates of CPM have remained steady; the objective of this study was to identify factors contributing to the pervasive usage of CPM.

Methods: Analysis was done for breast cancer patients at a single institution from 2014-2018. The patients were divided according to whether they received unindicated CPMs. We defined indicated CPMs defined by ASBrS consensus guidelines, such as genetic carriers, strong family history, and history of mantle cell radiation. Patient-level factors, including race, salary, type of insurance, location of care, stage of breast cancer, were obtained. Physician- and system-level factors were collected. Univariate analysis was used to identify significant dependent variables to incorporate into a multivariate model.

Results: A total of 1,270 patients were evaluated. Unindicated CPM rates remained steady throughout the time period (2014=84, 2015=80, 2016=88, 2017=89, 2018=61). On univariate analysis, nonsmoking status ($p<0.004$), higher median salary by ZIP code ($p<0.001$), white race ($p<0.001$), commercial insurance ($p<0.001$), surgery performed at an academic center($p<0.001$), early-stage cancer ($p<0.001$), and preoperative visit to a plastic surgeon ($p<0.001$) was predictive of unindicated CPM. On multivariate logistic regression, unindicated CPM patients were more likely to be performed on patients with median salary by ZIP code >$125,000 vs <$75,000 (OR=1.79, $p=0.0334$) or have an operation at an academic versus community hospital (OR=1.81,$p=0.0144$). Patients receiving reconstruction with implants (OR=3.90, $p<0.0001$) and expanders (OR=2.32,$p<0.0001$) are predictive of receiving unindicated CPM versus reconstruction.

Conclusions: CPM rates have remained steady since the ASBrS consensus statement encouraging contralateral breast conservation. Most women receiving CPM tended to be of higher socioeconomic status in an academic setting receiving immediate reconstruction. These results inform both oncologic and reconstructive providers and highlight the need for education on risks of unindicated CPM.

787892 - Contralateral Prophylactic Mastectomy Trends and Outcomes for Non-metastatic Inflammatory Breast Cancer: Stage-stratified Propensity Scoring Analysis of NCDB

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Background/Objective: A limited number of studies looked into performing contralateral prophylactic mastectomies (CPM) for non-metastatic inflammatory breast cancer (IBC). The purpose of this study is to examine the trends and survival outcomes of performing CPM in IBC patients using the National Cancer Database (NCDB).

Methods: NCDB data from 2004 to 2014 were retrospectively analyzed. Patients' demographics, tumor characteristics, and survival trends and outcomes were compared between Stages I-III IBC patients who underwent a CPM and those who did not (no-CPM). Univariate, multivariate, and propensity score weighted analyses were performed to compare study groups and overall mortality (OM).

Results: A total of 2,467 (23.25%) CPM and 8,146 (76.75%) no-CPM cases were identified. Median follow-up was 58.64 months. In comparison to no-CPM patients, CPM patients were more likely to be younger (Mean:52, SD:11.5 vs. Mean:57.9,SD: 13), be White, American-Indian or non-Hispanic, have a private insurance, have higher education and income, have less comorbidities, with an ER+/PR+/HER2+ tumor ($p<0.001$). Performing CPM vs. no-CPM was not associated with the stage of the disease - Stage I (22-29% vs. 53-71%), II (64-20% vs. 257-80%), or III (2,381-23% vs. 7,836-77%), $p=0.17$. The rate of CPM significantly increased from 13.70% in 2004 to 28.98% in 2014 ($p<0.001$). CPM was associated with a lower 90-day OM compared to no-CPM (0.85% vs. 1.83%, $p=0.002$). There was no association between CPM and 30-day OM or 30-day readmission (both $p>0.05$). In the adjusted propensity score weighted analysis, CPM was not associated with OM in Stage I (HR:0.61, $p=0.32$) and Stage II cases (HR:0.79, $p=0.34$); however, there was evidence of 34% lower hazard of OM in CPM compared to no-CPM in stage III (HR: 0.66, $p<0.001$) cases.

Conclusions: Our data suggest that there might be a survival benefit to performing CPM in Stage III IBC patients. This conclusion is limited as NCDB does not report the reason and indications for performing CPM. Additional large studies exploring this association further should be performed.

787138 - The Role of Contralateral Prophylactic Mastectomy in Women with Unilateral Breast Cancer Who Are Genetic Carriers, Have A Strong Family History, or Are Just Young at Presentation

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Background/Objective: The incidence of contralateral prophylactic mastectomy (CPM) in women with breast cancer is increasing despite improvement in modern, multidisciplinary, oncologic management, which has led to a reduction in the incidence of contralateral breast cancer (CBC). In light of this, the role of CPM in breast cancer management, including its impact on CBC risk, overall survival (OS), and disease-free survival (DFS) is questionable. The American Society of Breast Surgeons' Consensus Statement in 2016 concluded that CPM should be discouraged for an 'average-risk' woman with unilateral breast cancer, acknowledging the importance of shared decision-making, and patients' goals when considering CPM. This review explores the current evidence underpinning the role of CPM and its effect on CBC risk and survival in 3 specific high-risk groups affected by unilateral breast cancer: genetic carriers of high-risk BRCA mutations and moderate penetrance genes, those with a strong family history (FH) but with no demonstrable mutation, and women who are just young at presentation.

Methods: A comprehensive literature review was performed, assessing all studies published in the English literature from 1974 to March 2019 across Embase and Medline search engines. Search terms 'contralateral prophylactic mastectomy', 'unilateral breast cancer', 'BRCA', 'TP53', 'PALB2', 'CHEK2', 'ATM', 'mutation carrier', 'family history', 'young women', 'non-genetic carriers', 'overall survival', 'disease-free survival', 'contralateral breast cancer' and 'risk' were included.

Results: For BRCA carriers with unilateral breast cancer, 8 studies reported on the role of CPM in BRCA1/2 mutation carriers with unilateral breast cancer (UBC). Two of the 8 studies investigated the risk reduction of developing CBC following CPM, with a meta-analysis demonstrating a significant relative risk reduction of 0.072 [95% CI (0.035- 0.148)]. Five of the 8 studies reported that CPM does not improve survival. For non-BRCA genetic mutation carriers with unilateral breast cancer, there are no studies specifically investigating the role of CPM on CBC risk and survival in TP53, PALB2, PTEN and CDH1 mutation carriers. CBC risk does not appear to be elevated in the more frequent mis-sense ATM mutations. One recent meta-analysis demonstrated an increased risk of CBC in CHEK2*1100delC mutation carriers, but no studies have been conducted on the role of CPM on overall CBC risk or survival. For elevated familial risk with no inherited mutation and unilateral breast cancer, most available studies on elevated familial/genetic risk carry substantial heterogeneity, with most not having screened out genetic carriers. Within this limitation, one recent meta-analysis suggested that CPM confers a reduction in pooled absolute and relative risk of CBC and the rate of distant/metastatic recurrence. A Cochrane review suggested that despite the reduction in CBC risk, breast cancer survival is not improved with CPM. For young women with unilateral breast cancer, 8 cohort studies reported on the role of CPM on CBC risk and survival in young women, with this age definition ranging from <35 years to <49 years. No study specifically screened for, or excluded mutation carriers or

strong family history of breast cancer. The data was conflicting, with 5 of the 8 studies reporting that CPM did not confer survival benefit in young women.

Conclusions: This review supports the role of CPM in patients with high penetrance BRCA 1/2 mutations who develop unilateral breast cancer. Even in this high-risk group, whether this translates to a survival benefit remains controversial. More research on the role of CPM in the presence of moderate penetrance genes is required. The role of CPM in familial breast cancer and young age at breast cancer diagnosis is less clear, as the reported studies carry significant heterogeneity and potential selection bias. Meta-analyses in these 2 groups with the identification and exclusion of mutation carriers would be informative. The interpretation of the available evidence supports current guidelines in individualizing the recommendations for CPM by risk-stratification.

DCIS

787668 - Feasibility of Lumpectomy Surgery for Large Ductal Carcinoma In Situ

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Background/Objective: The diagnosis and management of large ductal carcinoma in situ (L-DCIS) remains a clinical challenge. Determining feasibility of breast conservation depends on the ability to estimate extent of disease. This study assessed characteristics of a cohort of patients with L-DCIS, as well as the reliability of preoperative MRI in predicting size of tumor.

Methods: We retrospectively identified patients treated by a single surgeon with DCIS diagnosed on core biopsy. Our study population was classified according to histopathological tumor size wherein L-DCIS is defined as 4 cm or larger and small DCIS (S-DCIS) is less than 4 cm.

Results: A total of 270 patients diagnosed with DCIS on core biopsy were ascertained, 55 of which had tumors 4 cm or larger. Overall, the average tumor size was 6.9 cm (range 4 – 13.4 cm). Mastectomy was performed on 36 women (65.4%) with L-DCIS, compared to 18.6% in S-DCIS. Lumpectomy was performed initially on 48 women (87.2%) L-DCIS; however, 29 women (52.7%) eventually received mastectomy for positive margins. Twenty-five patients (86.2%) of the latter had residual disease, measuring on average 1.6 cm. Upstaging to invasive disease occurred in 36.4% for L-DCIS versus 15.3% for the S-DCIS cohort. There was no difference in average tumor size for L-DCIS who successfully underwent lumpectomy versus mastectomy, 6.95 cm (range 4 – 8.7 cm) versus 6.99 cm (range 4.3 – 13.4 cm), respectively. Preoperative breast MRI was performed in 24 women (43.6%) in L-DCIS, with 16.7% demonstrating a mass and 83.3% showing non-mass enhancement. MRI accurately estimated tumor size to within 1 cm in only 12.5% of patients. It underestimated size in 50% of patients, by a mean of 3.6 cm. Conversely, tumor size was overestimated by a mean of 2.7cm in 37.5% of patients, and 80% of these were ultimately treated by mastectomy.

Conclusions: Lumpectomy surgery was successful in 34.6% of L-DCIS cohort. However, no difference in tumor size was observed between patients who underwent lumpectomy versus mastectomy. MRI findings did not correlate well with histopathological tumor size. Upstaging to invasive disease was higher in the L-DCIS than S-DCIS cohort. Other factors such as cosmesis, location of tumor, and breast size may influence lumpectomy feasibility in L-DCIS.

788138 - Impact of Pre-operative MRI on Ductal Carcinoma in Situ Surgical Outcomes: A Study in Canadian Women

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Background/Objective: Ductal carcinoma in situ (DCIS) poses diagnostic challenges. Mammography is the primary tool used for DCIS detection; however, extent of disease beyond radiographic calcifications is difficult to determine, leading to rates of positive resection margins as high as 25%. Although there is no standard recommendation for pre-operative magnetic resonance imaging (MRI) in DCIS, there has been an increase in its use. However, its benefit remains controversial. We examined patterns and impact of MRI usage in a cohort of Canadian women.

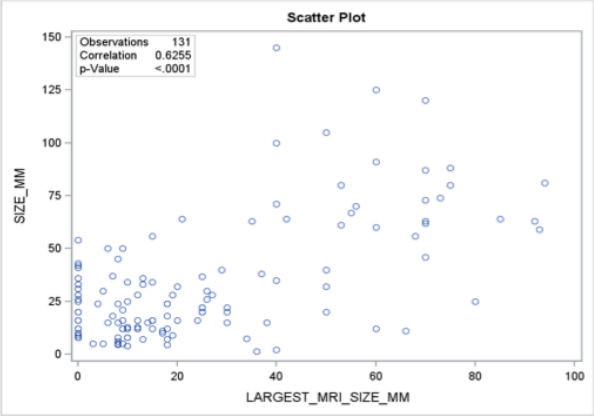
Methods: Women who underwent surgery between 2007-2017 at a high-volume tertiary cancer center for a first diagnosis of pure DCIS were retrospectively reviewed. All patients underwent conventional breast imaging, while MRI use was left to the discretion of the provider. Primary outcome of interest was to examine patterns of MRI use, and whether MRI changed the surgical management. Secondary aims were to assess the accuracy of MRI in estimating size of DCIS, and to identify the impact of MRI on re-excision rates and local recurrence rates, if any. For this analysis, patients were excluded if they had microinvasive DCIS, or a prior diagnosis of invasive or in situ breast cancer. The correlation between MRI size and true pathological size was analyzed using Pearson correlation co-efficient.

Results: Overall, 461 consecutive patients who underwent breast surgery for pure DCIS were included in this cohort. Median age at time of diagnosis was 57 (Interquartile range (IQR): 50-64). Of the 461 patients, 162 (35.1%) underwent MRI. Those who had MRI were more likely to be younger (Median age of 54; IQR: 46-62, $p<0.001$). In 8 patients (4.9%), MRI led to a change in surgical plan from breast conservation to mastectomy. Re-excision rates for positive margins was slightly higher in those who underwent MRI (25.3%), when compared to those who did not (23.1%) ($p=0.034$). Overall in-breast recurrence rates for all 461 patients was 4.3%, with a median time to recurrence of 4 years. In-breast recurrence rates were not statistically different between the 2 groups: patients who had MRIs had an in-breast tumor recurrence rate of 6.2%, versus 3.3% in those who did not ($p=0.155$). With respect to agreement between pathological size and MRI estimation of size, the correlation showed a moderate linear relationship between the measurements (correlation coefficient $(R)=0.625$, $p<0.0001$) (Figure).

Conclusions: In this cohort, MRI lead to more mastectomies but did not decrease re-excision or local recurrence rates. Although MRI estimated the size of DCIS moderately well, it had little added value to conventional breast imaging for surgical outcomes and should be used cautiously in the management of DCIS for women over 50.

Figures: Scatterplots

Figure 1a Scatterplot (left, below); Figure 1b (right, below) Scatterplot with linear regression and Loess Curve of Best fit demonstrating the agreement between pathological size and MRI estimation of disease size in this cohort of 461 consecutive women diagnosed and treated with a first diagnosis of DCIS (2007-2017). The correlation showed a moderate linear relationship between the measurements (correlation coefficient (R)=0.625, p<0.0001).



787434 - Sentinel Lymph Node Biopsy for Ductal Carcinoma In Situ: Can Radiologist Estimation of Percent of Lesion Biopsied Predict Upstage to Invasive Cancer?

Sonam Kapadia[1], Albert Lee[2], Amy Kaji[2], Amy Polverini[3], Junko Ozao-Choy[2], Christine Dauphine[2]

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Background/Objective: The upstage rate from ductal carcinoma in-situ (DCIS) on preoperative core needle biopsy to invasive carcinoma at definitive excision ranges from 20 to 30%. In patients with high-grade DCIS or those undergoing mastectomy, sentinel lymph node biopsy (SLNB) is often routinely performed at the time of initial surgical excision to avoid the need for reoperation to perform SLNB or inability to perform subsequent lymphatic mapping altogether when upstage occurs. Prior studies have identified grade, lesion size, presence of mass at the biopsy site, and suspicion for microinvasion to be most consistently predictive of upstage. Still, upstage remains difficult to predict, and many surgeons continue to perform SLNB routinely in DCIS cases, particularly with mastectomy. Intuitively, minimizing core needle biopsy sampling error should lower upstage rates. The purpose of this study was to evaluate whether the proportion of lesion biopsied was predictive of upstage and if this factor could help determine which patients can forego concurrent SLNB.

Methods: Patients with DCIS on preoperative core needle biopsy were identified using a prospectively maintained biopsy log from 2008-2018 at a single institution. Clinical, imaging, pathologic, and procedural factors were retrospectively collected. A board-certified breast radiologist reviewed pre- and post-biopsy radiographs to categorize patients according to proportion of lesion biopsied and thus removed (≤10%, 11-49%, 50-89%, ≥90%). Univariate and

multivariable analyses of the above factors were performed to determine association with the primary outcome of upstaging to invasive cancer.

Results: Of 231 patients diagnosed with DCIS on core needle biopsy, 57 (24.7%) were upstaged to invasive disease at excision. Mastectomy was performed in 109 patients (47.2%), lumpectomy in 122 (52.8%), and concurrent SLNB in 167 (72.3%). Proportion of lesion removed on core biopsy (p=0.005), mass lesion (p=0.0005), and suspicion for invasion (p=0.01) were independently predictive of DCIS upstage. Biopsy removal of 90% or more of the lesion significantly decreased the likelihood of upstage (OR 0.2, 0.1-0.6, p=0.005). Of the 174 patients that did not upstage, 115 (66.1%) underwent SLNB at the time of resection. In 36 of these patients, greater than 90% of the initial lesion had been core-biopsied, and there was no suspicion for invasion, mass, or PR negativity. Conversely, in 57 patients with upstage to invasive cancer, 52 (91.2%) had a SLNB performed at the initial operation. Three out of the 5 patients that required SLNB at a second operation had 10% or less of the initial lesion biopsied. Of the 70 patients with 90% or more lesion removal on biopsy, 66 (94.3%) did not upstage, whereas 3 of the 4 patients that did upstage had suspicion for invasion and PR negativity on core biopsy. In the 62 patients with 10% or less removed at biopsy, 31 (50%) upstaged.

Conclusions: This study demonstrates that the proportion of lesion biopsied is an independent predictor of upstage from DCIS to invasive breast cancer. In addition to nuclear grade, suspicion for invasion, and presence of mass lesion, proportion of lesion removed on core biopsy may help guide surgeons' decision to perform SLNB at the time of initial resection. Furthermore, we propose that radiology consider adding this estimation to post-procedure reports, and when feasible, aim for biopsy of 90% or greater of the mammographic lesion.

Table: Predictors of DCIS upstage

	Upstaged (n=57)	**Not Upstaged** (n=174)	**Univariate Odds Ratio** (95% CI)	**p-value**	**Multivariate Odds Ratio** (95% CI)	**p-value**
10% or less removed (n=62)	31 (50%)	31 (50%)	OR=7.9, 3.9-16.1	**p<0.0001**		
90% or more removed (n=70)	4 (5.7%)	66 (94.3%)	OR=0.1, 0.05-0.4	**p<0.0001**	OR=0.2, 0.1-0.6	**p=0.005**
Mass lesion (n=61)	28 (45.9%)	33 (54.1%)	OR=4.5, 2.3-8.7	**p<0.0001**	OR=3.9, 1.8-8.3	**p=0.0005**
Suspicious for invasion (n=47)	22 (46.8%)	25 (53.2%)	OR=3.7, 1.9-7.4	**p<0.0001**	OR=2.8, 1.3-6.3	**p=0.01**
PR positive (n=147)	27 (18.4%)	120 (81.6%)	OR=0.4, 0.2-0.7	**p=0.003**	OR=0.6, 0.3-1.3	p=0.2
Biopsy nuclear grade (n=230)				**p=0.04**	OR=1.6, 0.9-2.9	p=0.08

787847 - Axillary Staging in the Setting of a Preoperative Diagnosis of Ductal Cancer In Situ (DCIS): Results of an International Expert Panel and a Critical Guideline Performance Using Frequentist and Bayesian Analysis

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Background/Objective: Sentinel lymph node biopsy (SLNB) is not routine in DCIS. Guidelines suggest SLNB when there is high risk for underlying invasion (large size, high grade, symptomatic lesion) or for detection failure (e.g., after mastectomy). However, guidelines and current practice patterns are inconsistent. Moreover, whilst SLNB is thought to be feasible and accurate after wide local excision (WLE), there is less consensus to support its use after oncoplastic breast-conserving surgery (OPBCS), which can reduce the need for mastectomy (Mx) and is gradually adopted as standard of care. The study aim was to assess if guidelines or individualized assessment result in optimal selection of patients for upfront SLNB.

Methods: A panel of 28 international experts (20 surgeons, 8 oncologists, Europe 20, USA 5, Asia/Australia 3) was formed, all blind to the identity of the others. They reviewed anonymized patient cases from the SentiNot study (n=184, m. age 60 years, DCIS m. size 4 cm, Grade 2/3= 36%/64%, mass lesions 13,4%, underlying invasion 24.5%) and answer if they would consider upfront SLNB and why. Consensus and majority were set to >75 and >50%. At the same time, 6 independent raters (4 surgeons, 2 oncologists) reviewed guidelines and assessed the same patient cases per each guideline. Accuracy in relation to underlying invasion was assessed by Receiver Operating Characteristic (ROC) curves and Area Under the Curve (AUC) was reported. Agreement was investigated by kappa statistics and decision-making patterns by logistic multivariate regression and cluster analysis. To allow for flexibility and adaptation to current knowledge, both a frequentist and a Bayesian approach were undertaken. Priors were adjusted after a literature review regarding the factors that are commonly thought to be associated with higher risk for underlying invasion.

Results: A total of 44,896 decisions were retrieved and analysed. The panel reached consensus/majority for upfront SLNB in 41.3/61.4%, whereas individual rates ranged from 11 to 100%. Agreement among panelists was low (kappa=0.37). In multivariate regression analysis for the entire panel, type of surgery was the most common determinant, (simple WLE=less, OPBCS=more and Mx=constant for SLNB), followed by symptomatic diagnosis and DCIS size. Most (26) members had a clear decision-making pattern regarding SLND, based mainly on DCIS size and type of surgery. Individual decision-making performed modestly in identifying patients with underlying invasion (AUC range 0,47-0,59), resulting mainly in overtreatment in 44-77% of patients. The panel performed similarly by majority (AUC 0,5) and by consensus (AUC 0,55) but “undertreated” 60-75% of patients with invasion, failing to identify them as "high-risk." After the recognition of different decision-making patterns, panelists were divided in subgroups with similar decision-making pattern. Analysis identified subgroups with difference in SLNB rate but not with better AUC. The disagreement among panelists in the same subgroups was significant, not only regarding which patients should undergo SLNB, but also on what factors that recommendation was based on. Eight guidelines with relevant recommendations were identified [USA (ASCO/NCCN), Europe (ESMO), Sweden, Denmark, UK, Netherlands and Italy, retrieval date May 2019]. Agreement among raters for each guideline separately varied (kappa: 0.23-0.9). Interpretation as to whether SLNB should be performed ranged widely (40-90%) and with varying concordance (32-88%). No guideline demonstrated accuracy (AUC range 0.45-0.55). Overtreatment risk was high (50-90%), whereas 10-50% of patients with invasion were not identified as “high- risk.” Agreement across guidelines was low (kappa=0.24), meaning that different patients had similar risk to be treated inaccurately, regardless of which guideline was examined.

Conclusions: Individualized decision-making and guideline interpretation may be highly subjective and with low accuracy in terms of prediction of invasive disease, resulting in almost random risk for over- or undertreatment of the axilla in patients with DCIS. This suggests that current views and guidelines should be challenged. More accurate preoperative workup and novel techniques to allow for delayed SLNB may be of value in this setting.

787566 - Multispecialty Physician Knowledge About Recurrence Rates with DCIS Does Not Influence Physician Opinions on Observing DCIS

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Background/Objective: Several randomized trials are examining the efficacy of observing ductal carcinoma in situ (DCIS). We hypothesized that physicians with high knowledge about DCIS recurrence rates would feel more comfortable placing a patient on a trial of observation of DCIS.

Methods: A cross-sectional survey was sent to multispecialty physicians working at breast centers accredited by the National Accreditation Program for Breast Centers (NAPBC). Respondents were assigned a "high" knowledge score if they answered 3 or 4 questions correctly about local recurrence with and without treatment and distant recurrence with treatment. We also assessed respondent's answers to distant recurrence risk without treatment but did not include this in the composite knowledge score because of lack of robust data. Multivariate logistic regression models assessed association between physician factors and knowledge and opinions on observation of DCIS

Results: There were 968 physicians out of 1761 (55.0%) who responded to the survey from 379 out of 603 (63%) NAPBC centers. Three hundred twenty-two (34.3%) of the responders were breast surgeons, 300 (32.0%) were medical oncologists, and 316 (33.7%) were radiation oncologists. Three hundred eighty (40.9%) physicians answered correctly the local recurrence risk after lumpectomy without radiation as 20-40%, 554 (60%) selected 5-10% local recurrence risk for lumpectomy with radiation, and 755 (81.2%) selected <5% for mastectomy. When asked for the best guess of the 10-year distant recurrence risk with surgery, 218 (23.6%) correctly chose <1%. Overall, 301 (32%) of physicians had a high knowledge composite score. Sixty-four (21.3%) of medical oncologists, 104 (34.6%) of radiation oncologists, and 127 (42.2%) of surgeons had high knowledge. On multivariate analysis adjusting for physician demographic factors, surgeons (OR=2.1, 95% CI1.4-3.1), 5-9 years in practice (OR=2.0, 95% CI 1.1-3.9), >20 years in practice (OR= 3.2, 95% CI 1.3-8.1) and female gender (OR = 1.5, 95% CI 1.1-1.9) were significantly associated with higher composite knowledge scores. When asked about distant recurrence risk without surgery, 80 (8.9%) physicians chose <1%, 279 (31%) chose 1-2%, 285 (31.7%) chose 3-5% and 256 (28.4%) chose >5%. On multivariate analysis adjusting for physician demographic factors, surgeons (OR=2.9, 95% CI 1.4-5.7) were more likely to choose >5% distant risk without treatment then other physician types. Only 326 (35%) of physicians felt comfortable observing DCIS and 212 (22%) of physicians stated it would be very or fairly easy to recruit DCIS patients to a clinical trial of observation of DCIS. A multivariate model adjusting for physician demographic factors, composite knowledge score, and response on distant recurrence without treatment, demonstrated that physicians who predicted a >5% distant

recurrence risk with no treatment were less likely to feel comfortable with observing low-grade DCIS (OR=0.56, 95% CI 0.40-0.80). There were no other significant independent predictors of comfort level in observing DCIS or opinions on how easy it is to recruit patients to a clinical trial of observation for DCIS.

Conclusions: These findings suggest low recruitment to DCIS observation studies may in part stem from physician concerns about distant progression of disease without treatment but are not associated with physician demographic factors or recurrence risk knowledge.

Disparities

780730 - Does Residing in a Medicaid Expansion State Mitigate Racial Disparities in Reconstruction Rates?

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Background/Objective: Post-mastectomy reconstruction rates have increased in the past 2 decades, but disparities exist between Caucasian and African American (AA) patients. Factors contributing to this disparity include patient age, race, socioeconomic status (SES) and education level. While studies have shown disparities based on insurance status, no studies have evaluated the impact of Medicaid expansion on reconstruction disparity. We hypothesize that there are differences in the rate of reconstruction across the country based on race, and that Medicaid expansion has increased access to reconstruction. The primary aim of this study was to utilize the National Cancer Database (NCDB) to characterize breast reconstruction patterns across the United States according to race. A secondary aim was to determine if Medicaid expansion affected receipt of reconstruction.

Methods: The NCDB was examined to identify all women who underwent mastectomy with or without reconstruction between 2004-2016. The association of clinicopathologic variables with the receipt of reconstruction was assessed. A descriptive analysis for all variables of interest was performed and stratified by race. Univariate and multivariate logistic regression models were fit to assess association between variables of interest and the receipt of reconstruction, both without and with stratification by race.

Results: A total of 302,791 patients underwent mastectomy, of which 109,604 (36.2%) underwent reconstruction. AA patients accounted for 9.7% of those patients undergoing mastectomy, and 6.0% of all patients had Medicaid coverage. 182,818 (60.4%) of patients resided in states that underwent Medicaid expansion. Caucasian patients were less likely to have Medicaid insurance vs AA (4.9 vs 12.3%, $p<0.01$). Patients in the Northeast had the highest rates of reconstruction comparted to other parts of the country, regardless of race (OR = 1.00 vs 0.72-0.81, $p<0.001$). Caucasian patients in Medicaid expansion states were less likely to receive reconstruction, although the association was not robust (OR 0.97, CI 0.94-0.99, $p<0.009$). Medicaid expansion was not associated with the receipt of reconstruction in AA patients (OR 1.06, CI 0.98-1.15, $p=0.130$).

Conclusions: In line with previous analyses, this study also found that younger age, Caucasian race, higher SES, and lower-stage tumors were all associated with the receipt of breast reconstruction after mastectomy for breast cancer. The Northeast region had the highest rates of reconstruction across the country, regardless of race. Medicaid expansion was a significant factor in reconstruction for Caucasian patients, but not for AA patients. Further studies are needed to determine the reason for reconstruction disparities, despite Medicaid access for AA patients.

Table: Multivariate analysis of factors associated with the receipt of reconstruction

	Caucasian patients			African American patients		
Covariate	N(%)	Odd Ratio (95% CI)	p-value	N(%)	Odds Ratio (95% CI)	p-value
Age			<0.001			<0.001
≤65	164,328 (64.4)	3.6 (3.48-3.72)		20,268 (69.2)	4.12 (3.75-4.52)	
>65	90,870 (35.6)	Ref		9,001(30.8)	Ref	
Primary Payor			<0.001			<0.001
Medicaid	12,543 (4.9)	0.47 (0.45-0.49)		3,599(12.3)	0.49 (0.45-0.54)	
Non-Medicaid	242,655 (95.1)	Ref		25,670(87.7)	Ref	
Medicaid Expansion			0.009			0.130
Yes	154,255(60.4)	0.97 (0.94-0.99)		14,669 (50.2)	1.06 (0.98-1.15)	
No	100,943 (39.6)	Ref		14,600 (49.8)	Ref	
Location			<0.001			<0.001
South	95,027(37.2)	0.81 (0.79-0.84)		16,980 (58.0)	0.62 (0.56-0.68)	
Midwest	68,800(27.0)	0.85 (0.81-0.86)		5,466(18.7)	0.63 (0.57-0.69)	
West	41,666 (16.3)	0.72 (0.70-0.74)		1,407 (4.8)	0.69 (0.60-0.79)	
Northeast	49,705(19.5)	Ref		5,416(18.5)	Ref	

787046 - Barriers to Equitable Distribution of Nipple-sparing Mastectomy in Academic versus Community Hospitals

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Background/Objective: Nipple-sparing mastectomy (NSM) represents a radical departure from the Halsted mastectomy; however, there have been no studies examining the equitable distribution of NSM. Several studies have highlighted worse survival after breast cancer and time to mastectomy in disadvantaged populations. The objective of this study is to examine factors associated with inequitable distribution of NSM within the largest health system encompassing the Washington D.C. and Maryland areas.

Methods: A retrospective chart review from 2014 to 2018 identified all mastectomies performed for breast cancer across 10 hospitals. Patients with incomplete data, such as mastectomy weight, staging, or other patient characteristics, or exceeding 365 days after biopsy proven diagnosis before mastectomy were eliminated from the analysis. Patients were categorized to receiving NSM or other mastectomies (OM). Demographic information including race, insurance type, location of hospital, median income by ZIP code, and disease characteristics were collected. Provider-level and systems-level variables, such as hospital of operation and insurance status, was determined. Univariate analysis and multiple multivariable logistic regression models were performed. Tests for spatial dependency were performed.

Results: A cohort of 1183 patients were identified, with 394 having received NSM. The average age was 55 years (NSM: 48.6, OM: 59.1, $p<0.001$). The average Charlson comorbidity score was 3.38 (NSM: 2.49, OM: 3.82, $p<0.001$). The average BMI was 28.3 (NSM: 24.9, OM 29.9, $p<0.001$). The average mastectomy weight was 679 g (NSM: 383.7, OM: 827.9, $p<0.001$). The average median income by ZIP code was $94,443 (NSM: $109,669, OM: $86,824, $p<0.001$). 42% of White patients (n=610) and 21.0% of Black patients (n=424) received NSM ($p<0.001$). 38.1% of commercial insurance (n=986), 15.5% of Medicaid (n=90), and 9.3% of Medicare (n=107) patients received NSM ($p<0.001$). 42.0% (n=862) of patients treated at academic centers and 9.96% (n=321) of patients treated at community centers received NSM ($p<0.001$). In a logistic regression model, age ($p=0.001$), history of radiation (OR=0.21,$p<0.001$), Medicaid vs commercial insurance (OR=0.36,$p<0.001$), Stage 3 (OR=0.31,$p<0.001$) vs Stage 0 average mastectomy weight ($p<0.001$), reconstruction performed (OR=7.31,$p<0.001$), and community vs academic practices (OR=0.16,$p<0.0001$) were significant. No spatial dependency was detected (Moran's I coefficient = -0.00085).

Conclusions: This study highlights critical disparities in receipt of NSM beyond disease characteristics in our health system, particularly treatment in a community setting and Medicaid insurance status. Future interventions should be designed based on these findings to ensure equitable distribution of care.

788117 - Regional Variations in the Use of Endocrine Therapy

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Background/Objective: Patients with hormone receptor-positive (HR+) breast cancers should be offered hormone therapy (HT) to prevent recurrence. Previously published data indicate that African American (AA) women have a greater mortality from breast cancer than their Caucasian counterparts, and this effect is amplified in certain large cities across the country. While overall survival for HR+ breast cancers is improving, there remains a gap in survival between Caucasian and AA women in this receptor subtype. Studies on disparities have looked at factors including socioeconomic status and access to health insurance, but there has been no nationwide analysis on the receipt of HT in patients with HR+ cancers stratified by race. Our primary aim was to identify factors associated with HT use across the United States. A secondary aim was to stratify these associations based on race, in an effort to understand disparities in HT use.

Methods: The National Cancer Database (NCDB) was used to identify women with HR+ breast cancer. Patients with non-metastatic, HR+ breast cancers were included in the analysis. Exclusion criteria included patients without pathologic confirmation, and unknown facility type or location of treatment. Clinicopathologic variables were identified. Univariate and multivariate logistic regression models were fitted to assess the association between the variables of interest and HT use, stratified by race.

Results: A total of 1,008,895 patients were included for analysis between 2004-2016. Of these, 85.8% were Caucasian, and 9.0% were AA. The use of HT significantly increased in recent years (2010-16 vs 2004-09) in both Caucasian and AA patients (OR 3.27, Caucasian vs 3.02, AA, $p<0.001$). Caucasian patients with private insurance were most likely use HT (OR reference, $p<0.001$), whereas insurance status was not associated with HT use in AA patients (OR 0.06). With the Northeast region as reference, patients in the Midwest were most likely to use HT regardless of race (OR 1.16 for Caucasian and OR 1.14 for AA, $p<.001$). All patients in the South had a lower OR for HT use compared to the patients in the Northeast (0.63 for Caucasian vs 0.77 for AA, $p<0.001$). Patients living in metropolitan areas were less likely to use HT compared to patients in rural areas regardless of race (OR 0.64, white vs 0.60, AA, $p<0.001$).

Conclusions: HT use has improved in recent years, regardless of race. Insurance status does not play a significant role for HT use in AA patients, and is in line with studies showing that cultural beliefs may play a larger part in this patient population. HT use was highest in the Midwest, regardless of race, and both Southern Caucasian and Southern AA patients were less likely to use HT compared to their Northeastern counterparts. This finding may explain the higher disparity seen in breast cancer survival in the south compared to the northern states. While not explicitly examined in this analysis, tumor biology may additionally play a role in the survival disparity. Further studies are needed to identify reasons for disparities in HR+ tumors.

Table: Multivariable analysis of factors associated with use of endocrine therapy

Covariate	White			African American (AA)		
	N (%)	Odds Ratio (95% CI)	p-value	N (%)	Odd Ratio (95% CI)	p-value
Age						
≤65	329921 (38)	0.84 (0.82-0.86)	<.001	28583 (32)	1.01 (0.95-1.07)	0.790
>65	536136 (62)	reference		62000 (68)	reference	
Insurance status						
Uninsured	25288 (3)	0.68 (0.66-0.71)	<.001	4336 (5)	0.90 (0.81-0.98)	0.055
Medicaid	37720 (4)	0.92 (0.88-0.95)		10524 (12)	1.04 (0.97-1.12)	
Medicare	332758 (38)	0.97 (0.95-1.00)		31933 (35)	1.00 (0.95-1.07)	
Private	470291 (54)	reference		43790 (48)	reference	
Year of Diagnosis						
2010-2016	523464 (60)	3.27 (3.21-3.32)	<.001	58790 (65)	3.02 (2.88-3.17)	<.001
2004-2009	342593 (40)	reference		31793 (35)	reference	
Facility Location						
South	299541 (35)	0.63(0.61-0.65)	<.001	51353 (57)	0.77 (0.73-0.82)	<.001
Midwest	232020 (27)	1.16 (1.14-1.19)		18096 (20)	1.14 (1.05-1.22)	
West	147295 (17)	0.61 (0.60-0.62)		5120 (6)	0.63 (0.58-0.70)	
Northeast	187201 (21)	reference		16014 (17)	reference	
Location Type						
Metro	715193 (83)	0.64 (0.60-0.68)	<.001	81683 (90)	0.60 (0.47-0.76)	<.001
Rural	14585 (2)	reference		853 (1)	reference	

787089 - MammaPrint and BluePrint Molecular Profiles and Clinical-Pathological Features of Asian Early-stage Breast Cancer Patients: A Meta-analysis of Six Prospective Clinical Trials

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Background/Objective: Breast cancer incidence in Asian patients has increased in recent years; however, substantial variation in occurrence among Asian subpopulations has been reported. Furthermore, few studies have characterized clinical-pathological features and molecular subtypes in these patients groups. Here, we report a meta-analysis of clinical factors, pathology, molecular profiles, and treatment of Asian breast cancer patients enrolled in prospective registry trials from the United States and Hong Kong.

Methods: This analysis includes Asian patients with early-stage, invasive breast cancer (n=172) for whom clinical characteristics were captured with informed consent, enrolled between 2011 and 2019 in the US (n=130) and Hong Kong (n=42). Patients were selected based on self-reported Asian ethnicity from 6 independent prospective clinical registry trials (Table), 1 of which, the US-based FLEX registry, is currently open to accrual. Clinical characteristics, pathology, and results from the 70-gene (70-GS, MammaPrint) risk of recurrence and 80-gene (80-GS, BluePrint) molecular subtyping signatures are reported. Treatment regimens and responses are reported for a subset of patients.

Results: The majority of patients for whom subpopulation data were available (n=98) were Chinese (70.4%; n=27 enrolled in the US, n=42 enrolled in Hong Kong). Overall, the median age at diagnosis was 51 years, and 52.2% of patients were post-menopausal. Tumors were predominantly ductal carcinoma, not otherwise specified (NOS) (86.0%), T1 (58.3%), intermediate grade (46.5%), estrogen receptor-positive (ER+) (91.2%), and node-negative (74.3%). Frequency of lobular carcinoma was only 7.0%. Of patients with available family history (n=68), 54.4% report having at least 1 first- or second-degree family member with a history of cancer. By 70-GS and 80-GS (n=164) classification, tumors were 43.3% Luminal A, 41.5% Luminal B, 8.5% HER2-type, and 6.7% Basal-type. 56.3% of tumors (n=167) classified as 70-GS High Risk. The overall rate of pathological complete response (pCR, defined as absence of invasive carcinoma in both the breast and axilla) for patients with available neoadjuvant treatment and response data (n=24) was 45.8% (n=2 Basal-type, 6 HER2-type, 3 Luminal B). The majority (51.6%) of patients with available surgical data (n=91) received lumpectomy or segmental resection. Of the reported patients who received adjuvant chemotherapy (n=39), 87.2% were 70-GS High Risk.

Conclusions: Although the sample size is small, the current analysis suggests younger age at diagnosis, reduced frequency of lobular carcinoma, and a greater proportion of High Risk and Luminal B tumors among Asian breast cancer patients, compared with published data on Caucasian breast cancer patients. Additionally, although neoadjuvant therapy response data were only available in a small number of patients, a high pCR rate indicates a need for additional investigation in these patient populations. Further studies, especially those that include genomic profiling, are needed to better understand racial and ethnic disparities and their impact on disease incidence, progression, and response to therapies.

Table: Clinical trial details

Trial Protocol Title	Trial Registration Number	Enrollment Dates	Number of Patients included
The Study of Molecular Risk Panels in Chinese Breast Cancer Patient using Mammaprint, TargetPrint, BluePrint and Research Gene Panel assays	NCT02669745	2013-2018	66
MammaPrint, BluePrint, and Full-genome Data Linked with Clinical Data to Evaluate New Gene Expression Profiles: An Adaptable Registry (FLEX)	NCT03053193	2017-ongoing (open to accrual)	66
Neoadjuvant Breast Registry Symphony Trial (NBRST)	NCT01479101	2011-2013	23
Prospective Study of MammaPrint in Breast Cancer Patients With an Intermediate Recurrence Score (PROMIS)	NCT01617954	2012-2015	8
Measuring the Impact of MammaPrint on Adjuvant and Neoadjuvant Treatment in Breast Cancer Patients: A Prospective Registry (IMPACt)	NCT02670577	2015-2017	5
Multi-Institutional Neoadjuvant Therapy MammaPrint Project I (MINT)	NCT01501487	2011-2016	4

787864 - Breast Cancer in a Middle-income Country: The Age, Stage, and Molecular Distribution - What Are the Implications for Screening and Treatment?

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Background/Objective: The analysis of the age and molecular distribution of breast cancer within a given population is important in decision making, with respect to screening and directing therapy. This is especially important in resource-restricted countries. The current study was conducted to analyse the distribution of breast cancer across 3 patient groupings in our population, looking at the differences relating to tumour biology and stage at presentation.

Methods: All patients diagnosed with invasive breast cancer at a single referral hospital in a middle-income country who had a definitive breast cancer operation were recorded in a prospective registry over a period of 13 months. We excluded patients with sarcomas, lymphomas, or in situ disease from final analysis. Our patient population was reviewed and contrasted with the US SEER database for breast cancer 2012-2016 for age, stage, and molecular distribution. We also divided our patients into 3 groups (age 59 years). The distribution of tumour size, grade, molecular subtype, nodal status, and stage were analysed across these groups to assess the trends in breast cancer characteristics when moving from younger older patients. Comparisons of the various characteristics were performed using the Chi-squared test for the determination of significant differences.

Results: A total of 99 patients met the criteria for analysis, with the mean age of diagnosis of 54 years well below the 62 years that is consistently reported from the US SEER database for breast cancer. The proportion of our patients presenting with breast cancer below age 50 years was noted to be 36%, doubling the corresponding rate for white females in the SEER database. The corresponding rate for the African American patients was 26%. When stage distribution was assessed, 65% of US white females presented with localized disease at the time of diagnosis compared to 55% for US blacks and 50% for our registry patients. The molecular distribution of breast cancer was significant for triple-negative breast cancer rates of 22% in our data as well as for US blacks, versus a rate of only 10% for the for US Whites. There was also a marked difference in the proportion with luminal A subtype, 67% in the SEER versus 48% in our registry. There were some interesting trends when we looked at the distribution across ages. The age group under 50 years had no patients with grade 1 (low grade) breast cancer, while 48% of these patients had high histological grade (grade 3) invasive breast cancers. Only 30% of patients in the age group over 59 years had grade 3 breast cancer with 63% of them having either grades 1 or 2. The distribution of nodal stage showed 34% of patients under age 50 years having N2/N3 disease, while the rates were 8% and 11% for age groups 50-59 years and > 59 years. The overall stage of breast cancer at the time of presentation was 91% having stages 2 or 3 for patients less than 50 years, 72% for patients 50-59 years, and 81% for patients over 59 years. When we examined the molecular distribution, luminal A subtype was present in 40% of patients under 50 years, 51% aged 50-59 years and 56% for age >59 years. There we no other noticeable differences in the molecular subtypes among our groupings.

Conclusions: Breast cancer in our population was shown to different in the age, stage and molecular subtype distribution from the US population. Even within our own population, there exist stark differences among age blocks as it relates to tumour stage, grade, and molecular biology. The leftward shift of the age distribution of breast cancer requires a greater emphasis on screening in the younger aged population. The advanced stage at presentation will require greater access to multimodality therapy such as chemotherapy, radiotherapy, and more therapeutic options for patients with triple-negative breast cancer, which was twice the rate seen in the US population.

787989 - Delays in Chemotherapy in the Asian Pacific Islander Population: A NCDB Review

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Background/Objective: Delays in adjuvant chemotherapy of greater than 120 days after diagnosis has been shown to lead to worse overall survival. Some studies have attempted to clarify the reasons for these delays in relation to certain socioeconomic factors or ethnic groups such as African Americans. However, very little is known about the reasons for delays in the Asian and Pacific Islander (API) population, which comprises one of the fastest-growing ethnicity groups in the United States. We aimed to use the National Cancer Database to review the associated factors leading to delays in chemotherapy.

Methods: Using the National Cancer Database (NCDB), we analyzed time from diagnosis to initiation of adjuvant chemotherapy in non-neoadjuvant women with Stage I-III breast cancer diagnosed between 2010 and 2015, and whom ethnicity was classified under the Asian or Pacific Islander subgroups. Treatment delay was defined as ≥120-days from diagnosis to adjuvant chemotherapy. Chi-square and adjusted multivariate logistic regression analysis were used to examine factors associated with delays in initiation of adjuvant chemotherapy.

Results: Of the 9,247 patients that met inclusion criteria, 1,110 (12%) of patients had ≥120-days from diagnosis to adjuvant chemotherapy. Associated factors related to delays in adjuvant chemotherapy in the API patient population were patients living in the West coast compared to the Midwest (OR 2.07, CI 1.55-2.78), lower socioeconomic status (SES) (OR 1.20, CI 1.02-1.41), uninsured patients (OR 1.69., CI 1.13- 2.51), Stage 1 cancers (OR 1.45, CI 1.11 – 1.88), and treatment in academic facilities (OR 1.37, CI 1.16 – 1.63). Increased time from diagnosis to surgery directly correlated with increased incidence of delays to chemotherapy. (Table)

Conclusions: APIs comprise one of the fastest-growing populations in the United States currently. Further knowledge of factors related to delays in care such as adjuvant chemotherapy provide opportunities for continued improvement in breast cancer management.

Table: Variables associated with delay in adjuvant chemotherapy in Asian/Pacific Islanders (≥120 days)

ODDS RATIO ESTIMATES		
Effect	**Point Estimate**	**95% Confidence Interval**
Geographic		
Northeast vs Midwest	1.243	0.903-1.711
South vs Midwest	1.337	0.957-1.869
West vs Midwest	2.073	1.547-2.777
Income and Insurance		
Low SES vs High SES	1.199	1.017-1.414
Uninsured vs Insured	1.686	1.131-2.514
Stage		
Stage 1 vs Stage 3	1.445	1.112-1.878
Stage 2 vs Stage 3	1.249	0.969-1.608
Facility Type		
Academic vs Other	1.374	1.159-1.628
Surgery Time		
31-60 days vs 1-30 days	3.226	2.624-3.967
61-90 days vs 1-30 days	22.447	17.791-28.321
91-120 days vs 1-30 days	425.214	203.808-887.144

787871 - Fertility Concerns Among Young Women with Breast Cancer Do Not Appear to Vary by Race

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Background/Objective: Prior studies suggest the majority (51-80%) of young breast cancer patients have fertility concerns and that physicians lack awareness of fertility issues and options for addressing them. Few studies have examined how fertility concerns vary based on patient race. Our study aimed to examine fertility concerns and access to fertility counseling as it varied by race in our institution.

Methods: Women ≤40 years with non-metastatic breast cancer who underwent surgery between April 1 to October 1, 2018 were retrospectively identified. They were mailed a survey assessing their pre-treatment fertility concerns, whether those concerns were addressed, and whether they received fertility counseling or preservation. Survey responses and patient and tumor characteristics were compared between White women and Black/African-American women with Wilcoxon signed-rank test and Fisher's Exact test.

Results: Of 39 eligible patients who were mailed surveys, 28 responded (71% response); 20 respondents were White (71%), and 8 were Black/African-American (29%). Average age was 36 years. Eighteen patients (64%) had Stages 2 and 3 disease. Twenty-four patients (86%) received chemotherapy. There were no statistically significant differences between the 2 races in age at diagnosis, disease stage, tumor subtype, type of surgery, receipt of chemotherapy, receipt of ovarian function suppression, insurance status, or whether or not the respondent had biologic children. There was a significant difference in marital status with more White patients who were married or in a relationship ($p<0.02$). Black/African American women were significantly more likely than white women to want future biologic children ($p=0.01$) (Figure). Of all respondents, 58% reported being somewhat and very concerned about fertility at time of diagnosis; 68% reported their surgeons addressed fertility concerns; 26% met with a fertility specialist; 70% reported their concerns were sufficiently addressed (Figure). There were no differences observed between race and fertility concerns, meeting with a fertility specialist, and whether the fertility concerns were addressed. Specifically, among those who said they had fertility concerns at the time of diagnosis (15 patients), 8 (53%) said their concerns were addressed by their surgeon, 7 (47%) met with a fertility specialist, and 9 (60%) said their fertility concerns were sufficiently addressed. Of the 7 women with fertility concerns who met with a specialist, all but 1 reported that their fertility concerns were adequately addressed.

Conclusions: The majority of young women had fertility concerns at the time of their breast cancer diagnosis. We did not observe racial differences in fertility concerns or access to fertility counseling; however, more data may be needed to detect subtler differences. Many women with fertility concerns did not have their concerns adequately addressed, and few women met with fertility specialists. This highlights the need to better connect young breast cancer patients to fertility counseling before initiation of their treatment. Reasons for their fertility concerns not being well addressed by their physicians also need further investigation. Next steps include expansion of the data collection window to capture additional participants.

Table: Fertility concerns by race among young women with breast cancer

	All (n = 28)	White (n = 20)	Black (n = 8)	*p*
Fertility concerns				0.40
Not at all	11	9	2	
Somewhat or very	15	9	6	
No response	2	2	0	
Marital status				0.02
Married or in a relationship	23	19	4	
Single	5	1	4	
Biologic children at time of diagnosis				0.54
Yes	25	17	8	
No	3	3	0	
Desire to have future children				0.02
Yes	8	3	5	
No or unsure	20	17	3	
Surgeon addressed fertility concerns				
Yes or not needed	17	13	4	0.36
No	8	4	4	
Met with fertility specialist				
Yes	7	4	3	0.75
No	18	13	5	
Unsure	1	1	0	
Fertility concerns addressed				0.20
Not at all or insufficiently	8	4	4	
Sufficiently	18	14	4	

788294 - Reaching Across the Road: Disparities in Breast Reconstruction

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Background/Objective: Post-mastectomy breast reconstructive (PMBR) is an important cosmetic and psychological factor in the process of breast cancer treatment. The Women's Health and Cancer Rights Act is a Federal Law ensuring that women undergoing mastectomy will have their reconstruction covered by health insurances. We evaluated the PMBR rate between a private academic vs adjacent safety net hospital served by the same surgical and medical teams.

Methods: Surgical data from patients who underwent mastectomy with and without reconstruction at both institutions from 2011-2019 was analyzed. We compared the rates of PMBR between the 2 hospitals, demographic and social characteristics, as well as type of

reconstructive surgery. The primary outcome was correlation between type of hospital and undergoing PMBR vs mastectomy alone. Chi-square was used for primary analysis.

Results: A total of 1,701 patients underwent mastectomy for breast cancer at both institutions. The median age for safety net vs private hospital patients was similar 54 (range 19-87), and 53 (range 19-90), respectively. Mean age at diagnosis was no significant among the groups. There were 761 (44.7%) patients who were operated on at the safety net hospital vs 940 (55.3%) at the private hospital. Reconstruction surgery was done on 182 (24.0%) patients at the safety net institution vs 588 (62.5%) at the private hospital ($p<0.00001$). All flap reconstructive procedures (45 patients totally) were done on private insurance patients, and none of them were done for underinsured patients.

Conclusions: Only a quarter of patients treated by the same surgical team at a safety net hospital underwent PMBR, which was significantly lower than those treated in a private setting and mostly related to insurance status. Despite legislation, surgical disparities still exist in our current health system, and efforts should be made to bridge the gap to ensure breast cancer patients receive equal treatment options.

787869 - Distress Levels Vary as a Function of Race, Ethnicity, and Preferred Language in Patients with Breast Cancer

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Background/Objective: Distress is defined by the National Comprehensive Cancer Network as an unpleasant experience of a psychological, social, and/or spiritual nature that interferes with one's ability to cope. Studies have demonstrated distress is higher among patients with cancer compared to their unaffected peers. However, little is known regarding the difference in distress among cancer patients across races/ethnicities. Furthermore, the impact of language as a potential confounder is also poorly understood. Our objective was to assess distress levels in female breast cancer patients as a function of race, ethnicity, and preferred language. We hypothesized that minority patients and those with a preferred language other than English would have higher distress levels compared to English speakers and non-Hispanic whites.

Methods: We conducted a retrospective observational study of all female breast cancer patients treated at an NCI designated cancer center from 2009 to 2016 who were administered a validated biopsychosocial distress screening questionnaire. The questionnaire consisted of 70 items evaluating 5 domains of biopsychosocial distress: physical, practical, emotional, functional, and substance/tobacco use. Self-reported data on race, ethnicity, and preferred language was collected.

Results: A total of 3,339 female patients were included in the analysis with a mean age of 56.5±12.2 years. The racial/ethnic distribution of the cohort included 47.5% non-Hispanic white (NHW), 28.1% Hispanic, 16.6% Asian, 6.6% Black/African American, and 1.2% other. The

preferred language was English (PLE) for 76.3% of all patients; Spanish (13.3%) and Mandarin (3.1%) were the most common other preferred language (OPL). While emotional distress was the most common distress domain listed for all races/ethnic groups, all minority groups consistently ranked emotional distress higher than NHW ($p<0.05$). Furthermore, patients in the OPL group reported higher levels of distress across all 5 domains ($p<0.05$) compared to those in the PLE group. Finally, while the most common individual questionnaire items varied significantly by race, "sleeping," "side effects of treatment," "worry about the future," and "feeling anxious or fearful" were in the top 10 sources of distress for all race/ethnic groups.

Conclusions: This is one of the largest studies evaluating distress in minority breast cancer patients at a single institution. Top sources of distress in female breast cancer patients vary as a function of race, ethnicity, and preferred language. Specifically, minorities and non-English speaking populations experience higher levels of emotional distress compared to NHW. Future studies should focus on identifying effective, culturally appropriate targeted psychosocial interventions to mitigate emotional distress levels in minority and non-English speaking patients with breast cancer.

788123 - Insulin Resistance Is Associated with a Higher Oncotype DX Recurrence Score in White, But Not Black Women

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Background/Objective: Black women are more likely to present with breast cancers with poor prognostic features (e.g., advanced stage, higher grade, and triple-negative receptor status) and have worse overall survival when compared to white women. Despite this, there has been no demonstrable difference in Oncotype DX recurrence scores to explain these disparate clinical outcomes. Black women are also more likely to be disproportionately affected by metabolic risk factors for breast cancer, including obesity and insulin resistance. We sought to evaluate if insulin resistance is associated with a higher Oncotype DX recurrence score and whether there is a difference between white and black women to explain these disparate clinical outcomes.

Methods: A subgroup analysis of patients was identified in a multi-institutional prospectively collected database generated to evaluate differences in insulin resistance between white and black women. Women diagnosed with a new primary breast cancer and who had an Oncotype DX recurrence score were identified. Demographics including race, and biologic features of the tumor (e.g. grade of tumor, receptor status) were collected. Fasting blood glucose and insulin measurements were used to calculate the homeostatic model assessment of insulin resistance score (HOMA-IR), a method for assessing β-cell function and insulin resistance. Oncotype DX scores were reported in 3 categories, low (score <18), intermediate (score 18-30) and high (score >30) risk of recurrence. The analysis only included women with hormone receptor-positive, and HER2/neu-negative tumors.

Results: A total of 360 women (314 white, 46 black) were identified. Black women were more likely to present with a higher BMI (30 vs. 26, p<.0001), higher HOMA-IR score (2.4 vs 1.4, p=0.004) and proportionally fewer low-grade tumors, but more high-grade tumors (26% vs 11%, and 16% vs 30% respectively, p=0.01). When evaluating the HOMA-IR score as a continuous variable, there was a direct positive association with increasing HOMA-IR score with an increasing recurrence score in the entire cohort, p=0.014 (Table). On subset analysis, this same relationship was seen in white women (p=0.005), but not in black women (p=0.55), where an intermediate recurrence score was associated with the highest HOMA score.

Conclusions: In women with newly diagnosed breast cancer, increasing insulin resistance (a higher HOMA-IR score) is associated with a higher recurrence score. However, this was not reflected when examining a subset of black women. Lack of association may be due to the small number of black women in the cohort, or a reflection of a different biological disease process. To our knowledge, this is the first report demonstrating increasing insulin resistance being associated with a higher risk Oncotype Dx recurrence score in breast cancer.

Table: Comparison of the homeostatic model assessment of insulin resistance score (HOMA-IR), a method for assessing β-cell function and insulin resistance against the Oncotype DX risk group.

	Low Risk (Oncotype DX <18)		Intermediate Risk (Oncotype DX 18-30)		High Risk (Oncotype DX >30)		p-value
	N	Mean HOMA score ±sd	N	Mean HOMA score ±sd	N	Mean HOMA score ±sd	
Total Cohort	208	1.3 ±1.1	127	1.7 ±1.6	25	2.1 ±2.6	0.014
White	185	1.2 ±1.0	109	1.5 ±1.2	20	2.2 ±2.9	0.005
Black	23	2.2 ±1.6	18	2.8 ±2.9	5	1.7 ±1.0	0.551

787817 - The Impact of 20 Years of Screening Mammography on the Incidence of Early Versus Late-stage Breast Cancer in Eastern North Carolina

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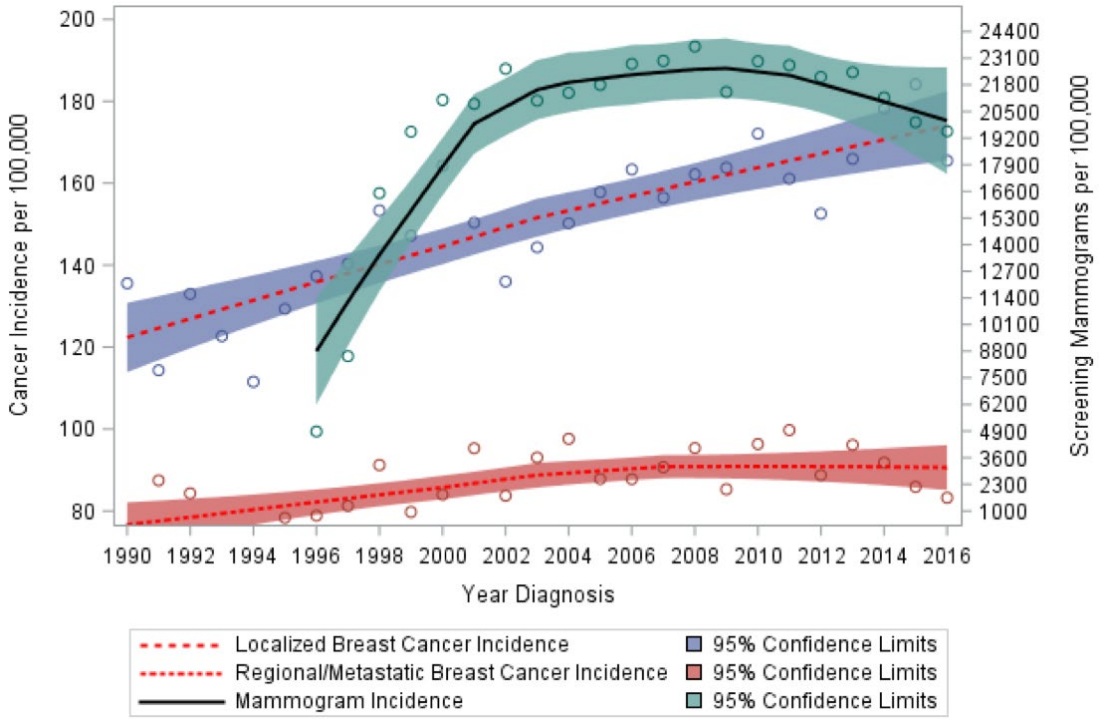
Background/Objective: Eastern North Carolina (ENC), a largely rural and medically underserved geographic region with a significant black population relative to the rest of the nation (~30% vs 13%), experiences disparate breast cancer outcomes. One strategy to address this regional disparity is the promotion of screening mammography utilization. However, an analysis of SEER data failed to demonstrate an association between increased screening and a reduction in late-stage breast cancer at diagnosis, instead attributing much of the observed increase incidence to “overdiagnosis.” We sought to examine temporal trends in screening mammography and incidence of early- versus late-stage breast cancer in ENC.

Methods: Screening rates were estimated from the annual number of screening mammograms performed between 1996-2016 in the region and US census data figures for women aged 40+ residing in ENC. Breast cancer incidence data in this population between 1990-2016 were obtained from the North Carolina Central Cancer Registry. Rates were modeled using a negative binomial with population size included as an offset that assumed a stable underlying risk of breast cancer.

Results: Between 1996 and 2016, the screening rate increased from 4,878 to 19,532 mammograms per 100,000 women (Figure). Concurrently, the overall cancer incidence increased from 230 to 255 cases per 100,000 women (137-166 per 100,000 localized disease, 79-83 per 100,000 regional/metastatic disease). Modeling showed that mammographic screening rates significantly increased by 15.5% per year (95% CI 4.4-25.6%, p=0.0008) until 2004, and then plateaued (Figure). Modeled breast cancer incidence increased by 1.0% per year (95% CI 0.8-1.3%, p<0.0001). Although this increase was the result of a rise in the diagnosis of both early- and late-stage disease, it was driven to a greater extent by an increase in incidence of localized disease (1.3% per year, 95% CI 1.0-1.7%, p<0.0001) than regional/metastatic disease (0.6% per year, 95% CI 0.3-1.0%, p=0.0002).

Conclusions: Increased screening mammography rates are temporally associated with a higher incidence of breast cancer in ENC, with a decrease in the proportion of late-stage disease over time. Assuming a stable underlying risk of breast cancer over time, mammographic screening in ENC appears to facilitate earlier cancer detection. Results suggest that the magnitude of the increased incidence of localized disease cannot be attributed primarily to overdiagnosis in this population.

Figure: Breast cancer diagnosis and screening mammograms, women 40 years of age or older, Eastern North Carolina



782423 - In Search of Options: Re-evaluating Distance to Treatment in Breast Cancer Surgery

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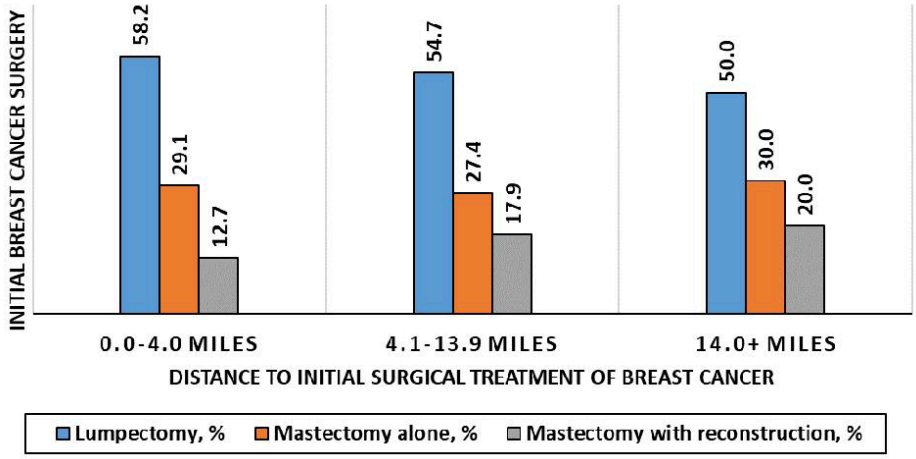
Background/Objective: The choice between breast-conserving therapy and mastectomy with or without reconstruction may be influenced by a patient's proximity to applicable health care resources. This study investigates the impact of the distance to treatment facility and the type of initial breast surgery selected. It also identifies the demographic characteristics of women who travel greater distances to undergo care.

Methods: Utilizing Florida state inpatient and ambulatory surgery databases, we identified female breast cancer patients of at least 18 years of age who underwent breast cancer surgery between January 1 and December 31, 2013. Patients were sub-grouped by distance to treatment facility informed by distribution in the overall sample. The primary outcome was the initial surgical treatment: lumpectomy, mastectomy alone, or mastectomy with reconstruction. Regression models were used to identify factors associated with greater distance to initial treatment.

Results: The final sample included 13,484 patients who underwent lumpectomy (54.4%), mastectomy alone (28.5%), or mastectomy with reconstruction (17.1%). Compared to women who travelled <4.0 miles (N=3,218), women who travelled >14.0 miles (N=3,122) were younger (61.1 vs. 66.0 years, $p<0.001$) more often identified as white and having private insurance (33.9% vs. 23.1%, $p<0.001$), and were less likely to have 3 or more medical comorbidities (29.3% vs. 33.1%, $p<0.001$). As the distance to treatment increased, the frequency of lumpectomy decreased (<4.0miles=58.2% vs. >14.0 miles=50.0%, $p<0.001$) and the frequency of mastectomy with reconstruction increased (12.7% vs. 20.0%, $p<0.001$). In multivariate regression modelling, older patients (adjusted odds ratio=0.98 [95% CI=0.98-0.99]) and those identifying as non-white with private (AOR=0.70 [0.61-0.80]) or public insurance (AOR=0.64 [0.56-0.73]) were less likely to travel for initial breast surgery.

Conclusions: The relationship between initial surgical intervention for breast cancer and the distance to treatment may be influenced by a patient's financial ability to seek the surgical care they desire. This likely represents an access to care disparity in which a patient's ability to travel restricts their ability to receive desired health care treatments.

Figure: Relationship between initial breast cancer surgery and distance to treatment



788598 - Comparing Systemic Breast Cancer Metastasis and Survival in White and African American Women

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Background/Objective: African American (AA) women are historically worse off than White American (WA) women with breast cancer (BC) regarding stage at presentation and death as an outcome. Since BC lymph node metastasis (mets) is strongly correlated with lymphovascular invasion (LVI), and regional lymph node (RLN) mets is a strong predictor of systemic mets, we elected to look for differences in LVI and RLN mets in BC to account for differences in survival outcome between AAs and WAs.

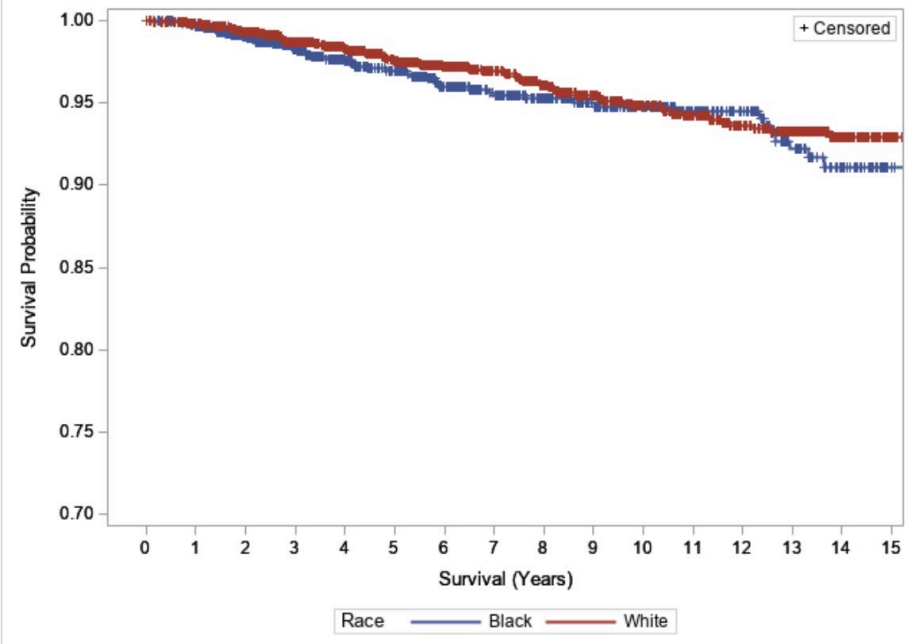
Methods: Demographic, clinicopathologic, treatment types, and molecular marker data were compared in 2947 BC patients prospectively abstracted over 22 years and maintained in a precisely managed, single institution database of BC patients undergoing RLN biopsy. Univariate and multivariate backward logistic regression models were constructed to estimate associations among LVI and RLN and/or systemic mets and overall survival of WA and AA women. Chi-Squared Test of Independence was used for comparison of tumor size, grade, and receptor status. Survival curves were generated for WAs and AAs for the entire cohort and individually for triple-negative breast cancer (TNBC) and non-TNBC using SAS 9.4.

Results: A total of 2947 patients with RLN biopsies were analyzed, and no significant difference ($p=0.80$) in the presence of LVI was found between WAs (14.3%) and AAs (13.9%). In addition, no significant difference was detected ($p=0.26$) in RLN positive between WAs (22.8%) and AAs (21%). There was also no significant difference ($p=0.51$) in systemic mets and overall survival between WAs (8.6%) and AAs (7.9%). Estrogen receptor (ER)-positive BC was more common in WAs (83.8%) vs. AAs (74.3%) [$p<0.0001$]. Progesterone receptor (PR)-positive BC was also more common in WAs (77.7%) vs. AAs (66.9%) [$p<0.0001$]. Occurrence of TNBC was significantly ($p<0.0001$) higher in AAs (16.5%) compared to WAs (9.5%). However, within the TNBC group, although there is a trend showing fewer patients with these molecular markers

survive, there are no significant differences noted in the survival curves comparing TNBC to non-TNBC (p=0.6223). There is also no difference in survival among AAs compared to WAs expressing TNBC.

Conclusions: We found no differences in LVI, RLN, systemic metastasis, or mortality rate between WA and AA women with BC despite showing significant differences in molecular markers, such as ER, PR and HER2/neu. Our data differs from commonly held beliefs, based on many studies, in that we show no racial differences in survival. WAs and AAs in our cohort have equal access to high quality BC care, which may not be true of studies that include a much broader array in different population groups, where socioeconomic disadvantage can contribute to BC outcome disparities because of reduced screening and diagnostic delays, as well as by creating barriers to comprehensive treatment.

Figure: Survival analysis of breast cancer by race



778849 - USPSTF Breast Cancer Screening Guideline in a County Hospital System: Is It Time to Re-evaluate Screening Initiation Age in Minority Women?

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Background/Objective: The American College of Radiology (ACR), American Cancer Society (ACS), and United States Preventive Services Task Force (USPSTF) recommend discrepant screening initiation ages varying from age 40 to 50. More recently, earlier breast cancer screening for African American women has been proposed due to more advanced-stage disease and younger age at diagnosis. Nonetheless, our large county hospital system follows USPSTF guidelines, which recommend initiation of screening at the oldest age of 50. In this retrospective

study, we apply the ACR, ACS, and USPSTF screening guidelines to a cohort of our breast cancer patients.

Methods: All patients with breast cancer diagnosed between 2014-2016 at our institution were identified. Demographics (age at diagnosis, race/ethnicity), tumor characteristics (clinical presentation, clinical stage), radiographic findings (tumor dimensions, visibility on mammography), surgical intervention offered/received were retrospectively collected, and univariate analysis was performed. Tumor volume was calculated using hemi-ellipsoid volume formula =(pi/6)*W*L*H based on mammography tumor dimensions. When retrospectively applying screening guidelines, mammograms at time of diagnosis (prior to receiving treatment) were used to determine whether patients would have been diagnosed by screening mammography at time of diagnosis; visible lesions 1 cm or greater were considered positive.

Results: A total of 205 patients were diagnosed with breast cancer from 2014-2016. The actual rate of diagnosis by USPSTF screening guidelines at our institution was only 45% (n=64) among patients 50 and older (n=143). Tumor dimensions were available in the mammogram or ultrasound report in 137 patients. When USPSTF screening guidelines were theoretically applied to those 137 patients who were 50 and over, an additional 53 patients would have been diagnosed by screening mammography for a total of 96% (n=95) of patients 50 and over and 74% (n=101) out of the total. When repeated with ACS screening guidelines, 62 additional patients were captured if screening had occurred at the time of diagnosis [95% (n=107) of patients 45 and older, 78% (n=110) of all patients]. With ACR guidelines, 70 additional patients were captured [94% (n=117) of patients 40 and older, 86% (n=118) of all patients]. Median age of BCT-eligible patients was higher, and tumor volume was significantly smaller than those of BCT-ineligible patients (59 vs. 53, p=0.0002; 1.42 cm3 vs. 3.34 cm3, p=0.0289). Median tumor volume was greater among those <50 years of age compared to patients 50 and older (2.93 cm3 vs. 1.87 cm3, p=0.2728). Among race/ethnicity groups, African Americans had significantly larger tumor volumes at diagnosis.

Conclusions: In addition to presenting at a younger age with more advanced-stage cancer, younger patients at our institution present with larger tumor volumes and may be less eligible for BCT. Given these findings, our patients may benefit from earlier screening. Ultimately, as most patients present with tumors that are mammogram detectable, screening compliance is increasingly vital to improve earlier diagnosis and optimize BCT eligibility. Future studies should include cost-benefit analysis of lowering the screening age among patients and re-evaluation of which screening guidelines to follow in large health care systems that serve predominantly minority patients.

787744 - Defining Breast Cancer in Hawaii: Are Socioeconomically Disadvantaged Patients Receiving Appropriate Screening Mammography?

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Background/Objective: According to the National Institute for Health National Cancer Institute, 83.7% of females in Hawaii ages 50-74 years old had a screening mammogram within the past 2 years. However, it has been anecdotally observed that socioeconomically disadvantaged (SD) patients in Hawaii tend to be diagnosed through work up of a palpable breast mass rather than screening mammography and tend to present with more advanced disease. We hypothesized that SD patients receive screening mammograms at a lower rate than their socioeconomically advantaged (SA) counterparts and that this lower rate of screening accounts for their higher incidence of late-stage breast disease.

Methods: Our hospital medical records registry was queried for women, age ≥40, who were admitted with a diagnosis of breast cancer or carcinoma in situ. Patients were excluded if they were not diagnosed in Hawaii or their screening or staging record was incomplete. Socially disadvantaged (SD) patients were identified as patients who did not have a primary care physician (PCP) or who received their primary care from the free-of-charge, resident-run clinic. Socially advantaged (SA) patients were identified as patients with a non-resident PCP. All identified SD patients were included in the analysis (n=21), and a random subset of 10% of the SA patients were included (n=49). Other variables analyzed included age, race, smoking status, and family history of breast cancer. Predictors of receiving appropriate screening mammography and late-stage breast cancer presentation (Stage IIIB or greater) were calculated by bivariate (t-test of proportions) and multivariate (multivariate logistic regression) analysis.

Results: A total of 61.22% of SA patients received appropriate screening mammography compared to only 9.52% of SD patients ($p<0.0001$). Being a SD patient (OR 15.26, 95%CI 3.16-117.91, $p=0.0022$) and having a personal history of smoking (OR 11.40, 95%CI 1.42-252.49, $p=0.0454$) were independently associated with not receiving appropriate screening mammography. Not receiving appropriate screening mammography was independently associated with presenting with late-stage breast cancer (OR 32.5, 95%CI 5.17-371.44, $p=0.0010$). Being a SD patient was associated with presenting with late-stage breast cancer by bivariate analysis, but was not found to be an independent predictor by multivariate analysis.

Conclusions: Being socioeconomically disadvantaged is independently associated with not receiving appropriate screening mammography, and not receiving appropriate screening mammography is independently associated with presenting with late-stage breast cancer. This study identifies a group of patients who may benefit from improved adherence to breast cancer screening guidelines.

788114 - Defining the Role of Frailty in Breast Oncology Patient Across a Regional Health Care System

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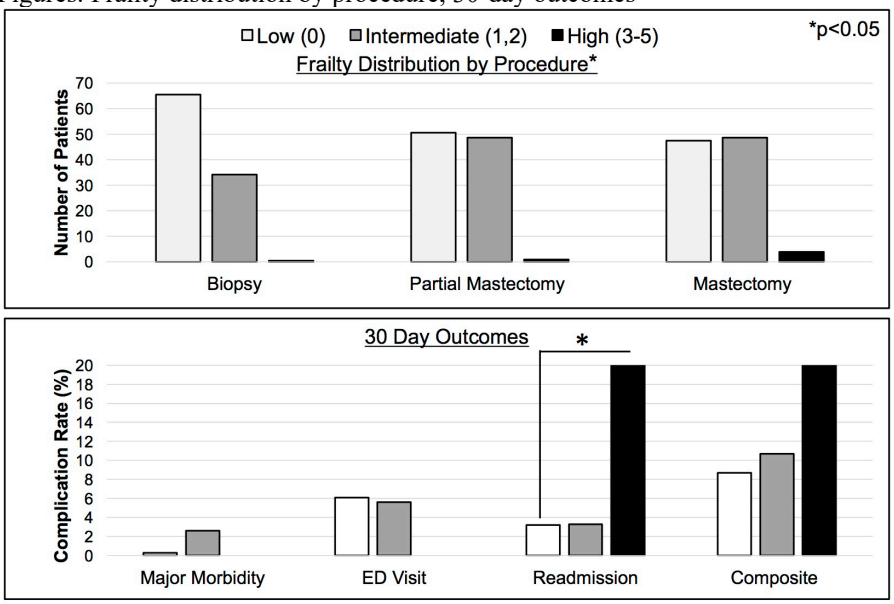
Background/Objective: Breast oncology procedures carry a relatively low morbidity and mortality profile relative to other surgical oncology fields; however, the need to identify at-risk patients within this population should not be overlooked. Frailty has emerged as a promising approach to capture composite risk in pre-operative patients. We seek to define the predominance of frailty in breast oncology patients within a regional health care system and explore its relationship with post-operative complications.

Methods: Frailty was prospectively measured in elective surgery patients (1/2016-6/2017) in a health care system (4 hospitals/901 beds). Frailty classifications—low (0), intermediate (1-2), high (3-5)—was assigned based on the modified Hopkins score. Operations were classified as inpatient versus outpatient. Outcomes measured (30 day) included major morbidity, mortality, Emergency Department (ED) visit, readmission, and length of stay. Inclusion criteria for our study included: greater than 18 years of age, elective surgery, undergoing a breast oncology procedure. Breast oncology procedures were classified into the following cohorts: biopsy (with/without radiographic marker; CPT 19120, 19125), partial mastectomy (19301, 19302), mastectomy (19180, 19240, 19303, 19307).

Results: A total of 14,530 patients (68.1% outpatient, 31.9% inpatient) were preoperatively assessed in elective surgical cases. High frailty was found in 3.4% of all patients (5.3% inpatient, 2.5% outpatient). There were 623 patients who met our inclusion criteria with the following distribution: 226 (36.6%) biopsy, 218 (35.0%) partial mastectomy, 179 (28.7%) complete mastectomy. All biopsy patients were outpatient procedures; partial and mastectomy patients were admitted for overnight observation or longer as required. High frailty was present in 10 (1.6%) of study patients. Frailty distribution differed by procedure types: biopsy 0.4%, partial mastectomy 0.9%, mastectomy 3.9% ($p < 0.05$; Figure). Median age of high-frailty patients was 69.5 years (range 23-88), although 2 high-frailty patients were less than 50 years. BMI extremes, <20 and >40) were present in the high-frailty cohort (range 17.1-63.1). The incidence of major morbidity, ED visits and a composite outcome did not differ with frailty; however, high-frailty patients had a higher incidence of readmission ($p<0.05$; Figure). Median length of stay after mastectomy did not differ based on frailty (median LOS in days: low 1.3, intermediate 1.2, high 1.2).

Conclusions: Frailty is feasible to assess pre-operatively in breast oncology patients. High frailty combined with extremes in age and BMI are represented in outpatient and inpatient populations, with an elevated frailty burden in mastectomy patients. High-frailty patients experience increased readmission rates. Additional work is required to explore this relationship in a larger population and determine how to mitigate this risk. Further studies aim to investigate the role of frailty in locally advanced disease, and explore how frailty may impact provider and patient bias towards treatment choices.

Figures: Frailty distribution by procedure; 30-day outcomes



788007 - Contribution of Race to Distant Recurrence After Neoadjuvant and Adjuvant Chemotherapy in Breast Cancer

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Background/Objective: Black women with operable breast cancer have higher recurrence and mortality rates than white women, as well as lower overall survival and cancer-specific survival, even after controlling for demographic and prognostic tumor variables. Biologic differences in the tumor microenvironment are now suspected to play a role in this racial disparity. Prior works have shown that structures called TMEM (Tumor MicroEnvironment of Metastasis) is prognostic for distant recurrence-free survival (DRFS). The goal of our study was to evaluate the racial difference in response to chemotherapy in prospective randomized studies of patients treated with adjuvant (AC) and neoadjuvant chemotherapy (NAC). The endpoints were (DRFS) and the TMEM density in residual disease post-NAC.

Methods: The association between race and DRFS in patients treated with AC and NAC was analyzed on prospectively collected data from NSABP-18 and B-27 trials. All patients from NSABP B-18 and the neoadjuvant arms of NSABP B-27 were included in the analysis. Patients were placed into 4 groups based on race and treatment course: white patients who received NAC or AC and black patients who received NAC or AC. Log rank test was used to determine differences in DRFS among the groups. The density of TMEM was evaluated in residual disease post-NAC in 80 patients from multi-racial New York Pathology Oncology Group (NYPOG) cohort. Tissue sections from residual tumors were stained and analyze for TMEM as described earlier.

Results: A total of 1,815 white and 251 black patients were included in DRFS analysis. Among white patients, 1,206 (66.5%) received NAC, and 609 (33.5%) received AC. Among black

patients, 165 (65.7%) received NAC, and 86 (34.3%) received AC. The 15-year DRFS for white patients who underwent NAC was 59.0% vs 51.6% for patients who underwent AC (p=0.190). The 15-year DRFS for black patients who underwent NAC was 55.8% vs 51.2% for patients who underwent AC (p=0.576). Among all patients who underwent AC, race did not affect DRFS (p=0.160). Interestingly, among patients who underwent NAC, there was a trend toward worse survival in black (58.3%) vs. white (60.6%) patients (p=0.052). This held true on a multivariate analysis accounting for other patient factors including tumor size, age, and lymph node status. In accordance, TMEM density in residual disease post-NAC was significantly higher in black than in non-black patients (p<0.001).

Conclusions: DRFS was similar in both black and white patients receiving AC or NAC. However, there was a trend towards a worse DRFS among black compared to white patients who received NAC. This may be due to differences in tumor response to NAC as black patients had higher TMEM density in their residual disease post-NAC compared to white patients. Further research is needed to understand the racial disparity in tumor response to NAC and its contribution to DRFS.

786817 - Comparing the Characteristics, Management, and Outcome of DCIS Among White vs. African American and Hispanic Patients

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Background/Objective: It is well documented that African American and Hispanic women have a more aggressive phenotype and higher mortality rate from invasive breast carcinoma than their white counterparts. However, there is a paucity of data regarding possible differences in Ductal Carcinoma In Situ (DCIS) phenotype, management and prognosis between these ethnic groups. We hypothesized that African American and Hispanic patients with DCIS at our institution present with more aggressive phenotype and larger areas of disease, and therefore higher rates of mastectomies and recurrence.

Methods: We performed a retrospective chart review of African American (AA), Hispanic (H) and White (W) women diagnosed with DCIS between the years 2010 and 2015. A total of 336 patients were included in the final analysis. We collected data on patient age and comorbidities, tumor size on imaging and pathology, tumor receptor status, treatment received, and time to recurrence. Data were analyzed with SAS v9.4. Chi-Square, and Fisher's exact tests were used for categorical variables and t-tests and Wilcoxon rank-sum tests for continuous variables. Time to breast cancer event (recurrence) was calculated from the date of surgery to the date of the first breast cancer event. Logrank tests were used to compare survival curves.

Results: Of the 336 patients, 99 were White (29.5%), 119 were African American (35.4%), and 112 were Hispanic (33.3%). The average age was 61 years (range 47 – 80). The average BMI was 28 (range 26.3 – 32.0). DCIS median pathologic size (W= 0.7cm AA= 0.8cm H=0.8cm), percent high grade lesions (W= 34.3% AA= 33.6% H= 34.8%), and positive ER status (W=

87.6% AA= 91.5% H= 84.4%) were not different between the groups (p=.448, p=.559, p=.255 respectively). Rates of mastectomies were highest in AA (21%) compared to 11.6% in H and 9.1% in W (p=0.03). Among the 67 patients who received mastectomies, rate of reconstruction was highest among W; 92.3% compared to 80% among H and 57.9% among AA (p=.038). Rates of MRI were highest among AA (12.6%) and H (17.8%) compared to W (5.1%) patients (p=.017). Among patients who received breast-conserving therapy (BCT) (282), AA received the lowest rate of adjuvant radiation therapy; 22% compared to 53% of W and 60% of H patients (p=.380). Conversely, among patients with ER-positive DCIS, minority patients received a higher rate of hormonal treatment; 55% AA and 60% H, compared to 45% of W patients (p=<.0001). There was a higher rate of positive margins in the minority groups; 27.1% AA vs. 26.8% in H vs. 17.2% in W (p=0.198). Among patients with positive margins, 25.0% of AA ultimately underwent mastectomy, 23.3% of H vs. 23.5% of W (P=0.931). Five- year disease free survival was 95% in W, 97% in AA and 94% among H patients. Five-year overall survival was 100% in W, 99% in AA and 99% in H. There were a total of 11 recurrences and 4 cases of contralateral breast cancer development, 10 of which were DCIS, and 5 of which were Invasive Ductal Carcinoma (IDC). Ten of the recurrences were local, and 2 were distant metastases. They occurred in 6.3% AA, 4.6% H and 4.4% W (p=.801).

Conclusions: In our study of DCIS among minority patients compared to white patients, we observed a similar DCIS phenotype and size. The recurrence rates were similar among the groups, eluding that a more aggressive phenotype of DCIS may not be race based. There were some treatment differences in that African American patients underwent a significantly higher rate of mastectomy, which did not result in an increase in recurrence rate. One possible hypothesis for this treatment discrepancy may be related to the higher rate of pre-operative MRI we observed in this group, which is known to over-estimate pathological size. Larger studies across multiple institutions would help elucidate if and why there are true differences in mastectomy rate between races, as well as the accuracy of MRI, so that unnecessary mastectomies with resultant morbidity are prevented.

788062 - Analysis of Health Care Delivery and Outcomes in Hispanic Women with Breast Cancer

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Background/Objective: Hispanics are the largest ethnic minority in the US. Studies that directly investigate the process of health care delivery for Hispanic women with breast cancer in the US are lacking. Without assessing such information, the epidemiology of breast cancer among this population cannot be understood. We aimed to assess the breast cancer care process among Hispanic women with breast cancer and to evaluate factors associated with mortality.

Methods: A review of the National Cancer Database (NCDB) was performed. Hispanic women diagnosed with Stage I-IV breast cancer between 2005-2015 were included in our cohort. Demographic evaluation and breast cancer care process were evaluated. Descriptive statistics, Chi-square, adjusted logistic regression analysis were used to evaluate the odds of covariates by

ethnicity of the subjects. COX proportional hazard model was used to evaluate the 10-year overall survival.

Results: A total of 178,398 women with Stage I-IV breast cancer were included in our study. Of these, 13,110 (7.3%) were Hispanic women, and 165,288 (92.7%) were White non-Hispanics. Mean age was 54.7 years (SD 9.72) for Hispanics and 58 years (SD 10.01) for White non-Hispanics. Hispanic women had similar hormone receptor-positive status when compared to White non-Hispanics (73.1% vs 74%) and similar rates of triple-negative breast cancer (19.3% vs 19.3%). Hispanic women presented at more advanced stages (III/IV) than their White non-Hispanic counterparts (23.6% vs 21.2%). On multivariate analysis, Hispanic women were more likely to undergo lumpectomy compared to mastectomy (OR 0.87; 95%; CI 0.77-0.98). Reconstruction following mastectomy was less likely in the Hispanic population (OR 0.90; 95%; CI 0.75-1.08). Additionally, Hispanic women were more likely to receive adjuvant chemotherapy vs neoadjuvant chemotherapy (OR 1.22; 95%; CI 1.01-1.46), had greater delays in time to chemotherapy initiation (>=120 days) (OR 1.58; 95%; CI 1.35-1.85) and delays in time to surgery (>=60 days) (OR 1.83; 95%CI 1.56-2.16) compared to their White non-Hispanic counterparts. There was no difference in terms of receipt of hormone therapy. There was no difference in 10-year overall survival among Hispanic and White non-Hispanic women with breast cancer.

Conclusions: Greater delays in timeliness of treatment were observed in Hispanic women with breast cancer. This finding may have implications for clinical outcomes and quality of care. Disparities among Hispanic women with breast cancer continue to exist compared with White non-Hispanics patients. The findings may point to the need to address process of care factors in the management of breast cancer in the Hispanic population.

TABLE. LOGISTIC REGRESSION ANALYSIS BY GROUP

	Hispanics			White Non-Hispanics		
VARIABLE	**OR**	**95% Confidence Interval**		**OR**	**95% Confidence Interval**	
HER 2 STATUS						
HER2 +	0.927	0.836	1.029	1.078	0.972	1.197
HER2 -	1 [Ref]	-	-	1 [Ref]	-	-
GEOGRAPHIC LOCATION						
MIDWEST	0.327	0.279	0.382	3.062	2.616	3.585
SOUTH	0.965	0.855	1.09	1.036	0.917	1.17
WEST	2.288	2.026	2.584	0.437	0.387	0.494
NORTHWEST	1 [Ref]	-	-	1 [Ref]	-	-
HORMONE RECEPTORS						
HR+	0.69	0.373	1.276	1.45	0.784	2.681
HR-	1 [Ref]	-	-	1 [Ref]	-	-
RECONSTRUCTION						
RECONSTRUCTION	0.896	0.745	1.077	1.116	0.928	1.342
NO RECONSTRUCTION	1 [Ref]	-	-	1 [Ref]	-	-
TYPE OF SURGERY						
MASTECTOMY	0.872	0.774	0.984	1.146	1.016	1.293
LUMPECTOMY	1 [Ref]	-	-	1 [Ref]	-	-
RECONSTRUCTION TYPE						
AUTOLOGOUS	0.783	0.567	1.081	1.277	0.925	1.764
IMPLANT	1 [Ref]	-	-	1 [Ref]	-	-
PATIENT AGE						
<50 YEARS	1.713	1.561	1.879	0.584	0.532	0.641
≥50 YEARS	1 [Ref]	-	-	1 [Ref]	-	-
PATHOLOGIC STAGE						
I-II	1.134	1	1.287	0.882	0.777	1
III-IV	1 [Ref]	-	-	1 [Ref]	-	-
INSURANCE						
UNINSURED	6.023	5.111	7.098	0.166	0.141	0.196
INSURED	1 [Ref]	-	-	1 [Ref]	-	-
FACILITY TYPE						
ACADEMIC	1.578	1.441	1.729	0.634	0.578	0.694
OTHER	1 [Ref]	-	-	1 [Ref]	-	-
CHEMOTHERAPY						
ADJUVANT	1.215	1.012	1.46	0.823	0.685	0.988
NEOADJUVANT	1 [Ref]	-	-	1 [Ref]	-	-
HORMONE THERAPY						
NEOADJUVANCE	0.896	0.752	1.067	1.116	0.937	1.329
ADJUVANCE	1 [Ref]	-	-	1 [Ref]	-	-
TIME TO CHEMOTHERAPY						
<120 DAYS	1.577	1.347	1.847	0.634	0.541	0.742
≥ 120 DAYS	1 [Ref]	-	-	1 [Ref]	-	-
TIME TO SURGERY						
<60 DAYS	1.833	1.555	2.16	0.546	0.463	0.643
≥ 60 DAYS	1 [Ref]	-	-	1 [Ref]	-	-
RADIATION THERAPY						
NO RADIATION	1.194	0.894	1.594	0.838	0.627	1.119
RADIATION	1 [Ref]	-	-	1 [Ref]	-	-
DAYS TO RADIOTHERAPY						
<12 WEEKS	0.542	0.434	0.677	1.845	1.478	2.304
≥ 12 WEEKS	1 [Ref]	-	-	1 [Ref]	-	-
NODAL STATUS						
NEGATIVE NODES	0.981	0.884	1.089	1.019	0.918	1.132

POSITIVE NODES	1 [Ref]	-	-	1 [Ref]	-	-
INCOME						
HIGH SES	0.461	0.418	0.508	2.171	1.968	2.394
LOW SES	1 [Ref]	-	-	1 [Ref]	-	-
TRIPLE NEGATIVE STATUS						
NO TNBC	2.385	1.039	5.479	0.419	0.183	0.963
TNBC	1 [Ref]	-	-	1 [Ref]	-	-
AXILLARY SURGERY						
ALND	1.436	1.285	1.605	0.696	0.623	0.778
SLNB	1 [Ref]	-	-	1 [Ref]	-	-

Genetics

780561 - Outcome of Intensive Breast Cancer Surveillance for Initially Disease-free BRCA Mutation Carriers

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Background/Objective: Pathogenic mutations of the BRCA tumor suppressor genes result in greater lifetime risk for breast cancer; intensive surveillance is recommended unless risk-reducing prophylactic mastectomy is performed. This study aimed to evaluate the incidence of breast cancer amongst disease-free BRCA mutation carriers under surveillance, the characteristics of those who subsequently developed breast cancer, and the performance of the screening imaging modalities.

Methods: The analysis was performed on a prospectively maintained database of Hong Kong Hereditary Breast Cancer Family Registry from 2007 to 2018. Patients with BRCA 1 or 2 pathogenic mutations without a history of breast cancer and prophylactic mastectomy were reviewed. Surveillance program included biannual clinical examination, annual mammogram (MMG) together with ultrasound (USG), and annual magnetic resonance imaging (MRI) with contrast. Mutation carriers were scheduled to have 1 screening imaging every 6 months, with alternating MMG + USG and MRI.

Results: During the study period, 410 patients from 260 families were diagnosed with BRCA 1 or 2 mutations. After excluding 276 patients with the diagnosis of breast cancer and 13 patients who died or lost to follow-up before the release of the genetic test results, 121 breast cancer-free patients were included for analysis. Upon detection of pathogenic mutations, all of them chose the intensive surveillance program instead of prophylactic mastectomy; while 8 (6.6%) agreed to have oral chemoprophylaxis. During surveillance, 1 patient later decided to undergo bilateral prophylactic mastectomy, 9 (7.4%) were newly detected with breast cancer. The average annual cancer occurrence rate was 2.8% (28 per 1000 BRCA mutation carriers) during the study period, which was significantly higher compared to the crude incidence rate of 0.106% in the general population from the Hong Kong Cancer Registry (2009 – 2016). The median interval from surveillance to cancer-detection is 35 months. The median age of diagnosis was 43 years old. Seven (77.8%) were diagnosed at Stage 0 or 1. Four patients (44.4%) underwent contralateral prophylactic mastectomy with cancer operation. Regarding imaging modalities, 5 patients (55.6%) were detected by MRI, while the rest (44.4%) were by MMG, USG or the combination. During the surveillance period, 38 patients were noted to have suspicious findings on imaging at least once, and the recall rate was 31.4%

Conclusions: Breast cancer incidence is significantly higher in BRCA mutation carriers. While prophylactic mastectomy was not popular among those who were cancer-free in our population, management relied mainly on intensive surveillance. Approximately one-third of the patients would have suspicious findings during surveillance which required further investigations. MRI

could be more sensitive in detecting earlier stage cancer than MMG and USG. Cost-effective analysis of intensive breast cancer surveillance in BRCA mutation carriers is warranted.

Table: Clinical characteristics of the surveillance-detected breast cancer for initially cancer-free BRCA mutation carriers

Patient	Mutation	Age	Gender	First detection imaging	No. of surveillance performed	TNM stage	IHC profile	Operations
1	BRCA2+	40	F	MMG	6	Tis	ER+ PR+	MTX + contralateral prophylactic MTX + IBR
2	BRCA1+	40	F	MRI	3	Tis	ER+ PR+	BCT
3	BRCA2+	43	F	MRI	1	Bilateral Tis	ER+ PR+	Bilateral MTX + IBR
4	BRCA1+	38	F	MRI	12	T1 N0 M0	Triple negative	MTX + contralateral prophylactic MTX + IBR
5	BRCA1+	43	F	MRI	4	T1 N0 M0	ER+ PR+ Her2+	BCT
6	BRCA2+	48	F	MRI	5	T1 N0 M0	ER+ PR+ Her2+	MTX
7	BRCA2+	47	F	USG	3	T1 N0 M0	ER+ PR+ Her2+	BCT
8	BRCA2+	54	F	MMG+USG	1	T2 N1 M0	ER+ PR+ Her2+	MTX + contralateral prophylactic MTX + IBR
9	BRCA2+	35	F	MMG+USG	1	T2 N2 M0	ER+ PR+ Her2+	MTX + contralateral prophylactic MTX

Abbreviations: MMG, mammogram; USG, ultrasound; MRI, magnetic resonance imaging; ER, estrogen receptor; PR, progestogen receptor; HER2; Human epidermal growth factor receptor 2; MTX, mastectomy; BCT; breast conserving therapy; IBR; immediate breast reconstruction; IHC, immunohistochemical staining

788041 - Evaluating the Rate of Genetic Testing in Newly Diagnosed Breast Cancer Patients

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Background/Objective: Genetic testing has become an important tool for optimizing breast cancer management for patients newly diagnosed with breast cancer as the result can influence surgical decision. In addition, identifying mutations in a breast cancer patient is important for surveillance of other cancers and has important implications for other family members. Studies have demonstrated a wide range of uptake of genetic testing varying between 27-70%. The aim of this study is to identify our institutional rate of genetic testing in newly diagnosed operative breast cancer patients who met the criteria for testing based on NCCN guidelines. We hypothesize our multidisciplinary clinic model with genetic counselor on site at our NCI-designated Comprehensive Cancer Center would result in a higher rate of genetic testing than currently reported.

Methods: After obtaining IRB approval, a retrospective, single institution chart review was performed. Patients were queried using our institutional cancer registry. Newly diagnosed patients with Stage 0-III breast cancer between January 2018 and February 2019 who were evaluated in our multidisciplinary breast clinic were included in the study. Patients diagnosed with recurrent or metastatic breast cancer were excluded. We evaluated patients' eligibility for genetic testing according to NCCN guidelines at the time of their diagnosis and the rate of genetic testing.

Results: Final analysis included 229 newly diagnosed operative breast cancer patients evaluated in our surgical clinic. Of these patients, 133 (58%) met the criteria for genetic testing. Of the patients who met the criteria for testing, 93 (70%) underwent genetic testing. Mean age of diagnosis was 61.9 years. Twenty patients (15%) who were eligible for genetic testing who underwent evaluation by our genetic counselor declined to undergo testing. A total of 4 patients who did not meet criteria were found to have undergone genetic testing. Of those who underwent genetic testing, 60% had a negative result, 14% were positive for at least 1 deleterious genetic mutation, and 25% were identified to have a variant of unknown significance (VUS). There was no variability of genetic testing eligibility ($p=0.30$) or rate of testing ($p=0.72$) between the treating surgeons. Further, patients who met criteria for testing were younger than those who did not meet eligibility (57.7 years vs. 67.7 years, $p<0.001$). There was no significant difference in rate of testing between 2018 and 2019 ($p=0.61$) despite change in testing criteria. There was no significant difference in the rate of declining testing if eligible between 2018 and 2019 ($p=0.50$).

Conclusions: Genetic testing has increasingly become an important part of breast cancer treatment. Our rate of testing in those who met the criteria was 70%, which was well above average rate reported. In our clinic, we have a multidisciplinary clinic model in which our genetic counselors are on site and available to evaluate the patient at the time of the initial surgeon's visit. Streamlining the process of genetic counseling and testing at the time of surgical consultation may be a model to increase the rate of genetic testing.

780710 - Comparing Survival Outcomes Between Breast-conserving Surgery and Mastectomy Among BRCA Carriers and Non-carriers

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Background/Objective: Breast cancer is the most common cancer and third leading cause of cancer deaths among females in Hong Kong. Hereditary cancers account for 5-10% of breast cancers, of which, 80% of hereditary breast cancer is due to BRCA1 and BRCA 2 mutations. The aims of management of breast cancer in BRCA mutation carriers are threefold - curative, risk reduction, and good cosmesis. Currently, controversy exists between breast-conserving surgery (BCS) and mastectomy for BRCA mutation carriers with some studies suggesting a higher ipsilateral breast cancer recurrence rate for BCS. Survival data is limited. This study aims to evaluate the survival outcomes between BCS and mastectomy among BRCA and non-BRCA mutation carriers in breast cancer patients.

Methods: This is a retrospective study analyzing prospectively maintained data for BRCA carriers and non-carriers diagnosed with breast cancer who underwent genetic testing between January 1st, 2007 to December 31st, 2018 and received either a breast-conserving surgery (BCS) or mastectomy. Patients who were tested positive for BRCA 1 or 2 were included; those that were tested positive for other pathogenic mutations such as PTEN, TP53 were excluded. Stage IV disease and bilateral breast cancer patients were also excluded. Local recurrence, overall survival, cancer-specific survival, and disease-free survival were analyzed by Log-rank test. Subgroup analyses of survival between different disease stages, BRCA status, surgical option

and triple-negative tumors were conducted by Log-rank test with p-values adjusted by Benjamini and Hochberg (BH) method. A Cox proportional hazards model was used to investigate the associated risk factors.

Results: A total of 3080 patients were included in the analysis, with 142 BRCA mutation carriers and 2938 non-carriers. The BCS and mastectomy rates in the BRCA mutation group were 42.3% and 57.7% respectively compared to 33.8% and 66.2% in the non-carrier group ($p=0.048$). There was no statistical significance between the different surgical groups and BRCA carrier status regarding local recurrence rate. Log-rank test showed that a poorer disease staging showed significantly worse overall survival, cancer-specific survival, and disease-free survival ($p<0.0001$). In a subgroup analysis, BRCA mutation carriers with Stage I disease who received BCS or mastectomy had a worse overall survival compared to non-carrier groups ($p=0.0097$). This finding was similar for cancer specific survival ($p=0.0031$). There was no difference in survival for other disease stages, disease-free survival, or triple-negative breast cancer patients. A Cox proportional hazards model revealed that BRCA mutation status ($p=0.71$) and type of surgery ($p=0.30$) were not independent risk factors for poorer survival.

Conclusions: BCS is not associated with adverse long-term survival outcomes in BRCA mutation carriers and has no survival benefits over mastectomy. The consideration for BCS should be based on surgical eligibility irrespective of genetic status. With appropriate pre-operative counseling, BCS should be offered as an option to BRCA mutation carriers.

787837 - Outcomes Associated with Rapid Genetic Testing at the Time of Breast Cancer Diagnosis

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Background/Objective: Recently, the American Society of Breast Surgeons released a Consensus Guideline on Genetic Testing for Hereditary Breast Cancer, stating that genetic testing should be offered to every patient with breast cancer. For women with a BRCA1 or BRCA2 mutation, bilateral mastectomy reduces mortality by 52%. However, women must know their BRCA status at the time of breast cancer diagnosis when making surgical choices. The objective of the study was to evaluate the impact of rapid genetic testing (RGT) for BRCA1 and BRCA2 at the time of breast cancer diagnosis on surgical choices and psychosocial functioning.

Methods: Participants included women diagnosed with invasive breast cancer at 4 academic health sciences centres in Toronto, Canada, between June 2013 and May 2018. Participants received standard pre-test genetic counselling and were offered RGT for BRCA1 and BRCA2. Participants completed a baseline questionnaire prior to genetic counselling, and follow-up questionnaires at 1-week and 1-year post-genetic test result disclosure. Cancer-related distress, anxiety, and depression were measured using standardized questionnaires. A medical chart

review was conducted to obtain diagnostic, pathological, and treatment data. Outcomes were compared between BRCA-positive and BRCA-negative patients.

Results: A total of 1007 women attended a pre-test genetic counselling session and consented to RGT for BRCA1 and BRCA2. The mean age of the participants was 46.3 years, and the median time to BRCA result disclosure was 10 days. Sixty women (6.0%) were found to have a BRCA mutation (33 BRCA1 and 27 BRCA2). Of women who had Stage I to III breast cancer, 45.9% women had breast-conserving surgery, 32.0% women had unilateral mastectomy, and 22.1% women had bilateral mastectomy. Women with a BRCA mutation were significantly more likely to elect for bilateral mastectomy compared to women without a BRCA mutation ($p<0.0001$). For women with a BRCA mutation with Stage I-III breast cancer, 37 women (62.7%) had bilateral mastectomy as their first surgery, 5 women (8.5%) had contralateral prophylactic mastectomy in a subsequent surgery within 1 year after diagnosis, and 17 women (28.8%) had the contralateral breast intact at 1-year follow-up. There were 95.7% of BRCA-positive patients who reported that they used the genetic test result to make a surgical decision. At all time-points, there were no significant differences in levels of cancer-related distress, anxiety, or depression between BRCA-positive and BRCA-negative patients.

Conclusions: Women who are provided with rapid genetic testing (RGT) at the time of breast cancer diagnosis use the genetic information to make surgical treatment decisions, and the majority of those identified with a BRCA1 or BRCA2 mutation elect for a bilateral mastectomy. Provision of RGT at the time of breast cancer diagnosis does not cause increased distress for those identified with a BRCA mutation. Women with breast cancer should be offered RGT at the time of breast cancer diagnosis to inform surgical decisions, which will have an overall impact on survival in women with BRCA-associated breast cancer.

783525 - Evaluating Surgeon-driven Preoperative Genetic Testing in Newly Diagnosed Breast Cancer Patients

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Background/Objective: As a patient approaches a new breast cancer diagnosis, determining eligibility for breast-conserving surgery is one of the first critical decisions. Preoperative genetic testing can influence decisions for breast conservation and contralateral prophylactic mastectomy (CPM). Yet cancer genetic counselors are not easily or expeditiously accessible across the country. Given the demand and expanded criteria for breast cancer genetic testing, in 2017, our breast cancer team developed a protocol for breast surgeons to consent patients for BRCA 1/2 or limited high-risk gene panel testing on patients facing a breast cancer surgical decision who met NCCN criteria for gene testing without a preoperative consultation with a genetic counselor. Now we seek to evaluate the outcomes of surgeon-driven preoperative genetic testing in an academic women's oncology program.

Methods: Using our prospective genetic testing database, women who were diagnosed with breast cancer and underwent surgeon driven genetic testing between January 2017 and June 2018 were identified. Retrospective chart review was performed to verify age, genetic testing status, presence of genetic mutation, dates of genetic testing, surgical consultation, genetics consultation, and resultant surgical decision making process. We reviewed the charts and ascertained from documentation the motivation for patients who underwent CPM.

Results: Ninety-eight patients with newly diagnosed breast cancer meeting NCCN guidelines underwent surgeon directed genetic testing and counseling. Eighty-three (85%) patients had BRCA1/2 testing, while 15 (15%) had a limited 8 gene high-risk panel test, which includes ATM, BRCA 1/2, CDH1, CHEK2, PALB2, PTEN, and TP53 genes. Four (4%) patients were found to have deleterious BRCA2 mutations, and a single mutation of CHEK2, PALB2, and BRCA 1 were found in 3 (3%) separate patients. Twenty-six patients (including one BRCA2 mutation, as well as the BRCA1, CHEK2, and PALB2 patients) did not undergo surgery at our facility or had incomplete records and were excluded from further analysis. In the remaining 72, the median age at diagnosis was 46 years, range 29-69. The average time from the date of genetic testing to date of surgery was 30.9 days, range 13 to 55 days, excluding patients who underwent neoadjuvant chemotherapy and/or had plastic surgery involvement prior to surgery. Two of the 3 deleterious BRCA2 mutations were disclosed to the patient by a certified genetic counselor (CGC), while 1 patient was informed of the results by the surgeon prior to surgery. Of the patients without a mutation, 20 had results disclosed by their surgeon, 4 were informed by the nurse navigator, and the remaining 45 had results disclosed in consultation with a CGC. Fifty-eight (81%) patients underwent expanded panel testing after surgery, and an additional 5 (7%) patients were found to have genetic mutation(s), which included: 2 MUTYH, 1 CHEK2, 1 PALB2 and 1 patient with both MUTYH and BRCA2 mutations. Fifteen patients (25%) were identified to carry 22 variants of uncertain significance (VUS). Fourteen patients declined further panel testing. Only 2 (3%) patients who received their results from a surgeon prior to surgery did not have a consultation with a CGC. Both declined further panel testing. Of the 3 patients that had a BRCA2 mutation identified on stat testing, 1 underwent therapeutic mastectomy with CPM, 1 elected breast-conserving surgery, while 1 underwent unilateral mastectomy because of extent of disease. Of the 72 patients, 1 patient decided against CPM after a negative stat testing result, and 6 patients (8%) who underwent CPM were not identified to harbor a deleterious mutation on stat testing.

Conclusions: In this retrospective review of our pilot study of surgeon-driven preoperative genetic testing and counseling, we were able to show the majority of patients (82%) completed a consultation with a CGC, and 81% proceed to panel testing without barrier. We also showed that the test results guided surgical decision making for 1 patient. No patients who underwent larger panel testing postoperatively voiced regret over their surgical decisions. This protocol improved efficiency for our CGC ultimately increasing their availability by eliminating stat preoperative testing consultations.

Imaging

787210 - The Ability to Look: Ultrasound Education in Breast Surgical Oncology Fellowship

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Background/Objective: Ultrasound is a useful tool in diagnosis and treatment of breast pathologies. Its applications are widespread, from the clinic to the operative settings and beyond. Current fellowship regulations require 15 hands-on breast ultrasound experiences and 30 observation-only experiences, with no further details provided. The objective of this review is to highlight the importance of ultrasound in breast surgical oncology fellowship training and to identify opportunities to implement a standardized ultrasound curriculum.

Methods: A literature search on ultrasound in breast surgical oncology was performed to identify the multitude of applications. We then developed a survey via Survey Monkey for program directors of breast surgical oncology fellowship programs to evaluate their current ultrasound usage and any education the fellows receive on such. The survey was sent via email to 48 breast surgical oncology program directors and the results were collected and analyzed for consistency across programs.

Results: There were 20 responses to the survey. The degree of ultrasound use varies widely among programs. An ultrasound is available in the surgery clinic in 17 programs (85%), with ultrasound-guided core needle biopsies being performed by the surgery team in 6 (37%) of those institutions. Preoperative clinical assessment with ultrasound is routinely used in 8 programs (40%). Intraoperative ultrasound is utilized in 12 programs (60%), with the same number of programs also using ultrasound to augment other methods. Other localization methods used include seed, needle/wire, radar, and radiofrequency identification. Postoperative evaluation and intervention with ultrasound are more consistent practices, with 15 of 20 programs (75%) utilizing it. Half of the programs that responded (10/20) send their fellows to an ultrasound course for further education. The survey questions and responses are listed in Table.

Conclusions: In the current literature, ultrasound has a variety of applications in the diagnosis, staging, treatment, and surveillance of breast cancer. Preoperative ultrasound evaluation can identify suspicious lesions and facilitate biopsy. Though intraoperative tumor localization techniques vary across the country, ultrasound can be a useful tool either on its own or as an adjunct to other technologies. Postoperative ultrasound can be used to identify and treat complications. Current ultrasound education in breast surgical oncology fellowship is informal and not standardized. The results of our survey may indicate that there is opportunity to better educate fellows on ultrasound technology and use. Further studies may be able to assess the

comfort level of fellowship graduates with complex ultrasound use and identify more specific deficiencies in the current curricula.

Table: Survey questions and responses

Question	Answers			
Number of fellows trained per year	**1**	**2**	**> 2**	
	14 (70%)	6 (30%)	0	
Availability of ultrasound in outpatient setting	**Yes**	**No**		
	17 (80%)	3 (15%)		
Routine use of preoperative ultrasound for tumor evaluation	**Yes**	**No**	**N/A**	
	8 (40%)	11 (55%)	1 (5%)	
Ability to do ultrasound guided biopsies in surgical clinics	**Yes**	**No**		
	6 (30%)	14 (70%)		
Intraoperative tumor localization techniques	**Needle/wire**	**Seed**	**Ultrasound**	**Other**
(ability to select more than one choice)	15	10	13	4
Use of ultrasound to augment other localization techniques	**Yes**	**No**		
	13 (65%)	7 (35%)		
Routine use of ultrasound for postoperative evaluation	**Yes**	**No**		
	15 (75%)	5 (25%)		
Utilization of outside ultrasound courses for fellows	**Yes**	**No**		
	10 (50%)	10 (50%)		

787832 - Does Preoperative MRI Improve Surgical Outcomes in HER2+ Breast Cancer?

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Background/Objective: Human epidermal growth factor receptor 2 (HER2)-positive breast cancer is a subtype of breast cancer notable for aggressive biology. The ongoing Alliance 11104 trial aims to determine whether preoperative MRI affects surgical outcomes in patients with HER2+ tumors, such as by reducing re-excision or local-regional recurrence. We sought to answer this question through retrospective analysis of a large single-institution database. We hypothesized that preoperative MRI would reduce re-excision rates and local-regional recurrence after lumpectomy in patients with invasive HER2+ breast cancer treated with adjuvant chemotherapy.

Methods: An institutional database was queried to identify female patients diagnosed with invasive HER2+ breast cancer from 2009-2019. Patients who were metastatic at diagnosis or who received neoadjuvant chemotherapy were excluded. Patients were also excluded if pathologic staging, receptor status, or surgery date were unknown. We used ANOVA and chi-squared tests to assess demographic and clinical characteristics. We controlled for clinical predictors of preoperative MRI usage using inverse probability weighted (IPW) analysis to assess the effect of preoperative MRI status on re-excision and local-regional recurrence after lumpectomy.

Results: Of 1111 patients identified with invasive HER2+ breast cancer, 571 (51.4%) underwent preoperative MRI. Compared to those without preoperative MRI, patients with MRI were significantly younger (median 54 vs. 60 years, $p<0.01$) and more likely to undergo mastectomy (45.5% vs. 32.0%, $p<0.01$). Groups did not significantly differ in race, socioeconomic status (SES), year of diagnosis, hormone receptor (HR) status, or pathological stage. Of 1111 HER2+ patients, 679 (61.1%) underwent initial lumpectomy, 311 (45.8%) of whom underwent preoperative MRI. Crude analysis showed a significantly higher re-excision rate in the MRI group (34.73% vs. 27.45%, $p=0.04$). However, when controlling for baseline clinical characteristics which predict MRI usage (age <40 at diagnosis, invasive lobular carcinoma, mammographic breast density, family history, prior radiation, and known mutation carriers) using IPW analysis, there was no difference in re-excision after lumpectomy ($p=0.31$). There was no difference between groups in local-regional recurrence on either chi-squared ($p=0.53$) or IPW analysis ($p=0.91$).

Conclusions: Contrary to our expectations, preoperative MRI had no effect on either re-excision rates or local-regional recurrence following lumpectomy in patients with HER2+ breast cancer. We also found that patients in this cohort with preoperative MRI were significantly more likely to undergo mastectomy rather than breast-conserving surgery. These findings call into question the necessity of MRI in HER2+ patients treated with adjuvant chemotherapy and raise concern for overtreatment following preoperative MRI in this cohort.

788270 - Utility for Additional Axillary and/or Systemic Staging Evaluation in Clinical T3N0M0 Breast Cancer Patients

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Background/Objective: Initial work-up recommendations and the role of preoperative staging evaluation of American Joint Committee on Cancer (AJCC) clinical stage T3N0M0 breast cancers is less clear as the overall clinical stage can now range from clinical stage IB to IIIB depending on grade and receptor status according to the AJCC 8th edition. To better define the utility of preoperative staging evaluation, this study sought to identify the tumor characteristics and upstage rate for cT3N0 breast cancer cases found to be clinical N1 or clinical M1 by additional axillary or systemic staging evaluation.

Methods: Our metropolitan hospital IRB approved breast cancer database was queried for the years 2010-2019 for clinical stage T3N0M0 cases. Patient demographics, cancer staging, tumor

characteristics, survival data were obtained. Chart review was performed for regional staging evaluation (axillary ultrasound, MRI) and preoperative systemic staging evaluation (PET/CT, CT chest/abdomen/pelvis).

Results: A total of 56 patients were identified from 2010 to 2019 that presented as cT3N0M0. Of these, 12 patients did not meet inclusion criteria – synchronous cancer (4), left system (4), or never returned (4). This left 44 patients of which 42 had additional imaging work-up that revealed a 15.9% upstaging rate. Of those upstaged, more than half (57%) were upstaged to stage 4. Of those upstaged, all of their management plans were initiated with systemic therapy.

Conclusions: Of our clinical T3N0M0 cohort, even though the overall clinical stage can vary from stage IB to stage IIIB depending on grade and receptor status, additional imaging for axillary and systemic evaluation still had a significant impact on patient care as 15.9% were upstaged and ultimately had their cancer treatment/management plan directed by these findings. This is important to appreciate as the 8th edition AJCC staging system may not yield an overall stage for clinical T3N0M0 breast cancer cases that would drive this further imaging.

786865 - Preoperative Evaluation of Mammographic Microcalcifications After Neoadjuvant Chemotherapy for Breast Cancer

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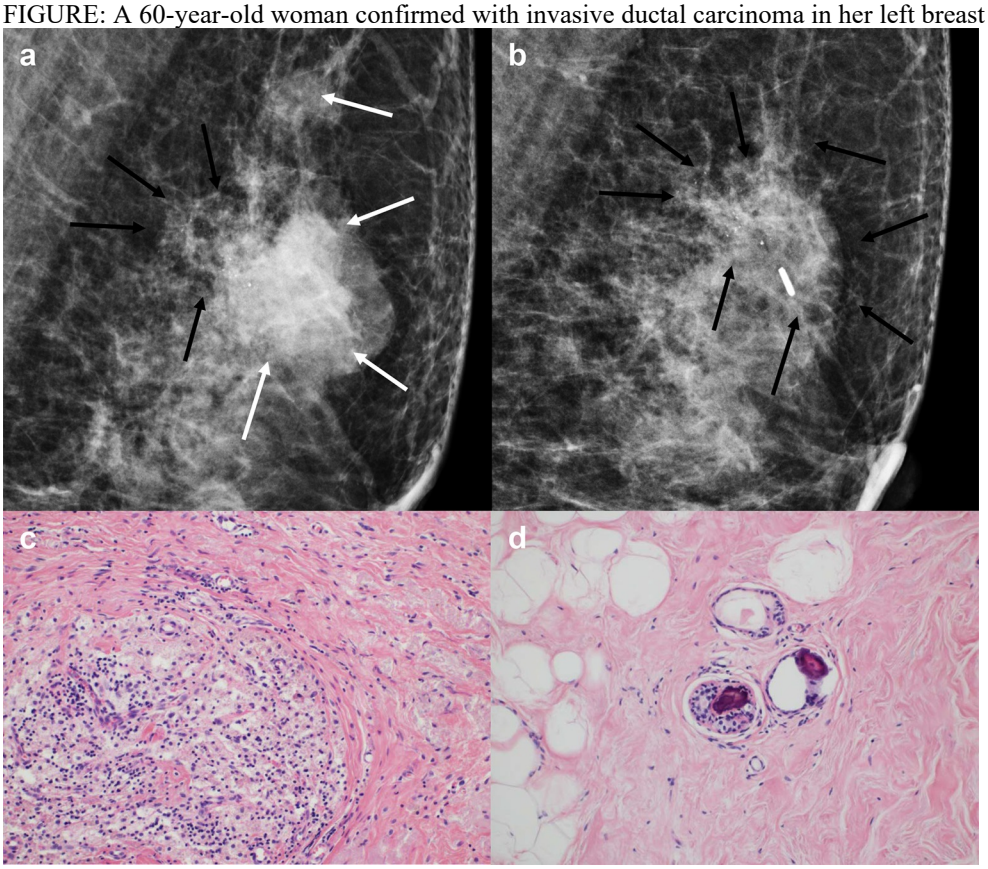
Background/Objective: This study aimed to assess the predictive value of preoperative residual mammographic (MMG) microcalcifications for residual tumors after neoadjuvant chemotherapy (NAC) for breast cancer.

Methods: This single-center, retrospective study included breast cancer patients who underwent NAC and demonstrated suspicious microcalcifications within or near the tumor bed on MMG from June 2015 to August 2018. The residual microcalcifications and remnant lesion on MRI were correlated with histopathologic findings of residual tumors and immunohistochemical markers.

Results: A total of 96 patients were included. Ten patients achieved pathologic complete response (pCR), and previous suspicious microcalcifications were associated with benign pathology in 10.4% (10/96) of the patients. In the remaining 86 patients who did not achieve pCR, 61.5% (59/96) of the residual microcalcifications were associated with invasive or in situ carcinoma, and 28.1% (27/96) with benign pathology. Hormone receptor-positive (HR+) patients had the significantly highest proportion of residual malignant microcalcifications compared to HR- patients (48.9% vs. 13.5%, respectively; p=0.019). MRI correlated better than residual microcalcifications on MMG in predicting residual tumor extent in all subtypes (ICC=0.709 vs. 0.365). MRI also showed higher correlation with residual tumor size for the HR-/ HER2+ and HR-/ HER2- subtype (ICC=0.925 and 0.876, respectively).

Conclusions: The extent of microcalcifications on MMG after NAC did not correlate with the extent of residual cancer in 38.5% of women. Regardless of the extent of microcalcifications, residual tumor extent on MRI after NAC and molecular subtype could be an accurate tool in evaluating residual cancer after NAC.

FIGURE: A 60-year-old woman confirmed with invasive ductal carcinoma in her left breast



788291 - The Utility of MRI in Predicting Response of Lymph Nodes in HER2-positive and Triple-negative Breast Cancer to Combination Neoadjuvant Immunotherapy and Chemotherapy (NAICT) and Its Implications on Axillary Surgical Management

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Background/Objective: Immunotherapy is increasingly used in combination with chemotherapy (NAICT) in the neoadjuvant setting in the treatment of certain breast cancers to increase pathological complete response (pCR) and improve survival. The goal of this study was to evaluate the ability of magnetic resonance imaging (MRI) to detect malignant axillary nodal disease among patients treated with NAICT and assess implications for axillary management.

Methods: We retrospectively reviewed the clinic-pathologic data of 43 women treated at a single institution who had undergone definitive surgery after treatment on an IRB-approved

NAICT trial protocol. Treatment protocols included (1) 14 TNBC patients treated with intratumoral Talimogene laherparepvec (TVEC) in combination with weekly Paclitaxel followed by dose dense Adriamycin and Cytoxan (ddAC); (2) 13 ER+HER2+ patients treated with subcutaneous interferon gamma (IFN-γ) in combination with weekly paclitaxel with Trastuzumab and Pertuzumab ; (3), 6 ER-HER2+ patients treated with 3 weeks of HER2 pulsed dendritic cell vaccines (DC1) followed by Taxotere, Carboplatin, and Pertuzumab; and (4), 10 patients on ISPY2 trial; 7 patients randomized to treatment with Pembrolizumab with weekly T followed by ddAC, 1 patient treated with SGN-LIV1A followed by ddAC, and 2 patients treated with Durvalumab, and Paclitaxel, followed by ddAC. The lymph nodes were evaluated on pre- and post-treatment MRIs and compared to the pathological results.

Results: Twenty-three patients (53.5%) had biopsy-proven axillary metastasis. They were staged into their respective nodal categories 20/43 (47%) N0, 19/43 (44%) N1, 4/23 (9%) N2/3. Within the N0 group, 20 patients underwent SNB, 1 was found to have a micro metastasis, and another had treatment-related changes. MRI evaluation of lymph nodes in the N0 group revealed a 95% accuracy and 95% sensitivity. In the N1 group (19 patients), 8 underwent axillary lymph node dissection (ALND), 8 had targeted sentinel node biopsy (TSNB), 3 required ALND, 3 had sentinel node biopsy (SNB), and 1 required further ALND. This resulted in a total of 12 ALND. Pathology revealed 32% (6/19) of patients had residual disease. Within this N1 group, the residual nodal disease burden was low. Two patients had micro-metastasis, and 4 had macroscopic disease involving only 1-2 lymph nodes. The remaining 13 patients had no residual disease. Sensitivity of MRI was 33.3%; however, specificity was 95%, and accuracy was 74%. In the N2/N3 group, all 4 patients underwent ALND. Final pathology revealed pCR in 50% (2/4) of patients and gross disease in 2 patients with greater than 4 nodes involved. Sensitivity, specificity, and accuracy of MRI within this group was 100%.

Conclusions: Patients with biopsy-proven nodal HER2-positive and triple-negative breast cancer treated with NAICT had an overall 65% axillary pCR (68% in N1 group and 50% in N2/N3 groups). NAICT does not interfere with accuracy of MRI in assessment of node-negative disease. The accuracy and sensitivity of MRI increases with greater nodal burden. In N2/N3 disease, this may be useful in discriminating which patients can undergo a selective TSNB versus those who require an ALND.

Table:

	Number of Pts	pCR of Axilla	Final Axillary Surgery	MRI accuracy
N0	20 (47%)	N/A	SNB 20	95%
N1	19 (44%)	13 (68%)	ALND 11 TSNB 5 SNB 2	74%
N2/3	4 (9%)	2 (50%)	ALND 4	100%
Total	23	15 (65%)		

787675 - Utility of MRI in Predicting Tumor Size and Re-excision Rate in Invasive Lobular Carcinoma

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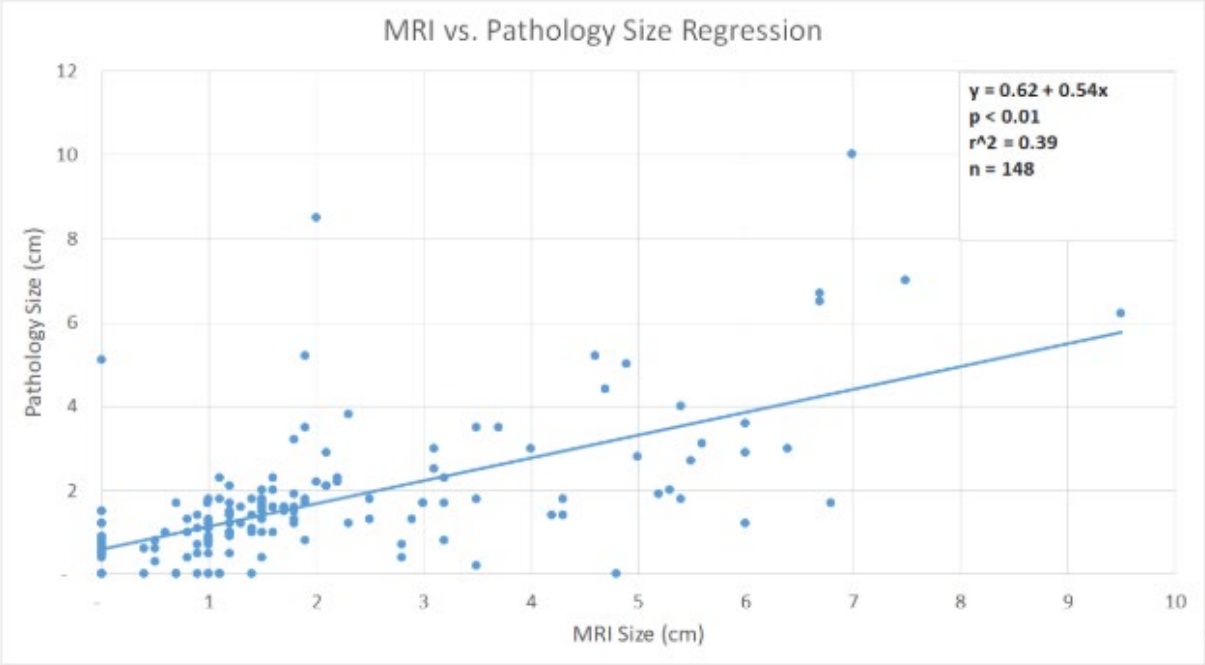
Background/Objective: Invasive lobular carcinoma (ILC) consists of 10-15% of invasive breast cancers, but provides diagnostic and therapeutic challenges due to its multifocal physiologic and radiographic nature. In combination with its propensity for metastatic spread, ILC generally has a worse long-term outcome than invasive ductal carcinoma. The multifocality of ILC makes breast-conserving surgery (BCS) challenging as re-excision and conversion to mastectomy rates are 29-67%. In patients undergoing re-excision lumpectomy for positive margins, 28% still has to undergo additional re-excision or completion mastectomy, further compounding the difficulty in surgical management of ILC patients. Magnetic resonance imaging (MRI) is used as a screening tool for younger women with hereditary risks of breast cancer, and as a supplemental modality. MRI is more sensitive (81-100%) than mammography or ultrasound, but it has a 4-12% false negative rate and specificity of only 65-79%. While studies support the use of MRI in ILC and lobular carcinoma in-situ, there is no evidence to support increased cancer detection rate. This study examines the utility of MRI to predict tumor size in patients with ILC and whether its preoperative use yields a lower re-excision rate than ultrasound alone.

Methods: This IRB-approved, single academic center retrospective study examined 187 ILC patients between 2005-2019. A total of 74% of patients received MRI, 88% received ultrasound, and 64% received both. Regression analysis and Chi Squared analysis were used.

Results: When comparing tumor size by MRI or ultrasound to the size of the final pathology, regression analysis favors MRI ($R2=0.39$, $F(1,147)=95.75$, $p<0.01$) over ultrasound ($R2=0.28$, $F(1,147)=58.22$, $p<0.01$) as a more accurate imaging modality. In patients receiving neoadjuvant therapy, the results also favor MRI ($R2= 0.41$, $F(2,146)=49.8$, $p<0.01$) as a better predictor of tumor size than ultrasound ($R2=0.30$, $F(2,146)=30.82$, $p<0.01$). Looking at re-excision, patients who received preoperative MRI (n=17) underwent less re-excision than those imaged with ultrasound (n=35), but the study was not powered for statistical significance (18% vs 31%, $\chi2=0.66$, $p=0.42$). However, those imaged with MRI and ultrasound did have lower rates of re-excision (n=119) than those imaged with ultrasound alone (0.08% vs 31%, $\chi2=7.18$, $p<0.01$).

Conclusions: These results validate that MRI should routinely be employed for more accurate clinical staging of ILC, and that the routine use of preoperative breast MRI in conjunction with ultrasound can reduce BCS re-excision rates. A larger multicenter analysis could validate this claim and investigate the impact of preoperative MRI alone. The use of MRI should be tempered with its known disadvantages, which include delaying surgical intervention, detection of additional disease without improvement in disease-free survival, additional cost, and additional psychological burden on patients.

Figure: Regression analysis: Preoperative MRI (cm) vs. Pathology (cm)



Localization

787766 – First-in-Human Study Using the 'GLOW' Near Infrared Camera System in Breast Cancer

Martha Kedrzycki[1], Maria Leiloglou[1], Vadzim Chalau[1], Paul Thiruchelvam[2], Jessica Lin[2], Dan Elson[1], Daniel Leff[1]

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Background/Objective: Breast-conserving surgery (BCS) is the cornerstone of surgical treatment for breast cancer. However, re-operative intervention due to positive tumor margins reflects the challenge of accurate tumor localisation in-vivo. Re-operation comes at great cost to the patient in view of the psychological burden, worsened cosmesis, and delay to adjuvant treatment(s), as well as having health economic implications. With the advent of fluorescence imaging, a technique has been developed that can illuminate the tumor in the infrared spectrum and give visual cues as to location, size, and invasiveness. Fluorescence imaging requires: a fluorophore to target the desired tissue, a light source to activate the fluorophore, a combined colour and infrared camera to capture the signal, and a software interface to interpret and overlay the images. We have built an in-house camera system referred to as the "guiding light optimising wide local excisions" ("GLOW system") to enable fluorescence guided BCS. Here, we present a first-in-woman in-vivo study of the GLOW camera.

Methods: Ten breast cancer patients were recruited to a single centre prospective clinical study following UK Research Ethics Committee approval (18/LO/2018). Surgeons were blinded to NIR images obtained. Indocyanine green (dose=12.5mg) was delivered intraoperatively via intravenous administration, after which images were taken of the tumor in vivo, tumor ex-vivo, cavity shave margins (if performed), and all excised sentinel nodes. The images were compared to 2D specimen radiographs and histopathology. Data was collected on patient demographics (including age, height, weight, and BMI), tumor size, location, type, grade, hormonal status, histological margins of the resected specimen, as well as any adverse events. Fourier transform (sine & cosine decomposition of an image) and image primitive analysis were used to process the images and assess the diagnostic potential of metrics such as density distribution and spatial frequencies.

Results: Ten women with median age 55 years (range 45-70) and median BMI 23.7kg/m2 (range 19.2-30.2) were enrolled in the study. Eight patients had IDC, 6 of which had concurrent DCIS, 1 patient had IMC, and 1 had ILC. Nine patients were ER+, 7 PR +, 1 HER2 +, and 1 patient was triple-negative. We estimate capturing in vivo images delayed surgery by <5 minutes per patient. Twp patients had positive margins defined as 'tumor on ink', 1 with disease at the inferior and medial margins, and the second with disease at the inferior and superior margins (with disease close to anterior and posterior margins). Another 4 patients had close margins for invasive cancer (i.e.. <2mm from resection margin), 2 in the anterior, 1 in the lateral, and 1 posterior margins. No adverse events occurred. Statistically significant differences between tumor and normal tissues were obtained for the slope (p=0.001) and intercept (p=0.002) of the linear fit as per the Fourier spectrum. The use of image primitives to differentiate between

benign and malignant regions of interest has shown that only the Euler number (image connectivity between image features and corresponding holes) demonstrated a statistically significant difference between these 2 tissue types ($p<0.001$). However, the Hausdorff box-counting fractal dimension (change of image pattern detail with scaling) and lacunarity (image inhomogeneity) failed to reach significance ($p=0.38$ and $p=0.16$ respectively).

Conclusions: This is the first-in-woman study using the GLOW camera for fluorescence-guided BCS. Our findings suggest that Fourier transform and image primitive analysis of the GLOW images are worth investigating to reveal differences between tumor and normal tissue. Future studies will modify the GLOW camera to be used in combination with targeting fluorophores to more precisely target breast tissue, thus enabling fluorescence-guided BCS.

787147 - Magseed Localization of Previously Biopsied Lymph Nodes Affects Pathological Staging and Type of Axillary Surgery

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Background/Objective: Previous studies have shown that localizing lymph nodes with biopsy-confirmed metastasis prior to surgery in patients who receive neoadjuvant chemotherapy can improve the accuracy of sentinel lymph node biopsy. Our aim was to evaluate the outcome of lymph node localization with Magseed in any node that was abnormal enough to warrant a pre-operative core needle biopsy, whether the result was positive or negative for metastasis.

Methods: Patients who underwent Magseed placement for operative localization of previously biopsied axillary lymph nodes from July 2017 to March 2019 were identified using a prospectively maintained database with IRB approval. Core needle biopsy was performed under ultrasound guidance for clinically abnormal lymph nodes detected by physical exam or imaging. Imaging studies included mammogram, ultrasound, and MRI. Patient demographics, tumor and treatment characteristics, and surgical information were collected. Pathology data included diagnosis at lymph node core needle biopsy and after surgery. Standard statistical analysis was performed using SAS version 10.0.

Results: Magseeds were placed in 104 patients for axillary lymph node localization. There were 62.8% (n=59) of patients who were Caucasian, and 34% (n=32) were African American; median age was 53.5 (range 21-92 years). A total of 40.4% (n=42) patients had palpable lymphadenopathy at presentation, and 90.4% (n=94) had enlarged lymph nodes based on imaging. Core needle biopsy yielded malignancy in 60.6% (n=63) of patients and benign results in 39.4% (n=41). There were 81.7% (n=85) of patients who underwent neoadjuvant therapy, of which 94.1% (n=80) received chemotherapy, and 5.9% (n=5) received hormonal therapy. The majority of patients (93.3%, n=97) underwent sentinel lymph node biopsy, including excision of the Magseed-localized lymph node; completion axillary lymph node dissection was performed in

45.4% (n=44) of these patients. Two patients required a second surgery for ALND. Of the 41 patients with benign results at core needle biopsy, 17.1% (n=7) had metastasis in the localized lymph node at surgery. Of these, nearly all (85.7%, n=6) were macrometastasis. Three patients (42.9%) had more than 1 positive lymph node, and all but 1 underwent completion axillary lymph node dissection. When comparing the patients with false-negative core needle biopsy results (n=7) to those with true negative results (n=33), 28.6% (n=2) vs. 63.6% (n=21) were treated with neoadjuvant chemotherapy (p=0.16). All patients with false-negative core needle biopsies had ER/PR-positive/HER2-negative disease; triple-negative disease was present in 15.5% (n=5), and HER2-positive disease in 36.4% (n=12) of patients with true negative lymph node results. By ultrasound, the largest lymph node size was 23 ± 7.9 mm (mean ± SD) vs. 13.2 ± 8.7 mm (p=0.09), with cortical thickness 3.7 ± 0.8 mm vs. 4.0 ± 1.7 mm (p=0.7) in the false-negative vs. true-negative lymph nodes. The benign core needle biopsy results in all 7 false-negative patients were reported as concordant with imaging findings.

Conclusions: In patients who underwent core needle biopsy of a clinically positive lymph node with benign results, intraoperative localization yielded malignancy in nearly 20%, highlighting the benefit of localizing any lymph node with characteristics abnormal enough to warrant pre-operative biopsy. There were no significant differences when comparing imaging characteristics of true-negative vs. false-negative lymph nodes. Intraoperative localization determined subsequent ALND in 51% of patients, including all patients with unexpected axillary macrometastasis at excision of the false-negative lymph node. Magseed localization of previously biopsied lymph nodes provides critical information for pathologic staging, to guide intraoperative decision-making, and in determining adjuvant therapy recommendations.

787603 - Comparison of Multiple Wire, Radioactive Seed, and Savi Scout Radar Localizations for Management of Surgical Breast Disease

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Background/Objective: Radioactive seed localization (RSL) and the Savi scout radar® (SSR) are newer alternatives to wire-guided localization (WL) for non-palpable breast lesions. There is limited data on localization using SSR and RSL for excision of multiple lesions within the same breast. Our objective was to compare 3 different localization devices when multiple devices were used for pre-operative localization of non-palpable lesions in patients undergoing breast surgery.

Methods: Sixty-eight patients had a partial mastectomy (n=54) or breast biopsy (n=14) with pre-operative image guided localization (loc) using multiple wires or device placement for non-palpable lesions between July 2017 to July 2018. Lesions were localized by WL, RSL, or SSR. Delay in operating room start times and total perioperative times in both the hospital and ambulatory setting, loc time, explant of loc device, positive margins, volume of tissue excised, and 30-day complications were evaluated.

Results: Forty-one patients (60%) had WL; 11 (16%) had RSL; 16 (24%) had SSR loc. Fifty-four patientss (79.4%) had loc of 2 lesions, 13 (19.1%) had loc of 3 lesions, and 1 (1.5%) had loc

of 4 lesions, of which 23 patients (33.8%) had a lesion that was bracketed (36.6% WL vs. 18.2% RSL vs. 37.5% SSR, p=0.487). There was no difference in length of localization time among the groups (average 25.5 min, p=0.179). In 91.2% of cases, the first specimen contained all the clips and loc devices, which was similar among groups (p=0.488). There was no difference in retained biopsy clip among the groups (average 7.4%, p=0.962). For operations performed in the hospital, there was no difference in operative time among the groups with a median of 77.5 min (range 32-197) (p=0.705) or total perioperative time of 508 min (550 min WL vs. 492 RSL vs. 472 SSR, p=0.210). However, among operations with delayed start times, there was a longer average delay of 95.5 min (range 23-238) in WL, followed by 61.5min in RSL, compared to 42 min in SSR (p=0.004). In the ambulatory surgery center, there was no difference in operative time (average 66.6 min, p=0.108), total perioperative time (average 382.7 min, p=0.809), or delayed start times (average 48.4 min, p=0.557) among the groups. Although there was no difference in lesion size (average 1.0 cm, range 0.1-12.0cm, p=0.197), there was a greater volume of tissue excised in the WL group (34.7g WL vs. 18.9g RSL vs. 14.2g SSR, p=0.019). There was no difference in positive margin rate and 30-day complications among groups [Table].

Conclusions: SSR and RSL can be used to localize multiple lesions in the same breast with no difference in positive margin rates or complications and less tissue excised compared with WL.

Table: Comparison of localization techniques – complications and outcomes

Variable	All patients (N=68)	Wire (N=41)	Seed (N=11)	Savi (N=16)	P-value
30-day complication	3 (4.41)	2 (4.88)	1 (9.09)	0 (0)	0.526
Type of 30-day complication					
Infection	1 (33.3)	0(0)	1 (100)	0 (0)	1.000
Medical complication	1 (33.3)	1 (50)	0 (0)	0 (0)	
Weight of specimen (grams)	29 (2.7-189)	34.7 (5.2-189)	18.9 (2.7-58)	14.2 (3.2-118)	0.019
Positive Margins [cancer only]	16/55 (29.1)	11/33 (33.3)	3/9 (33.3)	2/13 (15.4)	0.596

LRR

787170 - Evaluation of Incidence of Local Recurrence and Cosmesis Following Conventional Breast-conserving Surgery and Oncoplastic Breast Surgery: A Randomized Controlled Trial

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Background/Objective: Oncoplastic breast surgery (OPBS) is being increasingly offered to patients with breast cancer. Reported local recurrence rates (LRR) following OPBS are based on retrospective studies and case series. There are no randomized controlled trials to date comparing the incidence of LR following conventional breast-conserving surgery (BCS) and OPBS. Aim of the study: Evaluation of incidence of LR and cosmesis following conventional BCS and OPBS

Methods: IRB approval was obtained prior to commencement of study. Over a 2-year period, 94 consenting women with breast tumors ≤4cm were randomised to BCS (group 1- 47 patients) or OPBS (group 2-47 patients). Patients with no suspicious axillary nodes underwent SLNB and those with nodal metastasis underwent ALND. All surgeries were performed under general anesthesia. Patients in group 1 underwent 'standard' wide local excision with 1 cm tumor-free margin, following which wound was closed with absorbable sub-cuticular sutures. Patients in group 2 underwent level 1 or level 2 OPBS using volume displacement techniques wherein breast parenchymal plates were mobilized on either side from underlying pectoral fascia and overlying skin. The cut edges were approximated by absorbable interrupted sutures so as to obliterate the cavity, following which skin was closed with absorbable sub-cuticular sutures. Cavity margins were marked with titanium clips to facilitate planning of radiotherapy. All patients were discharged on postoperative day 1 and were followed up as per standard protocol. At follow-up patients were assessed for surgical site infection, seroma etc. Cosmetic and aesthetic outcome were evaluated by patient herself, a female nurse, and the surgeon at 3 and 6 months after surgery. Cosmetic score was assessed individually using the predetermined criteria viz. shape with brasserie, shape without brasserie, symmetry to the opposite breast, and overall appearance. All patients received whole-breast RT with boost to cavity site followed by systemic treatment. Qualitative and quantitative data was expressed as frequency, mean +SD, and median (min-max). Categorical and continuous variables were compared among the groups by chi-square, Fischer exact test, independent t test, or Wilcoxon rank sum test

Results: Mean age of patients was 48.78 years (range 23-76 years SD: 12.29). Tumor size ranged from 1-4 cm (mean: 2.9 cm; median 3 cm in group 1 and mean 3.14 cm; median 3 cm in group 2). Primary tumor was T1 in 17 (18%) and T2 in 77 (82%). Node status was N0 in 79 (81%) patients and N1 in 15 (19%). Sixty-six (69.6%) tumors were ER and PR +, 21 (22.3%) were triple-negative, and 8 (8.5%) were HER2 neu-positive. Ninety-one (93.61%) were invasive carcinoma,a and 3 (6.39%) were DCIS. Seven patients (7.4%) received NACT. Seventy-nine (81.4%) underwent SLNB, and the rest underwent ALND. Patient and tumor characteristics were similar in both groups. Local recurrence: At a mean follow-up of 28.02±8.82 (range 13-47)

months, 5 patients (5.3%) developed LR (1 in group 1 (2.1%) and 4 in group 2 (8.5%)). However, this difference was not statistically significant. Three (3.19%) of these patients (1 in group 1 and 2 in group 2) developed systemic metastasis and died. Results of cosmetic and aesthetic assessment are given in the Table.

Conclusions: Contrary to published literature, in this randomized controlled trial, LRR following OPBS is slightly higher compared to conventional BCS. But the difference is not statistically significant. Larger trials with longer follow-up are needed to confirm this observation. Cosmetic satisfaction and aesthetic outcome were significantly better with OPBS.

Table: Results of cosmetic and aesthetic assessment

		SIMPLE CLOSURE N=47 MEAN±SD MIN-MAX	ONCOPLASTY CLOSURE N=47 MEAN±SD MIN-MAX	P
Self assessment				
	Satisfaction after surgery	3.19±0.57 (2-4)	3.53±0.58 (2-4)	.004
	Comfort with brassiere	2.85±0.80 (1-4)	3.36±0.91 (1-4)	0.005
	Effect of surgery on social life	2.25±0.64 (1-3)	2.29±0.58 (1-3)	0.79
	Effect of surgery on sexual life	2.27±0.64 (1-3)	2.38±0.53 (2-4)	0.60
Surgeons Assessment				
	Shape of breast with brassiere	3.51±0.58 (2-4)	3.78±0.41 (3-4)	0.01
	Shape of breast without brassiere	2.82±0.89 (1-4)	3.23±0.75 (1-4)	0.01
	Symmetry to opposite breast	3.04±0.77 (1-4)	3.27±0.71 (1-4)	0.1
	Mobility of breast	3.29±0.80 (2-4)	3.53±0.74 (2-4)	0.1
	Inframammary fold	2.63±0.48 (2-3)	2.74±0.48 (1-3)	0.2
	Consistency of breast	2.74±0.44 (2-3)	2.76±0.42 (2-3)	0.6
	Overall appearance	3.04±0.75 (2-4)	3.48± (1-4)	0.001
Nurse's Assessment				
	Shape of breast with brassiere	3.48±0.58 (2-4)	3.78±0.41 (3-4)	0.007
	Shape of breast without brassiere	2.87±0.87 (2-4)	3.23±0.66 (1-4)	0.02
	Symmetry to opposite breast	3.06±0.79 (1-4)	3.31±0.72 (2-4)	0.11
	Mobility of breast	3.27±0.77 (2-4)	3.48±0.77 (2-4)	0.12
	Inframammary fold	2.63±0.56 (1-4)	2.76±0.51 (1-3)	0.13
	Consistency of breast	2.76±0.47 (2-4)	2.91±0.28 (2-3)	0.05
	Overall appearance	2.95±0.75 (1-4)	3.34±0.82 (1-4)	0.001

Lymphedema

787405 - Evaluating the Use of Targeted Axillary Dissection Using a Reflector-based Localization Device and Comprehensive Physical Therapy to Reduce the Risk of Lymphedema in Node-positive Breast Cancer Patients

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Background/Objective: Patients with node-positive breast cancer who have completed neoadjuvant therapy (NT) undergo axillary dissection (AD) and adjuvant radiation therapy (AR). Reported lymphedema rates of AD with AR are high at 20-30%. After NT, resolution of nodal metastasis occurs in approximately 20-40% patients. Targeted axillary dissection (TAD) involves removal of previously biopsy-positive clipped node and sentinel nodes after completion of NT. TAD helps to identify patients who now have negative nodes and can possibly avoid AD. Reported lymphedema rates of TAD with AR are 10-12%. There is considerable variability on recommended protocols for lymphedema prevention in these patients. This study investigated whether TAD in conjunction with comprehensive physical therapy can further reduce the risk of lymphedema in node-positive breast cancer patients receiving NT.

Methods: An IRB-approved retrospective review was conducted of 35 consecutive patients who were axillary node-positive and underwent NT between Aug 2016 and Aug 2019. Axillary node localization was performed with infrared reflector device Savi Scout (Cianna Medical, Aliso Viejo, CA). Patients with negative nodes intra-operatively underwent TAD only, while those with positive nodes had AD. Comprehensive physical therapy included deep myofascial release, range of motion exercises, and stretching. The outcome measures were Lymphedema Index (L-DEX) scores (normal range -10 to +10), range of motion evaluation and clinical evaluation.

Results: Twenty patients had TAD whereas 15 had AD (Table). Post-NT stages were 14 Stage 0, 4 Stage I, 1 Stage IIA, 10 Stage IIB, 5 Stage III A, and 1 Stage IIIC. Twelve patients had breast conservation surgery, 15 had mastectomy with implant-based reconstruction, and 8 had mastectomy without immediate reconstruction. The clipped node was localized at a median of 1 day (range 1-35) before surgery, and 100% clipped nodes were retrieved. Thirty-four of the 35 patients underwent AR. There were no statistically significant differences in pre-op and post-op L-DEX between TAD and AD. At 1-month post-op, 28 patients had full, and 7 had limited range of motion. Two AD patients with BMI 25.8 and 32.2 kg/m2 developed lymphedema at 9.2 and 16 months after surgery. No patient experienced tumor recurrence after a median follow-up of 6 months.

Conclusions: This preliminary study found no evidence of lymphedema in TAD and AD patients at 1 month following surgery. After a median follow-up of 6 months, 13% of AD patients but no TAD patients experienced lymphedema.

Table: Comparison of patient characteristics and outcomes between TAD and ALND (N=35)

Characteristic	TAD (n=20)	ALND (n=15)	P-value
Median age in years	51	55	0.22
Median BMI in kg/m^2	27.6	29.4	0.56
NT Neoadjuvant chemotherapy Neoadjuvant hormone therapy Neoadjuvant hormone and targeted therapy	 19 (95) 1 (5) 0 (0)	 14 (93.3) 0 (0) 1 (6.7)	 0.35
Response to NT Complete response Partial response No response	 13 (65) 5 (25) 2 (10)	 1 (6.7) 11 (73.3) 3 (20)	 **0.002***
Median sentinel nodes removed	3.5	3	**0.01***
Median size of clipped node (mm)	15	20	**0.03***
Median follow-up duration in months	6.7	5	0.64
Median number of PT visits	3	4	0.08
Median L-DEX score pre-op	-1.65	-1.4	0.67
Median L-DEX score 1 month post-op	-2.65	1.1	0.65
Median L-DEX score difference (post-op minus pre-op)	0.45	0	0.89
Range of motion 1 month post-op Full Limited	 18 (90) 2 (10)	 10 (66.7) 5 (33.3)	 0.09
Deep myofascial release to axilla and breast 1 month post-op Yes No	 13 (65) 7 (35)	 13 (86.7) 2 (13.3)	 0.12
Lymphedema during long-term follow-up Yes No	 0 (0) 20 (100)	 2 (13.3) 13 (86.7)	 0.09

Values in parentheses are column percentages
*P <= 0.05

786294 - Breast Lymphedema Following Breast Conservation Surgery and Radiation for Multiple Ipsilateral Breast Cancer: Data from the Alliance Z11102 Study

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Background/Objective: Breast-conserving therapy is well established for unifocal tumors, with equivalent oncologic outcomes to mastectomy in early-stage breast cancer. For multiple ipsilateral tumors, breast-conserving treatment may be effective but little data exists on long-term breast symptoms in this setting. We evaluated breast lymphedema associated symptoms over time in ACOSOG Z11102 (Alliance) trial - a prospective study of breast-conserving surgery for multiple ipsilateral breast cancer.

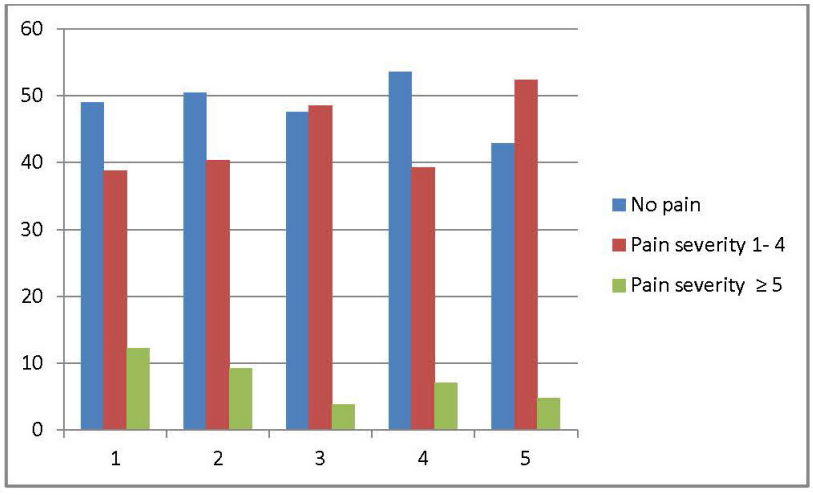
Methods: The ACOSOG Z11102 trial prospectively enrolled 270 women with 2 or 3 sites of biopsy-proven malignancy in a single breast with intent for breast-conserving treatment. Women had invasive cancer in at least 1 site, and disease sites separated by 2 cm or greater of normal breast tissue by imaging. Clinical N0 or N1 disease was permitted. Surgical excision was

permitted through a single incision or multiple incisions, and negative margins were required. Annual surveys were completed on breast symptoms associated with breast lymphedema (swelling, heaviness, redness, pain/discomfort), with an 11-point linear analog scale to grade the severity of each symptom.

Results: Among 270 enrolled women, 216 successfully completed breast-conserving treatment. Median age was 61.5 (range 40-87). A total of 96.2% of women had 2 cancer sites at preoperative biopsy, and 3.7% had 3 sites. Median largest single focus of tumor was 1.5 (0.1-6.5). A total of 82.9% had sentinel node surgery, 15.3% had axillary dissection, and 1.8% had no axillary surgery. A single incision was used in 28.8%, with 2 incisions in 68.8% and 3 in 2.4%. Survey results are available for 68%, 65%, 48%, 26%, and 10% of the subjects for years 1-5 postoperatively. The proportions of women reporting the presence of at least 1 breast lymphedema symptom were 62%, 57%, 56%, 50%, and 62% at years 1-5. Breast pain/discomfort was reported more commonly than swelling, heaviness, or redness and persisted over time, but severity was low in most (Figure). Among those with any symptoms, about half had only one symptom. At the 2-year follow-up timepoint, breast swelling (but not the other symptoms) was associated with multiple incisions: any degree of swelling reported in 25.6% with multiple incisions vs 12.2% with single incision, p=0.084. Breast swelling of severity 2 or higher was reported in 21.1% of women with multiple incisions vs 2.4% with single incision (p=0.006), and swelling of severity of 5 or higher was reported in 8.9% with multiple incisions vs 0% in those with a single incision (p=0.056).

Conclusions: Breast-conserving treatment is feasible in women with multiple ipsilateral breast tumors. Mild breast pain/discomfort occurs commonly, and multiple incisions may increase breast swelling. However, these symptoms appear comparable to prior published results in unifocal breast cancer. Support: U10CA180821, U10CA180882; ClinicalTrials.gov Identifier: NCT01556243

Figure: Percent of subjects with breast pain of varying severity by years of follow-up time



787662 - Anatomical Considerations for the Breast Surgeon When Participating in Axillary Reverse Mapping: Incorporating a New Variant Pathway

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Background/Objective: Axillary lymph node dissection (ALND) remains a necessary surgical procedure in certain breast cancer treatment plans. However, the procedure is associated with the risk of developing lymphedema. Axillary reverse mapping (ARM) has been proposed as a technique to reduce the risk of lymphedema by identifying and preserving lymph nodes draining the upper extremity, while removing the axillary nodes draining the breast. ARM traditionally is performed by injecting blue dye in the upper medial ipsilateral arm. We sought to identify the rate of a variant lateral upper extremity drainage pathway to inform the ARM technique.

Methods: A retrospective analysis of a single-institution lymphatic database was reviewed. Breast cancer patients from 2017-2018 who underwent ALND and immediate lymphatic reconstruction (ILR) with mapping of the Mascagni -Sappey (MS) pathway (i.e., lateral upper arm draining lymphatics) were included. Fluorescein isothiocyanate was injected at the medial upper arm, and isosulfan blue was injected at the cephalic vein, or lateral upper arm, prior to ALND. Patient characteristics and incidence of a variable MS lateral upper arm pathway were reviewed.

Results: In our cohort, 29 patients underwent MS mapping during ALND and immediate lymphatic reconstruction. The mean age was 54.6 years, and BMI was 26.6 kg/m2. In 10% (3/29) of patients, there was a suspected variant MS pathway identified draining into the axilla.

Conclusions: Our findings show that there is a variant MS pathway that can be identified in a subset of patients. Breast surgeons who perform ARM should consider injecting mapping dye not only in the upper inner arm, but also laterally to bring attention to these lymphatic pathways during ARM.

786856 - Lymphatic Micro Surgical Preventive Healing Approach (LYMPHA) - Lending a Helping Hand for Prevention of Enlarging Arm

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Background/Objective: Breast cancer-related lymphedema (BCRL) remains a potentially life-altering sequel of breast cancer treatment that affects approximately 1 in 5 patients with a reported incidence varying from 5% to more than 50%. Sentinel lymph node (SLN) biopsy and axillary reverse mapping (AR) has reduced the incidence and severity of BCRL. Lymphatic Microsurgical Preventive Healing Approach – (LY.M.P.H.A.) is a surgical technique proposed for patients with operable breast cancer requiring an axillary dissection consisting of carrying out lymphatico-venous anastamosis (LVA) between arm lymphatic identified by injecting blue dye or ICG in the arm and an axillary vein branch simultaneously. Objective: To evaluate the feasibility of LYMPHA procedure and to evaluate the efficacy of LYMPHA procedure in preventing lymphedema post-ALND.

Methods: All patients diagnosed with unilateral breast cancer requiring axillary clearance were enrolled in the study after informed consent. Exclusion criteria included bilateral breast cancer, allergy to ICG, pregnancy , and pre-existing lymphedema. Lymphedema was defined as change in >15% of volume on subsequent reading calculated by formula for volume of frustum of cone, more than 3 splashes on ICG lymphography and patient-reported arm swelling or heaviness. Patients had a baseline volumetric analysis pre-op and intra-op ICG lymphangiography. They were followed up at 3, 6, and 12 months with volumetry, ICG lymphangiography, and patient-reported outcomes.

Results: Fifty patients were included in the study. The general characteristics and LYMPHA procedural findings have been mentioned in the Table. With a mean follow-up of 20.4 ±2.8 months (8-26 months), 3/50 (6%) patients developed lymphedema. Looking into our retrospective cohort data of last 5 years, the lymphedema rate was around 32%. ICG lymphangiography detected lymphedema even before the actual volume changes were manifested.

Conclusions: LYMPHA is feasible, safe, and practical method for the primary prevention of clinical lymphedema. This technique serves to significantly reduce the rate of clinical LE in breast cancer patients with ALND. ICG lymphangiography can be used potentially to detect the early changes of lymphedema and intervene at appropriate time for benefit of the patient. However, a multi-institutional multicenter randomized study needs to be planned for defining patient selection and looking into long-term outcomes of the LYMPHA procedure.

Table: General characteristics and LYMPHA procedure

TABLE I: General Characteristics & LYMPHA Procedure	**Total N=50**
Age (years)	50.2±9.4 (32-68)
BMI Mean ±SD <25 25-30 >30	22±6.2 (18-32) 36 10 04
Stage T1 T2 T3 T4	 04 22 08 16
SLNB	8
Total Number of Nodes retrieved	16±7.5 (10-28)
Positive Lymph Nodes	4±5.2 (2-25)
MASTECTOMY/BCS	34/16
NACT : Yes/No	34/16
NAHT : YES/No	8/42
Adjuvant Chemotherapy : Yes/No	50/0
Adjuvant Radiotherapy: Yes/No	50/0
Reason for Not Performing LYMPHA Not able to visualise Lymphatic Extensive disease in axilla	 2 2
No of anastomosis per patient Avg (Range)	2.4±1.2 (2-5)
Duration of Surgery Avg (Range)	42 ± 20.5min (30-60 min)
Technique used For Lympha Procedure End to End End to Side Invaginate	 30 10 04

787694 - Does Lymphovenous Bypass for Breast Cancer-related Lymphedema Impact Bioimpedance Spectroscopy (BIS) Measurements?

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Background/Objective: Breast cancer-related lymphedema (BCRL) can be precisely assessed using bioimpedance spectroscopy (BIS), which measures tissue resistance to an electrical current to determine extracellular fluid volume. BIS has been studied as a tool for early detection and monitoring of BCRL after breast cancer surgery, but has not been used for assessment of response to treatment in patients undergoing lymphovenous bypass (LVB), a surgical method to treat development of BCRL resistant to conservative treatment. The aim of this study was to determine if BIS measurements can accurately assess reduction in BCRL in patients undergoing LVB.

Methods: Patients undergoing LVB for BCRL from 1/2015-12/2018 were identified from a prospectively maintained database. All breast cancer patients were assessed with baseline BIS measurements before oncologic surgery and serial subsequent BIS during follow-up visits. Clinicopathologic information, LVB operative details, and pre- and post-LVB operative BIS measurements were collected. Difference in BIS over time were assessed using t-test. Linear regression was used to evaluate the correlation between number of LVB performed and BIS change.

Results: Eleven patients underwent LVB. Of these, 9 had at least 1 postoperative BIS measurement and make up the study population. The majority (78%) received radiation, taxane chemotherapy, and underwent axillary dissection. Lymphedema stage prior to LVB was Stage 1 in 67% and Stage 2 in 33%. The mean time from initial oncologic surgery to LVB was 21 months (range 13-29) with a mean number of bypasses performed of 5.6 (range 2-9). Development of BCRL was defined by a 3-standard deviation (SD)(+10) change in volume from baseline measurement with associated clinical symptoms. Following LVB, the mean time to first BIS measurement was 6 months (range 1-13). Reduction in BCRL to baseline or subclinical stage was seen in 67%. Additional follow-up visits with BIS were identified in 7 of the 9 LVB patients with a mean follow-up of 20 months. With this longer follow-up time, BIS and clinical symptoms remained similar to first postoperative measurement, with 57% of patients remaining at baseline or subclinical stage, thus demonstrating stability of BIS change over time ($p=0.65$, 95% CI [-10.96,16.96]). The number of LVB performed did not correlate with the degree of BIS change pre- and post-operatively ($p=0.69$) but did trend toward significance with longer-term follow-up ($p=0.12$).

Conclusions: BIS measurements improve after LVB and demonstrates stability over long-term follow-up. To our knowledge, this study is the first to evaluate BIS with pre-oncologic treatment baseline and post-LVB follow-up comparative assessment. Our study demonstrates BIS as an objective tool that can be used to monitor response to surgical intervention for BCRL. Additional studies correlating the number of LVB performed with BIS measurements for an objective assessment of reduction in BCRL should be considered, given the trends seen in this cohort. BIS as part of routine pre- and post-operative LVB surveillance in BCRL evaluation is warranted to document operative outcomes.

Male Breast Cancer

785101 - Surgery for Men with Breast Cancer: Do the Same Data Still Apply?

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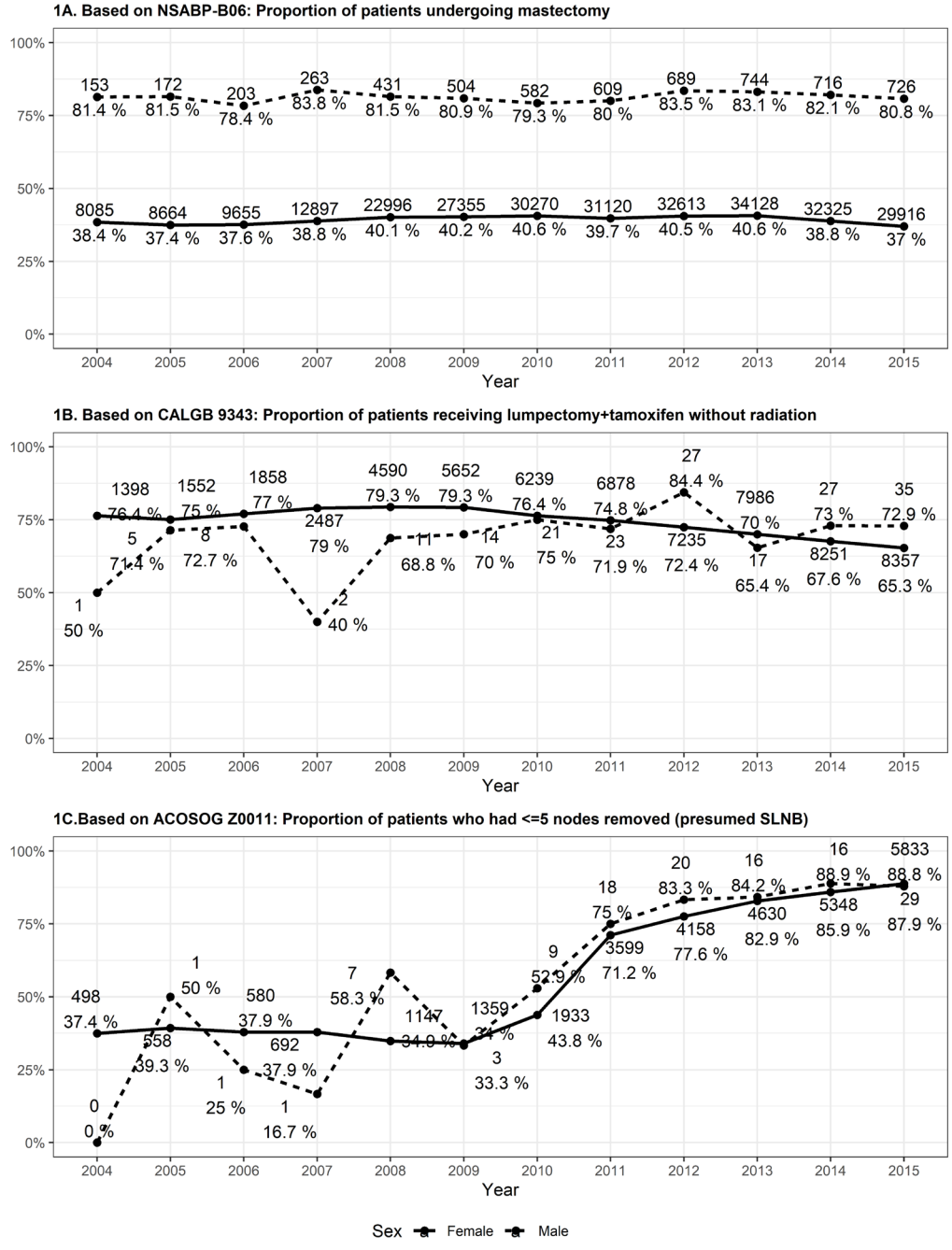
Background/Objective: Men represent a small proportion of breast cancer diagnoses each year and are often excluded from clinical trials. Thus, the most appropriate treatment strategies are largely extrapolated from evidence in women with breast cancer. Here, we compare contemporary practice patterns over time between men and women with breast cancer following the publication of several landmark clinical trials in surgery (NSABP B-06, CALGB 9343, and ACOSOG Z0011).

Methods: Patients diagnosed with invasive breast cancer (2004-2015) from the National Cancer Database were stratified by gender. Sub-cohorts were created based on trial eligibility for NSABP B-06, CALGB 9343, and ACOSOG Z0011. Patient and tumor characteristics were compared. Practice patterns were stratified by gender and compared over time. Unadjusted overall survival (OS) was estimated with the Kaplan-Meier method, and the log-rank test was used to test for differences. Analyses were repeated for each clinical trial sub-cohort.

Results: Of the 1,664,746 patients identified, 99% were women (n=1,648,070), and 1% were men (n=16,676). Median follow-up was 68.1 months. Compared to women, men were diagnosed at an older age (median 66 vs 61), with larger tumors (median 2 vs 1.6 cm), higher nodal stage (cN+ 24% vs 19.6%), and higher-grade tumors (grade 2/3, 85.7% vs 77.7%, all $p<0.001$). Triple-negative and HER2+ cancers were less common in men (TNBC 4.7% vs 12.7%; HER2+ 12.4% vs 14.8%; $p<0.001$). Men were more likely to be diagnosed with de novo metastatic disease (Stage IV 11.4% vs 7.6%, $p<0.001$). Men were significantly more likely to undergo mastectomy (70.1% vs 39.7%) and more extensive axillary surgery (≥10 lymph nodes examined, 36.3% vs 24.9%, both $p<0.001$). Men were less likely to receive post-lumpectomy radiation (66.4% vs 81.9%), although rates of post-mastectomy radiation were similar (27.9% vs 28.2%). Rates of endocrine therapy (57.2% vs 60%) and chemotherapy (42.5% vs 45%) were also similar between genders, but men were less likely to undergo neoadjuvant chemotherapy (6.8% vs 11.1%, $p<0.001$). Men had worse unadjusted OS within each clinical anatomic stage and within all clinical prognostic stages except Stage III, where OS was similar. Men were less likely than women to meet inclusion criteria for ACOSOG Z0011 (1% vs 2.8%) and CALGB 9343 (1.6% vs 5.2%, both $p<0.001$), with similar rates for NSABP B-06 (42.6% vs 43.1%, $p=0.26$). Among NSABP B-06 eligible men, mastectomy rates did not significantly change following publication of long-term results (Figure 1A), but unadjusted OS rates were similar for men and women undergoing breast conservation (5y OS 0.93 vs 0.93). Following publication of CALGB 9343, omission of radiation therapy after lumpectomy was less likely in men and lagged behind that of women (Figure 1B), despite similar unadjusted OS (5y 0.88 vs 0.86). Notably, the application of ACOSOG Z0011 trial resulted in de-escalation of axillary surgery, a trend that was similar between men and women (Figure 1C), with comparable unadjusted survival (5y OS 0.93 vs 0.90).

Conclusions: The uptake of landmark clinical trial results for male breast cancer patients often mirrors that for women, despite exclusion of men from these studies. However, when study findings were applied to eligible patients, men and women demonstrated similar survival outcomes. Observational studies can help inform or confirm the potential application of study findings to this unique population.

Figures: Uptake of landmark clinical trials in surgery and comparison of practice patterns over time between men and women with invasive breast cancer in the National Cancer Data Base (2004-2015) who were potentially eligible for (A) NSABP-B06 (initial results published 1985, longer follow-up published 2002), (B) CALGB 9343 (initial results published 2004, longer follow-up published 2013), and (C) ACOSOG Z0011 (initial results published 2011, longer follow-up published 2017).



787611 - Breast and Axillary Surgery Trends in Male Breast Cancer from 2004 to 2016: A National Cancer Database Analysis

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Background/Objective: The management of male breast cancer is typically extrapolated from clinical trials and studies for female breast cancer. Our aim was to characterize trends in breast and axillary surgery in propensity score matched men and women using the National Cancer Database (NCDB).

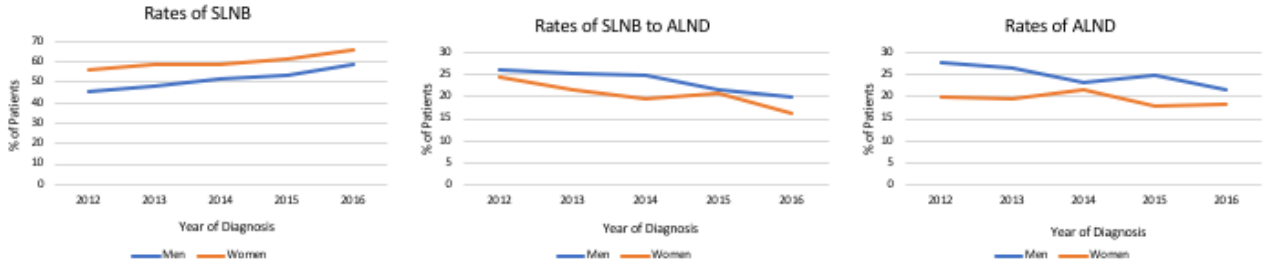
Methods: Treatment trends for breast surgery were compared between men and women from 2004 to 2016 using the NCDB. Treatment trends for the axilla were compared between 2012 to 2016, as data on sentinel lymph node biopsy (SLNB) and axillary dissection (ALND) became available in 2012. Men and women were matched 1:1 on clinical T and N stage, age, grade, facility type, and facility region. Differences in patient and tumor factors were compared using Student's t-test and Chi-squared tests, and trends over time were compared using the Cochran-Armitage trend test.

Results: From 2004 to 2016, 9,451 men and 1,138,987 women were diagnosed with Stage 0 to Stage 3 breast cancer. Compared to women, men were more likely to be of an older age at diagnosis ($p<0.0001$), more likely to present with a higher stage ($p<0.0001$), and more likely to have hormone receptor-positive disease ($p<0.0001$). The mean age at diagnosis for men increased from 61.8 to 64.1 years ($p=0.0236$) over the 12 years, and the proportion of patients with Stages 0 and 1 disease who were older than 60 increased significantly ($p<0.0001$). After propensity matching, each group in the analysis contained 9,451 patients. The rate of unilateral mastectomy (UM) in men has remained relatively stable around 65% over the time period, while that in women decreased from 40.0% to 25.2% ($p<0.0001$). The rate of breast-conserving surgery (BCS) in men has decreased slightly from 30.3% to 28.8%, reaching a nadir at 22.8% in 2012, but has increased in women from 56.1% to 66.3%. However, this difference in BCS trend between men and women was not significant ($p=0.1175$). The proportion of men undergoing bilateral mastectomy (BM) increased from 3.8% in 2004 to 8.8% in 2014, and then decreased to 6.3% in 2016. This trend was similar in women ($p=0.7055$); the rate was 3.9% in 2004, reached its maximum of 11.6% in 2014, and then decreased to 8.6% in 2016. From 2012 to 2016, the rate of SLNB increased while the rate of ALND decreased, at a rate similar in both men and women. However, the proportion of men with clinically node-negative disease undergoing SLNB was 65.9% compared to 73.4% of women in 2016. The proportion of men undergoing upfront ALND for clinically node-negative disease was 21.6% compared to 17.2% of women in 2016. In addition, the rates of ALND after SLNB have decreased in both genders over the time period, but men continue to have overall higher rates compared to women every year. After propensity score matching for the aforementioned factors, multivariable analysis of clinically node-negative patients showed that women were 50% more likely to have a SLNB compared to men (OR 1.5, 95% CI 1.3-1.6).

Conclusions: As expected, more men are treated with UM than women, but the rate of BM has increased at equal rates among women and men. Men are undergoing more extensive axillary

surgery than women despite equivalent stage of disease, although ALND rates have decreased in both genders. Further education of surgeons regarding indications for axillary surgery in men is needed.

Figures: Trends in axillary surgery in men and in women from 2012 to 2016



SLNB: Sentinel lymph node biopsy; ALND: Axillary lymph node dissection

787901 - Gender Differences and Survival Outcomes in Breast Cancer Patients: Stage-stratified Propensity Scoring Analysis of NCDB

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Background/Objective: There is limited research examining breast cancer gender differences. This study compares the trends and survival outcomes over the years between male (MBC) and female (FBC) breast cancer patients using the National Cancer Database (NCDB).

Methods: We retrospectively analyzed the NCDB registry for MBC and FBC cases diagnosed between 2004 and 2014. Patient demographics, tumor characteristics, overall mortality (OM), and trends were compared between MBC and FBC Patients. Univariate, multivariate, and propensity score weighted analyses were done to compare MBC and FBC.

Results: A total of 19,488 MBC patients (0.9%) and 2,138,730 FBC patients (99.1%) were identified. Median follow-up was 59.63 months. Compared with FBC group, MBC group was more likely to be older (Mean:64, SD:13 vs. Mean:60, SD 13.3), African American or non-Hispanic, have more comorbidities, and have a hormonally positive tumor with a higher stage at diagnosis (all p<0.001). From 2004 to 2014, Stage II (1.21% to 1.34%-p=0.001) and IV (0.88% to 1.43%-p=0.046) diagnoses significantly increased more for MBC than FBC (p<0.05). Surgery, radiation, and chemotherapy were used less in MBC regardless of stage (all p<0.001). However, hormonal therapy was used more in MBC for Stages III and IV (P<0.001). There was no significant change in 5-year overall survival from 2004 to 2010 for MBC (77.21% to 74.1%, p=0.13), while FBC 5-year overall survival significantly increased (83.84% to 85.31%, p<0.001). In the adjusted stage-stratified propensity score weighted analysis, there was a 21% lower hazard of OM in Stage 0 (HR:0.79; p=0.048) and a 21% higher hazard of OM in Stage II (HR:1.21; p<0.001) MBC cases compared to FBC cases. There was no statistical difference between MBC and FBC in OM for Stage I (HR:1.04; p=0.52), III (HR:1.01; p=0.88) or IV (HR:1.03; p=0.59) cases.

Conclusions: Our data suggest that there are some significant differences in the trends and survival outcomes of MBC in comparison to FBC. This data may help identify the areas that need further research and care optimization for MBC.

787674 - Trends in Axillary Node Dissection Rates in Male Invasive Breast Cancer

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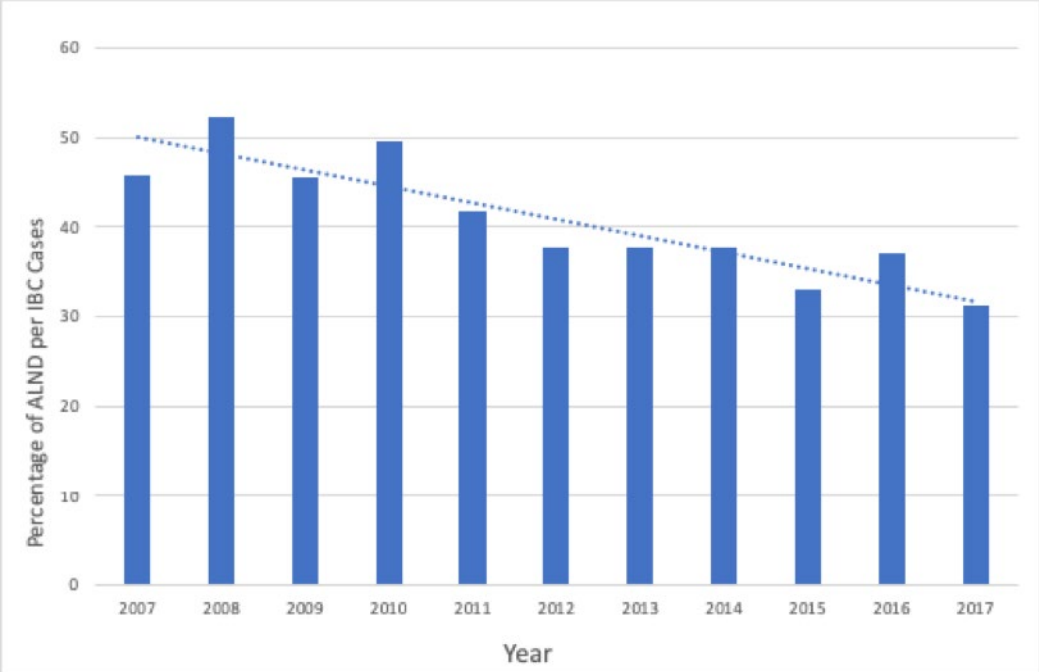
Background/Objective: Management of the axilla in invasive breast cancer (IBC) has shifted away from more radical surgery such as axillary lymph node dissection (ALND), towards less invasive procedures, such as sentinel lymph node biopsy. A previous study utilizing the ACS-NSQIP database showed an overall national downward trend in ALND procedures performed in women from 2007-2014. We hypothesize that there has also been a national downward trend in ALND procedures in the male population.

Methods: Male patients with invasive breast cancer were identified in the ACS-NSQIP database from 2007 to 2017. We included patients with ICD-9 and ICD-10 codes of malignant neoplasm of male breast. We then identified all patients with the following primary CPT codes: partial mastectomy with axillary lymphadenectomy (19302), modified radical mastectomy (19307), radical mastectomy (19305,19306), superficial axillary lymphadenectomy (38740), and complete axillary lymphadenectomy (38745). This number was divided by total cases of males with IBC reported in the NSQIP Database to give us the percentage of males with IBC undergoing these procedures by year. A Cochran-Armitage trend test was used to determine if there was any significant increase or decrease in the rate of ALND over the included years.

Results: A total of 200,132 patients were identified with IBC, 1.0% (2,024) of which were male with an average age of 64.9 year old, and 39.6% of all patients underwent ALND. The percentage of males with invasive breast cancer diagnoses undergoing axillary node dissection significantly decreased over the study period ($p<0.001$), with an average decrease of 1.81% annually.

Conclusions: While de-escalation of breast and axillary management in female breast cancer patients has been reported over the years, the same has not been noted in the management of male breast cancer patients with mastectomy being more prevalent. Interestingly, this study has demonstrated that there is a national downward trend in ALND procedures in the men with IBC similar to women. Although, the average yearly decrease was lower than that previously reported in the female population (1.81% vs. 2.43%).

Figure: Axillary lymph node dissection rates in males with invasive breast cancer



788353 - The Use of Lumpectomy, Mastectomy and Contralateral Prophylactic Mastectomy in Males with Operable Breast Cancer

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Background/Objective: Male breast cancer (MBC) is rare when compared to breast cancer in females, so most of the treatment decisions for MBC are based on studies in females. Some studies have demonstrated a reluctance to offer breast conservation to male patients due to several factors including an often-unfavorable tumor-to-breast ratio. Additionally, data do not show a survival advantage in female breast cancer patients who undergo contralateral prophylactic mastectomy (CPM), even those with genetic mutations. We sought to assess the surgical modalities used for the primary treatment of operable breast cancers.

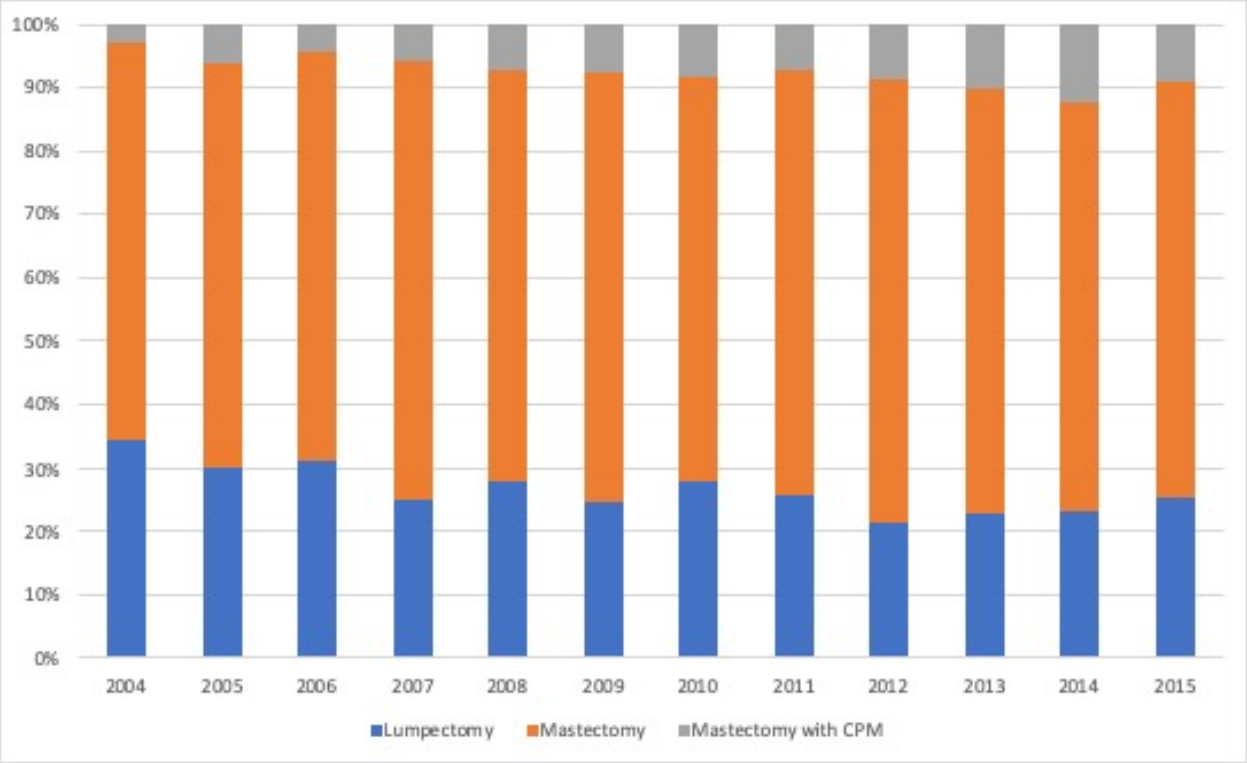
Methods: Using the National Cancer Database from 2004-2015, we identified male patients with operable (T1-3) invasive breast cancers and stratified by surgical treatment of the primary tumor: lumpectomy (L), unilateral mastectomy or bilateral mastectomy in a patient with bilateral cancers (M), or mastectomy with contralateral prophylactic mastectomy (M+CPM). We assessed the use of each surgery type over time and compared each by the demographic and clinical factors associated with their use using univariate and multivariate regression models.

Results: We identified 8,726 males with operable breast cancer, 2.224 (25.5%) of whom underwent L, 5.772 (66.1%) underwent M, and 730 (8.4%) underwent M+CPM. A significant trend was observed over the study period in that the rate of L decreased from 34.5% to 25.3%, and the rate of M+CPM increased from 2.8% to 9.0% (Figure, $p<0.001$). The rate of M increased slightly from 62.7% to 65.7%. Men undergoing M+CPM were significantly younger ($p<0.001$).

Individuals of white race were more likely to undergo M than other races with L and M+CPM being more prevalent among men of "other" races (p=0.03). Lumpectomy was more prevalent among men with fewer medical comorbidities (p<0.001) while L and M+CPM were associated with the patient having private insurance (p<0.001) and being treated at an academic or comprehensive cancer center (p<0.001). Adjuvant chemotherapy was more commonly given to patients undergoing M+CPM, which remained significant in both univariate and multivariate analysis correcting for tumor stage, grade and subtype.

Conclusions: Despite recommendations not supporting any benefit for contralateral prophylactic mastectomy for males with breast cancer, the use of CPM is this patient population is increasing. Additionally, while breast-conserving therapy is becoming more common in women, its use is decreasing among males with breast cancer. A prospective investigation of breast-conserving therapy and avoidance of CPM may be warranted in the male breast cancer population to determine whether these surgical options are equivalent in this population.

Figure: Trends of surgical modalities used for males with operable breast cancer



Margins

787984 - The Value of Routine Cavity Shave Margins in Breast-conservation Therapy in a Rural Academic Institution

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Background/Objective: Local recurrence (LR) of breast cancer following breast-conserving surgery (BCS) is influenced by final margin status. Routine cavity shave margins (CSM) at the time of lumpectomy have been shown to decrease LR rates and need for additional surgery. We sought to evaluate the experience with CSM at a large tertiary referral cancer center servicing a rural patient population.

Methods: After institutional review board approval, we retrospectively reviewed breast cancer patients who underwent BCS for invasive ductal (IDC), lobular (ILC), and ductal carcinoma in situ (DCIS) between January 2009 and September 2018. CSM technique was standard across all lumpectomies and was performed by excising and orienting each margin separately. The electronic medical record was reviewed, and data was collected related to demographics, surgical pathology, recurrence, and survival. Descriptive statistics were calculated using mean ± SD and comparison of outcomes to national rates was performed by calculating likelihood-ratio chi-squared test (LRT).

Results: A total of 550 patients undergoing lumpectomy with routine CSM were identified. Of these, 45% had IDC, 21% had both IDC and DCIS, 25% had pure DCIS, and 7% had ILC. The cohort had an average age (Mean ± SD) of 61 ± 11 years, body mass index 31 ± 7, and tumor size (mm) of 13 ± 10. Mean length of follow-up was 4.6 years ± 2.6 years. The overall positive margin rate leading to reoperation was 9.7% compared to the accepted average of 20%, LRT 43.7 ($p<0.0001$). The positive margin rate based on tumor histology was 10.2% for pure DCIS, 6.8% for IDC, 16.3% for mixed IDC and DCIS, and 15.8% for ILC. DCIS was the most common histology on the positive margin, with 18.9% of the overall positive margins detecting occult multifocal DCIS (negative lumpectomy margin and positive CSM). CSM saved subsequent reoperation for positive margins in 10.7% of the patients (positive lumpectomy margin and negative CSM). LR was 2.4% compared to an accepted national average rate of 9%, LRT 41.0 ($p<0.0001$). The systemic recurrence rate for our cohort was 2.5%. Of the 550 patients, there were 19 deaths, with 6 deaths due to metastatic breast cancer.

Conclusions: Excision of routine CSM at the index BCS reduces positive margin rate by approximately 10% and saves subsequent reoperation for positive lumpectomy margins in patients with invasive and non-invasive breast cancer, while maintaining a low rate of recurrence. This can be especially important in rural regions with access to health care disparities and patients with financial hardships.

787705 - Intraoperative Gross Pathologic Inspection Can Reduce the Need for Margin Re-excision After Breast-conserving Surgery Regardless of Localization Technique

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Background/Objective: Reoperation for re-excision of close or positive margins in breast-conserving therapy increases emotional and financial burden, and may delay adjuvant therapy. We previously demonstrated that regardless of surgeon experience, a low re-excision rate can be achieved with immediate gross pathologic inspection. In January 2018, our institution transitioned from the use of pre-operative wire localization of nonpalpable tumors to SAVI Scout localization. The use of immediate gross inspection with intraoperative specimen radiograph and pathologic consultation as a method of intraoperative margin assessment is standard at our institution, and we hypothesize that this results in a low re-excision rate after breast-conserving surgery (BCS) regardless of the method of localization.

Methods: A prospective review of consecutive patients diagnosed with invasive ductal carcinoma (IDC), invasive lobular carcinoma (ILC), and ductal carcinoma in situ (DCIS) who underwent BCS from 2016 to 2019 was undertaken. All surgeries were performed at a single institution by 3 surgeons. All specimens underwent intraoperative radiograph evaluation by the surgeon, as well as formal gross evaluation by the pathologist with the surgeon in attendance. Additional shave margins were taken during the initial operation based off these assessments. Criteria for reoperation were defined as ink on tumor for IDC/ILC and within 2mm for pure DCIS. Surgeries performed in the initial 18 months of this study utilized needle localization for nonpalpable tumors, and surgeries performed in 2018 onwards utilized SAVI Scout localization for nonpalpable tumors. Groups were compared using paired t-test statistical analysis, and a p-value of 0.05 was considered statistically significant. Outcomes measured were rates of re-excision.

Results: A total of 717 cases of BCS were reviewed. The mean patient age was 62.8 years (±11.4). Our population included 12.2% (n=88) of patients who underwent neoadjuvant therapy. There were 367 patients who underwent needle localization, while 350 patients underwent localization with a SAVI Scout. Both groups were similar in regard to patient and tumor variables including use of neoadjuvant therapy, tumor margins, and localization technique. Our total re-excision rate was 5.3% (n=38). Neither diagnosis (IDC, ILC or DCIS), nor localization device, significantly differed among those who had re-excisions and those who did not. Re-excision rate was 5.2% (n=19) for needle localization and 5.4% (n=19) for SAVI Scout. The average distance of negative margins was 8.7mm.

Conclusions: By utilizing a combination of formal gross inspection with the pathologist intraoperatively and specimen radiograph, both localization methods were able to achieve a similar re-excision rate, well below previously published rates. Our average negative margin was also within 1cm, demonstrating that unnecessarily large specimens were not removed. This combination of methods for margin assessment is easily implemented by many practices, and is an excellent tool for surgeons to help reduce return to the operating room after BCS even when used with wireless technology.

787779 - Predictors of Positive Resection Margins – Results of a Two-year Audit

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Background/Objective: Positive margins following breast-conserving surgery (BCS) are associated with re-excision which carries significant human and economic burden to both the patient and the National Health Service. Critically, impalpable tumours, such as ductal carcinoma in situ (DCIS), pose an even greater threat of re-excision than invasive disease. Whilst the mean rate of re-excision in England is 20%, the rates were observed to be even higher when DCIS was present (27%). Patients who undergo re-excision surgery have been found to experience additional emotional stress, increased wound infection, delay to adjuvant treatment, prolonged recovery, and increased risk of in-breast recurrence. The economic cost of re-operative surgery equates to a 3-yearly cost of $28,624,000 to the health care economy. We aimed to examine the predictors of positive resection margins at our institution to determine the clinicopathological factors that influence re-excision towards improved peri-operative decision making when counselling patients for BCS.

Methods: Following registration of this audit (ID: 374), a retrospective review of all patients who underwent BCS at our institution between June 2017 to June 2019 was undertaken (n=400). Patients receiving neo-adjuvant chemotherapy (n=43) were excluded. From the remaining 357 patients' electronic records, data was extracted including demographic (age), clinical and pathological details (invasive subtype, presence of DCIS etc.), margin status (e.g., negative, positive) and the need for re-excision surgery. Here, a "positive margin" was defined as per UK Association of Breast Surgery guidelines, i.e., invasive or in-situ disease <1mm of the inked resection margin. Univariate analysis was performed using logistic regression to identify predictors of positive margins using SPSS (v26).

Results: Three-hundred fifty-seven BCS patients were identified with a mean (±SD) age of 61(±10) years. Of these patients, 236/357 (66%) were screen detected cancers, and 121/357 (34%) were symptomatic. Of the 357 patients, 309 (87%) were ductal, 21 (6%) lobular, 6 (2%) ductal and lobular, and 21 (6%) other pathologies (including papillary, mucinous and tubular). More than two-thirds (245/357, 69%) of patients had further margin shaves taken at the index operation, with the majority (30%) having 1 further shave. However, only 43/245 (18%) had residual disease present in the cavity shaves. Seventy-seven patients (22%) underwent re-operation, either in the form of re-excision (77%, n=59/77) or completion mastectomy (23%, n=18/77). DCIS was found <1mm of the inked margin in 77% of patients (59/77); 43 of the 59 (73%) patients with re-excised margins were purely due to DCIS, 27% (16/59) were due to a combination of invasive disease and DCIS. Of the 77 patients who underwent re-excision, 34% (26) had residual tumour, and 66% (51) had no residual tumour. Nine patients underwent a third operative procedure. Following logistic regression, the results demonstrated that DCIS with comedonecrosis (OR 1.67, 95%CI=0.99-2.81, p<0.05) was the only factor significantly associated with positive resection margins on univariate analysis. All other clinicopathological variables including microcalcifications on pre-operative mammogram (OR 1.32, 95% CI=0.81-2.15, p=0.274), lymphovascular invasion (OR 1.42, 95%CI=0.83-2.48, p=0.2), HER2 status (OR 1.42, 95%C=0.90-2.26, p=0.133) and multifocal tumour (OR 2.66, 95%CI=0.92-7.71, p=0.071)

failed to reach statistical significance and were not associated with positive margins in this cohort.

Conclusions: This audit assessed factors predicting the likelihood of positive resection margins. Co-existing DCIS with comedonecrosis was the only factor found to significantly predict for positive resection margins. Therefore, the presence of DCIS with comedonecrosis should be considered carefully by the multidisciplinary team when planning the surgical management of breast cancer patient. Further retrospective data will be gathered to re-assess the significance of other clinico-pathological factors associated with positive resection margins including the presence of microcalcifications, lymphovascular invasion, multifocal tumours, and HER2 status.

786946 - Did the SSO-ASTRO Margin Guidelines Change Re-Excision Rates Among Women Diagnosed with Stage I and II Breast Cancer in an NSABP Center?

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Background/Objective: In 2014, the Society of Surgical Oncology (SSO) and the American Society for Radiation Oncology (ASTRO) established consensus guidelines on breast-conserving surgery (BCS) resection margins based on the relationship between margin width and ipsilateral breast tumor recurrence (IBTR). They determined that margins wider than "no ink on tumour" did not significantly reduce the risk of IBTR in Stage I and II invasive breast cancer, regardless of patient age or tumor subtype. This margin recommendation has in fact been used by the National Surgical Adjuvant Breast and Bowel Project (NSABP) for all its trials for decades. The objective of this study was to determine the effect of the SSO-ASTRO margin guidelines on re-excision rates among women with Stage I and II breast cancer undergoing BCS in an NSABP center. We hypothesized that there would not be a difference in re-excision rates.

Methods: We performed a retrospective analysis of a prospectively collected breast cancer surgery database. All women with Stage I or II invasive ductal carcinoma (IDC) who underwent BCS for definitive treatment at a single high-volume specialist-referral institution between March 2012 and April 2016 were included. Patients with positive margins were excluded. Patients were divided into 2 groups: before and after guideline implementation. The primary outcome of interest was revision of margins. Chi-squared analysis was used to make comparisons between the 2 groups for categorical variables. Multiple logistic regression was used to identify independent predictors of re-excision.

Results: A total of 491 patients met inclusion criteria, of which 270 (55.0%) were treated before the guidelines and 221 (45.0%) after. The mean age was 62.3 years (SD 12.4). All included tumors were IDC on final pathology, and mean tumor size was 1.45cm (SD 0.88). The vast majority were luminal A subtype (84.9%). Baseline characteristics and tumor characteristics were well balanced between groups. The proportion of close margins (<1mm) was similar in each group (11.9% before vs. 10.4% after (p=0.61)). The overall re-excision rate was 11.0% and did not differ between groups (11.5% to 10.4%, p=0.70). On multiple logistic regression analysis, adjusting for other risk factors, guideline implementation was not significantly

associated with re-excision in the cohort (OR 0.98; 95% CI (0.50-1.93)). Meanwhile, younger age, presence of DCIS, and close margins were independent predictors of re-excision in the overall model. Additionally, in the subgroup of patients with close margins, guideline implementation was also not independently associated with re-excision (OR 0.99; 95% CI (0.26-3.75), p=0.99).

Conclusions: In a specialized tertiary care center, publication of the SSO-ASTRO margin guidelines did not significantly impact re-excision rates overall as well as in the close margin subgroup. This finding may be attributed to our institution's early adoption of the NSABP-06 trial recommendations on breast margins, on which SSO-ASTRO based their consensus guidelines decades later. Future larger studies evaluating the nationwide adoption of these guidelines should be conducted to better determine their impact on re-excision rates, patient quality of life, and health care costs.

786322 - Intraoperative Inking Helps Identify Positive Margins in Breast-conserving Cancer Surgery

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Background/Objective: Achieving negative margins after breast-conserving surgery is one of the important factors to avoid recurrence of disease. There is variation in margin policy in the UK in response to the Society of Surgical Oncology and American Society for Radiation Oncology (SSO-ASTRO) and the Association of Breast Surgery (ABS) consensus. One way of minimizing re-excision rates is by accurate specimen orientation. Traditionally the lumpectomy specimen was orientated by the surgeon by placement of sutures intraoperatively, and then later, the pathologist would re-orient the specimen after being placed in formalin and ink it with different colours. Discordance between the surgeon and pathologist in margin orientation could influence the accuracy of re-excisions. Re-excision may lead to poor cosmetic results, delays in adjuvant therapy, and increased anxiety and expense. The aim of the audit is to evaluate whether intraoperative inking directly by the surgeon helps to correctly identify positive margins in breast-conserving surgery.

Methods: Retrospective database of patients treated with breast-conserving surgery oriented with sutures only and with intraoperative inking was analysed. Patient demographics and histopathology were extracted from the database and matched between the 2 methods. Inclusion criteria were women aged 18 years or older with a diagnosis of DCIS or invasive cancer undergoing breast-conserving surgery. Exclusion criteria included patients undergoing neoadjuvant treatment. In the suture only group, the surgeon placed sutures to mark the superior, lateral, and deep margins on the specimen before being sent to pathologist for painting. In the intraoperative inking group, the 4 radial margins were painted by the surgeon after excising the specimen then sent to the pathologist. A 2-tailed p-value of <0.05 was considered statistically significant.

Results: A total of 228 patients were included - 109 had standard suture orientation, and 119 had intraoperative inking. Twenty-nine patients had positive margins - 21 using intraoperative inking and 8 with suture only (p=0.020). Twenty-four percent were Grade 3 IDC, 17% were DCIS only, and 69% were node-negative. Four patients (14%) had residual disease on re-excision - 3 in the suture only and 1 using intraoperative inking (p=0.022). All 4 patients went on to have a mastectomy. There was 4 local recurrences - 1 triple-negative, 1 HER2+, and 2 ER+ HER2-. Three out of the 4 recurrences were in the suture-only group.

Conclusions: Although intraoperative inking did not reduce the re-excision rates, it did identify a lower proportion of positive margin at re-excision compared to suture only. In addition, there was a higher number of recurrences in the suture-only group compared to intraoperative inking. Our results are similar to other papers that have shown that intraoperative inking is more accurate at identifying positive margins. The findings show there seems to be better concordance between surgeon and pathologist using intraoperative inking. The number of re-excisions was small, and further longitudinal study is needed to accurately assess margins after breast-conserving surgery.

Table: Patient and tumor characteristics

Patient and Tumour Characteristics	Specimen Orientation Method	
	Suture only (n=109)	Intraoperative inking (n=119)
Patient age	57 (30-97)	64 (27-90)
Tumour histology		
DCIS alone	10 (9%)	18 (15%)
IDC	64 (59%)	79 (66%)
ILC	9 (8%)	8 (7%)
Other (including mixed)	26 (24%)	14 (12%)
Tumour Grade		
1	27 (25%)	32 (27%)
2	41 (38%)	52 (44%)
3	41 (38%)	35 (29%)
Tumour Receptor Status		
ER+	97 (89%)	101 (85%)
PR+	3 (3%)	1 (<1%)
HER2+	8 (7%)	8 (7%)
Lymph Node Positive	28 (26%)	24 (20%)
Adjuvant Therapy	107 (98%)	106 (89%)

786038 - Incidence and Management of Positive Margins After Mastectomy in Patients with Invasive Lobular Carcinoma of the Breast

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Background/Objective: The surgical treatment of invasive lobular carcinoma (ILC) is challenging due to its multifocal nature and the low sensitivity of pre-operative imaging studies. Many investigators have shown that patients with ILC undergoing breast-conserving surgery have high rates of positive margins, approaching 60% in some series. However, the rate of positive margins after mastectomy for ILC is less well described. Additionally, the optimal management strategy for this clinical scenario for ILC is unknown. We therefore evaluated the rate of positive margins after mastectomy in an institutional ILC database and determined how the management of these positive margins impacted outcome.

Methods: We queried a database of 700 cases of ILC and included all of those with Stage I-III disease who underwent mastectomy between 1981-2019. Our primary outcome was positive margin rate, and the secondary outcome was recurrence-free survival (RFS). We used the chi squared test to compare categorical variables, t-tests for continuous data, the log rank test for survival analysis, and a Cox proportional hazards model for multivariate analysis. Data were analyzed using Stata 14.2.

Results: A total of 357 patients underwent mastectomy for ILC. Of these, 38 (10.6%) had a positive margin. Those with positive margins had significantly larger tumors (mean size 6.5cm versus 3.8 cm, $p<0.0001$) but did not differ by other clinicopathologic characteristics (see Table). On univariate analysis, having a positive margin was associated with significantly shorter RFS ($p=0.0015$). Those with positive margins received additional local therapy in 29 cases (76.3%), with either surgical re-excision (n=8, 27.6%), radiation (n=16, 55.2%), or both (n=5, 17.2%). Women who did not have treatment for margin positivity were significantly older (mean age 66.8 years versus 55 years, $p=0.0184$). Undergoing treatment for a positive margin was significantly associated with improved RFS on both univariate analysis ($p=0.0086$) and in a Cox proportional hazards model adjusting for age and tumor size (hazard ratio for recurrence 0.1, 95% confidence interval 0.02-0.47, $p=0.004$).

Conclusions: These findings suggest that treatment with either re-excision, radiation or both can significantly mitigate the negative impact of positive margins on RFS, and should therefore be considered for all patients with positive margins after mastectomy for ILC. This also highlights the importance of finding optimal systemic treatment options to reduce tumor volume prior to surgical excision even in the setting of mastectomy. This may be especially true for larger lobular cancers, where high rates of positive margins after mastectomy are seen.

Table: Clinicopathologic characteristics

	Overall (n=357)	Positive Margins After Mastectomy (n=38)	Negative Margins After Mastectomy (n=319)	P value
Age in years (mean, SD)	56.8, 11.7	57.8, 13.3	56.7, 11.5	0.563
Receptor Subtype (data available in 303)				0.655
ER+PR+Her2-	237 (76.5%)	27 (77.1%)	210 (76.4%)	
ER+PR-Her2-	49 (15.8%)	4 (11.4%)	45 (16.4%)	
ER-PR-Her2-	9 (2.9%)	2 (5.7%)	7 (2.5%)	
Her2+	15 (4.8%)	2 (5.7%)	13 ()4.7%)	
Tumor grade (data available in 338)				0.998
1	96 (28.4%)	10 (28.6%)	86 (28.4%)	
2	222 (65.7%)	23 (65.7%)	199 (65.7%)	
3	20 (5.9%)	2 (5.7%)	18 (5.6%)	
Lymphovascular invasion	34 (9.5%)	4 (10.5%)	30 (9.4%)	0.609
Pleomorphic histology	42 (11.8%)	7 (18.4%)	35 (10.9%)	0.178
N stage				0.244
0	192 (53.8%)	16 (42.1%)	176 (55.2%)	
1	102 (28.6%)	11 (28.9%)	91 (28.5%)	
2	35 (9.8%)	6 (15.8%)	29 (9.1%)	
3	28 (7.8%)	5 (13.2%)	23 (7.2%)	
Mean tumor size (cm, SD)	4.1, 3.4	3.8, 3.3	6.5, 3.7	<0.0001
T stage				<0.001
1	124 (34.7%)	2 (5.2%)	122 (38.2%)	
2	110 (30.8%)	13 (34.2%)	97 (30.4%)	
3	123 (34.4%)	23 (60.5%)	100 (31.3%)	

787590 - Re-excision Following Breast-conservation Surgery in Modern Times: A Single Institution's Quality Study Looking at Re-Excision Following Segmental Mastectomy at Both the Institutional and Individual Surgeon Level

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Background/Objective: Breast conservation is performed in the majority of breast cancer patients in the United States, and re-excision is a known risk with wide variability in the published rates. We performed a single institution quality study which looked at our current re-excision rates, both as an institution and individually as surgeons, and the factors that were associated with these cases.

Methods: Our institution has 6 breast surgeons and is an accredited breast center. We performed a retrospective chart review of patients undergoing a segmental mastectomy (CPT code 19301) at our academic-affiliated institution from January 1st, 2016 through December 31st, 2018. Re-excision was defined as a return to the operating room for either another segmental mastectomy

or full mastectomy (with or without reconstruction) within 90 days of initial breast-conserving surgery. Patient characteristics, tumor histology, imaging findings, and neoadjuvant treatment were recorded. Individual surgeon re-excision rates were reported for each year and compared to re-excision rates generated by the tumor registry and reported to each surgeon. Prior to seeing their individual rates, each surgeon was asked to estimate their re-excision rate, rank factors associated with re-excisions, and state whether they believed if re-excision rates should be a quality measure.

Results: A total of 1,508 segmental mastectomies (CPT code 19301) were completed during the studied timeframe, and 238 re-excisions were performed (on 205 patients), with an overall institutional re-excision rate of 15.8%. Cancer was found in the re-excision specimens in 53.4% of re-excision cases. The re-excision rates for 2016, 2017, and 2018 were 16.2%, 15.1%, and 16.0% respectively. The re-excision rate varied significantly between surgeons, ranging from 3.3% to 30.0% overall from 2016-2018. The patient age, tumor histology, imaging findings, and neoadjuvant treatment status of the patients' undergoing re-excision was analyzed (Table). Patients with ductal carcinoma in situ (DCIS), particularly a larger size of DCIS, were more likely to require re-excision ($p<0.0001$). The tumor registry reported an overall re-excision rate of 20.7% compared to the chart review re-excision rate of 15.8%. All 6 surgeons underestimated their re-excision rate by 4.2% as a group, with the underestimation varying from 0.6-8.3%. Surgeons believe the top 3 factors that contribute to re-excision in their practice are DCIS not seen on imaging or core biopsy, a larger tumor than seen on pre-operative imaging, and inaccurate localization for non-palpable lesions. 83% of surgeons felt that margins should not be used as a quality measure in breast cancer surgeries.

Conclusions: Despite the recent margin guidelines, re-excision rates following breast-conservation surgery vary widely by breast surgeon within a single institution and when using different methodology to calculate re-excision rates. Institutions embarking on a re-excision quality study should take these findings into account and may want to focus on the factors surgeons' believe lead to re-excisions.

Table: Re-excision patient characteristics 2016-2018

	N (%)
Total Patients	205
Age [Mean ± SD]	63.2 ± 11.7
Cancer Pre-op	
DCIS	71 (34.6)
IDC	89 (43.4)
ILC	24 (11.7)
Other	21 (10.2)
Any Invasive Preop	134 (65.4)
Cancer Postop	
DCIS	64 (31.2)
IDC	98 (47.8)
ILC	29 (14.2)
Other	14 (6.8)
Any Invasive Postop	141 (68.8)
Size in Situ (N=64)	
< 2.0 cm	17 (26.6)
2.0-3.9 cm	26 (40.6)
≥ 4.0 cm	20 (31.3)
Unknown	1 (1.6)
Size Invasive (N=141)	
< 2.0 cm	91 (64.5)
2.0-3.9 cm	31 (22.0)
≥ 4.0 cm	14 (9.9)
Unknown	5 (3.6)
Distance from Margin in Situ (N=64)	
< 1 mm	32 (50.0)
≥ 1.0 mm	8 (12.5)
Involved	24 (37.5)
Distance from Margin Invasive (N=141)	
< 1 mm	25 (17.7)
≥ 1.0 mm	37 (26.2)
Involved	73 (51.8)
Unknown	6 (4.3)
Neoadjuvant Chemo	3 (1.5)
Pre-op MRI	55 (26.8)
Type of Localization	
Wire	45 (22.0)
Seed	133 (64.9)
US in OR	3 (1.5)
Unknown	24 (11.7)
Type of Subsequent Surgery	
Re-excision	143 (69.8)
Mastectomy	23 (11.2)
Multiple Re-excisions	15 (7.3)
Re-excision(s) followed by Mastectomy	23 (11.2)
Re-excision followed by Mastectomy an	1 (0.5)
Number of Re-Excisions	
1	167 (81.5)
2	30 (14.6)
3	8 (3.9)

787625 - Investigating the Use of MarginProbe® and Savi Scout® in Breast-conserving Surgery: A Single-institution Study

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Background/Objective: Breast-conserving surgery (BCS) with radiation therapy is considered standard therapy for low-grade breast cancer; localization of breast lesions as well as ensuring negative margins are the 2 most important aspects of the procedure. Our study aims to evaluate 2 main objectives: do the MarginProbe® and Savi Scout® devices aid in BCS by lowering re-

excision rates, and does the replacement of wire localization with the Savi Scout® localization device affect the overall specimen volume of breast tissue excised?

Methods: This was a retrospective study reviewing 417 cases of adult females undergoing BCS for low-grade invasive ductal carcinoma, invasive lobular carcinoma, or DCIS from September 2015 to June 2019. All surgeries were performed at a single institution by 2 surgeons. Exclusion criteria included any patient who had undergone preoperative chemotherapy or preoperative hormone therapy. The control group included 120 consecutive patients using standard wire localization and palpation techniques (n=120). The control group was compared to cases that used standard localization and MarginProbe® (n=211) and cases that used Savi Scout® localization and MarginProbe® (n=86). Study endpoints included re-excision rates, missed positive margins, and total volume of the lumpectomy and shaves. Other factors such as age, race, BMI, final pathology, and hormone receptors were considered as well.

Results: In BCS, the use of MarginProbe® and the addition of Savi Scout® with the MarginProbe® decreased the frequency of positive margins from 18.3% as seen in the control group to 9.5% and 5.8%, respectively (p=0.01). The total volume of the breast tissue (specimen + shavings) was evaluated in all groups, and there was found to be no significant difference (p=0.13). The primary results for each group are outlined in the Table.

Conclusions: Several studies have evaluated the MarginProbe® and its usefulness in the operating room to decrease re-excision rates in breast-conserving surgery, including 1 done by our institution in 2017. This study evaluates more cases and not only reaffirms the benefits of the MarginProbe® by demonstrating the decrease in re-excision rates by 48%, but also demonstrates that the additional use of Savi Scout® can further decrease re-excision rates by 68% compared with standard localization. Our study is the first study of its kind to evaluate both devices together. Also, the use of MarginProbe® and Savi Scout® does not significantly change the total volume of tissue removed in BCS, despite the decrease in positive margins. Based on our findings, the combined use of the MarginProbe® and Savi Scout® devices has utility in improving patient outcomes after BCS with fewer returns to the operating room. As the Savi Scout® becomes more prevalent, it would be beneficial to evaluate its efficacy in a larger randomized control trial.

Table: Comparison of outcomes between the 3 groups: (1) control, (2) standard localization + MarginProbe®, and (3) Savi Scout® + MarginProbe®

Variable	Control (N = 120)	Standard loc + MarginProbe® (N = 211)	Savi Scout® + MarginProbe® (N = 86)	*p*
Positive margins after initial BCS, n (%)	22 (18.3%)	20 (9.5%)	5 (5.8%)	0.01
Positive margins on main specimen, n (%)	25 (20.8%)	58 (27.5%)	15 (17.4%)	0.13
Positive margins cleared by shaves, n (% [a])	4 (16%)	39 (67.2%)	10 (66.7%)	<0.0001
Negative margins on specimen, positive shave, n (%)	3 (2.5%)	16 (7.6%)	1 (1.2%)	0.02
Number of shavings, mean (SD)	0.5 (0.6)	1.8 (1.4)	1.9 (1.3)	<0.0001
Volume of breast tissue [b]				
Main surgical specimen, mL, mean (SD)	50.2 (37.0)	47.7 (33.7)	43.4 (25.3)	0.34
Total (main specimen + shavings), mL, mean (SD)	53.6 (38.5)	61.2 (41.4)	53.7 (30.3)	0.13

Group comparisons evaluated using chi-square tests. Numeric outcomes compared using ANOVA. *Abbreviation*: BCS (breast-conserving surgery)

a) Percent out of above number of specimens with positive margins after BCS

b) Specimen volume calculated using the ellipsoid formula $\frac{\pi}{6} \times L \times W \times D$.

787567 - Implementation of Intra-operative Specimen Tomosynethesis and Impact of Re-excision Rates for Image-guided Partial Mastectomies

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Background/Objective: Breast-conservation therapy (BCT) is a well-established treatment for early-stage breast cancer, which often is not palpable and requires image-guided localization prior to surgery. However, approximately 1 out of 5 patients will require a second surgical procedure to achieve a negative surgical margin with BCT. Current methods utilized to avoid returning to the OR include 6 quadrant cavity shaves, selective shaves, pathologic gross evaluation, and margin probe use. Typically, after partial mastectomy (PM), the image-guided specimens are sent to the radiology department for remote interpretation by the breast imager, leading to longer operative times, and often the surgeon is not able to view images in real time. One promising tool, intraoperative specimen tomosynthesis, allows a surgeon to image the specimen in the OR and determine if a selective shave is required, thus reducing the need for re-excision, additional un-necessary shaves, overall operative time, and cost. OBJECTIVE: To investigate the effect of implementation of the Mozart Specimen Tomosynthesis System (Kubtec Imaging, Stratford, CT) on re-excision rates in image-guided PMs.

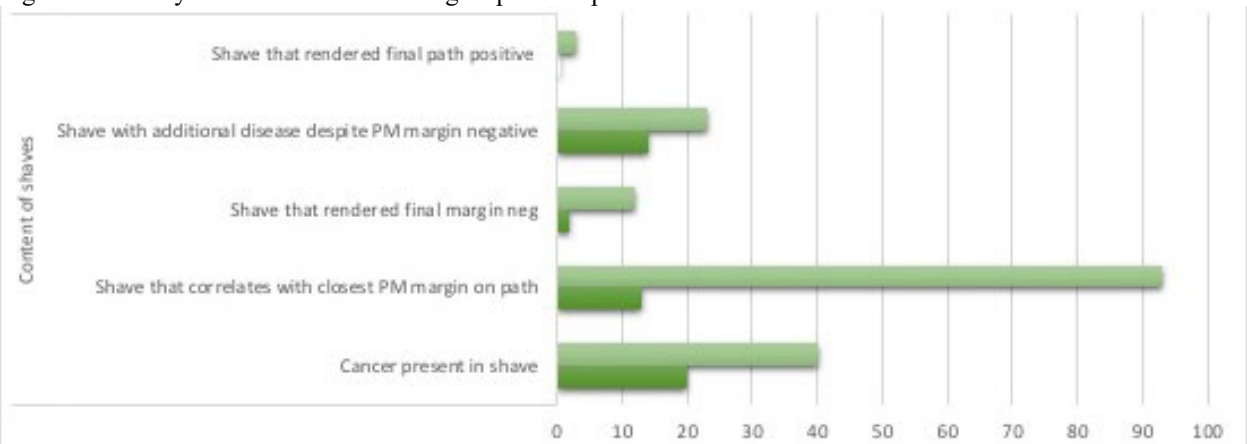
Methods: Re-excision rates for a single surgeon were compared for the 37 months prior (6/1/2013-7/31/2016) to institution of the Mozart to the 37 months after (8/1/2016-9/30/2019) the start of utilization. Prior to use of Mozart, shave margins were determined by palpation of the specimen as well as remote radiologist interpretation of 2D images. Final pathology of the initial specimen, pathology of additional shave margins, and overall positive margin rate were determined for both groups.

Results: A total of 561 image-guided PM were performed, 250 prior and 311 after the institution of specimen tomosynthesis (Mozart). Prior to Mozart, the 250 image-guided PMs were localized using a single wire 227 (91%), bracketed wire 19 (8%), and image-guided skin marking 4 (1%). After Mozart, the 311 image-guided PM were localized with the following techniques: 165 (53%) wire, 123 (40%) Savi Scout radar localization, 20 (6%) wire bracket, 2 (0.6%) Savi Bracket, and 1 (0.4%) image-guided skin marking. Before Mozart, 11.2% (n=28) were found to have positive margins compared to 5.5% (n=17) after implementation of the technology. The odds ratio is 0.458 with use of a Mozart of having a positive margin, which shows a statistically significant decrease in positive margins with use of the Mozart. Pathology of the groups was compared. Prior to Mozart, 65 % (n=162) IDC, 26 % (n=64) DCIS, 6 % (n=15) ILC, and 3% (n=8) had a combination of mucinous, neuroendocrine, and angiosarcoma. Post utilization of Mozart , 69% (n=216) IDC, 24 % (n=74) DCIS, 6% (n=18) ILC, and 1% (n=3) had mucinous and adenocystic.

Conclusions: Use of Mozart with palpation versus palpation and remote interpretation for determining additional shave margins in image-guided PM is associated with lower positive margins rates. Furthermore, use of Mozart was shown to discover positive margins that would have been missed based on final pathology of initial specimen alone. Although there were significantly more shave margins taken based on selective shave margin determination, this is far

fewer than the 1,866 that would be taken from full cavity shave; however, further studies are needed to compare the 2 techniques.

Figure: Summary of additional shave margins pre- and post-Kubtec



	Content of shaves				
	Cancer present in shave	Shave that correlates with closest PM margin on path	Shave that rendered final margin neg	Shave with additional disease despite PM margin negative	Shave that rendered final path positive
Post-Mozart (n=368)	40	93	12	23	3
Pre-Mozart (n=44)	20	13	2	14	0

786683 - Shaves Off the Cavity or the Specimen (SOCOS) Study: Should Tumor Size Determine Technique?

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Background/Objective: Re-excision for margins after breast-conserving surgery (BCS) is a frequent occurrence. Excising a higher volume of tissue is associated with worse cosmetic outcomes. However, studies demonstrate that routine cavity shaving reduces re-excision rates without compromising cosmesis. The surgical technique of margin shaving varies between surgeons. Cavity shaving margin (CSM) removes margins from the lumpectomy cavity edges. Alternatively, specimen shaving margin (SSM) requires ex-vivo removal of margins off the resected specimen by the surgeon. We compared these 2 distinct intraoperative shaving techniques to evaluate their impact on re-excision rates.

Methods: Retrospective review identified patients who underwent BCS for DCIS and invasive cancer and received CSM or SSM from 2017 to 2019. Data regarding demographics, pathology, surgical technique, specimen volume, and re-excision was collected. Primary margin (the margin on the initial lumpectomy excision), final shaved margin (margins of the shaved tissues), re-excision rates, and tissue volumes were compared using univariate Chi-Squared analysis and student t-tests.

Results: A total of 116 patients met final study criteria: 57 underwent CSM, and 59 received SSM. The groups were well matched in terms of BMI, T staging, nodal status, hormonal receptor, HER-2 status, and histology. Primary margins were positive in 19 CSM patients, and 21 SSM patients (33% vs.36%, p=0.798). Seventeen CSM patients were found to have tumor in the shaved margin specimens, compared to 4 patients in SSM (30% vs.7%, p<0.001). The final shave margin was positive in 3 CSM and 3 SSM patients (5% vs. 5%, p=0.983). The volume of shave specimens was higher for the SSM group (40.7 vs 13.4 cm3, p=<0.001), but total volume was similar. When evaluating those whose tumors were 2 centimeters or more, total volume removed was smaller for the CSM group (115 vs. 248 cm3, p=0.008), and the rate of final margin positivity was not significantly different (1 vs. 0, p=0.684).

Conclusions: Both CSM and SSM intra-operative techniques demonstrate very low re-excision rates. With larger tumors, CSM achieved a similar rate of negative margins while removing less tissue.

Table: Shaves off the cavity or the specimen

Demographics	Cavity Shave Margins (CSM)	Specimen Shave Margin (SSM)	P
N (number of patients)	57	59	
Age	59	62	0.228
BMI	29	28	0.437
Tumor Size average (cm)	1.84	1.59	0.306
Final Pathology: N (%)			
DCIS in Final Specimen	42 (73)	45 (76)	0.545
Primary Margin Positive	19 (33)	21 (36)	0.798
Final Shaved Margin Positive	3 (5)	3 (5)	0.9829
Tumor in the Shaved Margin	17 (30)	4 (7)	**<0.001**
Reexcision for Positive Margin	2 (4)	3 (5)	0.676
Volume: Mean cm³			
Shave Volume	13.4	40.7	**<0.001**
Primary Lumpectomy	120.8	106.1	0.428
Total Volume	134.4	146.8	0.540
Margin Positive Total Volume	11.7	61.4	0.098
Margin Positive Shave Volume	141.2	254.0	0.416
Tumors > 2cm			
N (number of patients)	13	6	
Tumor Size (cm)	3.92	3.83	0.902
BMI	26.6	32.1	0.213
Final Pathology: N (%)			
Primary Margin Positive	7 (54)	2 (33)	0.370
Final Shaved Margin Positive	1 (7.6)	0	0.684
Tumor in the Shaved Margin	6 (46)	0	0.063
Reexcision for Positive Margin	1 (7.6)	0	0.684
Volume: Mean cm³			
Shave Volume	11.7	52.5	**0.018**
Primary Lumpectomy	104	196	**0.031**
Total Volume	115.92	248.5	**0.008**
Margin Positive Total Volume	11.7	61.4	0.098
Margin Positive Shave Volume	141.2	254.0	0.416
Initial Specimen (Prior to any shaves)	104	248.5	**0.002**

787916 - Predictors of Re-excision and Positive Margins After Lumpectomy

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Background/Objective: Re-excision surgery to obtain negative margins is a persistent challenge following partial mastectomy, and is associated with increased rates of local tumor recurrence, poor cosmetic outcomes, delayed adjuvant therapy, and more frequent wound complications. The purpose of our study is to determine preoperative risk factors associated with re-excision for patients after partial mastectomy.

Methods: A retrospective review was performed from July 2015 through April 2019 at a single institution breast care center identifying adult patients who underwent partial mastectomy for a new diagnosis of invasive breast cancer (IDC) or ductal carcinoma in situ (DCIS). Patients with a history of neoadjuvant chemotherapy, radiation therapy, or previous breast surgery were excluded. Univariate analysis was used to identify patient and tumor variables associated with re-excision as the primary outcome. Multivariable logistic regression analysis was performed to identify independent factors associated with re-excision.

Results: A total of 300 patients met inclusion criteria, 264 (88%) of whom underwent radioactive seed localization of their tumors, 32 (10.7%) had palpable lesions, and 4 (1.3%) underwent wire localization. Of the 300 patients, 116 required re-excision for positive margins (38.7%). On univariate analysis, the presence of DCIS, HER2 positivity, larger tumor size, and higher tumor grade were significantly associated with higher rates of re-excision ($p<0.05$). On multivariable analysis, patients who had a final pathology consistent with DCIS had an 8.5 times higher odds of re-excision (95% CI: 2.4–29.9; $p<0.01$), and those with IDC and DCIS on final pathology had a 4.9 times higher odds of re-excision (95% CI: 1.6–15.1; $p<0.01$) compared to those with only IDC.

Conclusions: Patients with DCIS with or without IDC are more likely to require re-excision for positive margins following partial mastectomy. Other patient characteristics, such as smoking, obesity, dense breasts, and tumor characteristics, such as grade, stage, size, and tumor markers, were not significantly associated with an increased risk for re-excision. These findings suggest that for patients with DCIS and DCIS with IDC, additional shave margins should be considered at the time of initial surgery to prevent the need for further re-excision.

785305 - The Effect of Involved Anterior Margins on Loco-regional Recurrence Rates Following Breast Cancer Surgery

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Background/Objective: Many factors are associated with a greater risk of loco-regional recurrence (LRR) including involved surgical margins; the importance of an involved anterior margin (IAM) on local failure is thought to be less significant; as the need for anterior margin re-excision is uncertain, many centres balance the need for further surgery with cosmesis. An involved margin was defined as <1mm clearance of invasive or in-situ breast cancer as per national guidelines (Association of Breast Surgeons of Great Britain and Ireland). The aim of this study was to evaluate LRR rates in breast cancer patients with an IAM following breast surgery.

Methods: A retrospective review of a cohort of all women undergoing breast surgery from January to October 2012 was undertaken. Patients with recurrent disease, previous breast and/or axillary surgery, or previous breast radiotherapy were excluded. All patients with an involved radial margin underwent further surgery to achieve clear margins. Patients with an IAM did not have further surgery. LRR was defined as disease relapse in the ipsilateral breast or axillary / regional lymph nodes, and metastatic disease was defined as disease relapse in distant sites. Statistical analysis was performed using descriptive statistics and non-parametric testing.

Results: A total of 240 women were included in the analysis. The median age was 57 (range: 29-89) years. Thirty women (12.5.%) had ductal carcinoma in situ (DCIS) only. There were 210 (87.5%) women who had invasive carcinoma with sub-type distribution of 157 (65.4%) for hormone receptor (HR)-positive/HER2-negative, 21 (8.8%) HR-positive/HER2-positive, 10 (4.2%) HR-negative/HER2-positive, and 22 (9.2%) triple-negative (TN). The median tumour size on pre-operative imaging and surgical histopathology was 15 (range: 3-120) mm and 24 (range: 0-190) mm respectively. There were 141 (58.7%) women who had breast-conservation surgery, and 99 (41.3%) had a mastectomy. Sentinel lymph node biopsy was performed in 161 (67.1%) cases, and 62 (25.8%) had an axillary node clearance [median number of positive nodes: 7 (range: 1-25)]. Repeat surgery for involved radial margins was performed in 56 cases. Eighty-eight and 98 patients respectively received chemotherapy and/or adjuvant radiotherapy as per local and national guidelines. An IAM was demonstrated in 37 patients (15.4%). At a median follow-up of 6 years (interquartile range: 4-7), 10 women developed a LRR [7 in the breast (2.9%), 3 in the axilla (1.25%)], and 32 at a distant site (13.3%). Of the women who presented with LRR, only 2 had an IAM, and this was not associated with LRR (p= 0.655).

Conclusions: These results demonstrate that the risk of LRR with an involved anterior margin is very low and compares favourably with the published literature. As the yield from re-excision of an involved anterior margin is arguably low, the need for breast radiotherapy boost should be individualised on a case-by-case basis. A national prospective audit would provide consensus guidelines for this grey area.

788175 - Feasibility Study of the Intra-operative Use of the OTIS™, Wide Field Optical Coherence Tomography (WF-OCT) in Surgically Excised Partial-mastectomy Breast Tissue

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Background/Objective: The goal of breast-conserving surgery (BCS) for a biopsy-proven malignancy is to remove the cancer while limiting excision of normal tissue. For the approximate 20% of patients with a positive margin, additional surgery is recommended, leading to increased anxiety, cost, and potential delays in adjuvant therapy. The tools employed to reduce positive margins include those delineated by an ASBrS consensus conference; however, the tool that provides the lowest re-excision rate, intraoperative frozen section, is available at limited institutions. Therefore, there remains an unmet need for a rapid, accurate intraoperative tool for margin assessment. Optical coherence tomography (OCT) is a non-invasive method that exploits variations in the light-scattering properties to produce volumetric images to a depth of 2mm, in a manner analogous to the use of sound-scattering properties exploited in ultrasound imaging. We have performed a pilot intraoperative study at 2 academic institutions evaluating an investigational wide-field OCT (WF-OCT) device, OTIS (Perimeter Medical). Our objective was to determine if the OTIS system could be integrated into the operative and pathologic workflow and to create an atlas of intra-operative margin images for training and future clinical trials.

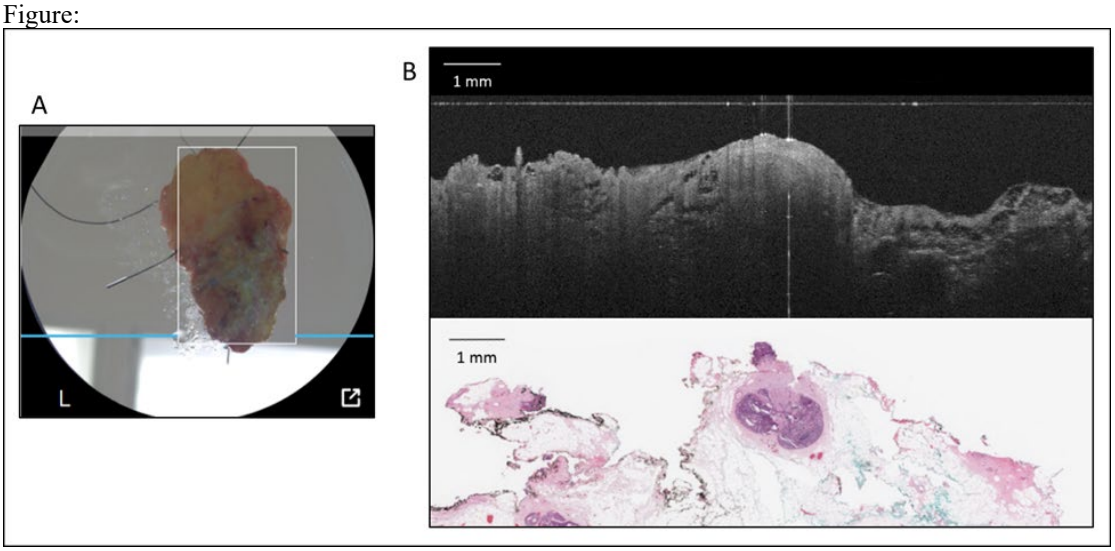
Methods: An IRB-approved, prospective study carried out at 2 sites included women >18 years of age with biopsy proven invasive or in situ carcinoma scheduled for primary BCS. Standard operative care and specimen processing was performed. Using the investigational OTIS device, lumpectomy specimens and final/shaved margins were imaged post-specimen mammogram and prior to standard histological processing and inking. At 1 site, the imaging included specimen stabilization with a compression bag while the other site used only manual stabilization. The WF-OCT technology used provided 2-dimensional, cross-sectional depth visualization of the margin widths. A volume of images were captured up to a 10cm x 10cm tissue surface at high-resolution (~15 μm) down to a 2mm tissue depth. No action was taken in this study based on OTIS images.

Results: WF-OCT was performed on 90 subjects with a median age of 60, with 30% being individuals with pure DCIS. A median number of 4 margins were imaged per primary specimen and at 1 site, all shave margins were imaged. The average scan time per patient was 20.5 minutes with no specimen arriving into the pathology suite later than 35 minutes from excision. There were no statistically different differences in re-excision rates between the sites validating the use of compression as a means to potentially better image the lumpectomy specimens without compromising specimen integrity for pathology. Greater than 55 positive margins have been imaged by OTIS to provide a comprehensive atlas of invasive and in-situ images for future clinical trials.

Conclusions: The OTIS WF-OCT system was able to be seamlessly integrated into an intra-operative workflow for breast specimen imaging with rapid image acquisition and intraoperative

display. The developed atlas will now be used for surgeon and pathologist training for a clinical trial evaluating the ability of the OTIS images to guide surgeons towards areas requiring additional margin excision.

Figure:



NAC

787971 - The Evolving Role of the 21-gene Recurrence Score in the Neoadjuvant Setting

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Background/Objective: Oncotype DX 21-gene recurrence score (21-GRS) has been extensively validated for use in the adjuvant setting, and studies demonstrate that it may help to select which patients benefit from neoadjuvant chemotherapy (NACT) and neoadjuvant hormonal therapy (NAHT). Despite this, there is little data regarding how frequently it is used in the neoadjuvant setting. We assessed the use of the 21-GRS in the neoadjuvant setting and the relationship between recurrence scores and response to neoadjuvant therapy.

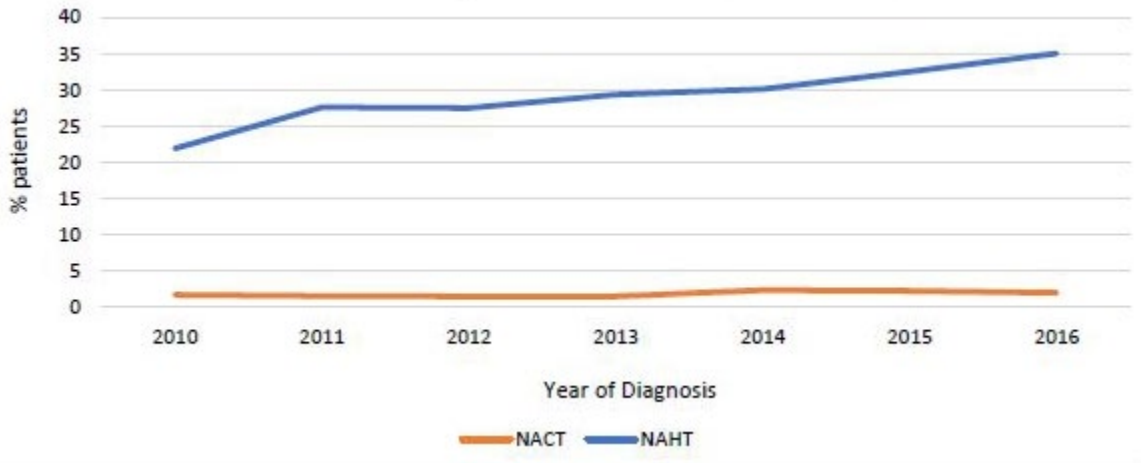
Methods: The National Cancer Database (NCDB) was queried from 2010 – 2016 to identify patients who received NACT or NAHT prior to definitive surgical management, and those having a 21-GRS. We compared pretreatment clinical T and N to final pathologic T and N to assess response to treatment. Multivariable analysis was then used to determine predictors for the use of the 21-GRS in the NACT and NAHT setting and its association with neoadjuvant treatment response.

Results: A total of 25,691 patients were identified who received either NACT or NAHT; 17,807 (69.3%) received NACT, and 7,884 (30.7%) received NAHT. A 21-GRS was utilized in 2721 (10.6%), among whom, 337 (12.4%) received NACT, and 2384 (87.6%) received NAHT. There was a significant uptrend in the overall use of the 21-GRS in any neoadjuvant setting from 185 (7.3%) in 2010 to 662 (12.8%) in 2016 (p=0.0001). While the rate of use in all patients receiving NACT remained stable at ~2% (31 to 70) there was a significantly increased use of the 21-GRS in all patients receiving NAHT from 21.9 to 35% (154 to 591) (p=<0.0001). In patients with an available 21-GRS, the NACT patients were younger at 54.3 years than NAHT patients at 67.3 years (p=<0.0001). Significant factors associated with use of a 21-GRS in the NACT cohort were lower grade and lobular histology. Significant factors associated with use in the NAHT cohort were younger age, lower Charleson/Deyo score, lobular histology, lower grade, and the presence of LVI. The mean 21-GRS scores were significantly different between those having NACT 29.8 versus NAHT 16.3 (p=0.0001). The T and N response rates to NACT with a 21-GRS were 46.6% and 14% respectively. The T and N response rates to NAHT with an available 21-GRS were 23.6% and 1.9% respectively. The T and N complete response rates to NACT with an available 21-GRS were 2.4% and 9.8% respectively, while the T and N compete response to NAHT with an available 21-GRS was 0.3% and 1.7% respectively.

Conclusions: Despite more limited data, oncologists are increasingly incorporating the use of the 21-GRS in the neoadjuvant setting. Lower 21-GRS scores predict the selection of NAHT while higher score predict the selection of NACT, suggesting its proper use. Although its use is increasing, it remains limited in this national dataset. Further validation and efforts to define

specific indications for its use preoperatively may increase adoption of the 21-GRS in the neoadjuvant setting.

Figure: Trends in oncotype use in neoadjuvant setting



783446 - Effect of Weekly Carboplatin and Paclitaxel with Trastuzumab and Pertuzumab (wPCbTP) on Nodal Disease and Surgical Options in HER2-positive Breast Cancer

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Background/Objective: In HER2-positive breast cancer, neoadjuvant chemotherapy (NACT) with dual HER2-targeted therapy achieves high pathologic complete response (pCR) rates, but the optimal regimen is not clear. We conducted a prospective pilot study to assess the efficacy of a weekly anthracycline-free regimen, including its impact on nodal disease and surgical treatment options.

Methods: Patients with clinical Stage II-III HER2+ breast cancer received neoadjuvant therapy with paclitaxel 80 mg/m2 and carboplatin AUC 2 weekly with Trastuzumab and Pertuzumab every 3 weeks (wPCbTP). Patients are restaged after 12 weeks with ultrasound or MRI. Responding patients receive another 6 weeks of wPCbTP, while non-responders are switched to AC x 4. Study participation is complete after surgery followed by a 3-month post-op visit.

Results: Thirty patients were enrolled, data for 27 patients is completed. Fourteen patients were ER+. Clinical stage prior to treatment included Stage IIA=12, Stage IIB=4, IIIA=3, IIIB=3 and IIIC=5, with 17 node-positive patients (confirmed by aspiration or biopsy) - N1=8, N2=4 and N3=5. No patients required switching to AC for suboptimal response at week 12; 2 were switched for toxicity. Sixteen patients were not candidates for breast-conserving surgery (BCS) at baseline. After treatment, 5 of these patients (31%) were considered candidates for BCS. Prior to treatment, 11 patients were considered eligible for sentinel lymph node biopsy (SLNB), while 16 would have required axillary lymph node dissection (ALND). After treatment, 7 pretreatment

ALND patients (44%) were converted to candidates for SLNB. In total, 21 patients (78%) had pCR (T0/isN0). Of the 17 patients who were node-positive at study entry, 11 (65%) were pathologically node-negative at surgery.

Conclusions: Treatment with wPCbTP was associated with a high pCR rate (78%). Treatment resulted in de-escalation of surgical management of the axilla, with a 44% decrease in the need for ALND. In addition, 31% of patients who were not candidates for BCS at baseline were converted with treatment. This regimen warrants broader investigation, though its toxicity was not insignificant, in part due to the duration of treatment. It may be worth exploring surgical intervention at 12 weeks in patients with optimal response.

789332 - Does Use of Neoadjuvant Chemotherapy Affect Decision to Pursue Fertility Preservation Options in Young Women with Invasive Breast Cancer?

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Background/Objective: The American Society of Clinical Oncology guidelines recommend early referral to reproductive endocrinology and infertility (REI) specialists for young women diagnosed with breast cancer. Current practice patterns demonstrate an increasing trend for utilization of neoadjuvant chemotherapy (NAC) in women with invasive breast cancer. Chemotherapy is associated with infertility, and fertility concerns have profound effects on psychological well-being and quality of life. Here we evaluate women with invasive breast cancer after consultation with a Fertility Nurse Specialist (FNS) and determine factors associated with referral to REI specialists.

Methods: This retrospective review of a prospective breast cancer database included all women diagnosed with Stage 0-III breast cancers between 2009 and 2015 who completed a consultation with an FNS in an institutional Cancer and Fertility Program. The FNS provided initial fertility counseling and facilitated referrals to REI specialists. Clinicopathologic features, treatment variables, referring service, and outcome of FNS consultation (REI referral or not) were analyzed. Comparisons were made between those referred or not to an REI specialist with the Kruskal-Wallis test for continuous variables and Fisher's exact test for categorical variables.

Results: A total of 349 women with 356 breast cancers (7 bilateral) were identified. Median age was 35 years (interquartile range 32-39). The majority of women were single (n=205, 58.7%) and nulliparous (n=248, 71.1%). The majority of the cancers were Stage II (n=164, 46.1%), estrogen receptor (ER)-positive (n=271, 76.1%), and high grade (n=184, 51.7%). Endocrine therapy was administered for 72.8% (254 of 356) of all tumors and in 93.7% (254 of 271) of those that were ER+. REI referrals were common (n=217, 61.3%). The Breast Surgery Service

was the most frequent referring service (n=201, 57.6%), with significantly greater REI referrals as compared to breast medicine or genetics (p=0.04). Nulliparity was associated with REI referral (p<0.01). Use of systemic therapy overall was also associated with REI referral. Adjuvant chemotherapy (p=0.002) and endocrine therapy (p=0.02) were associated with an REI referral whereas receipt of NAC (p<0.001) was associated with declining REI referral (Table).

Conclusions: Most women elected to consult with an REI specialist, confirming significant interest in fertility preservation among young women with breast cancer. However, women receiving NAC were likely to decline referral to REI, possibly suggesting the need to start NAC may affect decisions regarding pursuit of fertility options. With increasing utilization of NAC in breast cancer, our study supports the need to provide further counseling and education regarding fertility preservation for women undergoing NAC. Future study evaluating the impact of both FNS education programs and clinician counseling on choice of fertility preservation options are necessary in the NAC setting.

Table: Clinicopathologic features and factors associated with REI referral. Abbreviations: IDC, invasive ductal carcinoma; ILC, Invasive lobular carcinoma; DCIS, ductal carcinoma in situ; ER, estrogen receptor; REI, reproductive endocrinology and infertility; N/A, not available. *Numbers do not add up to 356 because REI referral status was unknown in 15 cases.

Tumor Characteristics 349 patients had 356 breast cancers		
Histology	IDC ILC DCIS	326 (91.6%) 16 (4.5%) 14 (3.9%)
Tumor Grade	I II III	6 (1.7%) 145 (40.7%) 184 (51.7%)
Receptor Profile	ER positive HER2 positive Triple negative	271 (76.1%) 69 (19.4%) 61 (17.1%)
Stage	0 I II III	14 (3.9%) 128 (36.0%) 164 (46.1%) 48 (13.5%)

Factors Associated with REI Referral*					
Factors		Overall (n = 341)	REI Referral (n = 217)	No REI Referral (n = 124)	p-value
Age, years (interquartile range)		35 (32-39)	35 (31-38)	36 (32-39)	0.08
Single		205 (58.7%)	126 (58.9%)	66 (55%)	0.56
Nulliparous		248 (71.1%)	168 (78.5%)	68 (56.7%)	<0.001
Referring Service	Breast Surgery Breast Medicine Genetics N/A	201 (57.5%) 144 (41.3%) 3 (0.9%) 1 (0.3%)	136 (63.6%) 76 (35.5%) 2 (0.9%) 0 (0.0%)	60 (50.0%) 58 (48.3%) 1 (0.8%) 1 (0.8%)	0.04
Neoadjuvant Chemotherapy		64 (18.3%)	23 (10.7%)	40 (33.3%)	<0.001
Adjuvant Chemotherapy		206 (59.0%)	139 (65.0%)	56 (46.7%)	0.002
Endocrine Therapy		254 (72.8%)	164 (76.6%)	77 (64.2%)	0.02

788129 - Analysis Comparing Breast-conserving Surgery Excision Volumes and Positive Margin Rates in Patients Undergoing Neoadjuvant versus Adjuvant Systemic Therapy

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Background/Objective: The effective use of neoadjuvant chemotherapy (NAC) in breast cancer treatment allows patients who previously required mastectomy to safely undergo breast-conserving surgery (BCS). This study aims to contribute to the growing field of research seeking to further minimize surgical intervention of the breast after NAC by examining lumpectomy excision volumes and positive margin rates between patients undergoing NAC versus adjuvant systemic therapy.

Methods: A retrospective review was completed of 349 tumors in 339 patients undergoing BCS for breast cancer at our institute from January 2015 – March 2017. Information about tumor and specimen dimensions as well as margin status was collected from surgical pathology reports. Tumor and specimen volumes were calculated, and this was used to determine calculated resection ratio (SV/TV ratio) for each tumor. The Shapiro-Wilk test was used to test the assumption of normality. The Mann-Whitney U-test was used to compare tumor volumes and BCS excision volumes between chemotherapy groups. A chi-square test was used to examine the association between chemotherapy groups and positive margins. Logistic regression analysis was performed to determine the effects of calculated tumor volume and chemotherapy groups on the likelihood of positive margins. A value of $p<.05$ on 2-tailed testing was considered statistically significant.

Results: A total of 349 tumors in 339 patients were available for analyses of the primary objective. Nine-percent of these (31/349) were treated with NAC, and 91% (318/349) were treated with adjuvant systemic therapy. The analyses showed no statistically significant differences in therapies for tumor size, calculated tumor volume, specimen volume or SV/TV ratio. These results are reported in the Table. No statistically significant association was found between chemotherapy groups and positive margins. Sixteen percent of the lumpectomies (5/31) in the NAC group demonstrated positive margins compared with 18% (56/318) in the adjuvant systemic group. A multivariable logistic regression model showed that when the variables NAC and calculated tumor volume were considered together, significantly predicted whether or not a lumpectomy had a positive margin. Although calculated tumor volume was a statistically significant predictor ($p=.001$) in the model, NAC was not ($p=.477$). The overall accuracy of the model to correctly classify cases is 83.7%. Sensitivity is 9.8%, specificity is 99.3%, positive predicted value is 75%, and negative predicted value is 84%. However, the model was better at predicting for lumpectomies without positive margins than predicting for positive margins. The odds ratio for calculated tumor volume in this study indicates that increased calculated tumor volume was associated with increased odds of having positive margins.

Conclusions: In this study, despite notably larger final pathological tumor size in the NAC group, lumpectomy excision volumes and positive margin rates were not significantly different between the 2 treatment groups, with NAC providing breast-conservative surgery for the patients. To confirm our findings, further studies are needed with NAC using an appropriately

powered sample size. Also needed for evaluation are patient survival rates and breast-cancer recurrence rates.

Table: NAC versus adjuvant systemic therapy (n=349)

Variable	Neoadjuvant Chemotherapy	Adjuvant Systemic Therapy	p-value
Tumor Size (cm)	(n = 31)	(n = 318)	
Median (IQR)	1.5 (1.9)	1.1 (1.0)	.251
Tumor Volume (cm^3)	(n = 31)	(n = 318)	
Median (IQR)	3.4 (13.7)	1.3 (4.6)	.251
Specimen Volume (cm^3)	(n = 31)	(n = 318)	
Median (IQR)	55.0 (54.2)	58.6 (63.8)	.923
SV/TV Ratio	(n = 31)	(n = 318)	
Median (IQR)	22.2 (220.8)	43.5 (149.0)	.301

787723 - Time to Treatment and Hospital Visits for Patients Undergoing Neoadjuvant Chemotherapy in a Single-payer System

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Background/Objective: Expanded indications have increased the number of breast cancer patients undergoing neoadjuvant chemotherapy prior to surgical management. Neoadjuvant chemotherapy requires the coordination of various services and specialists to ensure timely and accurate delivery of care. This process can result in multiple visits to the hospital and extend the time period from consultation to treatment. As more evidence emerges surrounding improved outcomes with timely receipt of chemotherapy, reducing the time from initial consultation to the initiation of chemotherapy is imperative to patient care. The objective of this study was to evaluate the time to treatment from initial consultation to neoadjuvant chemotherapy for patients at a regional cancer centre in a single-payer system. Health care resource use in the form of hospital visits prior to the initiation of chemotherapy were also evaluated.

Methods: A retrospective chart review was completed. Women over the age of 18 who were referred to a regional breast cancer center between January 1, 2012 and December 31, 2018 and who underwent neoadjuvant chemotherapy were included. Patient and tumour characteristics, date of first consultation, and date of first dose of chemotherapy were recorded. Intervening

hospital visits for consultations, diagnostic imaging, and/or additional biopsies were also recorded. Our primary outcome was total number of hospital visits prior to initiation of neoadjuvant therapy (excluding the initial consultation appointment). Secondary outcomes included number of visits based on specialty and time to receipt of first therapy. Descriptive statistics were calculated and a multivariable poisson regression model was utilized to determine independent predictors of increased hospital visits.

Results: Overall, 286 patients underwent neoadjuvant chemotherapy during the study period. The median number of days from first consultation to first neoadjuvant chemotherapy date was 22 (range 5 – 105). The median number of visits between first consultation and first date of chemotherapy was 5 (range 0-12). Overall, 10% of the patients had at least 1 additional visit prior to starting chemotherapy. The majority of additional visits were for diagnostic imaging or biopsies, with a median number of 4 visits (range 0-10) after the first consultation. Neither age, lymph node status, breast density, or tumour histology impacted the number of additional visits.

Conclusions: Women who undergo neoadjuvant chemotherapy require multiple visits prior to initiating treatment. The majority of these visits are with diagnostic imaging. Despite these additional visits, the median time to treatment initiation is less than 30 days within our single-payer health care system. To improve the patient experience and potentially reduce the time and financial burden of repeat hospital visits, coordination of additional diagnostic imaging either prior to consultation or as part of a streamlined line process of care should be considered for breast cancer patients undergoing neoadjuvant chemotherapy.

780306 - Characterizing Occult Nodal Disease within a Clinically Node-negative, Neoadjuvant Breast Cancer Population

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Background/Objective: Neoadjuvant therapy for breast cancer aims to downstage patients by decreasing tumor size or treating known nodal disease. While the efficacy of neoadjuvant chemotherapy for nodal down-staging is well established, factors associated with nodal upstaging at time of surgery have yet to be investigated. We evaluated risk factors for nodal-upstaging in clinically node-negative patients receiving neoadjuvant therapy.

Methods: We retrospectively reviewed a prospectively-maintained database for clinically node-negative patients undergoing neoadjuvant therapy for invasive breast cancer from 2009-18. All patients had dedicated physical examinations and imaging before and after neoadjuvant treatment. Patient characteristics (Table) were analyzed using univariate and multivariate analysis for association with occult nodal disease and nodal upstaging.

Results: A total of 224 clinically node-negative patients with a mean age of 56 years (range 22-90) underwent neoadjuvant therapy for Stage I-III invasive carcinoma. Tumor markers included ER+/HER2- = 91 (40%), HER2+ = 60 (27%), and triple-negative = 73 (33%). A total of 47 patients (21%) were intraoperatively or post-operatively upstaged due to occult nodal disease,

with 30 (64%) of these patients receiving immediate or delayed completion axillary lymphadenectomy. Nodal staging at time of surgery included: N0(IHC+) = 2 (4%), N1mic= 11 (23%), N1= 26 (53%), N2= 6 (13%), and N3= 2 (4%). Of these 47 patients with occult disease, majority had an MRI (64%) or axillary ultrasound (55%) prior to neoadjuvant therapy. Eight patients (17%) had a PET/CT. Five patients within the occult group had a preoperative ultrasound-guided axillary biopsy; all were negative. Univariate analysis showed that significant factors for occult nodal disease and upstaging included presenting stage (p=0.008), larger tumor size prior to neoadjuvant therapy (p=0.009), low/intermediate tumor grade (p=0.013), and hormone-receptor positivity (p<0.001). On multivariate analysis, patients with ER+/HER- cancer had a significantly higher risk of occult nodal disease and upstaging (OR = 5.6, 95% CI 1.9-16.5, p<0.001) compared to those with triple-negative cancer; multivariate results for preoperative stage, tumor size, and grade were not significant.

Conclusions: Despite neoadjuvant therapies, occult nodal disease is a significant risk among patients with ER+ breast cancer. Neoadjuvant patients with triple-negative disease exhibit a significantly lower incidence of occult nodal metastases.

Table: Patient characteristics

Characteristics	No Nodal Disease (N, %) N=177	Occult Nodal Disease (N, %) N=47	Total (N, %) N=224	P-Value
Age, Years (Mean, SD) (Range)	55 ±12.7 (22-90)	56 ±11.9 (31-76)	56 ±12.5 (22-90)	0.798[1]
BMI (Mean, SD) (Range)	27.9 ±6.8 (18.0-61.4)	28.1 ±5.7 (18.2-51.2)	28.0 ±6.6 (18.0-61.4)	0.432[1]
Pre-Neoadjuvant Imaging				
MRI	109 (62)	30 (64)	139 (62)	0.778[2]
Axillary US	79 (45)	26 (55)	105 (47)	0.192[2]
PET/CT	14 (8)	8 (17)	22 (10)	0.260[2]
Presenting Stage				0.008[2]
I	43 (24)	5 (10)	48 (21)	
II	116 (66)	36 (77)	152 (68)	
III	18 (10)	6 (13)	24 (11)	
Presenting Tumor Size, cm (Mean, SD) (Range)	3.2 ±1.9 (0.6-12.0)	4.1 ±2.3 (0.7-9.4)	3.4 ±2.0 (0.6-12.0)	0.009[1]
Histology				0.223[2]
IDC	156 (88)	37 (79)	193 (86)	
ILC	9 (5)	7 ((15)	16 (7)	
Mixed IDC/ILC	3 (2)	1 (2)	4 (2)	
Other	9 (5)	2 (4)	11 (5)	
Grade				0.013[2]
Low	18 (10)	9 (19)	27 (12)	
Intermediate	57 (32)	22 (47)	79 (35)	
High	102 (58)	16 (34)	118 (53)	
Tumor Markers				<0.001[2]
ER+/Her2-	58 (33)	33 (70)	91 (40)	
Her2+	52 (30)	8 (17)	60 (27)	
Triple Negative	67 (37)	6 (13)	73 (33)	

[1]Wilcoxon rank sum p-value, [2]Chi-Square p-value; IDC = Invasive Ductal Carcinoma, ILC = Invasive Lobu Carcinoma, ER = Estrogen Receptor, PR = Progesterone Receptor

787805 - The Neo-risk Score: Applying Biologic Factors and Response to Therapy to Staging for Patients Undergoing Neoadjuvant Chemotherapy for Breast Cancer

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Background/Objective: Neoadjuvant chemotherapy (NAC) is commonly used in the treatment of breast cancer. However, the updated AJCC 8th edition pathologic prognostic stage excluded patients receiving NAC. The previously reported Neo-Bioscore showed that both clinical and pathologic stage were important in survival outcomes for patients treated with NAC, but does not use the framework of anatomic staging. The previously reported Risk Score uses biologic factors to modify the anatomic stage in patients undergoing surgery as an initial intervention. Here we propose the Neo-Risk Score, a modification of the Risk Score that incorporates biologic factors and accounts for presenting clinical and final pathologic stage, to be used in patients receiving NAC.

Methods: The Neo-Risk Score applies a value of 0-2 for response to NAC (0 points for downstage, 1 point for same stage, 2 points for upstage). This is added to the 3-point scale as described in the Risk Score model (1 point for estrogen receptor [ER]-negative, 1 point for HER2-negative, and 1 point for grade 3) for a total Neo-Risk Score value of 0-5. The National Cancer Database was used for model development and testing. Patients that received NAC for invasive breast cancer from 2010-2015 and had known clinicopathologic data were included for analysis. The Kaplan-Meier survival method and Receiver Operating Characteristic (ROC) model fit were used for analyses.

Results: A total of 62,663 patients had NAC for clinical Stage I-III breast cancer. Median age was 52, and median follow-up was 35.4 months. There were 27,454 patients (43.8%) who were ER-negative, 43,316 (69.1%) HER2-negative, and 38,925 (62.1%) grade 3. There were 38,912 (62.1%) who were downstaged at least 1 stage group, 15,407 (24.6%) stayed the same stage, and 8,344 (13.3%) were upstaged. The Neo-Risk Score stratified patients well in predicting 5-year overall survival (OS) when applied to each clinical stage group (Table). This was also true when stratified by tumor subtype. ROC analysis showed a C-statistic of 0.72 for the Neo-Risk Score model. This C-statistic was higher than that for clinical anatomic staging (0.66) or clinical prognostic staging (0.71), suggesting improved model fit. When stratified by tumor subtype, the C-statistic for Neo-Risk Score is 0.67 for hormone receptor (HR)-positive, HER2-negative (HR+HER2-), 0.73 for HR-HER2-, 0.67 for HR+HER2+, and 0.70 for HR-HER2+ patients.

Conclusions: The Neo-Risk Score allows for a simple to use tool that can be applied within each anatomic clinical stage group in patients receiving NAC to help stratify and predict survival outcomes. While validation is needed, the Neo-Risk Score has potential to provide a framework for the discussion of staging in the neoadjuvant setting.

Table: Five-year overall survival estimates for patients undergoing neoadjuvant chemotherapy by neo-risk score at each anatomic stage group

	5-yr OS for Risk Score Applied to Clinical Anatomic Stage Group					
Neo-Risk Score	Stage I	Stage IIA	Stage IIB	Stage IIIA	Stage IIIB	Stage IIIC
0	99.9%	96.4%	93.8%	89.1%	79.2%	82.7%
1	97.4%	94.7%	92.0%	85.6%	82.4%	79.5%
2	93.6%	92.6%	87.1%	83.0%	71.0%	62.9%
3	92.2%	88.0%	81.2%	69.3%	57.3%	53.2%
4	84.9%	68.7%	58.5%	41.6%	30.2%	17.3%
5	69.2%	41.6%	28.4%	15.6%	14.7%	N/A

785912 - A Single Institution's Experience with Neoadjuvant Chemotherapy in Invasive Lobular Carcinoma

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Background/Objective: Invasive lobular carcinoma (ILC) is the second most common type of breast cancer, accounting for approximately 15% of invasive disease. Most ILC tends to be low grade, hormone receptor-positive (HR+), and HER2-negative (HER2-). There is very little literature available about the benefit of neoadjuvant chemotherapy (NAC) in this subtype. The aim of our study is to evaluate the impact of NAC in ILC and to determine whether there is a subgroup of patients (pts) who might benefit most from this treatment.

Methods: A retrospective review was performed on a prospectively maintained NAC database at a single institution from 2010-2018. All patients with ILC were identified. Demographic, clinicopathologic information, and treatment data were collected.

Results: Of 1488 patients treated with NAC, 64 (4%) had ILC. Mean follow-up time was 35 months (median 34, range 6-111). Mean age was 58 (range 35-78). Forty-seven (73%) were post-menopausal. At diagnosis, 48 (75%) had clinical T2 stage or higher, 32 (50%) had clinical N1 stage or higher. Fifty-seven (89%) had Nottingham grade 2 or 3. Twenty-three (36%) had Ki-67 >25% categorized as high or very high by our pathology department. ILC phenotypes were as follows: 53 (83%) HR+/HER2-, 8 (12%) HR+/HER2+, 3 (5%) HR-/HER2+, and 0 HR-/HER2-. ILC was classical in 39 (61%), pleomorphic in 16 (25%), and mixed in 9 (14%). Fifty-five (86%) completed the planned course of NAC. Most received doxorubicin, cyclophosphamide, and paclitaxel (ACT) or docetaxel, carboplatin, trastuzumab, and pertuzumab (TCHP) based on their respective ILC phenotype. Post-NAC surgical management for the breast was total mastectomy (TM) in 43 (67%), attempted breast-conservation therapy (BCT) in 20 (31%) patients, and no breast surgery in 1 (2%). Among the 20 patients undergoing attempted BCT, 5 underwent re-excision, and 6 had completion TM. Therefore, only 14 (22%) patients underwent successful BCT with negative margins. Forty-nine (77%) had TM due to extent of disease or positive margins on attempted BCT. Of the 32 clinically node-negative (cN-) patients, 2 (6%) upstaged at surgery and were pathologically node-positive (pN+). Of the 32 clinically node-positive (cN+) patients, 4 (12%) downstaged at surgery and became pathologically node-negative (pN-), thereby

avoiding axillary lymph node dissection (ALND). Of the 4 patients who avoided ALND, all had classical HER2- ILC. Pathologic complete response (pCR) was achieved in 5 (8%) patients. All of these had HER2+ ILC, and the pCR rate was 0% for the rest of the cohort. Among the 11 patients with HER2+ ILC, pCR rate was achieved in 5 patients (45%). During the follow-up time, there were 6 disease-specific deaths and 10 recurrences (8 distant, 1 locoregional, and 1 unknown).

Conclusions: In patients with ILC treated with NAC, the pCR rate was low (8%). There was also no substantial de-escalation of surgical management as most patients required TM (77%), and the majority of cN+ patients stayed pN+ (88%). These findings suggest that the benefit of NAC is limited for patients with ILC. However, the HER2+ subgroup had an excellent response to NAC (45% pCR), similar to that seen in their invasive ductal carcinoma counterpart. More research in a larger cohort would be helpful to look further at the impact of NAC in ILC.

Table: Treatment outcomes

		n	%
Breast Response	TM	43	67
	BCT attempted	20	31
	BCT successful with re-excision	5/20	25
	BCT not successful required cTM	6/20	30
	No breast surgery	1	2
	Overall BCT rate with negative margins	14	22
	Overall TM rate	49	77
Axillary Response	cN+ pre-NAC	32	50
	cN+ downstage to pN- post-NAC	4/32	12
	cN+ persistently pN+ post-NAC	28/32	88
pCR	Overall pCR	5/64	8
pCR by BC Phenotype	HR+/HER2-	0/53	0
	HR+/HER2+	4/8	50
	HR-/HER2+	1/3	33
	HR-/HER2-	0/0	0

cN clinical N stage pre-NAC, **pN** pathologic N stage post-NAC, **pCR** pathologic complete response, **HR+** hormone receptor positive, **HER2+** HER2/neu positive, **HR-** hormone receptor negative, **HER2-** HER2/neu negative, **BCT** breast conservation therapy, **TM** total mastectomy, **cTM** completion total mastectomy

786157 - Increased Use of Neoadjuvant Chemotherapy in Women With Early-stage Breast Cancer

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Background/Objective: Results from the landmark NSABP B-18 and B-27 trials showed improved rates of breast conservation and equivalent survival among women with operable breast cancer treated with neoadjuvant chemotherapy (NACT). More recently, NACT allows for assessment of pathologic response to chemotherapy and potential receipt of subtype-specific adjuvant therapies, yet it may be associated with an increased risk of local recurrence after

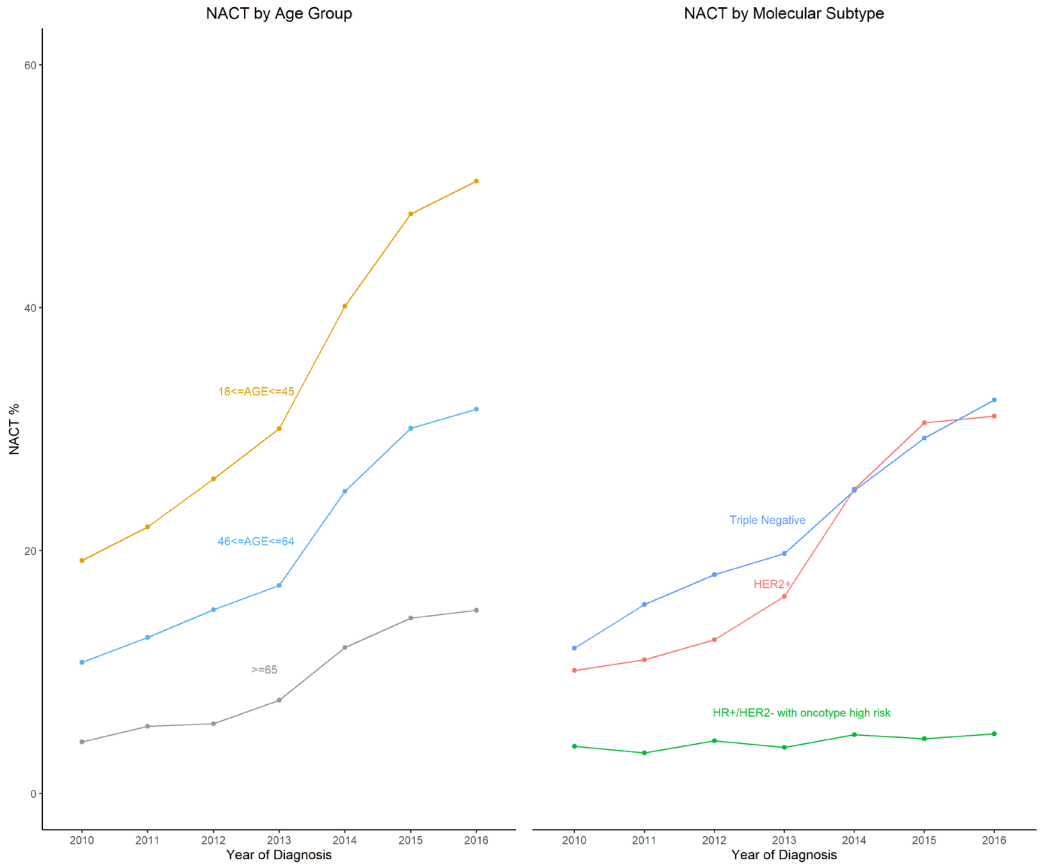
lumpectomy. Thus, we sought to examine national trends of NACT utilization in a contemporary cohort of women with early-stage, clinically node-negative (LN-) breast cancer.

Methods: Using the National Cancer Database (2010-2016), we identified adult women with cT1-2/cN0 HER2+, triple-negative, or high-risk hormone receptor-positive (HR+) breast cancers (21-gene risk score "high" or >31), eligible for receipt of chemotherapy in the neoadjuvant or adjuvant settings. Temporal trends were estimated by molecular subtype and patient age, and the Cochran-Armitage trend test was used to investigate trends within each subgroup. Logistic regression was used to estimate the association of molecular subtype, and age with likelihood of undergoing NACT, after adjustment for known covariates. Additional models including age and molecular subtype interaction terms were utilized to determine if the change over time in odds of NACT differed by subgroup.

Results: We identified 120,108 patients who met our inclusion criteria: 24,200 (20%) received NACT, and 95,908 (80%) underwent surgery first. There was no clinically meaningful difference in 5-year OS between the patients who underwent NACT (0.90, 95% CI 0.89-0.91) vs. those who had surgery first (0.88, 95% CI 0.88-0.88). Regardless of age, use of NACT increased from 11% in 2010 to 30% in 2016. There was no significant difference in the rate of increase according to patient age (year*age $p=0.44$). Temporal trends of NACT varied according to molecular subtype (year*molecular subtype $p<0.001$), with the greatest increases in NACT uptake seen in triple-negative (12% to 32%, $p<0.001$) and HER2+ (10% to 31%, $p<0.001$) breast cancer patients, and no significant change over time for women with high-risk HR+/HER2- breast cancer (4% to 5%, $p=0.06$).

Conclusions: Between 2010 and 2016, NACT use increased over time among women with early-stage, LN- breast cancers requiring chemotherapy. This trend likely correlates to physician uptake of neoadjuvant regimens among HER2+ and triple-negative disease, and available clinical trials. Updated national guidelines may better delineate multidisciplinary indications for NACT among women with operable breast cancer.

Figure: Temporal trends of NACT use by age group and molecular subtype, women with cT1-2/cN0 breast cancer, National Cancer Database, 2010-2016



784090 - Metaplastic Triple-negative Breast Cancer Has a Poorer Response to Neoadjuvant Chemotherapy and Worse Survival Compared to Other Triple-negative Breast Cancer: National Cancer Database Analysis

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Background/Objective: Metaplastic breast carcinoma (MpBC) is a rare histologic subtype of breast cancer that is generally triple-negative (TNBC) and associated with a poor prognosis. At present, little is known regarding predictive and prognostic outcomes in MpBC. This study aims to evaluate response to neoadjuvant chemotherapy (NAC) and survival in patients with MpBC.

Methods: Women with Stage I-III TNBC diagnosed between 2010 and 2015 were identified from the National Cancer Database. A total of 344 women with MpTNBC who underwent neoadjuvant chemotherapy were compared to 14,585 women with non-MpTNBC who also

underwent NAC with respect to clinical factors at presentation and pathologic response to NAC. Multivariable logistic regression was employed to identify factors associated with poor response to NAC, and the Kaplan-Meier method was then used to estimate overall survival (OS) between MpTNBC and non-MpTNBC groups.

Results: Women with MpTNBC were older (56 vs 52 years, p<0.01), and presented with larger tumors (cT3; 25% vs 19%, cT4; 17% vs 10%, p<0.01) compared to women with non-MpTNBC. However, women with MpTNBC were less likely to have nodal (cN) involvement relative to women with non-MpTNBC (cN+; 40% vs 53%, p<0.01). Women with MpTNBC were less likely to achieve a pathologic complete response (pCR) to NAC and more likely to have a pathologic no response (pNR) compared with women with nonMpTNBC (pCR; 15% vs 38%, pNR; 23% vs 7%, p<0.01). Multivariable logistic regression revealed that among women with TNBC who underwent NAC, MpBC was a significant predictor for non-response to NAC (odds ratio 3.76, 95% CI 2.82-4.96, p<0.01). Overall, women with MpTNBC had a significantly worse prognosis compared to women with non-MpTNBC (5-yr OS; 65% vs 74%, p<0.01). Lack of response to NAC was independently associated with poorer prognosis both in MpTNBC and non-MpTNBC (Mp: 5y-OS 41% vs 73%, non-Mp: 39% vs 77%).

Conclusions: MpTNBC had a poorer response to NAC and a worse overall survival at 5 years compared to non-MpTNBC. Further research with definitive pathologic criteria and molecularly targeted therapies to this subtype are necessary to advance individualized therapy for MpTNBC.

Table: Pathologic response to NAC for Stage I-III TNBC

Pathologic response to NAC	MpTNBC n=344		non-MpTNBC n=14,585		
Complete response	51	14.8%	5600	38.4%	<0.0001
Partial response	142	41.3%	5018	34.4%	
Response noted but no mention if it was complete or partial	71	20.6%	2990	20.5%	
No response	80	23.3%	977	6.7%	

NSM

786301 - Long-term Oncologic Safety of Nipple-sparing Mastectomy in Patients with Short Tumor-Nipple Distance

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Background/Objective: There is a tendency to avoid nipple-sparing mastectomy (NSM) when a tumor-nipple distance (TND) is <2cm due to the risk of occult nipple involvement. The purpose of the study was to determine whether the patients who undergo NSM with immediate reconstruction are oncologically safe when TND is <2cm.

Methods: Patients who underwent NSM followed by immediate reconstruction for breast cancer were retrospectively analyzed. Patients who are negative for nipple-base in either frozen-section or paraffin histopathology were included. MRI was used to obtain TNDs to compare local-recurrence-free and disease-free survival in group I (TND <2cm) and group II (TND ≥2cm). Disease-free survival rates were determined to assess the outcome.

Results: Of the 214 cases with malignancy on MRI, 21 cases diagnosed with pure ductal carcinoma in situ were excluded. Among the 193 NSM cases diagnosed with invasive cancer, TND was <2.0cm in 59 (30.56%) cases and ≥2.0cm in 134 (69.43%) cases. No significant differences were found between groups regarding ER, PR, HER2-neu status, and nodal involvement (p=0.34, p=0.41, p=0.54, and p=0.12 respectively). In a median follow-up time of 62 months (range, 13-114), patients in group I had 4 local recurrences, whereas group II was found to have 5 local and 3 distant metastases. No significant differences were observed between groups concerning disease-free survival (10-year DFS 93.2% vs 96.3%; p=0.368 respectively).

Conclusions: Patients who have invasive cancer diagnosis with a TND <2cm are eligible to undergo therapeutic NSM with immediate reconstruction.

785436 - Sensation After Nipple-sparing Mastectomy

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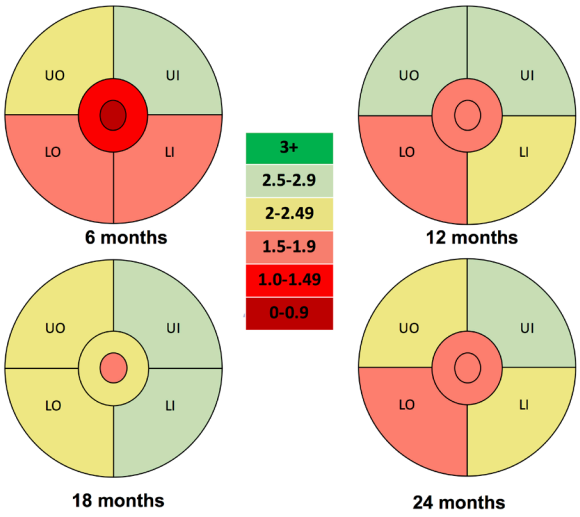
Background/Objective: Nipple-sparing mastectomy (NSM) offers superior aesthetics without sacrificing oncological safety. A well-recognized limitation is subsequent loss of sensation following operative intervention. However, sensation of the nipple areolar complex (NAC) and skin flap after NSM is poorly characterized. Therefore, this study aims to characterize the presence of sensitivity after NSM in a longitudinal and systematic nature.

Methods: Patients undergoing NSM with a single surgeon beginning in April 2016 were prospectively enrolled. Patients completed baseline heat, cold, and vibration testing on the nipple. Sensation testing was performed in all 4 breast quadrants (upper inner = UI, upper outer = UO, lower inner = LI, lower outer = LO), as well as the nipple (N) and areola (A). Weinstein Enhanced Sensory Test (WEST) with ascending sequential testing was performed in each location 3 times. Detection of 1 of 3 stimuli was used to determine the lowest sensible threshold and an ordinal score was assigned with 0.2gm = 4, 2gm = 3, 4gm = 2, 200gm = 1, and none = 0. Testing was repeated at 6-month intervals for a total of 2 years. ANOVA was used to compare tested regions at each time point and changes in sensation over time.

Results: A total 42 patients and 73 breasts were used in the final analysis. At 6 months, 27.6% retained heat sensitivity, 14.9% retained cold sensitivity, and 17.0% retained vibratory sensation. There was no significant change from 6 months to 24 months with heat (27.2%), cold (18.2%), or vibration (18.2%). At 24 months, sensation with the largest probe was 100% in both upper quadrants, 95.2% in LI, 90.5% in LO, 95.2% on A, and 76.2% on N. At 6 months, there was a significant difference ($p<0.001$) in sensation, with UI (2.58) and UO (2.36) > LI (1.78) and LO (1.62) > A (1.08) and N (0.84). At every interval, UI had the greatest sensation and N had significantly worse sensation (Figure). In both upper quadrants, no significant improvements were seen beyond 6 months. For LO, significant improvement occurred from 6 to 12 months ($p=0.0334$) and again from 12 to 18 months ($p=0.0204$). For LI, significant improvements occurred between 6 and 12 months ($p=0.0443$), with no significant changes beyond that time. For both A and N, there were significant sensation increases from 6 months to 12 months (A, $p=0.0021$; N, $p=0.001$), with no significant increase after 12 months.

Conclusions: Overall, patients exhibit better sensation in the upper inner quadrant, and the least sensation in the nipple. Significant improvements in nipple sensation are observed throughout the first 12 months with a subsequent plateau at 18 months. Sensation improves globally in 2 years but is still limited at the NAC and lower quadrants.

Figures: Sensation by quadrant over 24 months (upper outer = UO, upper inner = UI, lower inner = LI, lower outer = LO). Sensation scoring using Weinstein Enhanced Sensory Test (WEST) to determine the lowest sensible threshold (0.2gm = 4, 2gm = 3, 4gm = 2 and 200gm = 1, none = 0).



749447 - Nipple-sparing Mastectomy in Previously Radiated Patients

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Background/Objective: Nipple-sparing mastectomy (NSM) offers improved, patient-centered outcomes with oncologic safety. Indications for NSM continue to expand to less-ideal patients, including those with prior history of radiation. Currently, limited data is available comparing short- and long-term operative outcomes. As the indications of NSM continue to expand, this study aims to analyze outcomes of patients undergoing NSM with a history of radiotherapy.

Methods: All patients undergoing bilateral NSM from 1989 through Mar 2019 with history of prior radiation were included in the final cohort. Cohorts were divided by breast: previously radiated vs. nonradiated. Patients with open wounds or severe radiation dermatitis were not candidates for NSM. Retrospective chart review was performed to identify patient demographics, operative details, and identification of complications. Chi-squared or Fisher's exact test was used to assess rates of acute and chronic complications stratified by history of prior radiation.

Results: A final cohort of 36 NSMs were included: 22 (61.1%) receiving radiotherapy and 14 (38.9%) with no prior history of radiotherapy. Median follow-up was 4.7 (2.5–5.4) years. Mean BMI was 23.4, 25.0% were former smokers, 94.4% underwent immediate reconstruction, and 81.8% of previously radiated patients underwent prior lumpectomy or excisional biopsy. With regards to acute complications, there was no significant difference in the previously radiated vs nonradiated breasts for nipple necrosis (4.6% vs 0%, respectively; p=1.0), flap necrosis (13.6% vs 7.1%, p=1.0), wound dehiscence (9.1 vs 0%, p=0.511) or infection (13.64% v 7.14%, p=0.546; Table) . A composite acute complication rate was also similar (27.7% vs 14.3%, p=0.441). Chronic complications requiring operative intervention in previously radiated vs. non-radiated had no significant difference including capsular contracture (9.1% vs 0%, respectively; p=0.511), contour abnormality (13.6% vs 7.1%, p=0.762), animation deformity (0% vs 7.1%, p=0.389), or bottoming out (4.6 vs 0 %, p=1.0). A composite chronic complication rate was also similar (13.6 vs 14.3%, p=1.0). Reconstructive failure or implant explantation was seen in 27.7% of previously radiated and 14.3% in nonradiated breasts (p=0.441).

Conclusions: No significant differences in short- or long-term complications were identified between patients undergoing NSM with and without a history of prior radiation. However, previously radiated breasts tended to have relatively increased complication rates across the board, although not significant. While larger studies are needed, these findings suggest that a history of breast irradiation should not be a contraindication to NSM.

Table: Summary of complication rates stratified by history of prior radiation

	Prior radiation n = 22	**No prior radiation n = 14**	***p***
Acute			
Infection	3 (13.64%)	1 (7.14%)	0.546
NAC necrosis	1 (4.6%)	0 (0%)	1.0
Flap necrosis	3 (13.6%)	1 (7.1%)	1.0
Wound dehiscence	2 (9.1%)	0 (0%)	0.511
Acute composite	6 (27.7%)	2 (14.3%)	0.441
Chronic			
Capsular contracture	2 (9.1%)	0 (0%)	0.511
Contour abnormality	3 (13.6%)	1 (7.1%)	0.762
Animation deformity	0 (0%)	1 (7.1%)	0.389
Bottoming out	1 (4.6%)	0 (0%)	1.0
Chronic composite	3 (13.6%)	2 (14.3%)	1.0
Secondary outcomes			
Reconstructive failure/explantation	6 (27.7%)	2 (14.3%)	0.441
Fat grafting	9 (40.9%)	5 (35.7%)	0.755
Unplanned surgery	8 (36.4%)	3 (21.4%)	0.467

787606 - Indications, Surgical and Oncologic Outcomes of Nipple-sparing Mastectomy: Pushing Boundaries?

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Background/Objective: The role of nipple-sparing mastectomy (NSM) in prophylactic and therapeutic mastectomy has increased dramatically in the last decade. This is often driven by patient expectation for a natural-appearing breast after mastectomy. With this increasing patient expectation and more surgical experience, we find broadening indications for NSM pushing the usual boundaries. The objective of this study is to review the surgical indications for NSM at a tertiary care multidisciplinary breast centre. The secondary outcomes of surgical and oncology safety were also reviewed. The aim is to improve patient selection for this surgery type and optimize the indications.

Methods: A retrospective review of a prospectively maintained breast surgery database identified all patients who underwent NSM between January 1, 2012 and December 31, 2018. Three groups of patients were identified based on indication for NSM – cancer, contralateral prophylactic mastectomy (CPM) and bilateral prophylactic risk reduction mastectomy (BPM). Patient demographics, radiologic and pathologic features were collected along with surgical and oncologic outcomes.

Results: A total of 336 NSM were performed in 282 patients. Indication for surgery included cancer in 72%, CPM in 20%, and BPM in 8%. NSM for cancer increased over time, with more cases performed from 2015 – 2018 (64 cases/year on average) compared to 2012 – 2014 (30

cases/year on average). When reviewing cancer characteristics, 41 patients were found to have DCIS, and 152 had an invasive cancer. The average size of DCIS was 23.45mm with a range of 0 – 85mm. Invasive cancer patients had an average size of 16.9mm with a range of 0 – 57mm. Based on pathology, NSM was performed most often in T1 tumours on 105 patients (43.4%), with 44 patients (18.2%) having T2 tumours and only 3 patients (1.2%) with T3. Fifty-seven (27%) of our patients had node-positive disease, 12.8% of patients were treated with neoadjuvant therapy. Adjuvant chemotherapy was used in 68 patients (28%), and 70 patients (29%) had adjuvant radiotherapy. As for surgical technique and outcomes, the mastectomies were performed mainly through inframammary fold (38%), circumareolar with lateral extension (36%), radial (15%), Wise-pattern (4.8%), or other/unknown (6.2%) incisions. Reconstruction types included permanent implants with bioprosthesis (57.4%), tissue expanders (18.8%), DIEP flaps (10.1%), TRAM flaps (2.4%), or another type of unspecified (11.3%) reconstruction. Nipple core biopsies were performed in 295 of 336 cases (88%). Three percent of these patients (10/295) had a positive result, of which 6 patients required surgery to remove the nipple-areolar complex (NAC). Post-operative complications occurred in 40 of the 336 cases, 33 of which were among the cancer patients. These complications include skin flap necrosis (13/40), NAC necrosis (11/40), wound dehiscence (3/40), wound infection (10/40), hematoma (4/40), seroma (9/40), and implant loss (4/40). Six patients required surgery for implant loss and skin flap necrosis. As for oncologic outcomes, 7 of 242 cancer patients had a distant recurrence, and there were only 3 regional and 2 local recurrences. Of the 68 CPM patients, 6 were found to have an occult malignancy (5 DCIS and 1 invasive cancer) and of the 26 BPM cases, 1 was found to have occult DCIS. None of these patients found to have cancer in the CPM and BPM groups had a recurrence.

Conclusions: Since 2015, there has been an increase in the number of NSM being performed for cancer, CPM, and BPM. Cancer patients undergoing NSM are generally node-negative and either have invasive tumours that are mainly Stage 1 and 2, or DCIS less than 2.5 cm in size. Only 3% of all the patients who underwent a nipple core biopsy had a positive result, and post-operative complications occurred in 11.9% of all patients. Cancer recurrence was found in 5% of the cancer patients, with a majority being distant rather than locoregional. Our study shows that the oncological recurrence and surgical complications for NSM have remained low despite increased prevalence and broadened indications. This surgery seems to be a safe option for women requiring risk reduction surgery and those with breast cancer, even if they have more advanced tumours with node-positive disease.

787629 - Breast Vascular Perfusion Patterns by Intraoperative Indocyanine Green Angiography in Skin- and Nipple-sparing Mastectomy Patients

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Background/Objective: The viability of mastectomy skin flap is an important factor for a successful breast reconstruction. Complications include necrosis of the mastectomy skin flaps, infection, delayed wound healing, and exposure of the implant. The incidence of these complications is predominantly associated with malperfusion of mastectomy skin flaps. The aim of this study was to identify and classify the blood supply to the breast intraoperatively using indocyanine green (IC-GREEN™, ICG) and a specialized infrared camera–computer system (SPY Elite™) in females undergoing skin- and nipple-sparing breast surgery for malignancy.

Methods: In a single center, pre-incision baseline and postmastectomy skin perfusion studies were performed intraoperatively using indocyanine green and a specialized infrared camera–computer system. The number of dominate vessels were identified and marked. Breasts that failed to map a dominate vessel were categorized as having a diffuse vascular pattern. BMI, tobacco use, previous breast surgery, tumor size, and nodal status were recorded.

Results: From 47 patients, 49 breasts were suitable for inclusion. The most commonly observed vascular distribution was 2 or 3 dominate arteries (n=14, 28.6%, n=14, 28.6%), followed by 4 dominate arteries (n=10, 20.4%), a diffuse pattern (n=8, 16.3%), and one dominate artery (n=3, 6.2%). No significant difference between perfusion patterns was seen among patients based on BMI, tobacco use, previous breast surgery, tumor size, or nodal status.

Conclusions: We suggest that breast SPY angiography can provide valuable information about breast blood supply to aid customized mastectomy skin flaps and avoid dominate vasculature during surgery. This may be useful in patients who are at high risk for flap necrosis. Individual patient characteristics may be associated with different vascular patterns and warrant additional study.

Table: Patient characteristics and breast vascular perfusion patterns

		Number of vessels					
Variable	**Total**	**Diffuse**	**1**	**2**	**3**	**4**	*P-value*
Total	49	8 (16.3%)	3 (6.2%)	14 (28.6%)	14 (28.6%)	10 (20.4%)	
BMI, mean (SD)	27.1 (6.2)	31.1 (8.7)	27.4 (2.7)	27 (6.1)	24.4 (3.4)	27.7 (6.9)	0.19
Mastectomy type, n (%)							
SSM	25 (51.0%)	6 (75.0%)	1 (33.3%)	10 (71.4%)	3 (21.4%)	5 (50.0%)	0.083
NSM	23 (46.9%)	2 (25.0%)	2 (66.7%)	4 (28.6%)	10 (71.4%)	5 (50.0%)	
Mastectomy not specified	2 (2.0)	0	0	0	1 (7.1%)	0	
SLNB, n (%)	27 (55.1%)	3 (37.5%)	2 (66.7%)	7 (50.0%)	6 (42.9%)	9 (90.0%)	0.11
T-stage, n (%)							
N/A	8 (16.3%)	1 (12.5%)	0	2 (14.3%)	5 (35.7%)	0	0.13
Recurrent DCIS	1 (2.0%)	0	0	0	1 (7.1%)	0	
Recurrent breast cancer	2 (4.1%)	0	0	0	2 (14.3%)	0	
T0	1 (2.0%)	0	1 (7.1%)	0	0	0	
T1	1 (2.0%)	0	0	0	1 (7.1%)	0	
T1a	1 (2.0%)	1 (12.5%)	0	0	0	0	
T1b	5 (10.2%)	1 (12.5%)	1 (33.3%)	1 (7.1%)	0	2 (20.0%)	
T1c	9 (18.4%)	1 (12.5%)	0	5 (35.7%)	2 (14.3%)	1 (10.0%)	
T2	4 (8.2%)	2 (25.0%)	0	1 (7.1%)	0	1 (10.0%)	
T3	4 (8.2%)	1 (12.5%)	0	0	1 (7.1%)	2 (20.0%)	
Tis	13 (26.5%)	1 (12.5%)	1 (33.3%)	5 (35.7%)	2 (14.3%)	4 (40.0%)	
N-stage, n (%)							
N/A	8 (16.3%)	1 (12.5%)	0	2 (14.3%)	5 (35.7%)	0	0.29
Recurrent DCIS	1 (2.0%)	0	0	0	1 (7.1%)	0	
Recurrent breast cancer	2 (4.1%)	0	0	0	2 (14.3%)	0	
N0	34 (69.4%)	6 (75.0%)	3 (100%)	11 (78.6%)	5 (35.7%)	9 (0.0%)	
N1	4 (8.2%)	1 (12.5%)	0	1 (7.1%)	1 (7.1%)	1 (10.0%)	
Smoking, n (%)							
No	38 (77.6%)	5 (62.5%)	2 (66.7%)	13 (92.9%)	11 (78.6%)	7 (70.0%)	0.22
Former	9 (18.4%)	2 (25.0%)	1 (33.3%)	0	3 (21.4%)	3 (30.0%)	
Yes	2 (4.1%)	1 (12.5%)	0	1 (7.1%)	0	0	
Current/former smoker, n (%)	11 (22.5%)	3 (37.5%)	1 (33.3%)	1 (7.1%)	3 (21.4%)	3 (30.0%)	0.42
Previous breast surgery, n (%)	14 (28.6%)	3 (37.5%)	0	2 (14.3%)	6 (42.9%)	3 (30.0%)	0.42

787671 - Do Nipple Necrosis Rates Differ in Pre- Versus Sub-pectoral Implant-based Reconstruction after Nipple-sparing Mastectomy?

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Background/Objective: Pre-pectoral implant-based reconstruction for breast cancer patients is increasing in popularity but there is limited data examining perioperative outcomes after nipple-sparing mastectomy (NSM) in these patients. Our aim was to determine whether there is a difference in surgical complications, including nipple necrosis rates, after NSM followed by immediate breast reconstruction in the pre- versus sub-pectoral planes.

Methods: A retrospective chart review was performed on patients undergoing NSM, followed by immediate breast reconstruction with implant or tissue expander placement in either the sub-pectoral (SP) or pre-pectoral (PP) plane between 1/1/2015-5/31/2019. Demographics, co-morbities, indications for mastectomy (malignancy versus prophylactic), reconstructive details, and complications were collected. Nipple areolar complex (NAC) status was classified as “no necrosis” in patients with no loss or superficial epidermolysis not requiring intervention versus “NAC necrosis” in those with full thickness loss of any percent of the NAC. SP and PP patients were compared utilizing chi squared and student’s T test to analyze outcomes between groups.

Results: Overall, 296 breasts (163 patients) following NSM were included, of which 28.0% (n=83) were SP, and 72.0% (n=213) were PP. Patients were well matched with respect to age (p=0.24), BMI (p=0.36), smoking history (p=0.17), and indication for surgery (malignancy versus prophylactic, p=0.42). Cancer patients undergoing neoadjuvant chemotherapy were matched between groups (p=1.0). There was no difference in infection (p=0.24) or explant (p=0.95) rates between SP and PP. Furthermore, the overall rate of NAC necrosis was 15.9% (n=47) and did not differ between SP (14%) and PP (15%) groups (p=0.86).

Conclusions: There is no difference in postoperative complications including NAC necrosis for SP versus PP reconstruction following NSM, confirming safety of this reconstruction technique for NSM patients. The data presented here represent one of the largest cohorts of PP reconstruction patients in the literature, and the first direct comparison of NSM complications based on implant-based reconstructive plane. Surgeons can have confidence offering NSM as a safe option in the setting of PP reconstruction based on this data.

787677 - Outcomes After Preservation of the Internal Mammary Artery Perforator in Nipple-sparing Mastectomy

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Background/Objective: Nipple-sparing mastectomy (NSM) has gained widespread acceptance as an oncologically safe procedure with excellent cosmetic results. However, nipple-areola complex (NAC) and skin flap ischemia and necrosis continue to be serious complications, with literature reported rates ranging from 15 to 26%. Preoperative MRI has previously been shown to characterize breast vascularity as single versus dual blood supply. With the dominant blood supply to the NAC originating from the internal mammary (IM) artery, this study assessed the impact of breast magnetic resonance imaging (MRI)-guided identification of dominant internal mammary perforators and preservation thereof during NSM on post-operative outcomes.

Methods: Following IRB approval, all patients who underwent NSM by a single breast surgeon followed by immediate breast reconstruction from January 2018 to October 2019 were identified using a prospectively maintained database. In all cases, the preoperative breast MRI was reviewed, and the dominant blood flow confirmed with a breast radiologist. Operative reports were reviewed for confirmation of identification and preservation of the IM perforator(s) during NSM. Individual chart review was performed to capture post-operative complications.

Results: Eighty NSM with immediate reconstruction performed in 53 consecutive patients with a mean age and BMI of 47.9 and 26, respectively, were included in the study. Preoperative MRI demonstrated a dominant IM perforator in 74% (59/80) of NSM. Intraoperatively, the dominant IM perforator was identified and preserved in 72% (57/80) of NSM. NAC or skin necrosis was observed in 6.25% (5/80), of which the majority were treated non-operatively (Table). Of the 6 patients who required re-operation, only 2 (2.5%) underwent re-operation for ischemic complications. One patient required revision for epidermolysis, and 1 patient had skin necrosis not involving the NAC.

Conclusions: Preoperative MRI can reliably identify IM perforator dominant blood flow. This study demonstrates the feasibility of intraoperative IM perforator identification and preservation during NSM in the majority of patients. Evaluation of ischemic complications in this cohort of patients suggests that preservation of the IM perforator blood flow results in lower rates of ischemic complications compared to the literature and successfully prevents re-operation for NAC necrosis.

Table: Post-operative complications after nipple-sparing mastectomy

Type of Post-Operative Complication	Complications among mastectomies with reconstruction n=80
Epidermolysis	4 (5%)
Necrosis	5 (6.25%)
Nipple Necrosis	4 (5%)
Areola Necrosis	2 (2.5%)
Skin Necrosis	2 (2.5%)
Infection	5 (6.25%)
Other Complications	2 (2.25%)
Re-operation and Procedures	
Re-operation	6 (7.5%)
Office Debridement	5 (6.25%)
Implant Removal	1 (1.25%)

772366 - Five-year Outcomes of Nipple-sparing Versus Skin-sparing Mastectomy: No Difference in Local-Regional Recurrence or Survival

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Background/Objective: Nipple-sparing mastectomy (NSM) has become increasingly popular for the treatment and prevention of breast cancer. Many patients and surgeons prefer the cosmetic result achieved by preservation of the nipple and areola. While the safety of skin sparing mastectomy (SSM) in patients with cancer is well established, some concerns remain about the safety of preserving the nipple in patients with cancer. There is little data directly comparing outcomes of SSM and NSM. To address this, we reviewed our large, single institution experience with nipple-sparing and skin-sparing mastectomy for Stage 0-III breast cancer.

Methods: We reviewed patient and tumor characteristics, treatments, and follow-up data in our institution's prospective database of NSM and SSM performed for Stage 0-III breast cancer. Patients were eligible for NSM if they had no radiologic or clinical evidence of nipple involvement by tumor and if final nipple position was expected to be acceptable. Although use of NSM increased over time, during the 2011-2013 timeframe from which sequential SSMs were evaluated, some surgeons still preferentially performed SSM. Patients with less than 12 months

of follow-up were excluded from analysis. We used the Kaplan-Meier method to estimate 5-year disease-free and overall survival.

Results: From a prospective database of 3193 NSM performed at our institution from 6/07-7/19, we identified 673 sequential NSM performed for cancer in 612 patients from 7/07-12/14, median age 48 years (range 26-78). To create a similar median follow-up, we identified 381 sequential SSM performed in 343 patients from 1/11-12/13, median age 52 years (range 20-80). Tumor characteristics were similar in NSM and SSM patients. There were no significant differences in the distribution of tumor sizes by T-stage or in rates of positive nodes between NSM and SSM patients. The frequency of tumor histological types, ER+ tumors, and HER2+ tumors were similar in NSM and SSM groups. Treatments were also similar, with no significant differences in use of chemotherapy, endocrine therapy, and radiation therapy between NSM and SSM patients (Table). There was no difference in overall or disease-free survival between groups. Five-year overall survival was 98.1% for NSM and 96.9% for SSM (p=0.26), and 5-year disease-free survival was 94.2% for NSM and 92.3% for SSM, (p=0.22). There was no significant difference in local-regional recurrence rates between NSM and SSM patients. No patient in the NSM group had a recurrence in the nipple or areola. Isolated local-regional recurrence was seen in 3.1% of NSM patients and in 1.7% of SSM patients (p=0.21). Both local-regional and distant recurrences were seen in 0.7% of NSM patients and 0.6% of SSM patients. The rate of distant metastases was higher in the SSM group, with 6.4% of SSM patients developing distant metastases compared with 2.5% of NSM patients.

Conclusions: There was no difference in 5-year overall or disease-free survival between NSM and SSM patients. Most importantly, local-regional recurrence rates were not significantly different for NSM and SSM, and there were no recurrences in the nipple or areola. Nipple-sparing mastectomy is a safe option for patients with breast cancer.

Table: NSM vs SSM: Tumor characteristics, treatment, and patient outcomes

	Nipple-Sparing Mastectomy 673 breasts, 612 patients median f/u = 68 months	**Skin-Sparing Mastectomy** 381 breasts, 343 patients median f/u = 76 months	**p-value**
Tumor characteristics, n (%)			
IDC ± DCIS	385 (57.2%)	223 (58.5%)	0.68
ILC ± DCIS	76 (11.3%)	31 (8.1%)	0.10
DCIS ± microinvasion	190 (28.2%)	107 (28.1%)	0.96
Invasive Other	22 (3.3%)	20 (5.3%)	0.11
ER +	563 (83.7%)	305 (80.1%)	0.14
PR +	522 (77.6%)	268 (70.3%)	0.009
HER2+	84 (12.5%)	50 (13.1%)	0.53
Tumor grade			
1	78 (11.6%)	59 (15.5%)	0.07
2	344 (51.1%)	180 (47.2%)	0.23
3	246 (36.6%)	136 (35.7%)	0.78
Unknown	5 (0.7%)	6 (1.6%)	0.11
Invasive tumor size, cm, mean (range)	1.94 (0.05-17.5)	2.21 (0.1-17.0)	.08
Tumor stage			
Tis	190 (28.2%)	107 (28.1%)	0.96
T1	321 (47.7%)	162 (42.5%)	0.11
T2	134 (19.9%)	88 (23.1%)	0.22
T3	28 (4.2%)	24 (6.3%)	0.12
Positive axillary nodes	146 (21.7%)	97 (25.5%)	0.16
Treatment, n (%)			
Chemotherapy (any)	265 (43.3%)	157 (45.8%)	0.46
Endocrine therapy	371 (60.6%)	213 (62.1%)	0.65
Radiation therapy	150 (22.3%)	101 (26.5%)	0.12
Outcomes, n (%)			
Recurrence			
Nipple	0 (0.0%)	N/A	N/A
Local-regional only	19 (3.1%)	6 (1.7%)	0.21
Distant only	15 (2.5%)	22 (6.4%)	0.002
Local-regional and distant	4 (0.7%)	2 (0.6%)	0.89
Kaplan-Meier Estimated 5-year survival	98.1%	96.9%	0.26
Kaplan-Meier Estimated 5-year disease-free survival	94.2%	92.3%	0.22

f/u: follow-up; DCIS: ductal carcinoma in situ; IDC: invasive ductal carcinoma; ILC: invasive lobular carcinoma; ER: estrogen receptor; PR: progesterone receptor; HER2: human epidermal growth factor receptor 2

777908 - Predictors of Successful Nipple-sparing Mastectomy After Neoadjuvant Chemotherapy

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Background/Objective: Nipple-sparing mastectomy (NSM) utilization after neoadjuvant chemotherapy (NAC) is increasing. A 1cm tumor-to-nipple distance (TND) is often used for NSM eligibility in the primary surgical setting, but its suitability after NAC is not well defined. Here we examine use of imaging findings to determine negative nipple pathology (NS-) in a cohort of women having total mastectomy after NAC.

Methods: We retrospectively reviewed women treated with NAC and total mastectomy between 8/2014-4/2018 with pre- and post-NAC MRI available. Total mastectomy cases were selected to allow complete nipple examination. Nipples are routinely sectioned perpendicularly, and representative sections examined. Patients with clinical T4 tumors, clinical nipple involvement, or pathologic nipple discharge were excluded. Mammogram and pre-/post-NAC MRIs were reviewed. Findings of mass and non-mass enhancement or suspicious calcifications were included in TND measurement; patients were stratified based on TND <1cm, 1-2cm, or ≥2cm. Association of demographic, clinicopathologic, and imaging variables with nipple involvement was examined using the t-test or Wilcoxon's rank test for continuous variables, and the Chi-square or Fischer's exact test for categorical variables. Accuracy of 1cm TND for estimating probability of nipple involvement was determined using epidemiological parameters such as sensitivity, specificity, and negative and positive predictive value.

Results: A total of 175 eligible women undergoing 179 mastectomies met criteria and were analyzed. Median age was 48 years (IQR 41-57). Based on pre-NAC staging, 74% of tumors were cTis-T2 and 67% cN+. Of these, 77% were ductal histology, 24% triple-negative, and 34% HER2-positive. Ten percent (18/179) had invasive carcinoma or DCIS in the nipple on final pathology (Table). On univariate analysis, nipple involvement was associated with lower grade, HR+/HER2-, pT3, pN+, greater numbers of positive nodes, greater tumor extent on pre- and post-NAC MRI, and multifocality/multicentricity on post-NAC MRI (p-values <0.05). Likelihood of NS- was higher, with increasing TND on both pre- and post-NAC imaging. In breasts with pre-NAC TND 2cm ($p<0.05$). Similarly, on post NAC imaging, 73%, 95%, and 96%, respectively, had NS- ($p<0.05$). On multivariate analysis, increasing number of positive nodes and TND remained significant ($p<0.05$). A ≥1cm TND on pre-NAC imaging had a NPV of 97% for NS- compared to 95% for post-NAC imaging. In 13 women with TND of <1cm on pre-NAC imaging and a complete response on post-NAC imaging, all had NS-.

Conclusions: Increasing TND on pre- or post-NAC imaging was associated with a higher likelihood of NS-. Use of a TND of ≥1cm on pre- or post-NAC imaging had a high predictive value for NS- and could be used to determine eligibility for NSM post NAC. Further study of imaging accuracy in women with TND <1cm pre NAC who achieve complete imaging response post NAC is needed.

Table: Demographic, clinicopathologic, and imaging characteristics. Abbreviations: IQR, interquartile range; LVI, lymphovascular invasion; LN, lymph node; NAC, neoadjuvant chemotherapy; TND, tumor-to-nipple distance (includes mass and non-mass enhancement, and pathologic-appearing calcifications)

Variable	Overall n=179	Pathologic nipple involvement n=18	No pathologic nipple involvement (NS-) n=161	P-value
Age, years, median (IQR)	48 (41,57)	48 (42,66)	48 (41,57)	0.5
Tumor Histology				0.06
Ductal	77%	56%	79%	
Lobular	6%	17%	5%	
Mixed ductal/lobular	12%	22%	11%	
Other	5%	5%	5%	
Grade				0.02
Well/Moderate	32%	62%	29%	
Poor	68%	38%	71%	
Clinical T				0.3
Tis-T2	74%	61%	76%	
T3	26%	39%	24%	
Clinical Node positive	67%	67%	67%	>0.9
LVI present	49%	73%	45%	0.08
Pathologic T stage				0.02
Tis-T2	89%	67%	91%	
T3	11%	33%	9%	
Pathologic Node positive	46%	80%	42%	0.01
Number of positive LN, median (IQR)	0 (0,3)	6 (2,8)	0 (0,2)	<0.001
Subtype				<0.001
HR+/HER2-	42%	83%	37%	
HER2+	34%	17%	36%	
HR-/HER2-	24%	0%	27%	
Pre-NAC MRI largest extent suspected disease, median (IQR)	7.9 (5.7,10.1)	9.4 (8.6,11.4)	7.7 (5.5,9.9)	0.001
Post-NAC MRI largest extent suspected disease, median (IQR)	3.4 (0.8,6.9)	7.8 (6.2,8.9)	2.8 (0.5,6.2)	<0.001
Pre-NAC multifocal/multicentric	89%	100%	88%	0.2
Post-NAC multifocal/multicentric	55%	83%	52%	0.02
Pre-NAC imaging: TND				0.006
<1cm	48%	83%	44%	
1-2 cm	13%	6%	14%	
>2cm	39%	11%	42%	
Post-NAC imaging: TND				<0.001
<1cm	25%	67%	20%	
1-2 cm	11%	6%	11%	
>2cm	64%	28%	68%	
Pre-NAC <1cm and resolution on Post-NAC	8.2%	0%	9.2%	0.4

787844 - Nerve Preservation and Grafting for Sensory Innervation Following Nipple-sparing Mastectomy and Immediate Implant Breast Reconstruction

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Background/Objective: Nipple-sparing mastectomies and immediate reconstruction can provide excellent aesthetic outcomes, yet absent or significantly diminished post-operative breast and nipple/areolar sensation remains a challenge. We present a novel technique combining nerve preservation and nerve grafting at the time of mastectomy and implant-based reconstruction to optimize post-mastectomy sensation and patient quality-of-life.

Methods: A total of 35 women (68 breasts) underwent nipple-sparing mastectomy and single-stage, direct-to-implant, pre-pectoral breast reconstruction. During the mastectomy, careful dissection performed along the lateral aspect of the breast allowed identification, and in some cases, preservation of the T4 and T5 intercostal nerves. In cases where the nerves could be preserved without compromising the oncologic safety of the mastectomy, they were left intact heading into the subcutaneous tissue of the lateral mastectomy skin flap. When preservation was not feasible, neurotization of the nipple/areolar complex (NAC) was performed utilizing allograft coapted from either the T4 or T5 lateral intercostal nerves to subareolar nerves identified at the completion of the mastectomy. Quantitative outcomes including 2-point discrimination and pressure thresholds were assessed at multiple time points post-operatively. Sensation to light touch throughout the rest of the reconstructed breast was also assessed, as was patient satisfaction with overall breast and NAC sensation.

Results: At a mean follow-up of 11 months, all of the patients studied had grossly intact sensation to light touch throughout the majority of their reconstructed breasts. In the first study cohort, using NAC 2-point discrimination (2PD), 2PD was preserved compared with pre-operative values in 89% of breasts. In the second study cohort, using a pressure-specified sensory device, similar results were seen, with 88% of breasts demonstrating excellent return of NAC sensation by 6 months post-operatively. BREAST-Q scores given at 6 months demonstrated high rates of overall breast sensation and nipple sensation. None of the women developed hyperesthesia, allodynia, or other symptoms concerning for neuroma formation.

Conclusions: A combined approach of nerve preservation and grafting during nipple-sparing mastectomy and implant reconstruction allows for maintenance/return of sensation in the vast majority of women undergoing the procedure. This represents a significant advance from prior studies showing low rates of nipple or skin flap sensation following standard mastectomy and implant-based reconstruction. Further study will help to define the quality-of-life benefits of sensation-preserving mastectomy and characterize optimal patient selection and techniques.

Oncoplastics

786664 – Early versus Late Onset of Free Movement of Upper Limbs After Conservative Surgery for Breast Cancer with Oncoplastic Technique: Impact on Kinetic-Functional Recovery and Healing Complications

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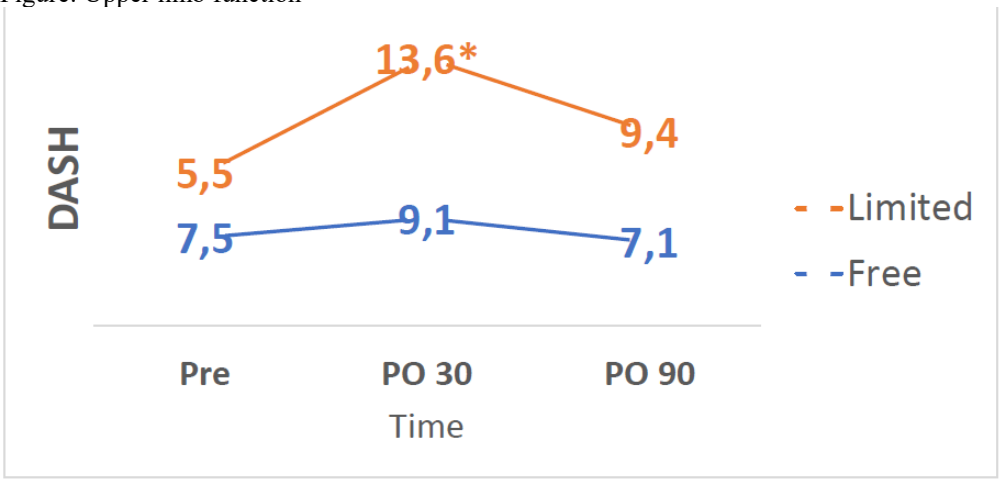
Background/Objective: Early exercises after breast cancer surgery are important for preventing motor and functional complications. However, there are no prospective studies with exercise protocols specifically for patients undergoing breast oncoplastic surgery. The objective of this study was to evaluate range of motion, pain, and upper limb function, and the incidence of dehiscence, seroma, infection and necrosis, in women following breast oncoplastic cancer surgery who underwent postoperative exercise protocol with limited shoulder joint amplitude during 15 or 30 days.

Methods: Sixty women with breast cancer who underwent conservative oncoplastic surgery were included in a Randomized Clinical Trial, which was registered in the Clinical Trials registry on June 25, 2015 under number NCT02480842, and approved by the research ethics committee (number 1.051.996). They were evaluated preoperatively and 07, 15, 30, 60, and 90 days after surgery. The day after surgery, all patients started exercise protocol limited to 90 degrees, directed by the physiotherapist to be performed at home. Two weeks after surgery, they were randomized into 2 groups: Free Amplitude Group (30 patients) - release of shoulder joint amplitude at pain limit or even feeling the removal of surgical edges; Limited Range Group (30 patients) - maintenance of shoulder movement restriction at 90º until 30 days after surgery, at which time they were also released to free-range exercises. The active range of motion of flexion, extension, adduction, abduction, internal rotation and external rotation of the shoulder homolateral to oncologic surgery was evaluated with a goniometer. Pain was assessed by the Analog Verbal Scale from zero to 10 (zero means no pain and 10 the worst possible pain). Upper limb motor function was assessed by the DASH (Disabilities of the Arm, Shoulder and Hand) questionnaire. The score ranges from zero to 100 and is directly proportional to arm or shoulder dysfunction (the higher the score, the worse the function). Dehiscence, seroma, infection, and necrosis were evaluated by inspection and/or palpation. They were described as “present” or “absent” in each evaluation, with a definition of incidence when the complication occurred at least 1 of the postoperative moments.

Results: There was no difference between the groups in shoulder joint amplitude, pain, and upper limb function. In the intragroup analysis, only the Amplitude Limited Group had a worse upper limb function score than the preoperative period, according to the Figure. No difference between groups in the incidence of postoperative scar complications was found.

Conclusions: The free-range exercise protocol after 15 days of surgery had no impact on patients' range of motion and pain, with a beneficial effect only on intragroup analysis of upper limb function and was safe in relation to cicatricial complications.

Figure: Upper limb function



Legend: Pre - Preoperative period, PO 30 - 30 days after surgery, PO 90 - 90 days after surgery, DASH - Disabilities of the Arm, Shoulder and Hand Questionnaire. Repeated Measures ANOVA Test: p <0.001 for differences over time; p = 0.022 for differences between groups; * for intragroup differences from preoperative values.

787753 – Patient-level Costs of Staged Unilateral versus Immediate Bilateral Symmetrisation Mammaplasty

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Background/Objective: Therapeutic mammaplasty extends the boundaries of breast-conserving surgery (BCS), combining breast reduction and mastopexy techniques with tumor excision, preserving natural breast cosmesis and circumventing the need for mastectomy. However, following unilateral therapeutic mammaplasty, a contralateral procedure (mastopexy/mammaplasty) is often needed to improve symmetry. There is no consensus regarding when this contralateral balancing procedure should be performed. Our hypothesis is that immediate symmetrisation through a dual attending approach is more cost-efficient than delayed staged symmetrisation. The objective of this study was to investigate the impact of staged unilateral versus immediate bilateral symmetrisation mammaplasty for BCS on patient level costs.

Methods: The study was conducted at a large academic medical center. Data was collected from women who had received either unilateral alone (n=76), unilateral staged mammaplasty by single attending (n=26) or bilateral immediate mammaplasty by dual attending (n=27) between April 2015 and March 2019. Procedural inclusions were oncoplastic application of breast reduction or mastopexy techniques including removal of the skin to treat invasive (ductal or lobular carcinoma) or non-invasive breast cancer (ductal carcinoma in situ). Financial data were retrieved using the Patient-Level Information and Costing Systems (PLICS), a software package using a unit of observation based on the hospital admission.

Results: The median cost of unilateral staged mammaplasty (index and subsequent symmetrisation) was $11,463 (range: $4,690 to $17,901). The median cost of index procedure was $4,900 (range: $2,019 to $10,180), and median cost of subsequent symmetrisation was $5,285 (range: $1,487 to $10,549). The median cost of bilateral immediate mammaplasty was $6,086 (range: $2,612 to $17,166). Therefore, the additional median cost of unilateral staged mammaplasty versus bilateral immediate mammaplasty is $5,377 (range: $3,837 to $6441, $p<0.01$) per patient. There was no statistically significant difference in clinicopathological determinants of age, Charlson Comorbidity Index, or tumor size between the comparator groups. Only 1 patient experienced a complication and return to theatre for evacuation of hematoma in the unilateral staged symmetrisation cohort. Extrapolation of a subsequent contralateral symmetrisation at the median cost for unilateral mammaplasty alone patients (n=76) would represent an additional $408,444 in cost at our institution.

Conclusions: The authors present the first cost comparison between immediate bilateral mammaplasty and delayed unilateral staged symmetrisation, with a granular approach to cost at the patient level. The results demonstrate that the facilitation of single-stage immediate symmetrisation mammaplasty is of significant financial benefit to our health care systems. Synchronous dual consultant operating may also improve cosmesis, reduce visits to hospital for delayed symmetrisation, with potential to enhance patient satisfaction. This study has demonstrated the magnitude of added patient-level costs of delayed symmetrisation after BCS and established a framework for further health economic analyses.

787160 - Hidden Port Scars: A New Technique to Improve Patient Quality of Life

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Background/Objective: Significant progress has been made in the field of oncoplastics with the onset of hidden scar surgery for breast cancer patients. The port site scar, however, has remained unchanged in position and visibility despite the technical advancements. One study evaluating the effects of port placement showed that most patients with an anterior chest port scar were self-conscious about the scar and, if given the opportunity, would opt for a more hidden location. While the port site on the anterior chest wall is optimal for ease of access, it is visible and hard to conceal with clothing. To date the most common alternate port site is the upper extremity, which, despite a more hidden location for the scar, poses difficulty for access and compromises patient comfort. The aim of this study was to develop a new technique for port placement utilizing the standard port position on the anterior chest wall, but with the incision site placed in the anterior axillary fold. We analyzed operative time, complication rates, and quality-of-life outcomes for patients who underwent this novel technique compared to patients whose incision sites remained on the anterior chest wall.

Methods: We performed a retrospective chart review of all patients who underwent port placement with a single surgeon between 01/30/2016 and 01/30/2019. Data analyses included demographics (age, gender, race), operative time, and complication rates (wound infection, port failure, return to the OR, port infection, pain, hematoma). We additionally completed a validated

quality-of-life questionnaire with patients to evaluate whether a hidden port scar improved overall quality of life and satisfaction.

Results: A total of 87 patients were identified: 26 patients underwent the hidden port scar technique, and 61 had standard port placement. The mean operative time was 59.3 minutes (range 46 to 85 minutes) for the hidden port scar technique and 43.5 minutes (range 32 to 72 minutes) for standard port placement. While the mean operative time was 15.8 minutes longer with the hidden port scar technique, the time for port placement remained on average under an hour for all procedures. There was a 3% complication rate (1 patient with axillary web syndrome or cording) in the hidden port scar group. Three patients (5%) in the standard port placement group experienced complications, including hematoma, pain, and non-functioning port. Two patients in the standard port placement group required a return to the OR for replacement of their port. There was a trend towards increased satisfaction and improved postoperative quality of life attributed to the hidden location of the port scar in the hidden port scar group.

Conclusions: Hidden port scar placement appears to be a safe and cost-effective alternative to the traditional port placement involving an anterior chest incision, with minimal complications and operative time under 1 hour. This new technique is cosmetically beneficial to patients and may improve quality of life as it relates to cancer survivorship.

786166 - Surgeon Performed Continuous Intraoperative Ultrasound-guided Oncoplastic Surgery After Neoadjuvant Chemotherapy

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Background/Objective: Neoadjuvant chemotherapy (NAC) is the preferred option of treatment in locally advanced and selected cases of early-stage breast cancer, currently. One of the major aims is to downstage tumor size to allow conservative surgery with the most acceptable cosmetic and oncologic outcome, which is achievable with oncoplastic surgery (OPS). After NAC, excess degree of fibrosis leads to difficulties to accurately predict margin status intraoperatively. However, the prediction of negative margins is a must to avoid a secondary mastectomy in OPS with excess tissue rearrangements. The aim of the presented study is to determine the value of intraoperative sonography guidance during OPS after NAC to localize the residual cancer, to achieve negative margins at index procedure and to decrease secondary interventions.

Methods: A single-institution, retrospective review of a prospectively maintained database was analyzed. No patient had preoperative localization with wire or radiotracer. OPS procedures were decided according to patient and tumor characteristics and patient preferences. Tumor localization, breast/tumor volume ratio, glandular density, and patient preferences were the major factors to make selection. All of the patients underwent level I or II OPS with regards to the abovementioned criterion. Intraoperative real-time sonographic localization, sonographic margin assessment during resection, macroscopic and sonographic examination of specimen, cavity sonography, and shavings (CS) were done as the standard procedure. No frozen assessment was performed.

Results: The study included 253 patients treated with NAC followed OPS and axillary nodal surgery. Patients who required mastectomy were excluded. A total of 102 patients (40.3%) achieved pathologic complete response and all of who had a corresponding clinical complete response. Ultrasound guided OPS accomplished successful localization of the targeted lesions in all patients. Patients were on average 49 years old (range, 34-72). There was no difference with respect to patient characteristics including age, menopausal status, personal-family history, oral contraceptive usage, body mass index, and tumor localization. Tumor-free margins were obtained by means of ultrasound-guided OPS in 90% of margins evaluated sonographically. Moreover, the involved margins were correctly identified by the surgeon via specimen sonography in 43% of the cases, which was confirmed by cavity shaving results. No frozen section analysis was performed, and macroscopic evaluation of the specimen predicted nothing significant. According to permanent section analysis of the resected specimens and cavity shavings, no further intervention was required due to margin positivity. Ultrasound-guided OPS with real-time specimen sonography were unable to predict involved margins in cases confirmed to be invasive lobular carcinoma and ductal carcinoma in situ (DCIS) without evidence of residual cancer on pathological examination of cavity shavings. No re-excision or mastectomy was required. For a setting without CS, the negative predictive value (NPV) of US guided OPS rate was 92%. Intraoperative ultrasound was found to over and underestimate tumor response to NAC both in 3% of patients.

Conclusions: Continuous ultrasound-guidance with specimen sonography and cavity scan seems to be a valuable modality to perform efficient OPS at index operation with no additional localization method after NAC. Especially, when CS is integrated as a standard to OPS, ultrasound guidance seems to provide safe surgery for patients with no false negativity. However, the accuracy of sonographic guidance should be questioned in case of lobular histology and DCIS after NAC, similar to upfront chemotherapy.

743632 - Evaluating the Feasibility of a Novel Marking Breast Oncoplastic Surgery Simulator (MBOSS) as a Training Tool to Teach Marking

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Background/Objective: Currently, volunteers and/or anatomical models are used for teaching oncoplastic surgery marking. However, there are difficulties recruiting volunteers as the breast is an intimate organ, and the available droopy breast model (mastotrainer) is costly. We aim to evaluate the feasibility of a novel Marking Breast Oncoplastic Surgery Simulator (MBOSS), which is cheaper than the existing breast model, to teach marking. We hypothesized that MBOSS can replace the use of volunteers for teaching wise pattern mammoplasty marking. MBOSS was fabricated with silicon using a mold produced by stereolithography (SLA), an efficient 3D printing technique. MBOSS was designed to mimic the droopy breasts in appearance and texture, so that it could be maneuvered in the similar fashion as the female breasts for marking purposes.

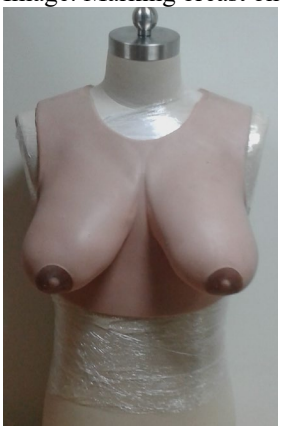
MBOSS's smooth surface also allowed easy removal of marking so that repeated marking could be performed.

Methods: Breast/plastic surgeons/trainees, grouped according to their oncoplastic experience of little/moderate/much, were randomized within each oncoplastic experience group to MBOSS or volunteer. All underwent pre-test prior to hands-on training in wise pattern mammoplasty marking using MBOSS or a volunteer, followed by an assessment of marking skills by an examiner blinded to group assignment using a different volunteer. Subsequently, all underwent post-test and a Likert scale questionnaire evaluation of the course. Participants who used MBOSS for training also evaluated MBOSS realism. The Kirkpatrick educational model, which assessed learner's course satisfaction (level 1) via the questionnaire, knowledge gain (level 2) via the pre- and post-test assessments, and marking skill application (level 3) via the marking skills assessment, was used to compare learning outcomes between the 2 groups. Fisher's exact test was used to compare categorical variables between the MBOSS and volunteer groups, and the 2-sample t-test or Wilcoxon rank-sum test was used as appropriate for continuous variables.

Results: Forty participants were enrolled. There was no difference in demographics, baseline oncoplastic experience, or pre-test results between the 2 groups. There was no difference in Kirkpatrick level 1 course satisfaction outcomes between the 2 groups. In level 2 knowledge assessment, the MBOSS group scored better in the post-test assessment ($p=0.0471$). In level 3 skill application, there was no significant difference between the 2 groups. Though MBOSS may not mimic the breast completely, 95% rated MBOSS as a good training tool, and 85% would use MBOSS instead of a volunteer.

Conclusions: MBOSS is novel with comparable learning outcomes to using volunteers, making MBOSS an alternative to volunteers for teaching oncoplastic surgery marking. Using MBOSS would avoid logistic issues associated with recruitment of volunteers for teaching and allow teaching to be done repeatedly at the participants' own time and pace, irrespective of volunteer availability. In contrast to mastotrainer, MBOSS is not as cost prohibitive and is reusable for teaching marking, although MBOSS could not be used to practice operative surgical steps as with mastotrainer. The surgical steps training may, however, be imparted via other teaching methodologies.

Image: Marking breast oncoplastic surgery simulation (MBOSS) model



787329 – Five-year Experience of Oncoplastic Volume Replacement Using Local Perforator Flaps

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Background/Objective: Patients undergoing breast-conserving surgery require volume displacement or volume replacement to fill the excisional defect and ensure a good aesthetic outcome. Volume displacement by local mobilisation or mammoplasty may not be possible in small non-ptotic breasts. This can be addressed by importing tissue in the form of a local perforator flap. In this study, we assess the outcomes of local perforator flaps following breast-conserving surgery.

Methods: A consecutive case series study was performed. Since December 2013, 109 patients have undergone local perforator flap reconstruction in our unit. Data was collected prospectively for all patients in relation to indication for surgery, resection volumes, local flap type, surgical and oncological outcomes.

Results: Of the 109 patients included, 99 underwent immediate reconstruction following tumour excision, and 10 underwent revisional surgery to correct defects from previous surgery. Patients had a mean age of 52 years (26-75 years). The flaps used were based on the lateral intercostal artery perforator (LICAP, n=40), lateral thoracic artery perforator (LTAP, n=14), combined LICAP and LTAP (n=42), anterior intercostal artery perforator (AICAP, n=8), medial intercostal artery perforator (MICAP, n=3) and thoracodorsal artery perforator (TDAP, n=2). Mean excision weight was 78g (24-190g). Postoperative complications occurred at a rate of 2.7% (1 infected seroma, 1 partial flap necrosis, and 1 delayed wound healing). There has been 1 biopsy required for fat necrosis after surveillance imaging, and the local recurrence rate is 0%.

Conclusions: The use of local perforator flaps is a reliable technique to avoid and correct breast defects, with minimal donor morbidity and good oncological outcomes. This technique extends the criteria for breast-conserving surgery, allowing it to be performed in patients with a high tumour-to-breast size ratio.

Other

784629 - Breast Cancer Screening in Rural Area in Kannur District, Kerala, India: "The Kannapuram Model"- A Community Participatory Approach

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Background/Objective: Globally, breast cancer tops women cancers and accounts for 14% of all cancers in India. It is characterized by late-stage presentations due to fear and lack of awareness resulting in high mortality. Public education about cancer symptoms and importance of early detection can help in improving outcomes. Aims of this study are 1) to understand importance of community participatory approach in success of a screening program and 2) effectiveness of breast exam as screening device for breast cancer

Methods: Continuous community awareness on breast cancer was conducted prior to a screening program in a panchayath in rural Kannur, Kerala, under leadership of local self-government with technical support from a tertiary cancer center. IEC material distribution, health exhibitions and awareness classes, cancer survivors meetings, cancer-protective food festivals, observation of cancer-related days were conducted. After obtaining gatekeeper consent from the panchayath president, single-day registration was done through a community participatory campaign, in which women 30 years and above were given dates for examination in a ten-day continuous camp. After taking consent, trained lady technicians tested each woman with an ibreast exam device, a non-invasive, low-cost strategy for early detection and recorded findings. This is a handheld mobile medical device with piezoelectric sensors that can differentiate varying tissue elasticity. Women were also given pamphlets on breast self-examination methods. Those detected positive were given counseling and referred to the tertiary cancer center for mammogram or ultrasound examination. A patient navigation system under the local self-government lady members helped women reporting at the cancer center in large numbers. Diagnosed cancer patients were treated at the tertiary cancer center. Expenses for investigation and treatment were met by the local self-government.

Results: A total of 3247 women above 30 years of age participated in the camp. There were 203 (6.2%) who were found positive on ibreast exam. All were referred to the tertiary cancer center for further evaluation, of which 137 underwent further investigations. There were 109 (79.6%) who had BIRADS 1 or 2. Ten (7.3%) subjects with BIRADS 3 were advised follow-up at 6 months. Out of 15(11%) with BIRADS 4, 14 underwent wire-guided biopsy, of which 2 were detected to have carcinoma, and none had any palpable abnormality on clinical breast examination. One with BIRADS 5 had early-stage carcinoma. A total of 97% of the participants reported the test as acceptable and recommendable to relatives. Awareness levels of the participants were found to be high. There were 67.5% who reported for further evaluation either at the tertiary cancer center or elsewhere as a result of continuous intervention and motivation. There were 28% of positive cases who failed to undergo further investigation in spite of continuous motivation by panchayath members, posing challenges to the successful implementation of the program. All cancer patients (0.092%) were treated at the tertiary cancer center and are in good health now.

Conclusions: ibreast exam is a useful preliminary tool for community-based screening, but is not a replacement for established screening modalities. The success of the program in terms of participation and follow-up was the result of community coalition forged prior to the initiation of camp through sensitization programs popularized as “The Kannapuram Mode.l” Acceptable screening methods preceded by continuous community sensitization programs on cancer awareness may alleviate apprehensions and improve participation in early detection programs.

786390 - Clinical Factors Affecting the Efficacy of Evening Primrose Oil on Mastalgia

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Background/Objective: Evening primrose oil (EPO)(= Gamma-linolenic acid) or metabolites are believed to restore the saturated/unsaturated fatty acid balance and decrease sensitivity to steroidal hormones or prolactin. On the contrary, conflicting results exist regarding the success of EPO on mastalgia. The primary aim was to understand whether the EPO is an effective treatment on mastalgia. The secondary aim was to explore clinical factors associated with the efficacy of EPO on the treatment of mastalgia.

Methods: The study recruited 1327 patients with mastalgia among 13,680 patients with any complaint who were admitted between January 2015 and March 2018. Those patients with mastalgia were categorized into 2 groups as group I, treated with EPO (1300mg, twice a day) and group II, treated with Paracetamol (500mg, twice a day). The visual analog scale (VAS) was used to assess the therapeutic efficacy of EPO in comparison to Paracetamol upon admittance and 6 weeks later. Clinical factors affecting the efficacy of EPO were analyzed. Patients presenting with a palpable lump or cancer diagnosis received chemo-radiotherapy, and pregnancy were excluded.

Results: A total of 1126 patients among 1327 patients were recruited. Lost to follow-up or rejection has occurred in 111 cases. Comparison analyses were done among 1015 patients (n=581, group I; n=434, group II). The mean age was 42.9 ±11.2 (14-82). EPO was found to be more effective than paracetamol on the treatment of mastalgia (p=0.042). Factors significantly affecting on EPO treatment was hormone replacement therapy (HRT), RIA with levonorgestrel, iron deficiency, hypothyroidism, and Hashimoto’s thyroiditis (p=0.034, p=0.045, p=0.026, p=0.015, and p=0.021 respectively). Replacement of iron or thyroid hormone was efficiently treated in mastalgia patients who had a failure with EPO. Side effects (allergy, anxiety, blurred vision, constipation, and nausea) were higher in group I but not statistically significant (p=0.67).

Conclusions: Evening primrose oil (1300mg, twice a day) can be used for the treatment of mastalgia without significant side effects. Hormone replacement therapy, RIA with hormones, iron deficiency, hypothyroidism, and Hashimoto’s thyroiditis are factors significantly affecting the efficacy of EPO on mastalgia.

787780 - Breast Cancer Screening in Hodgkin's Disease Survivors: Can We Reach a Consensus on the Guidelines?

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Background/Objective: The incidence of secondary breast cancer (SBC) is increased after treatment for Hodgkin's disease (HD) (standard incidence ratio (SIR) ranges from 2.4 to 75.3). The last 4 decades have witnessed attenuation in radiation techniques (RT) used to treat HD both with respect to dose and target volume; fewer patients are exposed to high doses and large volumes of RT. Fewer alkylating (and gonadotoxic) chemotherapies (CT) are used. In the context of these changes in RT, SBC incidence is envisaged to decrease over time. There are a variety of breast cancer screening programmes for female childhood cancer survivors, including HD. We summarise their similarities and differences, and whether they require adaptation to reflect recent advances in treatment of HD.

Methods: A systematic search of PubMed was performed, using the terms 'Guidelines,' 'Breast Cancer screening,' and 'Childhood Cancer Survivors.' Articles published in the English language between 01/01/1990 and 31/12/2018 were included. Articles were excluded if they focused on screening utilisation/patient participation, or screening behaviours/practices, or were irrelevant. Case reports/series, comments, letters, and editorials were excluded. Additionally, references supporting the guidelines found were searched, and additional published guidelines included.

Results: From 50 articles, 11 published breast cancer screening recommendations were identified. The guidelines were compared according to the following criteria: 1) which patients were eligible for BC screening, 2) whether the guidelines specified if patients were higher risk if they had been exposed to higher doses of RT, were younger when treated for HD, or had been exposed to CT 3) age at initiation of screening 4) screening modality, 5) frequency of screening (and frequency of each screening modality), and 6) upper age limit of screening. All studies (n=11) identified those women exposed to chest RT as being 'at risk' of SBC and thus eligible for screening. Six studies were aimed at childhood, adolescent, and young adult cancer survivors. Two studies included HD survivors only. FOur guidelines risk-stratified patients according to the exposed dose RT; however, the cut-off value for both inclusion in the target screening population, and 'high-risk' patients was heterogeneous (range 7-20Gy). Only 2 studies specified that those patients exposed to alkylating CT should be included in the screening cohort. Five studies identified an age range of RT exposure that was higher risk; this ranged from 10-40 years. There were discordances in the age at which screening should be started (range 25-40 years). Only 1 guideline specified an upper age limit (75 years). All studies (n=11) recommended annual screening; 5 studies specified that clinical examination should occur more frequently. All 11 studies suggested mammography as an appropriate screening modality; 3 studies identify certain patient groups where annual MRI should also be used; the remainder recommend MRI for all patients.

Conclusions: There are disparities between current breast cancer screening guidelines - in particular, their age limits and risk stratification criteria. A review and consensus of these

guidelines is necessary to reflect current knowledge of BC incidence after HD, and the evolution of HD treatment.

787684 - LCIS as a Risk Factor for Secondary Contralateral Breast Cancer in Patients with Ipsilateral Invasive Breast Cancer

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Background/Objective: Lobular carcinoma in situ (LCIS) is a risk factor for initial breast cancer (BC) development, but it is unknown whether or not there is an increased risk of a secondary new primary BC after a first diagnosis. Our objective was to determine if there is an association between LCIS identified concurrently with invasive BC and the development of a future new primary contralateral BC (CBC).

Methods: A single center retrospective chart review identified patients from 1/1/2013-4/30/2019 who were women >18 years old with Stage I-III BC and underwent lumpectomy or unilateral mastectomy. Patients were excluded if they were diagnosed with inflammatory BC, or if they underwent bilateral mastectomy. Patients were divided based on whether or not there was LCIS in the surgical specimen from their BC operation. Chi-squared analyses were used to assess for an association between presence of LCIS and development of a new subsequent CBC. Ipsilateral BC (IBC) recurrence for patients undergoing lumpectomy was also assessed for patients with and without LCIS.

Results: Of the 1808 patients included, 83.4% (n=1507) did not have LCIS in their BC surgical specimen while 16.6% (n=301) did have LCIS in their BC surgical specimen. Groups were matched with respect to age (p=0.74), race (p=0.96), and risk factors for BC including family history of BC (p=0.33), history of LCIS (p=0.07), and history of atypia (p=1.0). Groups differed with respect to rate of lumpectomy (p=0.0008) and radiation (p=0.02) but had the same rate of adjuvant endocrine therapy (p=0.08). Patients with LCIS had a higher rate of subsequent new CBC development than those without LCIS (3.3% versus 1.0%, p=0.004) (Table). Most invasive CBC were ductal histology (76%). Presence of LCIS in the BC surgical specimen was not associated with increased risk of IBC recurrence for patients undergoing lumpectomy (p=0.49).

Conclusions: Patients with LCIS identified at the time of BC surgery are more likely to develop new subsequent CBC than those without LCIS. Presence of LCIS was not associated with an increased risk of IBC recurrence. Currently LCIS is a clinically irrelevant associated finding if noted at the time of BC surgical excision, but our results challenge this tradition. Future work should confirm the contralateral risk that LCIS confers in BC patients, so clinicians can determine the best follow-up and treatment recommendations for their patients.

Table: Risk of subsequent new contralateral breast cancer by LCIS status

	No LCIS Associated with Known BC (N=1507)	LCIS Associated with Known BC (N=301)	p-value
New Contralateral DCIS Diagnosis	5 (0.3%)	2 (0.7%)	0.34
New Contralateral Invasive BC Diagnosis	10 (0.7%)	8 (2.7%)	0.005*
New Contralateral Any Cancer Recurrence	15 (1.0%)	10 (3.3%)	0.004*

*p<0.05 statistically significant

786889 - Evaluating the Safety of Breast-conserving Therapy versus Mastectomy for Patients with Large Invasive Lobular Carcinoma of the Breast

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Background/Objective: Randomized trials have established the safety of breast-conserving therapy (BCT) for early-stage breast cancer. However, questions persist regarding applying BCT to patients with diffusely growing tumors like invasive lobular carcinoma (ILC), with some investigators recommending mastectomy as the best surgical choice for this tumor type. While oncoplastic approaches can allow for cosmetic removal of larger tumors than previously possible, the safety of BCT in the setting of large ILC has not been well studied. We therefore evaluated surgical outcomes and recurrence-free survival (RFS) in women with ILC ≥4cm in diameter with the hypothesis that BCT would yield similar results as mastectomy in these large tumors.

Methods: We queried a prospectively collected institutional database and identified 706 cases of Stage I-III ILC treated from 1981 to 2019. Among these, we compared clinicopathologic features of tumors <4cm versus ≥4cm in size. Among cases ≥4cm in size, we evaluated margin status and RFS (time to local or distant recurrence) with the log rank test in those treated with BCT versus mastectomy. BCT cases underwent lumpectomy with or without local tissue rearrangement or oncoplastic reduction mammoplasty, and all received adjuvant radiotherapy. We used multivariate analysis to determine the impact of surgical treatment on RFS in Stata 14.2.

Results: Of the 706 cases analyzed, 491 (69.5%) were <4cm in size (mean 1.6cm) and 215 (30.5%) were ≥4cm in size (mean 6.8cm). Larger tumors were more often found in younger women (58.3 versus 60.5 years, p=0.0301), were higher grade (p=0.018) and more likely to have positive margins (p<0.001). Among the 215 cases ≥4cm in size, 160 (74.4%) underwent mastectomy,y and 55 (25.6%) underwent lumpectomy. Those receiving mastectomy were significantly younger (p=0.0017, Table). RFS at 5 and 10 years did not differ by surgical therapy among those with tumors ≥4cm (5-year cumulative RFS 83.9% in lumpectomy/radiation group, 79.9% in mastectomy group, and 75.8% in mastectomy/radiation group). A multivariate model for RFS adjusting for age and margin status found that surgical therapy (BCT versus mastectomy) did not impact RFS, but those with unresected positive margins had significantly worse RFS (hazard ratio 2.7, 95% CI 1.3-5.7, p=0.01).

Conclusions: We found no difference in RFS among patients with ILC ≥4cm in size treated with BCT with or without oncoplastic techniques versus mastectomy. However, unresected positive margins were associated with significantly worse RFS. These results suggest that BCT is safe in patients with large ILC tumors provided that negative margins are achieved. Future work should focus on developing treatment strategies to reduce tumor volume and the high positive margin rates seen in ILC, and therefore afford patients more surgical options.

Table: Clinicopathologic features of patients

	All cases with tumor size ≥ 4 cm (n=215)	BCT group (n=55)	Mastectomy group (n=160)	p-value (BCT vs Mastectomy)
Age at diagnosis (mean ± standard deviation, years)	58.3 ± 12.6	62.9 ± 12.4	56.8 ± 12.3	0.0017
Receptor Subtype				0.412
ER+ PR+ HER2-	134 (70%)	32 (67%)	102 (72%)	
ER+ PR- HER2-	44 (23%)	14 (29%)	30 (21%)	
ER- PR- HER2-	5 (3%)	0 (0%)	5 (3.5%)	
HER2+	7 (4%)	2 (4%)	5 (3.5%)	
ILC Grade				0.915
1	50 (24%)	14 (26%)	36 (23%)	
2	140 (68%)	35 (66%)	105 (69%)	
3	16 (8%)	4 (8%)	12 (8%)	
Stage				0.278
1	67 (54%)	15 (56%)	52 (54%)	
2	24 (19%)	3 (11%)	21 (22%)	
3	33 (27%)	9 (33%)	24 (25%)	
Lymphovascular invasion	26 (13%)	8 (18%)	18 (12%)	0.326

787962 - Pleomorphic Lobular Carcinoma in Situ: A Single Institution Experience

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Background/Objective: Pleomorphic lobular carcinoma in situ (PLCIS), an intermediate to high nuclear grade variant of lobular carcinoma in situ, has been studied in several case series with varying upgrade rates and treatment recommendations. We aim to present our single institution experience with PLCIS identified on core needle biopsy with follow-up excisions focusing on clinical aspects and upgrade rate.

Methods: A retrospective review and query was performed through the institutional pathology laboratory information system for cases indexed as PLCIS that were diagnosed between 1998 and 2019. Only cases that had a diagnosis of PLCIS on core needle biopsy as the "worst" lesion were included. Exclusion criteria included any findings of PLCIS with a concomitant diagnosis of DCIS or invasive carcinoma. Retrospective review of subjects and pathology was carried out to identify demographic profiles, social/family history and upgrade rates.

Results: A total of 228 patients were identified with a core need diagnosis of PLCIS; however, only 28 patients were identified who met the above inclusion criteria. The average age at diagnosis was 63.5 years with a range of 43-79 and 88% of patients being postmenopausal at diagnosis. The majority (85.7%) of patients were Caucasian, and the remaining 14.3% were African American. Average BMI at diagnosis was 26.61 (range of 18.6-42.7), with 50% having a history of smoking and 67.9% with a history of alcohol use. A documented history of family breast cancer was noted in 12/28 (42.9%), and 4/28 (14.3%) had a personal history of a prior breast cancer. All subjects were identified by mammography with calcifications present in 24/28 (85.7%), asymmetry or distortion identified in 6/28 (21.4%), and a mass present in 6/28 (21.4%). All subjects had a core needle biopsy with a diagnosis of PLCIS that was followed by excisional biopsy. On final pathology, 9/28 (32.1%) were found to have invasive carcinoma, while 19/28 (67.8%) had atypia including atypical lobular hyperplasia/lobular carcinoma in situ or additional foci of PLCIS

Conclusions: In this series that focused on PLCIS as the most significant finding in a core needle biopsy that prompted excision, mammographic calcifications were the most common imaging presentation. Given that the upgrade rate is similar to high-grade ductal carcinoma in situ, a core needle diagnosis of PLCIS should be managed with excision regardless of imaging findings.

788225 - Expectations of Increased Surveillance for Women at Elevated Risk of Breast Cancer Due to History of Breast Biopsy with or without a Family History of Breast Cancer

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Background/Objective: Our institution's Preventive Care Program for Women's Cancers provides risk assessment, genetic testing, and preventive interventions for women at increased risk for breast cancer. Women enrolled in the program may opt to undergo active surveillance. Arming patients with knowledge regarding surveillance expectations is key to facilitating informed decisions. Previous work from our institution reported on what active surveillance looks like for genetic mutation carriers, including BRCA1 and BRCA2. In this study, we focus on women with a history of benign breast biopsy with or without a family history of breast cancer who are enrolled in the Preventive Care Program and may undergo increased breast cancer screening. We aim to characterize and better define expectations of increased surveillance in this population.

Methods: Patients identified as high risk for the development of breast cancer are referred to the preventive care program through primary care providers, gynecologists, and word of mouth. Between August 2003 and March 2019, more than 2800 patients were recruited for enrollment. A cross-sectional study was conducted from this population, limited to a sub-cohort of patients with a history of breast biopsy. Upon enrollment, demographics, family history of cancers, and medical history were collected. During follow-up, utilization of chemoprevention, additional need for biopsy during follow-up, and future cancer diagnoses were recorded.

Results: A total of 189 patients were identified for the study, with a mean age at enrollment of 52.3 (SD 9.4) years. There were 150 patients (79.4%) who had a family history of breast cancer. There were 47 (24.9%) patients who underwent genetic testing. Chemoprevention was recommended for 113 (59.8%), and 48 (42.5%) of those patients accepted. Overall, 163 women were screened with the addition of breast MRI. The average number of biopsies that these women underwent was 2.0 (SD 1.5), which includes initial biopsy, with 43 (22.8%) having 3 or more. Eleven (5.8%) patients went on to undergo a mastectomy following enrollment, with the mean time from enrollment to surgery as 773.1 days. Additionally, 95 (50.3%) women received at least 1 lumpectomy during this time period. Twenty-one patients were diagnosed with a subsequent breast cancer (Stage 0=14, 1=5, 2=1, 3=1). Of those diagnosed, DCIS was the most common type (n=10), followed by IDC (n=7). Seventeen of the cancers were diagnosed following a biopsy, 3 following a lumpectomy, and 1 case being a re-occurrence confirmed by a lumpectomy following diagnosis, with a mean time between screening method and diagnosis of 2.25 days. The mean time of enrollment to diagnosis was 1,385.9 days.

Conclusions: Women at elevated risk for breast cancer due to previous benign breast biopsy with or without a family history of breast cancer may enroll in breast cancer prevention clinics to learn more about their breast cancer risk, preventive methods, and opportunities to participate in active surveillance with of hope of early detection of breast cancer. This study specifically highlights the effectiveness of screening a population that is high risk due to the detection of a suspicious lesion. Furthermore, it helps this group of women establish realistic expectations regarding the likelihood of abnormal screenings results that warrant biopsy and the likelihood of malignant results. In our sample, the majority of women who received a cancer diagnosis were diagnosed in Stage 0 or 1. This information may be used by high-risk women debating on enrolling in the active surveillance program as it speaks to the program's efficacy. In the future, this can help inform women who qualify for active surveillance. Additionally, the population could be expanded to look at women with no history of biopsy, but who have a family history of breast cancer.

786938 - ASBrS Speaks: A 20-year Review of Presenter Gender at the American Society of Breast Surgeons Meetings

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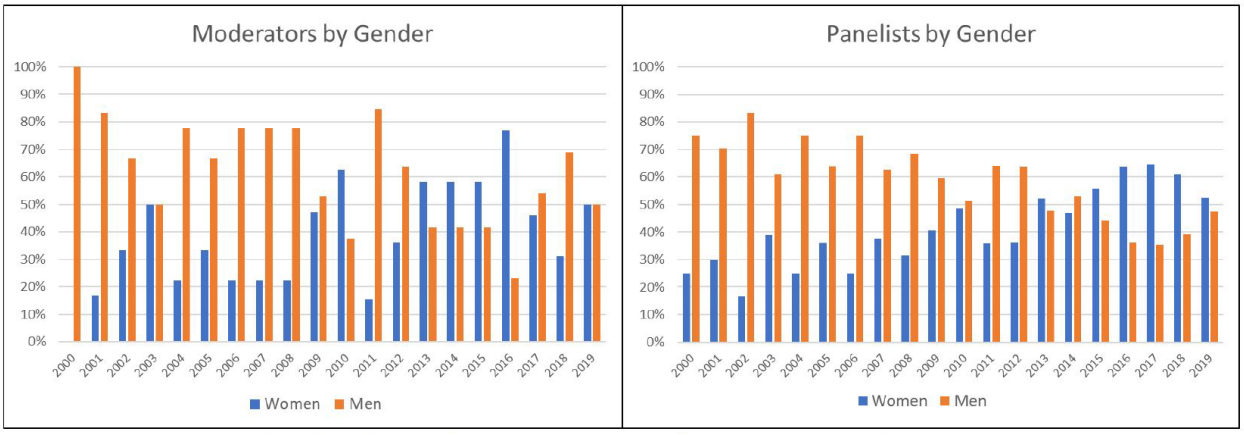
Background/Objective: The American Society of Breast Surgeons (ASBrS) was founded in 1995. Since the first Annual Meeting in 2000, the diversity of membership has increased. Over the past few years, there has been an increase in attention to the diversity of presenters at medical society meetings. Speaking at national meetings is one of the ways to gain national attention which assists with career growth. Lack of access to these opportunities for women has been recognized as one of the barriers to academic and general career advancement. Recent publications focusing on surgical societies demonstrates underrepresentation of women as speakers, especially for plenary speaker roles which are the most prestigious. For that reason, we examined the gender of speakers at the ASBrS meetings from 2000-2019.

Methods: Programs for the ASBrS meetings were obtained electronically for years 2009-2019 via the member website, and those for years 2000-2008 were obtained on paper from the Society at the request of the authors. All programs were reviewed manually for general session moderator and panel speaker gender based on name, as well as gender of the society president, program chair, and keynote speaker. If gender could not be determined by name, a search was performed using an online search engine.

Results: The percent of both moderators and panelists who were women increased overall from 2000 to 2019, from 0% to 50% of moderators and 25% to 52.5% of panelists. The first inclusion of a keynote speaker into the annual program was in 2001, but not all early meetings included a keynote speaker. For the 17 meetings that included a keynote speaker, 3 of 17 keynote speakers (17.6 %) were women. Two of these were physicians, and the other was a patient advocate. Over the study period, 6 of the society presidents were women (30%), and 8 of the program chairs were women (40%). In 4 of the years evaluated, both the president and program chair were women, and in 7 years they were both men, including 2019.

Conclusions: Diversity in gender representation of speakers at the ASBrS annual meetings has improved over the past 20 years. Only 3 women have been honored with the keynote address. As being an invited speaker at national medical societies is important for career advancement, ongoing attention to representation by gender and other identity metrics should be monitored to ensure equity in physician speaker opportunities with particular attention to keynote speakers.

Figures: ASBrS meeting moderator and panelist gender from 2000-2019



788090 - The Effect of "National Breast Cancer Awareness Month" on Breast Cancer Diagnoses

Ann-Kristin Friedrich[1], Brigid Killelea[1], Kevin Baratta[2], Justin LeBlanc[1], Tristen Park[1], Nina Horowitz[1], Anees Chagpar[1], Donald Lannin[1]

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Background/Objective: The National Breast Cancer Awareness Month (NBCAM) was introduced in October of 1985 and since then has been repeated annually. The purpose of this study was to identify the influence of this campaign on diagnosis of breast cancer in the month of October.

Methods: The SEER 18 database was used to identify the month of diagnosis for all female breast cancers from the year 1974 to 2016. Since months have different numbers of days, the data were calculated as the number of cancers per day in October compared to that of other months. The results are expressed here as the percent increase in the cancers/day for October compared to other months.

Results: In this cohort of 1,678,886 patients, more cancers/day were diagnosed in October than in any other month. The excess October cancers by decade were -0.38% in the 70s, 3.55% in the 80s, 4.8% in the 90s, 5.15% in the 2000s, and then declined slightly to 3.52% between 2010 and 2016 ($p=0.001$). We therefore chose the peak decades of 1990 to 2009 to further characterize the cancers. The excess cancers were higher in older patients (3.79% under 60 vs 6.2% over 60, $p=0.002$), and in black patients (4.58% white, 9.11% black, and 4.83% other, $p<0.001$). The excess cancers were earlier stage: 7.11% increase in Stage 0, 4.9% in Stage 1, 6.16% in Stage 2, 2.81% in Stage 3, and -0.03% in Stage 4 ($p=0.002$). They were also more likely to be treated by lumpectomy (6.22% lumpectomy vs. 3.71% mastectomy, $p=0.002$). The cancers were more likely to be low grade (7.64% increase in grade 1, 5.67% in grade 2, and 4.19% in grade 3, $p=0.03$), and more likely to be ER-positive (5.69% increase in ER+ compared to 2.06% in ER-, $p=0.002$).

Conclusions: Since introduction of the NBCAM campaign, there has been a moderate increase in breast cancer cases diagnosed in the month of October compared to other months. The largest increase was seen among black patients, patients over 60, and in patients with in situ or early cancers. The increased numbers of low-grade and ER-positive cancers suggests that there is also a significant degree of increased overdiagnosis. Similar to breast cancer screening in general, therefore, it is controversial whether the increased diagnosis is a good thing or a bad thing.

788275 - Clinical Characteristics of Long-term Survivors of Metastatic HER2+ Breast Cancer

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Background/Objective: Prognoses for women with HER2+ breast cancer have improved since targeted anti-HER2 therapies became available. It is unclear if the use of dual HER2 blockade has improved survival in patients diagnosed with metastatic HER2+ breast cancer. We sought to evaluate the clinicopathologic and treatment characteristics associated with overall survival in patients diagnosed with metastatic HER2+ breast cancer.

Methods: Female patients with metastatic HER2+ breast cancer treated at our institution from 2009-2019 were included in our study. Chi-square and ANOVA statistical analyses were performed to evaluate clinical characteristics differences between vital status groups (deceased vs. alive) ($p<0.05$ was considered statistically significant). Multivariate analysis using inverse probability-weighting (IPW) adjusting for potential confounders (age at diagnosis, race, socioeconomic status (SES), year of diagnosis, site of metastasis, receptor status, axilla staging, surgery, and receipt of anti-HER2 therapy, chemotherapy, radiation, and hormone therapy) was performed to evaluate overall survival (OS) in our study cohort.

Results: Of the 2,260 patients with HER2+ breast cancer treated at our institution, 291 met inclusion criteria. The median follow-up time is 38 months. At the time of analysis, 151 (51.9%) were alive. When we compare the clinical characteristics of the study cohort stratifying by vital status as deceased vs. alive, we found that the deceased group was more likely to have a higher mean age at diagnosis ($p<0.001$), earlier median year of diagnosis ($p<0.001$), and shorter median follow-up time ($p<0.001$). Brain metastasis was more common in the deceased group. A higher proportion of patients alive at the time of analysis (47.0%) received dual agent anti-HER2 therapy as opposed to deceased patients (19.3%) ($p<0.001$). Of the 151 patients alive at the time of analysis, 55 (36.4%) were receiving maintenance Trastuzumab at a median follow-up of 45 months. After adjusting for potential confounders, overall survival (OS) did not differ between patients who received single vs. dual agent anti-HER2 therapy ($p=0.31$). However, patients who were hormone receptor-positive had better OS with a positive gain of 11.55 months, 95% CI (2.81 to 20.29), $p=0.01$ compared to patients who were hormone receptor-negative. In addition, patients who received hormone therapy had better OS with a positive gain of 17.35 months, 95% CI (8.69 to 26.01), $p<0.01$ compared to patients who did not receive hormone therapy.

Conclusions: We were not able to demonstrate that dual anti-HER2 therapy improves survival in our study cohort. However, other clinical and treatment characteristics such as hormone receptor status and receipt of hormone therapy were associated with improved survival in women diagnosed with metastatic HER2+ breast cancer. A larger multi-institutional study cohort may be warranted to validate our results.

788269 - Estrogen Receptor Positive and Progesterone Receptor-negative Breast Cancer: The Role of Hormone Therapy

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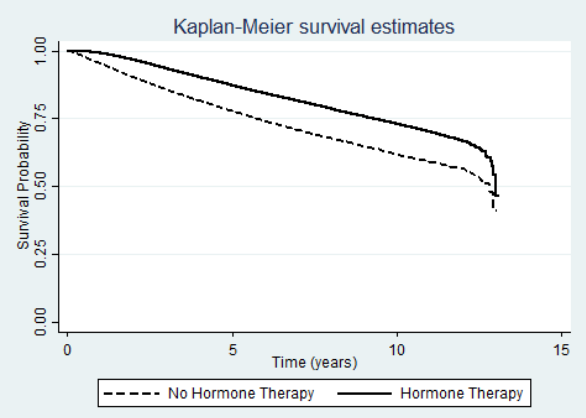
Background/Objective: Estrogen receptor-positive and progesterone receptor-negative (ER+/PR-) tumors constitute only a small portion of the breast cancer population. However, patients with ER+/PR- tumors are characterized by remarkably worse survival than estrogen receptor-positive and progesterone receptor-positive (ER+/PR+) patients. Controversy exists regarding the role of hormone therapy for these patients.

Methods: Eligible patients treated for breast cancer in the U.S. between 2004-2015 were identified from the National Cancer Database (NCDB) registry. Patients with both ER+/PR+ and ER+/PR- cancers were queried and divided into 2 categories based on receipt of hormone therapy. We also examined the following variables: age, race, charlson score, insurance carrier, income quartile, education quartile, patient residence category, type of hospital where they were treated, T stage (0- IV), level of lymphadenectomy performed, and margin status. We employed univariate Cox proportional hazards to compare outcomes among patients who did or did not receive hormone therapies.

Results: We identified 138,398 patients with invasive ER+/PR- tumors, 32,044 (23%) of whom did not receive hormone therapy. The reasons for not receiving hormone therapy included contraindications, death, patient refusal, and unknown. There were no significant differences in race, income quartile, or education quartile between patients who did and did not receive hormone therapy. Patients who did not receive hormone therapy underwent lymphadenectomy more frequently than those who did receive hormone therapy. Our analysis demonstrated that hormone therapy administration was associated with increased overall survival, which continued for up to 10 years (HR: 0.58; 95% CI: 0.56-0.59, p<0.001).

Conclusions: Hormone therapy may be associated with increased survival for breast cancer patients with ER+/PR- tumors. Although this benefit may last for years after completion of the course, up to 30% of patients do not receive this treatment. Strategies to increase the utilization and adherence to hormone therapy regimens may improve patient survival outcomes.

Figure: Ten-year survival based on receipt of hormone therapy



733445 - Use of PECS II Block in Partial Mastectomy for Improving Postoperative Pain Control and Mitigating Narcotic Use - Initial Results from a Randomized Control Trial

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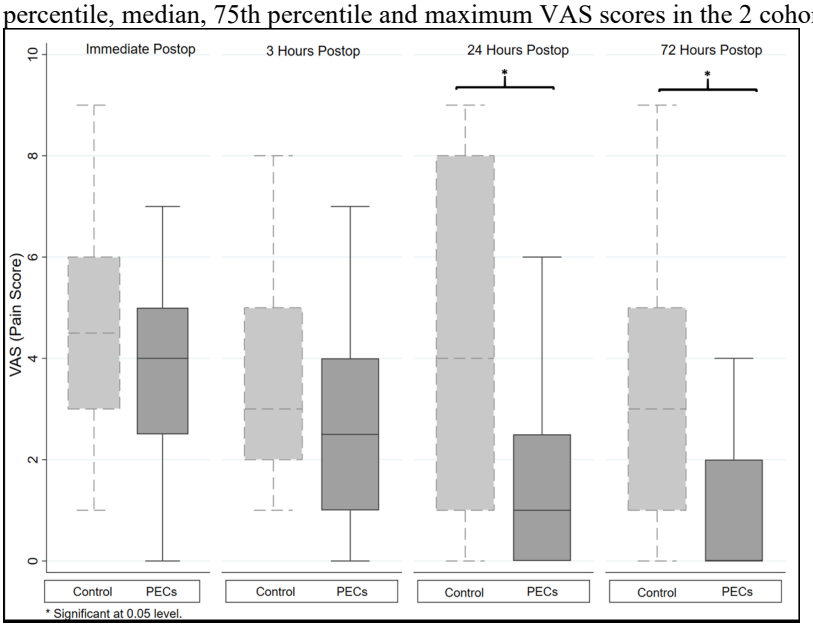
Background/Objective: Pectoral nerve block II (PECS II) is a technique of injecting local anesthesia between muscle groups of the chest. PECS II has been previously shown to significantly improve intraoperative and postoperative pain control in patients undergoing mastectomy but has not been evaluated or widely used in breast-conserving therapy (BCT). The purpose of our study was to evaluate PECS II performed by the breast surgeon in a novel subset of breast cancer patients – partial mastectomy with or without sentinel lymph node (SLN).

Methods: This is a prospective, IRB-approved patient blinded randomized control trial approved for 130 adult female patients undergoing partial mastectomy with or without sentinel lymph node (SLN) in a comprehensive breast center. All patients received preoperative enhanced recovery after surgery (ERAS) medications which included acetaminophen 975, celecoxib 200 mg, and gabapentin 300 mg unless medically contraindicated. The control group received general anesthesia, 10 cc of 0.25% Marcaine subcutaneously at incision sites. PECS II group received general anesthesia, 10 cc of 0.25% Marcaine subcutaneously at incision sites and 20 cc of 0.25% Marcaine between pectoralis major and minor muscles and between serratus anterior and latissimus dorsi on affected side (PECS II block) by the breast surgeon under ultrasound guidance. The primary outcomes were postoperative 0-10 pain Visual Analog Score (VAS score) immediately post-operatively, at time of discharge from post-surgical recovery unit, and on postoperative days 1 and 3. Secondary outcomes were intraoperative and postoperative narcotic use.

Results: Thirty-four patients have been accrued to the study currently since opening 9/1/19. Eighteen patients were randomized to the control group and 16 to the PECS II group. The mean age was 59.6 in the control group and 65.3 in the PECS II group (p=0.215). The rate of SLN was similar in both the control and PECS group (38.9% vs 37.5%, p=1.0). The median VAS score at 24 hours was 4 in the control group and 1 in the PECS II (p=0.008). Median VAS score at 72 hours after surgery was 3 and 0, respectively (p=0.003). Two patients (11%) of the control group reported their pain as not well controlled, while 0 patients in the PECS II reported this. There was no difference in intraoperative median morphine equivalents (MEQ) administered in the control (12.5) and PECS II (11.3, p=0.875). There was no difference in adherence to the acetaminophen (p=1) and ibuprofen regimen postoperatively (p=1) between the control and PECS II patients. Twenty-four-hour postoperative MEQ was higher in the control group versus PECS II (4.5 vs 2.3, p=0.014). At 24 hours postoperatively, 6% of the control group reported a pain score of 0, while 28% of PECS II group reported this. Total median postoperative MEQ were 2.3 in both groups (p=0.160); however, 18% of the control group and 40% of the PECS II group used 0 MEQ postoperatively.

Conclusions: Based on initial results from an ongoing trial, PECS II block is a novel protocol for BCT that improves pain control postoperatively and decreases postoperative narcotic use. Breast surgeons should consider performing a PECS II block in all patients undergoing breast-conserving surgery, and efforts should be directed at educating more breast surgeons on how to perform this block independently under ultrasound.

Figure: Postoperative Visual Analog Scores (VAS) immediately after surgery, 3 hours postoperatively, postoperative day 1 and postoperative day 3 visualized in the boxplots above. This shows the minimum, 25th percentile, median, 75th percentile and maximum VAS scores in the 2 cohorts at 4 different time points.



787533 - BRACELET Study: Breast Recovery After Axillary Node Clearance - Evaluating Limbs with E-Technology

Richard Kwasnicki[1], Naairah Khan[2], Alexander Cairns[3], Daniel Leff[1]

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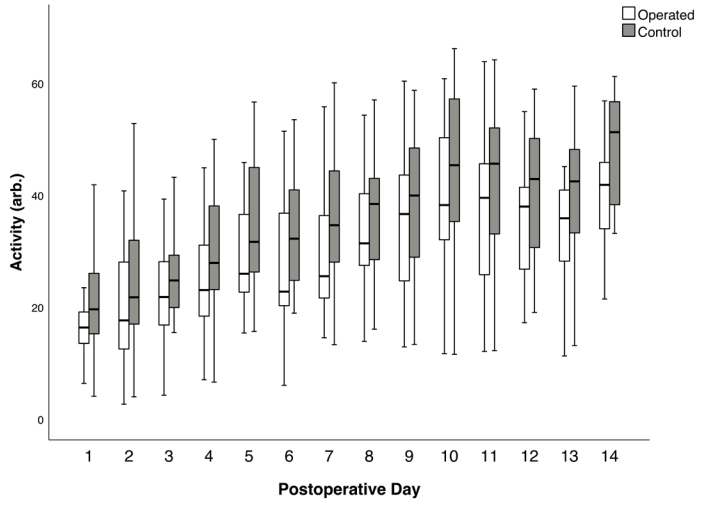
Background/Objective: Upper limb morbidity is common in breast and axillary surgery but is rarely measured objectively. Studies have reported up to 70% of women being affected with upper limb morbidity after invasive surgeries such as axillary lymph node dissection (ALND), with limitation in function often continuing for years after treatment. Wearable activity monitors (WAMs) capture continuous measurements of body movement in a free-living environment and have been used in clinical settings such as the assessment of arm function in patients after stroke and musculoskeletal conditions. The aim of this study was to determine whether the use of WAMs provided meaningful objective data regarding functional recovery in patients undergoing breast and axillary surgery and whether WAMs data correlate with quality of life and introspective upper limb morbidity scales.

Methods: A prospective, single centre, observational study was conducted (NHS Ethics Ref: 15/LO/1038). Breast cancer patients were invited to wear WAMs (AX3, Axivity, UK) continually on both wrists for 1 week pre-operatively and 2 weeks post-operatively. Upper limb function (Disability of the Arm, Shoulder and Hand – DASH) and quality of life (EQ-5D) questionnaires were also completed pre-operatively and 1-week post-operatively. Patient physical activity levels as recorded by WAMs were plotted longitudinally to assess the recovery plateau, including both gross activity as well as any difference in movements between arms. Correlation between physical activity and patient questionnaires were calculated at different time points to measure correlation between activity and questionnaire data. SPSS v25 software was used to perform the analysis, and data were analysed using non-parametric statistical tests of significance.

Results: Thirty-four patients were recruited, of which 20 generated sufficient datasets for analysis. Attrition was due to patient factors such as intolerance to wrist strap, non-compliance, or non-surgical management. Mean age was 64 (±14) years, with 45% breast-conserving surgery, 35% mastectomy, 10% reconstruction, 30% ALND, laterality ratio 7:9:4 (R:L:BL). All patients demonstrated measurable improvement in post-operative activity levels, with an apparent plateau at day 7 ($p<0.05$, SVM=66.0, StD 20.8). On average, patients doubled their activity between the 1st and 14th post-operative day. The greatest statistical increase in activity occurred in the first 7 post-operative days, with continued increases up to and potentially beyond day 14. Whilst activity was significantly greater in the non-operated arm compared to the operated arm (Mann Whitney U, $p<0.05$), this difference attenuated longitudinally with a 25% difference observed at day 1 post-op to 17% observed at day 14. Activity levels correlated well with pre-operative ($R=0.66$, $p<0.05$) and post-operative quality of life surveys ($R=0.62$, $p=0.06$).

Conclusions: The study demonstrates the feasibility of WAMs to quantify and characterise post-operative recovery in upper limb function after breast and axillary surgery. Objective evidence of a quantifiable difference between arm movements post-operatively is shown. This approach offers a technological solution for enhanced assessment of upper limb functional outcomes after surgery, allowing more meaningful comparisons of post-operative morbidity, as well as a platform for novel personalised rehabilitation strategies.

Figure: Disparity between recovery in operated vs control arm movement activity over 2 weeks postoperatively



787813 - A Feasibility Study of Intraoperative Surgeon-performed PECS I/II Blocks for Mastectomy with Immediate Reconstruction

Cynthia Lee[1], Melinda Seering[2], Jerrod Keith[2], Lillian Erdahl[2], Sonia Sugg[2], Ronald Weigel[2], Ingrid Lizarraga[2]

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Background/Objective: Pectoralis field blocks (PECS I/II) are a well-established modality for postoperative pain control after mastectomy with reconstruction and are often performed by an anesthesia pain team prior to surgery. There are potential technical and logistical advantages to having the surgeon perform the block intraoperatively after the breast is removed prior to reconstruction, such as avoiding the need for a separate skin prep, ease of procedure, and longer duration of block effect postoperatively. We conducted a pilot study to determine the feasibility of a randomized double-blinded trial comparing intraoperative and postoperative outcomes of blocks performed by the anesthesia team prior to skin incision versus by the surgeon after the breast has been removed.

Methods: Patients with breast cancer undergoing bilateral mastectomies with immediate expander or implant reconstruction were randomized to receive PECS I/II block prior to incision or after mastectomy. The study was double-blinded to the patient and data collector. Group I received the block by the anesthesia team after induction of anesthesia and prior to incision. Group II received the block by the surgeon after mastectomy and before reconstruction. Block time was measured from placement of ultrasound probe on the skin to removal of needle. Pain scores were collected preoperatively, on arrival to the post anesthesia care unit (PACU), and every hour until discharge from PACU as well as every 4 hours during the inpatient stay. We also measured duration of surgery, postoperative nausea and vomiting, and length of PACU stay.

Results: The pilot study consisted of 10 patients with 5 in each group. There was no difference in median age or BMI. Three patients in each group received neoadjuvant chemotherapy. No patient had a history of opioid dependence. All patients in Group I had sentinel lymph node biopsy only, while 3 patients in Group II had axillary lymph node dissection. Nipple-sparing mastectomy was performed in 2 patients in Group I and 4 patients in Group II. Tissue expanders were placed in 1 Group I patient and 3 Group II patients. Expander/implant placement was prepectoral in all but 1 patient (Group II). Block placement time was similar in both groups (9.4 minutes + 3.78 vs. 9.6 minutes + 5.73, p=0.95). Group I had a shorter duration of surgery (6.99 hours + 0.70 vs. 7.59 hours + 1.28, p=0.39) and longer length of PACU stay (2.29 hours + 1.10 vs. 1.77 hours + 0.53 , p=0.36), but neither difference was significant. Average pain scores (APS) were less than 3 for both groups during PACU stay, with no nausea or vomiting. Narcotic use was not different between the 2 groups (Group I: 7.8 morphine milligram equivalents (MME) vs. Group II: 14.7 MME, p=0.3). Two patients in Group II had a hospital stay of more than 24 hours. APS during hospitalization were not significantly different between the 2 groups (2.83 + 2.03 for Group I vs. 4.04 + 2.02 for Group II, p=0.37).

Conclusions: PECS I/II block administered by the surgeon after completion of mastectomy before reconstruction is feasible and procedure duration is similar to preoperative block performed by the anesthesiologist. Pain scores in the immediate post-operative period were

similar for the 2 groups. These results support a randomized trial to examine the impact of block timing on intraoperative and post-operative narcotic use, short- and long-term pain control, operating room time, and wound outcomes.

786924 - The Value of OncotypeDX (oDX) Testing in Patients with T1aN0 Hormone Receptor (HR) (+) Breast Cancer

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Perelman School of Medicine, Philadelphia, PA

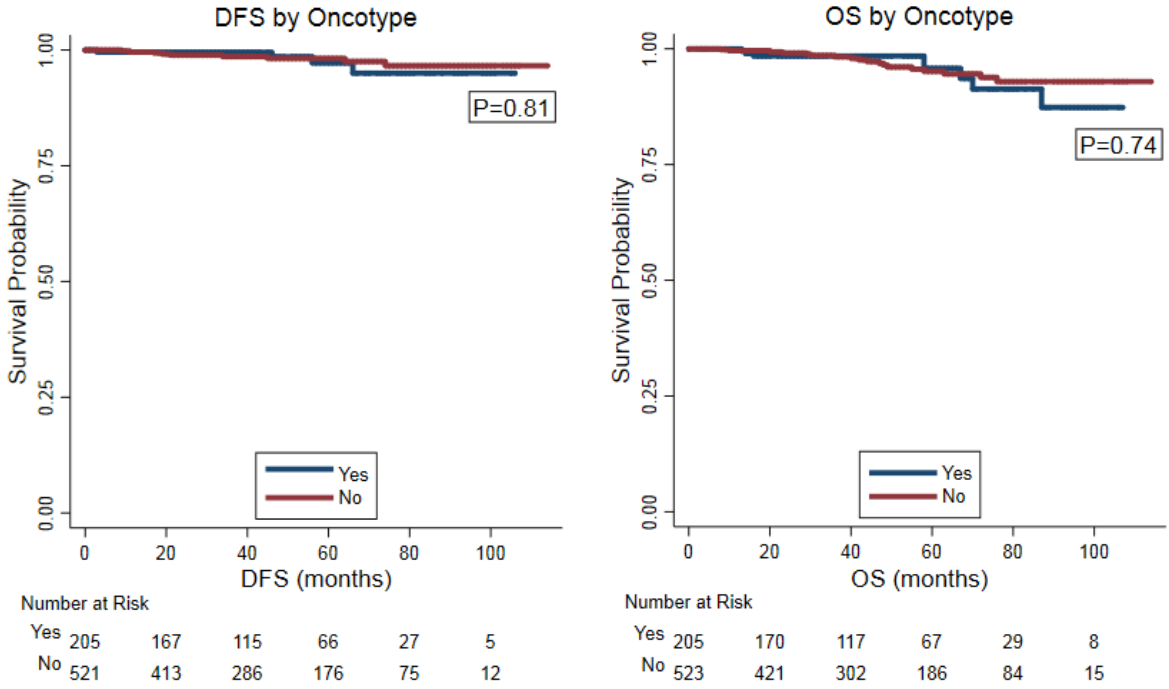
Background/Objective: OncotypeDX (oDX) testing has revolutionized the treatment of HR+ node-negative (N0) breast cancer by underscoring the prognostic value of tumor biology, which is better portrayed by gene expression profile. The clinical impact of oDX testing in patients with T1 tumors, specifically T1a tumors ≤5mm is unknown. We therefore undertook this retrospective analysis to examine the impact of the use of oDX testing on clinical outcomes in patients with node-negative HR+ HER2- T1a tumors.

Methods: After receiving IRB approval, we identified initial cohort of women (n=2307) with non-metastatic HR+HER2- N0 breast cancer treated at our institution between 2009-2018. Patients with tumors >T1a were excluded. Demographic and clinical information was collected, and patients were stratified by the receipt of Oncotype testing. Chi2 tests were used to determine statistical significance of adjuvant chemotherapy use between the 2 groups. Inverse probability of treatment weighting (IPW) analysis was used to compare disease-free survival (DFS) and overall survival (OS) between groups.

Results: Of the 729 women comprising our final cohort, 524 (72%) did not have Oncotype testing, while 205 (28%) did. Overall median follow-up was 45 months. Women who had oDX testing were more likely to have private insurance (78% vs. 55%), household income in the highest quintile (23% vs. 10%), mastectomy as definitive surgery (38% vs. 27%), and chemotherapy (9% vs. 3%) (all p values <0.001). The crude recurrence rate overall and in those who had oDX and no oDX testing was similar at 1.8%, 2.0%, and 1.7% respectively. Despite increased use of chemotherapy in those who underwent oDX, there was no difference in DFS (p=0.25) or OS (p=0.52) when comparing these women to those that did not have Oncotype performed. Kaplan Meier plots of DFS and OS stratified by oDX use also show no statistically significant difference between the 2 groups.

Conclusions: Regardless of receipt of oDX, women with T1aN0 HR+ breast cancer have excellent outcomes. The use of oDX is unlikely to add value to the care of these women.

Figures: Kaplan Meier curves of DFS and OS stratified by oDX use



788176 - Relative Survival of Stage I Breast Cancer in the Screened vs Unscreened Population

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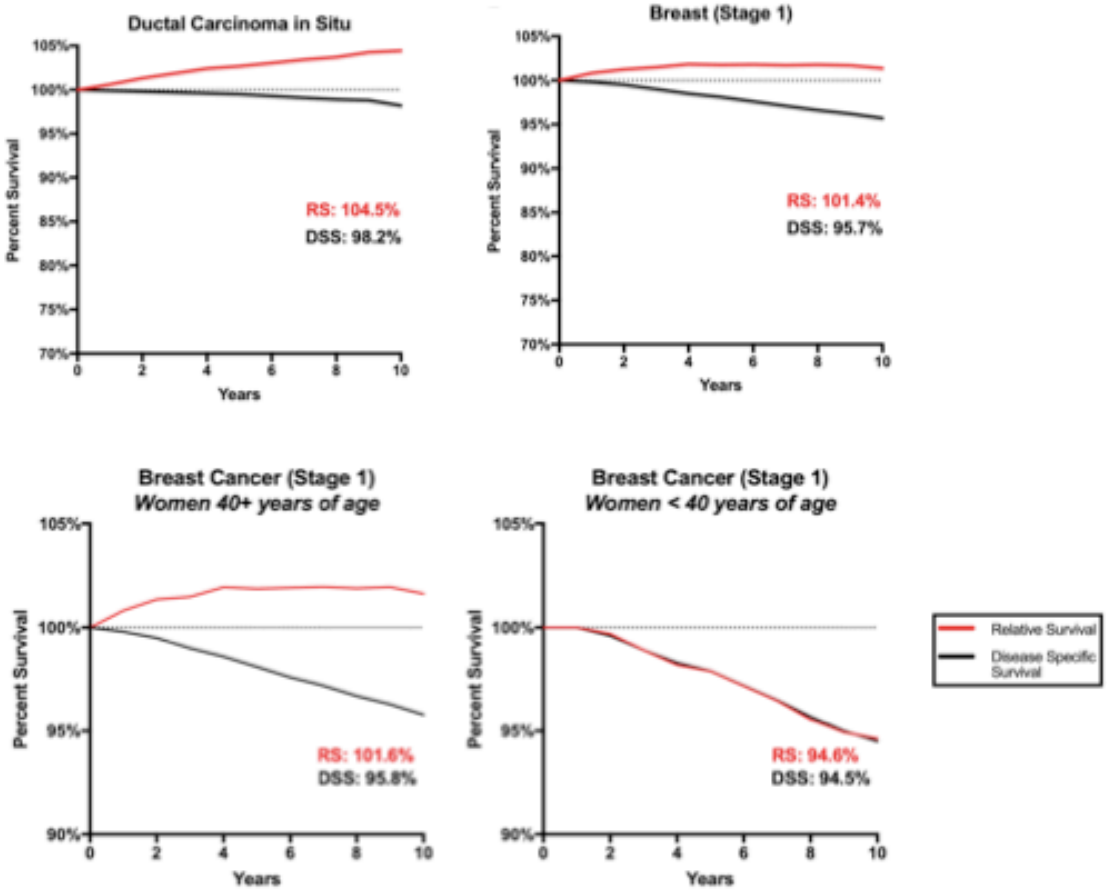
Background/Objective: Survival in oncology is often measured via overall survival (death from any cause) or disease-specific survival (DSS). A parallel measure is relative survival (RS), which is the ratio of observed to expected survival, comparing patients with cancer to a similar non-cancer population of matched age, race, and sex. RS and DSS are often similar, but in some cases, might diverge when the cancer population differs from the non-cancer population in terms of overall risk of mortality. For example, patients with lung cancer have RS rates lower than DSS rates, due to the prevalence of smoking in the lung cancer population. RS could exceed DSS if the cancer population is healthier than the general population. This may occur in patients who have incidentally diagnosed or screen-detected cancers, because patients who seek out or receive preventive care are known to more often engage in other healthy behaviors (the healthy user effect). Our objective was to analyze RS and DSS rates in women with DCIS and Stage I breast cancer, and to compare women in screened and unscreened populations.

Methods: We analyzed data in the Surveillance, Epidemiology and End Results (SEER) cancer registry. We calculated survival rates for Stage I breast cancer in all women, and stratified by age: in women <40 years (in whom routine screening is not recommended) and women older than 40 years of age (in whom routine screening is often recommended).

Results: In ductal carcinoma in situ (DCIS) and Stage I cancers of the breast, we observed 10-year RS rates of over 100%, ranging from 101-105%. The 10-year RS for Stage I breast cancer is 102% in women over age 40, and 95% in women under 40 years of age (Figure).

Conclusions: Women with Stage I breast cancer in the age group recommended to undergo mammographic screening have RS rates higher than DSS, and over 100%, indicating that they are living longer than matched women without cancer, consistent with the effects of screening and the healthy user effect. In contrast, RS and DSS were identical (95%) in women under 40 years old. These data indicate that screening predominantly leads to the identification of low-risk cancers in healthy, health-conscious women. These statistics may help physicians to explain to patients that being diagnosed with a small, clinically very low-risk breast tumor is a marker of attentiveness to one's health and access to care, and is in fact associated with a lower risk of dying. Sharing this information with patients may mitigate some of the stress and anxiety that occurs after a breast cancer diagnosis. Women with DCIS and Stage I breast cancer may choose more aggressive therapies if they believe that the diagnosis has impaired their expected survival. These data may help inform these conversations by providing comparison to a similar patient population without cancer, and showing that the diagnosis is in fact associated with longer survival.

Figures: Ten-year relative survival and disease-specific survival .American Joint Committee on Cancer, 6th edition was used for staging. Data from SEER.



785537 - Obese Patients Who Receive an Opioid-sparing Enhanced Recovery After Surgery (ERAS) Protocol Are at Increased Risk of Persistent Pain After Breast Surgery

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Background/Objective: Obese patients are at increased risk of both persistent pain and chronic opioid dependence after surgery. In the present study, we evaluated the impact of an opioid-sparing Enhanced Recovery After Surgery (ERAS) protocol in breast surgery patients to investigate whether multimodal analgesia was effective for both obese and non-obese patients.

Methods: A prospective cohort of patients undergoing breast surgery that received an opioid-sparing ERAS protocol was compared to a similar historical control group (non-ERAS). Pain scores were compared with respect to body mass index (BMI). Obesity was defined as BMI ≥30, and moderate-severe pain was described as pain score 4-10 of a 10-point scale. Postoperative day one and week one pain scores for obese and non-obese patients were compared using the Kruskal-Wallis test.

Results:
Between 2017 and 2019, 730 patients who received the ERAS protocol were compared to 624 non-ERAS patients who underwent lumpectomy, mastectomy without reconstruction, and/or axillary surgery between 2015 and 2018. Pain scores were available for 622 patients. Median BMI was 28.6 (range 19-49) in the non-ERAS group, and 29.2 (range 17-58) in the ERAS group. The groups were similar with regards to median age and comorbidities. On the day after surgery, those who received the ERAS protocol reported lower rates of moderate-severe pain, regardless of BMI [(obese: 46.3% vs. 21.8%, p<0.001); (non-obese: 36.3% vs. 19.4%, p=0.002)] (Table 1). One week after surgery, obese patients who received ERAS had higher rates of persistent pain when compared to non-obese patients (18.6% vs. 11.1%, p=0.042*).

Conclusions:
An opioid-sparing ERAS protocol utilizing multimodal analgesia significantly improved postoperative pain control in both obese and non-obese patients. However, it appears that obese patients are still at relatively greater risk for persistent pain after surgery. The application of opioid-sparing protocols in breast surgery should include special attention to obese patients, who may benefit from additional interventions such as high-risk screening and weight-based dosing.

Table 1. Rates of moderate-severe pain after surgery

	Obese			Non-obese		
N (%)	Non-ERAS (n=54)	ERAS (n=220)	p-value	Non-ERAS (n=80)	ERAS (n=268)	p-value
Postoperative Day One	25 (46.3)	48 (21.8)	<0.001	29 (36.3)	52 (19.4)	0.002
Postoperative Week One	16 (33.3)	36 (18.6)*	0.026	14 (20.6)	25 (11.1)*	0.042

*p_{eras}=0.042

786743 - The Breast Cancer Survivorship Program: A Systematic Review of Literature with Recommendations for Successful Implementation

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Background/Objective: The National Accreditation Program of Breast Centers (NAPBC) has advocated that a comprehensive survivorship care plan is an essential element to successful patient care. The 2018 NAPBC standards recently added that all eligible patients, within 6 months of completing active treatment, must have a survivorship care plan (SCP) developed and implemented following the National Comprehensive Cancer Network (NCCN) guidelines. Despite these recommendations, there remains a lack of specific guidelines. We sought to create a definitive pathway for a successful breast cancer survivorship program.

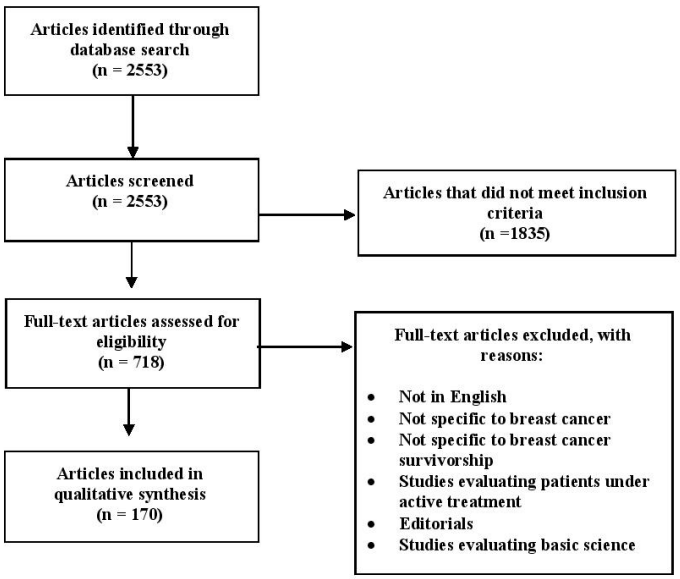
Methods: We conducted a systematic literature review using PRISMA guidelines. We searched for peer-reviewed articles in PubMed using a combination of keywords "breast," "cancer," "neoplasm," "survivorship," "care," and "plan." The resulting articles were screened for relevance to breast cancer survivorship care planning and further categorized based on their recommendations within the SCP.

Results: A total of 2,553 studies were initially reviewed from the years 1950-2019. A total of 170 studies met inclusion criteria. The most prevalent categories reported within an SCP included: who should deliver the SCP, when follow-up surveillance should be conducted, having a healthy lifestyle focus or mental health focus, management of treatment side effects, and recognition of ethnic disparities. We identified the following components as essential in a comprehensive SCP: the ideal time for delivery of a survivorship care plan should be at 3-12 months post-surgery depending on adjuvant therapy; care plans are prepared by oncology nurses and delivered by the oncology nurse practitioners; specific guidance on maintaining healthy lifestyle habits and managing distress, and close surveillance and management of treatment side effects.

Conclusions: A definitive pathway for breast cancer survivorship should be an important component of a comprehensive breast cancer program. A thorough and timely delivery of an SCP is critical in the ongoing care of the breast cancer patient. This review provides concise, yet tangible, guidelines for a successful breast cancer survivorship plan.

Figure: The Breast Cancer Survivorship Program: A systematic review of literature with recommendations for successful implementation

Figure 1. **PRISMA Flow Chart**



787714 - Implementation of Non-opioid Regimens for Pain Management After Breast Surgery in a Large, Integrated Health Care Delivery System

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Background/Objective: In 2017, the opioid epidemic was declared a public health emergency in the United States. Opioids prescribed by surgeons for postoperative pain management have contributed significantly to this epidemic. In response to this, a large, integrated health care delivery system implemented programs to reduce opioid prescribing, including promoting non-opioid postoperative regimens as an effective alternative to opioids. We evaluated the impact of these initiatives on the use of non-opioid regimens (NOR) after breast surgery.

Methods: From 2017 to 2018, a large, integrated health care delivery system initiated a multifaceted approach to reduce postoperative opioid prescribing for its 4.4 million members in Northern California. This approach included education sessions at the system's 21 medical centers, reduction of default opioid pill counts on electronic order sets, and implementation of an outpatient enhanced recovery after surgery (ERAS) protocol. Breast surgery-specific measures included a regional breast surgery webinar on non-opioid regimens (NOR), and quarterly regional breast surgeon meetings to discuss best practices, including postoperative NOR and multimodality analgesia. We retrospectively collected data from the integrated health care

delivery system's electronic medical records to evaluate postoperative prescribing practices before and after the 2017-2018 intervention period, comparing April-July 2016 to April-July 2019 breast surgery cohorts. We excluded operations for gender reassignment, breast reduction, treatment of gynecomastia/accessory breast tissue, and emergency operations for infection. The primary endpoint was the use of NOR for pain management after breast surgery. Secondary endpoints were emergency department (ED) visits and readmissions within 7 days of surgery. Analysis was performed using chi-square tests.

Results: We evaluated 1,917 breast operations in the April-July 2016 and 2,166 in the April-July 2019 cohorts. NOR increased from 8% in 2016 to 38% in 2019 ($p<0.001$). Lumpectomies accounted for the majority of this increase, with 11% NOR in 2016 vs 54% in 2019 (Table). Seven percent of all mastectomies with reconstruction were managed with NOR by 2019. Only 1% of NOR patients required subsequent opioid prescriptions for inadequate pain control. Significantly fewer ED visits occurred in the NOR group (1.8% in the NOR group vs 3.5% in the opioid group, $p=0.007$). The 7-day readmission rates for the NOR and opioid groups were similar (0.38% NOR vs 0.39% opioid, $p=0.95$).

Conclusions: Between 2016 and 2019, breast surgeons in a large, integrated health care delivery system adopted NOR for nearly 40% of breast operations. There were no increases in ED visits and readmissions for NOR patients. Our results suggest that NOR for pain management after breast surgery are safe and feasible.

Table: Non-opioid regimens by operation, 2016 vs. 2019

	Year				
	2016		2019		p-value
	# operations	# managed with NOR (%)	# operations	# managed with NOR (%)	
Lumpectomy	779	89 (11%)	924	497 (54%)	<0.001
Lumpectomy with nodal surgery	602	66 (11%)	672	265 (39%)	<0.001
Mastectomy without reconstruction	290	12 (4%)	322	51(16%)	<0.001
Mastectomy with reconstruction	201	1 (0.5%)	201	13 (7%)	0.02

787784 – Triple-blinded Prospective Study Assessing the Impact of Genomics and Artificial Intelligence Watson For Oncology (WFO) on MDT's Decision of Adjuvant Systemic Therapy for Hormone Receptor-positive Early Breast Carcinoma

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Background/Objective: Decision on adjuvant systemic therapy in hormone-positive early breast carcinoma is the only grey area in breast carcinoma management. This study was done to investigate the concordance between the results of genomic test (Endopredict), artificial intelligence (Watson For Oncology) and tumor board decision and implications of the same in clinical practice

Methods: This was a triple-blinded, prospective study. Decision regarding the adjuvant systemic therapy was done by the multidisciplinary tumor board (MDT) after reviewing the pathology reports and the results correlated with Endopredict test reports and artificial intelligence (Watson for Oncology).

Results: Total of 42 patients were included. Mean age was 58.3 years, 71.4% were post-menopausal. Breast conservation was done in 47.6%. There were 64.2% of patients who were T1-2N0 stage. Infiltrating ducal carcinoma was major type (83.3%). The MDT decided to give adjuvant chemotherapy for 25 patients (59.5%) and hormonal therapy for the rest. Recommendation by Watson For Oncology was to give adjuvant chemotherapy in 50%. Endopredict score (EPclin) resulted in a low-risk group of 22 patients (52.3%), while 15 (47.6%) had a high-risk EPclin score. Discordance between the endopredict test, Watson, and tumor board was for 11 patients (26.1%): 3 patients had a high-risk score, but the tumor board decision was to give hormonal therapy due to the age factor. Eight patients had a low-risk score, but tumor board decision was to give adjuvant chemotherapy. Extremes of age, premenopausal status, intermediate grade, and high Ki 67% values were the factors associated with discordance. The treatment decision changed for 4 patients (4/11, 36%) after reviewing the Endopredict test and Watson recommendation.

Conclusions: Tumor board decision can be more scientific and evidence based with the help of genomics and a learnt colleague in the form of Watson For Oncology. Even though the clinical experience is the important determinant of adjuvant therapy, genomic testing with artificial intelligence, which includes the scientific evidence, will guide in decision making. Long-term follow-up is needed for validation in our clinical setting.

788009 - Treatment Trends of Patients with Occult Primary Breast Cancer - An NCDB Study

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Background/Objective: Patients with axillary lymph node metastasis from an occult primary breast cancer (POBC) are an uncommon subset of patients seen in less than 0.3% of breast cancer cases. Current recommendation is to undergo either mastectomy with axillary lymph node dissection (MRM) or axillary lymph node dissection (ALND) alone followed by whole-breast irradiation. The objective of the current study is to use a population-based database to determine the demographics, tumor characteristics, and patterns of care of patients with OPBC who had axillary metastasis.

Methods: National Cancer Database patients with T0N+M0 invasive breast cancer were identified. We collected demographics and tumor characteristics and assessed surgical management (MRM versus ALND) as well as radiation and systemic therapy recommendations trends. Standard metrics were measured.

Results: We identified 890 patients with a mean age of 60.3 years of age; the majority of patients were white (78.4%) with a comorbidity score of 0 (83%) and treated at a comprehensive community center (42.5%). The most common breast cancer subtype was hormone-positive, HER2-negative in 44.2% of patients. When stratified into surgical approach, 414 (46.5%) patients underwent MRM, and 476 (53.4%) patients were treated with ALND. Patients who were treated at an academic center were more likely to have an ALND versus MRM for their surgical management (35.9% vs 24.6%; $p<0.001$). When looking at treatment trends, patients were less likely to have neoadjuvant systemic therapy if they were undergoing MRM versus ALND alone (49.3% vs 88.0%; $p<0.001$) but no difference was seen in adjuvant systemic therapy or radiation treatment. Factors such as age, race, comorbidity, clinical nodal stage, or tumor subtype were not statistically different among both surgical treatment groups (Table).

Conclusions: Primary occult breast cancer is rare, and current surgical management trends vary. In our study, ALND alone as the surgical modality seems to be more frequently performed in academic centers, and the majority of patients did not receive neoadjuvant systemic therapy. With recent studies suggesting further progress in axillary response rates, it is conceivable that in carefully selected patients who present with POBC, neoadjuvant systemic therapy for axillary downstaging may have a role in future management of this patient population.

Table: Practice patterns in women with T0, cN+ breast cancer stratified by surgery type (modified radical mastectomy vs. axillary lymph node dissection alone)

	Overall	MRM	ALND alone	p
n	890	414	476	
Year of Diagnosis				
2012	202 (22.7)	99 (23.9)	103 (21.6)	0.1
2013	235 (26.4)	121 (29.2)	114 (23.9)	
2014	212 (23.8)	96 (23.2)	116 (24.4)	
2015	241 (27.1)	98 (23.7)	143 (30.0)	
Age	60.3 ± 12.3	59.3 ± 12.4	61.2 ± 12.2	0.02
Race				
White	698 (78.4)	333 (80.4)	365 (76.7)	0.07
Black	151 (17.0)	59 (14.3)	92 (19.3)	
Other	37 (4.2)	21 (5.1)	16 (3.4)	
Comorbidity score				
0	739 (83.0)	340 (82.1)	399 (83.8)	0.76
1	125 (14.0)	61 (14.7)	64 (13.4)	
2+	26 (2.9)	13 (3.1)	13 (2.7)	
Median income				
<$38,000	158 (17.8)	75 (18.1)	83 (17.4)	0.68
$38,000-$47,999	160 (18.0)	68 (16.4)	92 (19.3)	
$48,000-$62,999	248 (27.9)	115 (27.8)	133 (27.9)	
$63,000 +	323 (36.3)	156 (37.7)	167 (35.1)	
Percentage with no high school diploma				
>=21%	130 (14.6)	59 (14.3)	71 (14.9)	0.85
13.0-20.9%	212 (23.8)	94 (22.7)	118 (24.8)	
7.0-12.9%	315 (35.4)	151 (36.5)	164 (34.5)	
< 7.0%	232 (26.1)	110 (26.6)	122 (25.6)	
Hospital category				
Community	92 (10.3)	58 (14.0)	34 (7.1)	<0.001
Comprehensive community	378 (42.5)	181 (43.7)	197 (41.4)	
Academic	273 (30.7)	102 (24.6)	171 (35.9)	
NCI	111 (12.5)	54 (13.0)	57 (12.0)	
Clinical nodal stage				
N1	590 (66.3)	288 (69.6)	302 (63.4)	0.12
N2	198 (22.2)	80 (19.3)	118 (24.8)	
N3	102 (11.5)	46 (11.1)	56 (11.8)	
Tumor subtype				
HR+ HER2-	393 (44.2)	183 (44.2)	210 (44.1)	0.65
HR+ HER2+	117 (13.1)	62 (15.0)	55 (11.6)	
HR- HER 2+	83 (9.3)	38 (9.2)	45 (9.5)	
HR- HER 2-	190 (21.3)	92 (22.2)	98 (20.6)	
Unknown	107 (12.0)	39 (9.4)	68 (14.3)	
Systemic neoadjuvant therapy				
No	623 (70.0)	204 (49.3)	419 (88.0)	<0.001
Yes	190 (21.3)	165 (39.9)	25 (5.3)	
Unknown	77 (8.7)	45 (10.9)	32 (6.7)	
Chemotherapy				
Yes	728 (81.8)	351 (84.8)	377 (79.2)	0.02
No	143 (16.1)	61 (14.7)	82 (17.2)	
Unknown	19 (2.1)	2 (0.5)	17 (3.6)	
Radiation				
Yes	569 (63.9)	245 (59.2)	324 (68.1)	0.03
No	317 (35.6)	168 (40.6)	149 (31.3)	
Unknown	4 (0.4)	1 (0.2)	3 (0.6)	

NCI- National Cancer Institute, HR- Hormone Receptor, (+) - positive, (-)- negative.

787878 - Breast Implant-associated Anaplastic Large-cell Lymphoma: A Prospective Series of 52 Patients

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Background/Objective: Breast implant-associated anaplastic large cell lymphoma (breast implant ALCL) is an uncommon T cell lymphoma that is associated with textured surface breast implants. The disease has received increasing attention over the last 20 years. Prior retrospective studies have begun to outline the clinical course of breast implant ALCL. We sought to evaluate patients at a single academic institution in a prospective manner to report patient presentation, clinical course, treatment, and outcomes in breast implant ALCL patients.

Methods: We prospectively followed women with cytologically proven breast implant ALCL from 2014 to 2018. Demographic, clinical, treatment, and outcome data were collected, and descriptive statistics were performed on variables of interest.

Results: We identified 52 women with pathologically confirmed breast implant ALCL. Implants were placed for augmentation in 61.5% of women and reconstruction in 36.5% of women. All of the 41 patients with known implant information had implants with textured surface. The majority of patients presented with delayed seroma (69.2%) and without systemic symptoms (86.5%). Most patients with staging information presented with Stage IA disease, defined as lymphoma confined to the peri-prosthetic effusion. The majority of patients with known surgical history underwent removal of the affected implant (98%) and removal of the contralateral implant (91%).

Conclusions: Further evaluation of the prospective and growing database of patients with breast implant ALCL will further improve our understanding of the disease and its clinical course. Robust participation in the breast implant ALCL PROFILE registry will improve our knowledge of long-term outcomes after implant placement. Finally, increasing awareness for patients and providers, especially the importance of en bloc resection and complete pathologic evaluation of the capsule, will lead to earlier diagnosis and improved outcomes for patients.

Table: BIA ALCL patient clinicopathologic characteristics

	N = 52 n (%)
Age (years)	
Mean	52.4 years
Range	35-76 years
Indication for Implant	
Augmentation	32 (61.5)
Reconstruction	19 (36.5)
Not reported	1 (1.9)
Implant Surface	
Smooth	0 (0)
Textured	41 (78.8)
Not reported	11 (21.2)
Presenting Symptoms*	
Breast skin lesion	1 (1.9)
Capsular contracture	11 (21.2)
Erythema	3 (5.8)
Pain	7 (13.5)
Palpable mass	6 (11.5)
Seroma	36 (69.2)
Systemic Symptoms	
Yes	5 (9.6)
No	45 (86.5)
Not reported	2 (3.8)
Time from Implant to Diagnosis	
Mean	119 months
Range	2-324 months
Surgical Removal of Affected Implant	
Yes	45 (86.5)
No	1 (1.9)
Unknown	6 (11.5)
Surgical Removal of Contralateral Implant	
Yes	42 (80.8)
No	4 (7.7)
Not reported	6 (11.5)
Stage	
IA (disease confined to effusion)	13 (25.0)
IB (early invasion within capsule)	2 (3.8)
IC (aggregate mass, confined by capsule)	2 (3.8)
IIA (invasive mass outside of capsule)	7 (13.5)
IIB (one regional lymph node involved)	0 (0)
III (multiple regional lymph nodes involved)	8 (15.4)
IV (distant metastasis)	2 (3.8)
Unknown	18 (34.6)

* Some patients presented with more than one symptom, therefore this row totals >100%.

Patient Education

786867 - A Decision Analytic Approach for Optimal Surgical Treatment in Early-stage Breast Cancer

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Background/Objective: Women with early-stage breast cancer are faced with various surgical options. Many objectives influence decisions regarding choice of surgery, and evaluating tradeoffs among multiple objectives becomes important especially when surgical treatment options may have similar oncologic outcomes, but may result in different quality of life outcomes. Although studies have reported statistically equivalent survival for breast-conserving therapy (BCT) and mastectomy, small differences in survival outcomes may influence patient decision making depending on how patients value survival-related objectives relative to quality of life objectives. The purpose of our study was to evaluate the influence of oncologic outcomes on the optimal patient surgical decision; we evaluated decisions based on oncologic, quality of life, and both oncologic + quality of life outcomes. We use decision analysis to evaluate how different surgical treatments best achieve patient objectives with an explicit evaluation of tradeoffs.

Methods: A decision analytic approach was paired with simulation modeling, allowing for an evaluation of multiple patient scenarios while incorporating uncertainty. The oncologic parameter was overall survival (OS) rate, calculated using a retrospective cohort of patients with early-stage invasive breast cancer in the National Cancer Database (2004-2016). The Kaplan-Meier estimator was used to examine OS by type of surgery (BCT, mastectomy, mastectomy + reconstruction), estrogen receptor (ER) and progesterone receptor (PR) status and stage (1, 2A, 2B). Quality of life objectives (e.g., satisfaction with breasts after surgery, surgical concerns, radiotherapy concerns, need for future testing/surveillance) and their utility values associated with each surgery type were obtained from the published literature. Variability in the optimal surgical decision was accounted for by incorporation of uncertainty in oncologic and quality of life parameter values and due to patient preferences for objectives. The simulation drew values from the uncertainty bounds for outcomes of each of the oncologic and quality of life objectives. Multi-criteria decision analysis was used to calculate the optimal surgical decision, using simulation to evaluate all possible scenarios representing patient rank orders for objectives.

Results: Of 750,795 patients in the NCDB representing women ≤70 years old, T0-T2 (≤5cm), N0-N1, M0, with no previous diagnosis of breast cancer or any previous malignant tumors, surgery types included BCT (n = 472,543), mastectomy (n = 165,465), and mastectomy + reconstruction (n = 112,787). Data were simulated for 120 scenarios (all combinations of rank order of preference for 5 objectives), generating 16,000 patients for each scenario. For each of the 120 scenarios, the optimal surgical decision was calculated across the 16,000 patients by maximizing the sum of the outcomes for each surgery type across all objectives, weighted by patient preference for objectives; the optimal decision was calculated for oncologic-only, quality of life only, and oncologic + quality of life objective scenarios. We evaluated the optimal

surgical decision for 12 different combinations of ER/PR status and stage. We demonstrate that under certain scenarios, a difference as small as 2% in overall survival may switch the optimal patient decision from mastectomy to BCT for patients who value survival objectives greater than quality of life objectives.

Conclusions: The addition of oncologic outcomes to quality of life-only objectives may change the optimal patient surgical decision to one that favors BCT over mastectomy under some scenarios. Information provided by surgeons may be an important determinant of surgical treatment decisions by patients, and therefore it is valuable for surgeons to understand how small differences in oncologic outcomes across treatments may alter optimal patient decisions for surgery type. Our decision analytic approach for evaluating the tradeoffs among oncologic and quality of life objectives on optimal surgical decisions for early-stage invasive breast cancer provides a framework that may form the basis of a shared decision making tool.

788078 - Predicting Adjuvant Endocrine Therapy Initiation and Adherence Among Older Women with Early-stage Breast Cancer

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Background/Objective: The C9343 trial demonstrated that women age 70 or older with early stage, ER-positive breast cancer may safely forgo radiation therapy (RT) and be treated with breast-conserving surgery (BCS) followed by adjuvant endocrine therapy (AET) alone. However, a large majority of patients in this population are still treated with RT. Additionally, AET adherence outside of the clinical trial setting is low and leaves AET non-adherent patients who also omit RT at an increased risk for breast cancer recurrence. Predicting AET adherence is not possible at the time a decision is made regarding RT. We sought to develop an algorithmic classifier to predict AET initiation and adherence for this population of older women with early stage breast cancer.

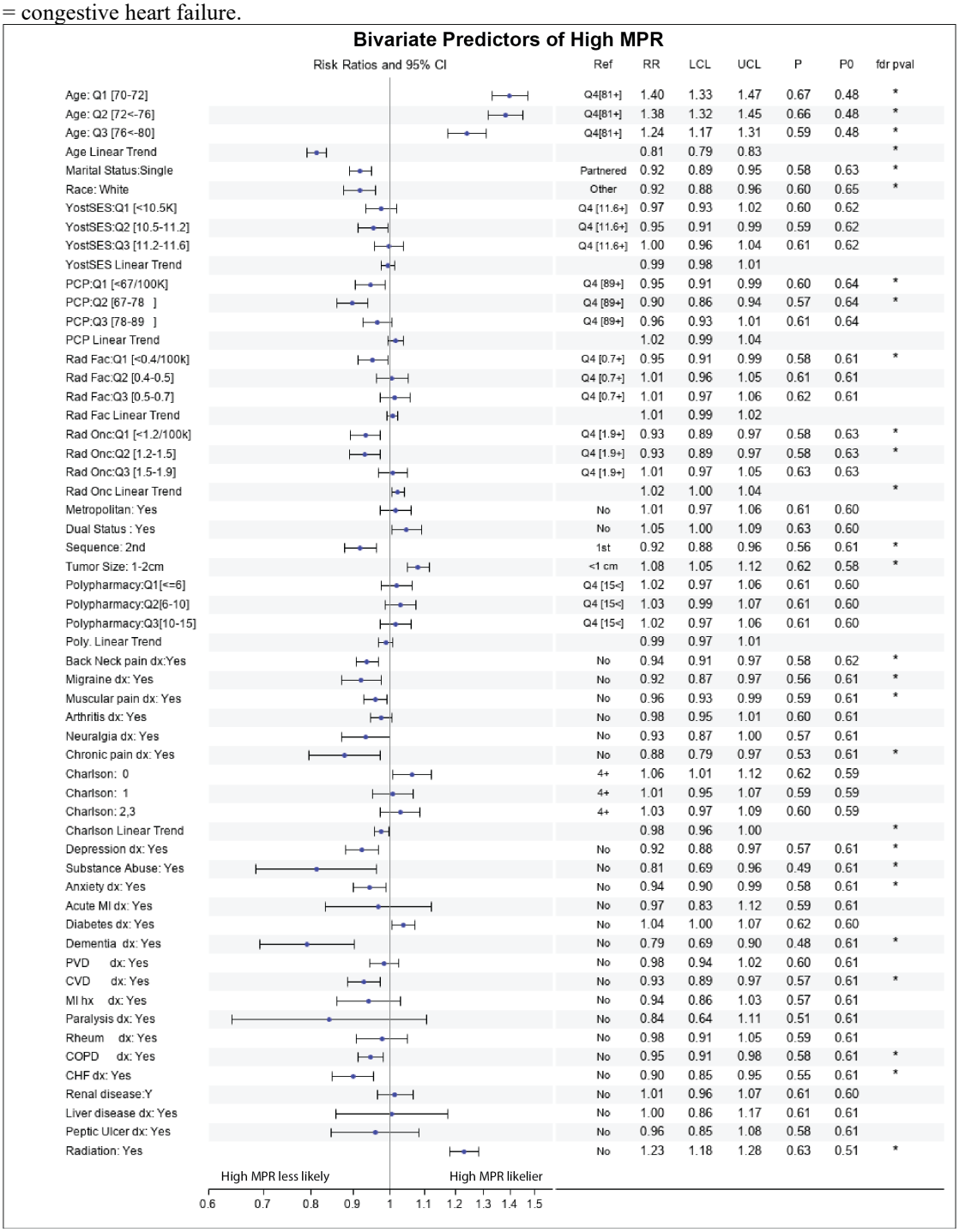
Methods: The Surveillance, Epidemiology, and End Results (SEER)-Medicare database was utilized to identify women diagnosed with breast cancer from 2007-2015 whose clinical characteristics matched the inclusion criteria of the C9343 trial. Patient comorbidities, socioeconomic measures, and demographics were collected as potential predictors. AET adherence was defined as having a medication possession ratio (MPR) $\geq$.80. Bivariate relative risks for each candidate predictor were examined, where significance was defined as a false discovery rate (FDR) adjusted p-value <0.05. The dataset was then divided into training (50%), validation (25%), and test datasets (25%). Using the training dataset, stepwise selection of significant predictors of AET initiation and AET adherence were used to develop a logistic-regression classifier. Varying models' performances were compared in the validation dataset using the c-statistic and Akaike Information Criterion. Actual performance of the final model was evaluated in the test dataset.

Results: We identified 11,037 patients who met the C9343 inclusion criteria. Of eligible patients, 8,703 (78.9%) initiated AET, and 8,523 (77.2%) underwent RT. Bivariate predictors of

AET initiation were similar to predictors of adherence. The table shows bivariate predictors of AET adherence. In the test data, the best AET initiation classifier was poorly predictive (c-statistic = .65), with a specificity of 53%, sensitivity of 69%, and positive predictive value (PPV) of 84%. Similarly, the AET adherence classifier was unreliable (c-statistic = .60), with a specificity of 49%, sensitivity of 64%, and PPV of 66%.

Conclusions: While not widely adopted, the C9343 trial supports omission of RT in older women with early-stage breast cancer. Initiation and adherence to AET are important factors in decision-making regarding whether or not to forgo adjuvant RT. We sought to develop a predictive model of AET initiation and adherence. Despite including a wide range of socioeconomic factors, social determinants of health, comorbidities, and cancer-specifics, the best model remained poorly predictive. The decision to initiate and adhere to AET is individual and complex and therefore difficult to predict from factors available in SEER. Future work should focus on improving individual prediction of AET initiation and adherence. This information will allow patients and clinicians to make an educated decision regarding RT omission after BCS.

Table: Bivariate predictors of high MPR for adjuvant endocrine therapy (AET). Significant predictors include age, marital status, race, access to primary care and radiation facilities as well as radiation oncologists, second cancer, tumor size, a number of medical comorbidities, and having radiation. YostSES = Yost socioeconomic index score; PCP = geographic primary care provider density per 100,000 people; Rad Fac = geographic radiation facility density per 100,000 people; Rad Onc = geographic radiation oncologist density per 100,000 people; Dual Status = Medicare and Medicaid dual status; Sequence = sequence of breast cancer in relation to other cancer diagnoses; Charlson = Charlson comorbidity index; dx = diagnosis; MI = myocardial infarction; PVD = peripheral vascular disease; CVD = cerebrovascular disease; Rheum = rheumatological disease; COPD = chronic obstructive pulmonary disease; CHF = congestive heart failure.



Phyllodes

784917 - Race-related Differences in the Clinical Presentation and Histologic Features of Phyllodes Tumors

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Background/Objective: Phyllodes tumor (PT) is a rare fibroepithelial lesion of the breast with variable malignant potential. Black women have a higher incidence of a related benign tumor, fibroadenoma, but there are limited epidemiological data on PT. The aim of our study was to evaluate race-related differences in the clinical presentation, histologic features, and outcomes of PT.

Methods: Our institutional pathology database was queried for breast specimen reports from January 2009 through October 2019 containing the search term "Phyllodes." All subsequent breast pathology reports of identified patients were reviewed. Demographic, clinical, and pathologic variables were extracted from charts of patients whose final breast specimen had a pathologic diagnosis of PT.

Results: Fifty-four records containing the search term "Phyllodes" were identified from 41 distinct patients. Among 31 who underwent mass excision, 12 had a final diagnosis of PT: 3 malignant, 2 borderline, and 7 benign. All women with malignant and borderline PTs were black, compared with 29% of those with benign PT. The remainder of the benign PT subgroup were white except for 1 Hispanic woman. The mean age at diagnosis was 50 years for both malignant and benign PT, compared with 32 years for borderline PT. The mass was detected by screening mammogram in 4 of the benign PT patients, and by the patient in the remainder. The mean tumor size was 13.7cm for malignant PT, 6.8cm for borderline PT, and 5.8cm for benign PT. Re-excision or mastectomy was indicated due to positive or close margins in 2/3 patients with malignant PT, 1/2 with borderline PT, and 3/7 with benign PT. One patient had a local recurrence 7 months after re-excision of a malignant PT to negative margins.

Conclusions: We observed disproportionate rates of aggressive features of PT among black women. A multi-institutional PT registry would facilitate improved knowledge about race-related differences in the presentation and outcomes of this rare tumor.

787722 - Excision of Breast Fibroepithelial Lesions: When Is It Still Necessary?

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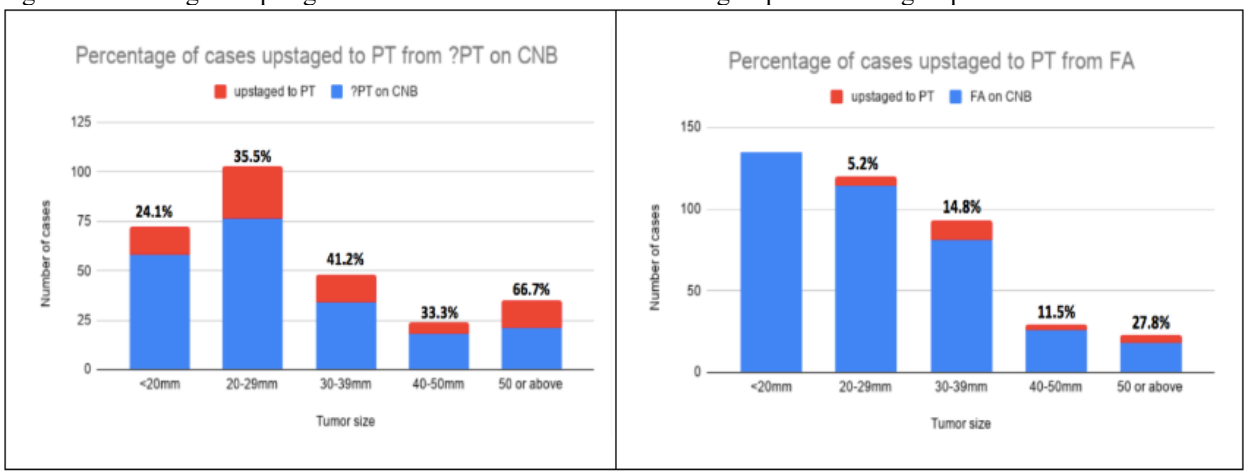
Background/Objective: Fibroepithelial lesions (FEL) range from benign fibroadenoma (FA) to malignant phyllodes tumor (PT). While FAs do not require routine excision, PTs require excision with negative margins. It is sometimes difficult to distinguish FA from PT on core needle biopsy (CNB) due to overlapping histological features. In such instances, pathologists may designate the lesion as an FEL and then add a comment of concern such as "cannot rule out phyllodes" (?PT). Additionally, it has been recommended for many years that FA over 3cm in size be excised to avoid missing PT. However, we have been unable to find literature to support that recommendation. The first objective of this study is to look for risk factors for upstaging to PT among all cases of FEL. The second objective is to assess whether the policy to excise FA 3cm in size or greater is justified, and identify a low-risk group that can be spared surgery.

Methods: Patients having surgery with FEL on CNB at Mt St Joseph hospital from 2009-2018 were identified from a prospective database. The association of clinical, radiology, and pathological features with upstage to PT was evaluated. Univariable and multivariable logistic regression analysis of variables was conducted to identify the risk factors of upstage to PT and trend analysis was performed to assess tumor size cut-offs.

Results: Of the 627 patients included in this study, 405 were identified as having FA on CNB, and 222 were identified as having ?PT on CNB. A total of 113 cases of PT were identified upon surgical excision, 27 had CNB of FA (6.7%), while 82 were upstaged from ?PT (36.9%). For ?PT the NPV for tumor size of 10-100mm ranged from 57% to 65%, and the percentage of upstage to PT ranged from 24% to 67% (Figure). However, the NPV among FA cases was consistently high, 88% to 99%, for all tumor sizes, and for tumors <37mm it is 95.6%. Using the size cut-off of 37mm, 86.2% of FA patients in our study could have avoided surgical excision of these lesions. There were no upstage to PT with CNB of FA that were less than 20mm in size (Figure). All cases of PT with CNB of FA were noted to be enlarging regardless of tumor size. While there was no association between age and risk of upstage to PT among FA cases, there was a 1.1% increase in risk per year in patients with ?PT on CNB ($p<0.001$). Lastly, there was no significant association between having a family history of breast cancer and risk of upstage to PT in both FA and ?PT groups.

Conclusions: Patients with ?PT on CNB should continue to have surgical excision to rule out PT. Based on size alone, we now recommend that patients identified with FA lesions that are 37mm or less in size can be considered for non-operative management. Lastly, FA lesions that are more than 20mm in size and enlarging should be surgically excised to avoid missing PT.

Figures: Percentage of upstage to PT at various tumor sizes in ?PT group versus FA group on CNB



788003 - Are Margins ≥1cm Really Necessary for Phyllodes Tumors?

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Background/Objective: The NCCN guidelines recommend wide local excision as the surgical treatment for phyllodes tumors with the intention of obtaining ≥1cm margins, as narrow margins have been associated with increased recurrence. We sought to determine final margin status and correlation with recurrence.

Methods: Retrospective review of phyllodes cases performed at a single tertiary institution from 2008 through 2018. Data collected included demographics, type of surgery, final margin status (defined as positive if tumor on ink, close if negative but ≤2mm, negative if 3-9mm and widely negative if margins ≥1cm), recurrence and length of follow-up. Statistical analysis was done using Fisher's exact tests for categorical variables and Wilcoxon 2-sample test for continuous variables.

Results: A total of 117 phyllodes cases were reviewed (67 benign, 16 borderline, and 34 malignant). Mean age of diagnoses was 36 years old for benign/borderline (group 1) vs. 50 years old for malignant (group 2) ($p<0.001$). Both groups were predominantly Hispanic. Group 2 had larger tumors by preoperative imaging, final pathology and tended to undergo mastectomy compared to partial mastectomy ($p<0.001$) (Table). There were positive margins at index operation in 23 (28%) patients in group 1 vs. 9 (26%) patients in group 2. All of the malignant cases with positive margins underwent re-excision (6 re-excision of margins and 3 mastectomy) compared to 13 cases (57%) in the benign/borderline group (13 re-excisions of margins). There were close margins in 20 (24%) cases of group 1 vs. 14 (41%) cases in group 2; of which 3 (15%) patients in group 1 vs. 4 (29%) patients in group 2 underwent re-excision. Adjuvant radiation was given to 18 of the 34 patients (53%) in group 2. Chemotherapy was rarely given. Seven (8%) patients in group 1 vs. 4 (12%) patients in group 2 had a recurrence. Mean recurrence time for malignant cases was 8.5 months [5.5-17.5 months] vs. 38 months in benign

cases [4.5-58.5 months]. In patients with close margins without re-excision, 2 out of 17 (12%) in group 1 vs. 2 out of 10 (20%) in group 2 had a local recurrence. Of the 10 patients in group 1 with positive margins without re-excision, 2 (20%) had a recurrence. Mean follow-up from surgery to last visit was 49 vs. 46 months for group 1 vs. group 2, respectively.

Conclusions: Despite close or positive margins in the benign/borderline group, local recurrence was low, indicating that margins ≤1cm may be acceptable without requiring a re-excision. In malignant phyllodes, only 9% had margins ≥1cm, yet the recurrence rate was low at 12%, possibly mitigated by adjuvant radiation. Consideration should be given to revising current guidelines for resection.

Table: Clinical and surgical characteristics

	Benign/Borderline (group 1) n= 83 (%)	Malignant (group 2) n= 34 (%)	*p* value
Race			0.213
White	29 (35)	9 (27)	
Black	11 (13)	10 (29)	
Hispanic	37 (45)	14 (41)	
Asian	6 (7)	1 (3)	
Size by imaging, cm	3.39	8.48	<0.001
Pathologic tumor size, cm	4.26	10.94	<0.001
Type of surgery			<0.001
Mastectomy	5 (6)	14 (41)	
Partial Mastectomy	37 (45)	12 (35)	
Excisional biopsy	41 (49)	8 (24)	
Margin status at index operation			0.124
Positive	23 (28)	9 (26)	
Close ≤ 2mm	20 (24)	14 (41)	
Negative 3-9mm	31 (37)	6 (18)	
Widely negative ≥1cm	6 (7)	3 (9)	
Negative, unquantified	3 (4)	2 (6)	
Re-excision if positive margin at index operation			0.030
Yes	13 (57)	9 (100)	
No	10 (43)		
Re-excision if close margins at index operation			0.410
Yes	3 (15)	4 (29)	
No	17 (85)	10 (71)	
Recurrence by margin status at index operation			
Positive	3	1	
Close ≤ 2mm	2	2	
Negative 3-9mm	1	0	
Widely negative ≥ 1cm	0	0	
Negative, unquantified	1	1	
Adjuvant chemotherapy			
Yes		2 (6)	
No		32 (94)	
Adjuvant radiation			
Yes		18 (53)	
No		16 (47)	
Receipt of adjuvant radiation by final margin at index operation			
Positive		5	
Close ≤ 2mm		6	
Negative 3-9mm		4	
Widely negative ≥1cm		3	

780761 - Variable Practice Patterns in a Contemporary Multi-institutional Cohort of 550 Cases of Phyllodes Tumors (2007-2017) Demonstrate a Need for More Individualized Margin Guidelines

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Background/Objective: Phyllodes tumors (PT) are rare breast neoplasms, for which there is little granular data on margins. Current guidelines recommend wide excision, with an attempt at ≥1cm margins, regardless of tumor grade. With recent data suggesting narrower margins may be sufficient, we sought to determine contemporary practice patterns.

Methods: We performed an 11-institution contemporary (2007-2017) review of PT practices. Demographics, surgical management, histopathologic factors, adjuvant therapy, and follow-up data were captured. Logistic regression was used to estimate the association of select covariates with likelihood of a secondary operation and local recurrence (LR).

Results: Of 550 PT patients, median age was 44 years. There were 81.3% (n=447) who had a pre-surgical core needle biopsy. There were 69.1% (n=380) who had clinical suspicion of PT prior to surgery. There were 54.9% (n=302) who had an excisional biopsy (no margin attempt), 38.2% (n=210) had lumpectomy/wide excision (attention to margins), and 6.2% (n=34) had mastectomy. There were 2.2% (n=12) who had nodal evaluation, and all nodes were negative (n=10 SLNB, n=2 ALND). Median tumor size was 30mm, 68.9% (n=379) were benign, 19.6% (n=108) borderline, and 10.5% (n=58) malignant on first operation. Surgical margins were positive in 42% (n=231), and negative in 56.4% (n=310). A second operation was performed in 37.6% (n=207) of the total cohort (87.9%, n=182 re-excision, 11.1%, n=23 mastectomy, 1.0%, n=2 excisional biopsy), including 49 patients with an initial negative margin (85.7% with <2mm), and 158 with an initial positive margin, with residual disease only found in 6. Notably, 32.0% (n=74) of those with an initial positive margin did not undergo a second operation, among whom only 2.7% (n=2) recurred (median follow-up 27.5 months). Recurrence occurred in 3.3% (n=18) of the total cohort (n=15 LR, n=3 distant), with a median follow-up of 36.7 months. LR by grade included 1.3% (n=5) of benign, 5.6% (n=6) borderline, and 6.9% (n=4) malignant; of these, 2 had final positive margins, 7 margins <2mm, 4 margins ≥2mm, and 2 unknown. (Table) LR (all PT grades) was not reduced with wider negative margin width (≥2mm vs. <2mm: OR=0.48, 95%CI 0.14-1.65, p=0.24). Positive vs. negative margin status was associated with higher odds of a second operation (OR=8.4, 95% CI 6.2-11.2), as were borderline and malignant vs benign grade (OR=4.8 and OR=11.8, respectively), after adjustment. Very few patients

received adjuvant chemotherapy (n=5, 0.9%), radiation (n=23, 4.2%), or died of disease (n=2, 0.4%).

Conclusions: In current practice, many patients have positive margins, despite high pre-surgical suspicion of PT, and many are managed outside current guidelines with final positive surgical margins. For the entire cohort, a final margin ≥2mm was not associated with a reduced risk of LR. Future multi-institutional prospective studies are needed to individualize recommendations based on tumor features, grade, and margin status.

Table: Negative margin width by initial operative type and phyllodes tumor grade

Final Negative Margin Width by Operative Type			
	Benign	**Borderline**	**Malignant**
Initial Operation, with Final Negative Margins (N=310)			
Excisional Biopsy (no attempt at margins) (N=107)			
<1 mm	42 (47.2%) **[1]**	9 (69.2%) **[1]**	1 (20%)
≥1-2mm	9 (10.1%)	4 (30.8%)	2 (40%)
≥2mm	7 (7.9%)	0 (0%)	1 (20%)
Unknown	31 (34.8%)	0 (0%)	1 (20%)
Lumpectomy / Wide Local Excision (N=172)			
<1 mm	29 (24.2%) **[2]**	9 (26.5%)	5 (27.8%) **[1]**
≥1-2mm	11 (9.2%)	6 (17.6%) **[1]**	3 (16.7%) **[1]**
≥2mm	64 (53.3%)	16 (47.1%) **[3]**	7 (38.9%)
Unknown	16 (13.3%)	3 (8.8%)	3 (16.7%) **[1]**
Mastectomy (all types) (N=31)			
<1 mm	1 (14.3%)	1 (12.5%)	3 (18.8%)
≥1-2mm	0 (0%)	0 (0%)	2 (12.5%)
≥2mm	5 (71.4%)	4 (50%)	5 (31.3%)
Unknown	1 (14.3%)	3 (37.5%)	6 (37.5%) **[1]**
*** † Total Local Recurrences by Grade**	**3**	**5**	**4**
[#] Patients with local recurrence (N=15)			
*** 1 Recurrence had initial positive margins, reoperation had no residual PT (initial benign)**			
† 2 Recurrences had initial positive margins, no 2nd operation (1 benign, 1 borderline)			

785408 - Phyllodes Patients' Perceptions of Care: Do They Trust Their Doctors?

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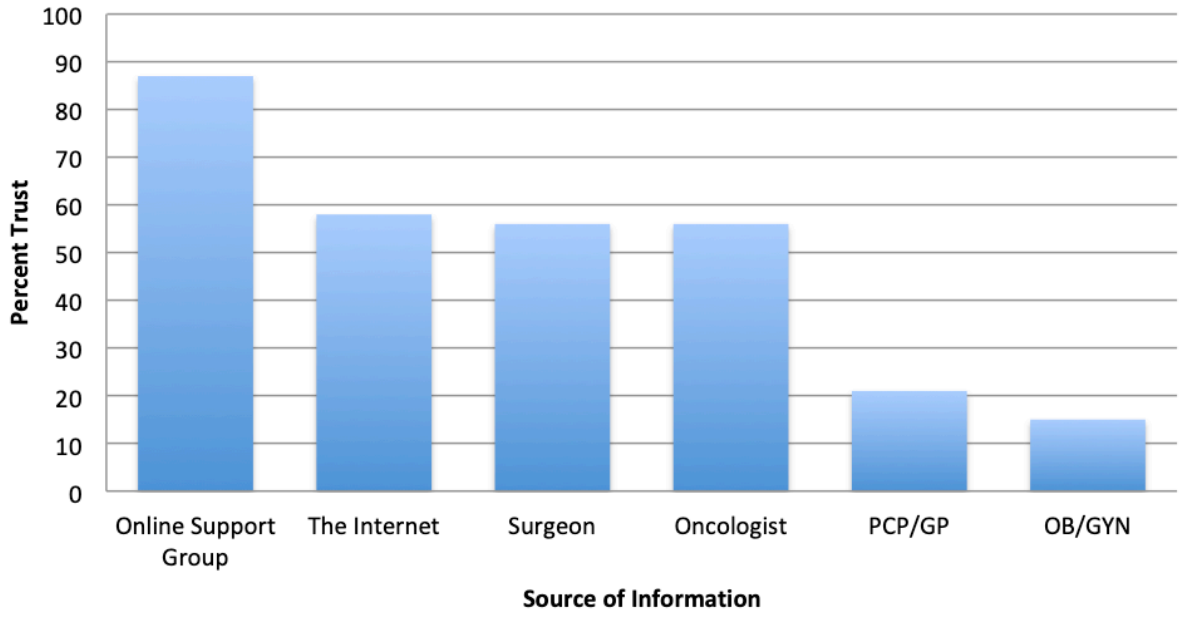
Background/Objective: Given its rare presentation, management of phyllodes tumors of the breast varies widely. This study aimed to survey patient perceptions of care and study phyllodes management methods and outcomes across the world, hypothesizing that the paucity of data and clear guidelines on phyllodes tumors would lead to distrust in medical professionals.

Methods: A RedCap survey link was sent to an online worldwide support group for phyllodes patients. Participants self-identified as phyllodes patients and voluntarily completed the survey.

Results: There were 93 respondents from 10 countries. Of these, 31.5% had benign, 25.8% were borderline, and 42.7% had malignant phyllodes tumors. There were 73% who were treated at a community hospital and 27% at an academic center. There were 59% who were operated on by breast surgeons, 30% by general surgeons, and 11% by surgical oncologists. There were 62% who underwent lumpectomy, 30.4% mastectomy, and 7.5% excisional biopsy. There were 50% of malignant tumors, and 17% of borderline tumors received radiation; none received chemotherapy. Twenty-one percent of patients experienced a recurrence (83% local; 17% distant). Seventy-nine percent of patients thought surgical margins should be ≥1cm for benign phyllodes tumors. Eighty-two percent believed malignant tumors should receive radiation, and 39% believed they should receive chemotherapy. Participants overwhelmingly trusted the online support group ($p<0.001$) over the Internet, surgeons, oncologists, primary care physicians, or OB/GYNs (see Figure).

Conclusions: This study was the first to examine patients' opinions of phyllodes management, which were more aggressive than current guidelines. Most patients prefer wide surgical margins even for benign phyllodes tumors despite recent data suggesting no association between margins and tumor recurrence. Furthermore, phyllodes patients were more likely to trust other patients and the Internet over medical professionals for information about phyllodes tumors. Given the discordance, more should be done in reaching out to phyllodes tumor patient advocates to build collaborations in care and educating both patients and physicians about phyllodes tumors.

Figure: Trust of various sources for phyllodes information



Quality Measures

785233 - Evaluation of SSI Risk Prediction Model for Breast Reconstruction Outcomes
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Background/Objective: Surgical site infections (SSI) in breast cancer patients can result in implant loss, delay in receipt of adjuvant therapy, patient dissatisfaction, psychosocial dysfunction, depression, and sexual dysfunction. The BRA Score is a validated model developed using the National Surgical Quality Improvement Program (NSQIP) and the Tracking Operations and Outcomes for Plastic Surgeons Program (TOPS) that determines risk of postoperative complications for patients undergoing mastectomy with immediate tissue expander or autologous reconstruction using 27 demographic variables and comorbidities. We aimed to determine the accuracy of the BRA Score for predicting SSI in our patient population, with a goal of identifying a subgroup of high-risk patients who might benefit from a tailored approach to infection prophylaxis in order to reduce risk.

Methods: Using the BRA Score, we calculated the risk of SSI for each of the 643 consecutive patients between 1/2017 and 6/2019 who underwent a mastectomy with immediate reconstruction at our institution. We assessed the model's accuracy in predicting SSI, defined as an abnormal swab and culture, at 30 and 365 days after surgery. For patients deemed to be high-risk for SSI, our standard practice is to implement preventive strategies such as preoperative chlorhexidine gluconate bathing and intranasal mupirocin application along with postoperative negative pressure wound dressings.

Results: A total of 643 patients with an average age of 53.0 ± 12.0 years and BMI of 30.3 ± 7.3 were reviewed. Within this cohort, 0.6% were smokers, 26% had hypertension, 0.8% had coronary artery disease, and 10% were diabetic. There were 8 occurrences (1.2%) of SSI within 30 days and 12 occurrences (5.9%) within 365 days of operation. ROC curves yielded 0.57 and 0.61 area under the curve for the 30 and 365 day analyses, respectively, reflecting a poor BRA score and SSI correlation. No patient with a calculated BRA Score of less than 2.3% developed a SSI, accounting for more than 15% of our patient population.

Conclusions: In our patient population, the BRA Score underperformed in predicting patients at higher risk for SSI. This is likely secondary to patient selection limiting the number of high-risk patients, use of measures such as negative wound pressure dressing to reduce SSI, as well as the differences between our SSI definition (abnormal swab and culture) and the NSQIP definition used by the BRA Score (purulent drainage, positive culture, or clinical signs). However, a very low BRA Score correlated with not developing SSI in a sizable fraction of our patients. It is possible that the model may be useful in identifying very low-risk patients in whom preventive measures such as negative pressure wound dressings can be eliminated without leading to adverse outcomes. It is important to validate risk prediction models in the population of interest prior to adoption into an institutional protocol.

788147 - Post-operative Pain Control in Patients Who Have Received the Breast-enhanced Recovery After Surgery Protocol

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Background/Objective: Increasingly, many different surgical subspecialties have adopted enhanced recovery after surgery (ERAS) programs to facilitate improved patient experiences in the post-operative setting. Using fewer narcotics and other pain management modalities to reduce patients' pain is particularly critical in the setting of the United States' current opioid addiction crisis. A breast ERAS (BERAS) protocol was implemented at our institution in February 2017. The primary goal of this study is to evaluate post-operative pain control with the implementation of the BERAS protocol. We hypothesize that the implementation of the BERAS protocol will improve post-operative pain control.

Methods: This is a retrospective chart analysis to determine the efficacy of the BERAS protocol when evaluating for pain control in the post-operative setting. This chart review covers a time span of 2 years from January 1, 2016 to June 30, 2019. February 2017 was when the BERAS protocol was first implemented at our institution. Exclusion criteria included patients who underwent breast surgery during the month of February 2017. We compared the pre-BERAS with the post-BERAS implementation group of breast patients for 3 breast surgeons at our institution.

Results: We evaluated patient's age, length of stay in hours, highest self-reported PACU pain scale, total morphine equivalents, PACU morphine equivalents, intraoperative morphine equivalents, and post-PACU morphine equivalents. Using the Mann-Whitney U Test, we found 4 areas of statistical significance. Patients in the post-BERAS group had a lower self-reported PACU pain scale (1.5 vs 5.5, $p=0.003$), a lower consumption of total morphine equivalents (10000 vs 26280, $p<0.001$), lower consumption of PACU morphine equivalents (0 vs 5000, $p=0.009$), and lower consumption of intraoperative morphine equivalents (8750 vs 25000, $p<0.001$).

Conclusions: Our results demonstrate that implementation of a breast-specific enhanced recovery after surgery protocol can significantly improve both the breast patient's perception of pain as well as their objective narcotic consumption. These findings are important not only for the optimization of patient care but for the prevention of further contribution to the growing opioid epidemic in the United States.

787241 - An Evaluation of Opiate Prescribing Patterns in Residents and Attendings in Breast Surgery

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Background/Objective: Prior studies have suggested that teaching hospitals prescribe more opiates than nonteaching hospitals. With residents as significant prescribers at these facilities, it is important to evaluate factors that influence overprescription. "Attending preference" has previously been cited as an important factor in opiate prescription practices by residents, though the attending perspective has not yet been assessed. In this study, we aim to compare opioid prescribing practices of residents and faculty in breast surgery and assess differences between stated preferences and their current practice.

Methods: Surgical residents and breast surgical oncology faculty at a large academic institution were emailed surveys assessing prescription patterns as well as the quantity of 5 milligram oxycodone tablets they would recommend prescribed at discharge for common breast procedures. Additionally, a retrospective review of opiates prescribed on discharge for opioid-naïve patients undergoing these procedures between Apr 1, 2018 – Sept 30, 2019 was performed. Descriptive statistics were used to analyze the data.

Results: Fifty-six of 72 (78%) categorical residents, 5 (100%) breast surgery, and 4 (100%) plastic surgery attendings completed the survey. Of 56 residents, 45 (80%) cited "attending preference" as a factor influencing the quantity of opiates prescribed, and 29 (52%) ranked it among top 5 factors. The table summarizes opiate prescription practices by group. The mean number of 5mg tablets of oxycodone recommended by residents was greater than that by breast attendings for all breast procedures (lumpectomy, mastectomy, modified radical mastectomy [MRM]). Retrospective review for lumpectomy and mastectomy confirmed that the number of tablets prescribed by residents was also greater than recommended by breast attendings. Conversely, for MRM and mastectomy with reconstruction, fewer tablets were actually prescribed than recommended by attending surgeons.

Conclusions: While residents cite "attending preference" as a key factor influencing opiate prescription practices, both resident-recommended and actual prescription quantities may not reflect stated faculty preferences. Even amongst faculty members, there is variation in preferred prescribing practices. These results indicate the need for improved education and communication between residents and faculty to standardize the amount of opiates prescribed for common breast procedures to decrease variation in prescription practices.

Table: Recommended vs actual opiates prescribed on discharge

Procedure	Residents' Recommendation (N=56)	Attending Breast Surgeons' Recommendation (N=5)	Attending Plastic Surgeons' Recommendation (N=4)	Actual Discharge Prescription
Lumpectomy ± SLNBx	10 [0-30]	7 [0-15]	N/A	12 [0-50], N=244
Mastectomy ± SLNBx	21 [8-40]	16.4 [10-30]	N/A	20.3 [0-40], N=28
Modified radical mastectomy	22 [10-50]	17.4 [10-30]	N/A	15.3 [0-30], N=13
Mastectomy + TE	N/A	N/A	29.5 [25-35]	26.3 [5-80], N=90
Mastectomy + DIEP flap	N/A	N/A	38.75 [25-50]	32.8 [20-55], N=13

All results show number of 5 milligram oxycodone tablets expressed as Mean [Range]. N/A = not assessed. SLNBx = sentinel lymph node biopsy. TE = tissue expander. DIEP = deep inferior epigastric perforator.

787555 - Calculating Quality Indicators for Mastectomy

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Background/Objective: There is current concern for the overtreatment of early-stage breast cancer. Breast-conserving surgery (BCS) is recommended for early breast cancer and may represent an opportunity to de-escalate surgical treatment. Quality indicators (QIs) have been published by European and American Breast Cancer Societies that should be monitored by a breast program. One recommended QI is the BCS rate, for which there are no published Canadian standards. Review of our practice in 2012 showed a higher-than-expected mastectomy rate. Our primary purpose was to calculate QIs for BCS rate and determine compliancy with American and European standards. Our secondary purpose was to examine reasons for mastectomy and identify opportunities to de-escalate surgery. We hypothesized that mastectomy rates will be higher at our institution than European standards due to a high number of medically necessary mastectomies.

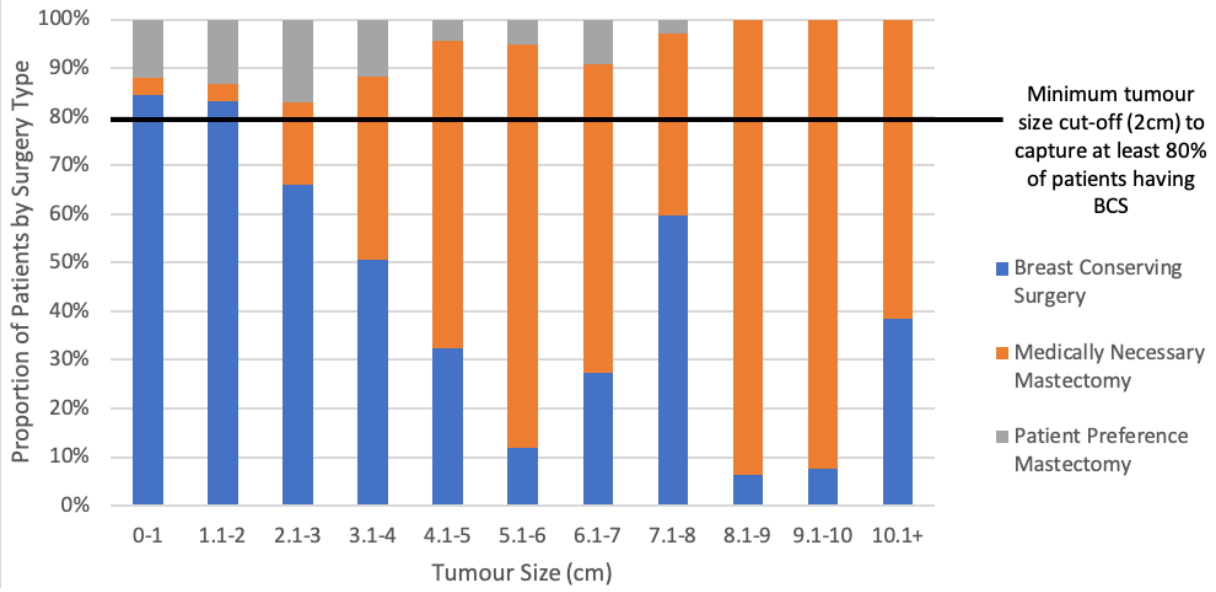
Methods: All patients who received a breast cancer surgery between 2013 to 2017 were identified using our institution's database. QIs for BCS rates were calculated and compared to American and European standards. Patients with unifocal first diagnosis of breast cancer were included, and patients with multifocal disease, neoadjuvant therapy, contraindication to radiotherapy, and BRCA1/2 predispositions were excluded. The reasons for mastectomy were prospectively collected and verified by chart review. Where appropriate, logistic or Poisson regression models were constructed for statistical analyses using R.

Results: Between 2013 to 2017, 3076 patients underwent breast cancer surgery, and 2311 met inclusion criteria. Our BCS rate for invasive cancer <3cm was 77.1%, invasive cancer <2cm was 84.1%, and in situ cancer (DCIS) <2cm was 84.9%. The single-operation rate for invasive cancer was 88.8% and 80.3% for DCIS. Despite an awareness of the high mastectomy rate in 2012,

there was no statistically significant change in BCS rates over the 5-year period, but there was a significant reduction in contralateral prophylactic mastectomy (CPM) rate from 31.6% to 17.3% ($p<0.001$). The highest BCS rate was among patients aged 40 to 74 with invasive cancer ($p<0.001$). For those patients having initial mastectomy, 72% were medically necessary, and 28% were by patient choice. When removing medically necessary mastectomies from the QI calculation, the BCS rate for invasive cancer <3cm was 83.4% and for DCIS <2cm was 90.48%. Within the patient preference mastectomy group, we identified a higher bilateral cancer rate but no difference in CPM rate nor a geographical influence. Trend analysis looking at tumour size and medical need for mastectomy indicated that 80% of patients at our centre would be eligible for BCS with tumour cut off of 2.5cm inclusively (Figure).

Conclusions: Our institution met American but not European QI standards for BCS rates. We identified a high number of medically necessary mastectomies, potentially indicating a difference in patient characteristics compared to Europe. However, when we removed the medically necessary mastectomies from the QI calculation, our institution met the European QI recommendations. Our results support the understanding that BCS rates are influenced by multiple factors and are challenging to compare across jurisdictions without standardized inclusion and exclusion criteria. CPM rates may offer a more actionable opportunity to de-escalate surgery for early-stage breast cancer than BCS rates.

Figure: Proportion of patients by surgery type according to tumour size



786152 - Access to Minimally Invasive Breast Biopsy in a Rural State

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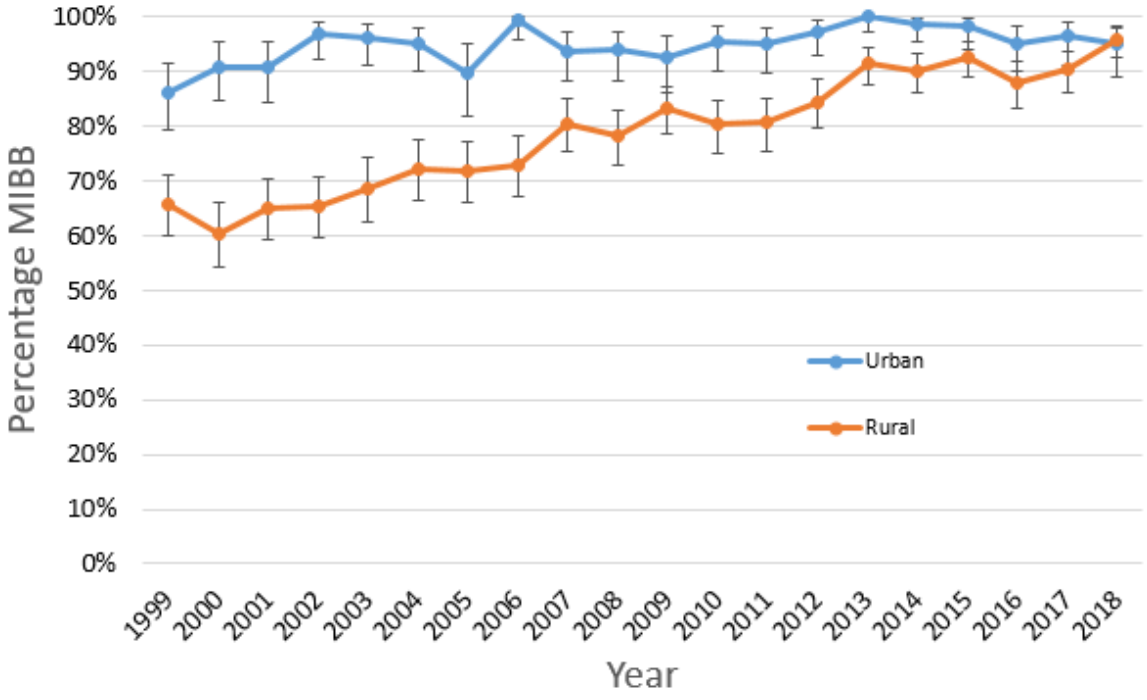
Background/Objective: Minimally invasive breast biopsy (MIBB), which includes core needle and fine needle biopsy, is considered the standard of care for the diagnosis of breast cancer, with consensus guidelines suggesting MIBB goals of 90% of total biopsy types. There have been several studies that have shown that patients in rural communities receive open biopsies at much higher rates than their urban counterparts. In a previous study of Vermont patients during the years 1998-2006, rural patients had open biopsy 42% of the time compared with 29% of urban patients. The aim of this study was to assess the overall population-based biopsy trends in Vermont, hypothesizing that there would be some facilities in which MIBB was less than 90%, but that all facilities would trend towards more MIBB.

Methods: The Vermont Breast Cancer Surveillance System (VBCSS) was used to identify women receiving minimally invasive and excisional breast biopsies in the state of Vermont. The participating institutions include 1 academic tertiary care medical center (the University of Vermont Medical Center), 7 critical access hospitals (CAHs), and 5 community hospitals (CHs). Diagnostic episodes were defined to begin with breast a biopsy (fine needle aspiration (FNA), core needle, or surgical excision) that was not preceded by a separate breast biopsy within the same breast in the past year. After internal validation, procedures performed by plastic surgeons were excluded to ensure exclusion of excisional procedures performed for cosmetic purposes. Patient ZIP code at time of the initial biopsy was used to determine the rurality of the patient's residence. This was accomplished by using rural urban commuting area codes (RUCA 2.0 ™), which classify U.S. census tracts using measures of urbanization, population density, and daily commuting. RUCA codes 1-3 were classified as urban, and RUCA codes 4-10 were classified as rural. StataIC 15 ™ was used to conduct all statistical analyses

Results: An initial sample size of 10,558 diagnostic episodes were identified between 1999-2018. After exclusion criteria were applied, 9,122 were available for analysis. MIBB was the initial biopsy method in 7,524 (82.5%) cases, while surgical excision was the initial biopsy method in the remaining 1,598 (17.5%) cases. The figure shows the percent MIBB performed in Vermont in rural and urban patients by year. A linear trend fit to the data estimated an average absolute increase of 1.3% per year ($p<0.001$, 95% CI 1.1-1.5%] in the fraction of patients undergoing MIBB. Patients living in rural areas were less likely to receive a MIBB (78.5%) than those living in urban areas (94.9%), p (chi-squared) <0.001. As time progressed however, the rate of MIBB in the rural patient category increased and met the 90% quality standard in 2013 and ultimately matched the urban patient rate of MIBB in 2018.

Conclusions: For the first time, we show that MIBB usage is above 90% in the state of Vermont, and that there no longer exists disparities in breast biopsies between urban and rural patients or rural/urban facilities overall. This study shows improvement in MIBB in a rural state and should support resource allocation and attention aimed at achieving high-quality breast cancer diagnosis practices across any demographic region

Figure: Percent of biopsies that were minimally invasive, by year and urban/rural status of patient's resident



788095 - Can Hospital System Type Accelerate the Journey to High-value Breast Cancer Surgical Care?

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Background/Objective: Breast reconstruction after mastectomy has well-established benefits with regards to patient well-being, without any oncologic downside. Hospitals in the United States are increasingly consolidated into health systems, and yet the clinical implications of this shift remain unclear. The purpose of this study was to determine if hospital system affiliation is associated with rate or cost of immediate reconstruction after mastectomy.

Methods: Female patients who underwent mastectomy alone, mastectomy with immediate reconstruction, or reconstruction alone for a personal or family history of breast cancer between 2013 and 2016 were selected from Healthcare Cost and Utilization Project State Inpatient Data in 9 nationally representative states. This patient data was linked to hospital data using American Hospital Association (AHA) annual survey data. Hospitals were characterized as non-system hospitals or as system-affiliated hospitals. Systems were defined by their geographic distribution as local, regional, multi-regional, or national (see Table for definitions). Patient and hospital characteristics were compared across hospitals by hospital affiliation. Wage-adjusted total cost of care in 2016 USD was compared across hospital affiliation types using clustered regression.

Results: We identified 29,813 patients who underwent mastectomy alone (6,189 patients, 20.8%), mastectomy with immediate reconstruction (6,783 patients, 22.8%), or reconstruction alone (16,841 patients, 56.5%) in 67 non-system hospitals and 211 system-based hospitals in 64

health systems. Within the study states, the majority of patients were treated at hospitals affiliated with a system. Representative hospital characteristics can be seen in the Table. Regardless of system type, annual case volume per hospital ranged widely for all operations studied. Immediate reconstruction rates varied significantly by hospital affiliation, with national system hospitals doing the fewest mean cases per year (p=0.004). Hospitals affiliated with national health systems also performed the fewest reconstruction-only cases per year (p=0.001). Mean total case cost varied significantly by hospital affiliation, with hospitals affiliated with national systems achieving the lowest case cost overall, and for each operation type (p<0.05 for all).

Conclusions: The wide range of mean case volume per hospital is a clear target for improved efficiencies in surgical breast cancer care. Further, the disparate use of immediate reconstruction across hospital affiliation types provides an opportunity for improved access to comprehensive care. Finally, financially important differences in the case cost across system types suggest an opportunity for improvement in the value of surgical breast cancer care.

Table: Patient characteristics, hospital characteristics and mean total case cost by hospital affiliation

Patient Characteristics	**Total**	**Hospital Affiliation**					**p-value**
		Non-system	**Local Systems (Single Metropolitan Statistical Area)**	**Regional Systems (Single AHA Region)**	**Multi-Regional Systems (2-7 States)**	**National (8+ states)**	
# Patients, n (%)	29,813 (100%)	8,391 (28.1%)	5,191 (17.4%)	8,282 (27.8%)	2,866 (9.6%)	5,083 (17.0%)	
Age, years, mean (SD)	55 (12.8)	54.6 (12.6)	54.8 (12.3)	53.1 (12.3)	55.1 (12.2)	58.9 (13.6)	<0.001
Race – Black, n (%)	3,163 (11.4%)	978 (12.2%)	597 (12.1%)	734 (10.0%)	179 (6.5%)	675 (14.3%)	<0.001
Hospital Characteristics							
# of Systems (n)	64	N/A	22	19	17	10	
Mean # of Hospitals per system, n (SD)	3.4 (3.9)	N/A	2.1 (1.0)	3.1 (2.0)	2.1 (1.7)	8.9 (7.4)	<0.001
Mean Annual Case Volume per Hospital							
Mastectomy only, n (range)	8.5 (1-148)	10.3 (1-148)	7.5 (1-60)	8.7 (1-74)	9.1 (1-55)	7.3 (1-38)	0.542
Mastectomy with Reconstruction, n (range)	10.3 (1-162)	12.1 (1-162)	8.5 (1-48)	14.9 (1-130)	11.7 (1-111)	5.7 (1-28)	0.004
Reconstruction only, n (range)	17.8 (1-379)	22.1 (1-229)	20.8 (1-223)	23.5 (1-379)	15.6 (1-145)	9.1 (1-74)	0.001
Mean Total Case Cost							
All operation types, $ (SD)	16,718 (7,331)	17,045 (6,238)	17,934 (7,247)	19,122 (8,361)	15,157 (7,309)	14,609 (6,696)	0.001
Mastectomy only, $ (SD)	16,101 (6,909)	16,780 (6,220)	17,283 (6,829)	18,594 (8,028)	14,489 (6,620)	13,645 (5,813)	<0.001
Mastectomy with reconstruction, $ (SD)	17,106 (6,999)	17,619 (6,248)	17,660 (6,957)	19,636 (7,743)	15,608 (6,817)	14,879 (6,297)	0.002
Reconstruction only, $ (SD)	17,224 (7,271)	17,717 (6,077)	18,417 (7,243)	19,362 (8,075)	15,524 (7,455)	15,139 (6,805)	0.002
Note: Patients may be included in more than one category as those undergoing delayed reconstruction may be counted as Mastectomy only and Reconstruction only.							

787414 - Impact of a Preoperative Peripheral Nerve Block in an Enhanced Recovery After Surgery Protocol versus Direct Injection of Liposomal Bupivacaine for Mastectomy with Immediate Breast Reconstruction

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Background/Objective: An Enhanced Recovery After Surgery (ERAS) protocol using a preoperative peripheral pectoralis nerve block under ultrasound guidance (PECS) has been shown to decrease opioid pain medication requirements. Prior to implementation of our ERAS protocol for mastectomy patients, plastic surgeons injected liposomal bupivacaine intraoperatively under direct visualization (DI), a proven method to relieve postoperative pain. The objective of this study was to compare morphine milligram equivalents (MMEs) and operative factors between PECS blocks and DI.

Methods: We conducted a retrospective review of patients undergoing mastectomy with immediate prosthetic breast reconstruction from April 2016 to May 2019. Patients who underwent PECS block were compared to patients who underwent DI by the plastic surgeon. Patient-reported visual analog scale (VAS) pain scores, postoperative narcotic usage in morphine milligram equivalents (MMEs), total time in the operating room, and length of hospital stay were compared between the PECS block and DI groups. Wilcoxon rank-sum tests and multivariable linear regression analysis was used to compare outcomes between groups.

Results: A total of 108 PECS patients and 154 DI patients were studied. The DI group reported lower pain scores on the day of surgery ($p=0.01$), but pain scores were no different between DI and PECS groups on postoperative days 1 and 2. However, postoperative narcotic usage was significantly less in the PECS block group ($p<0.01$) by 18.5 MMEs (Table). The PECS block group was associated with a longer operative time ($p<0.01$) regardless if the operation was uni- or bilateral mastectomy by an average of 23 minutes. Mean length of hospital stay for PECS block patients was significantly less than the DI group by about 7 hours ($p<0.01$). On multivariable analysis adjusting for patient age, body mass index, and laterality of surgery, pain scores on the day of surgery, postoperative narcotic use, and length of stay differences remained statistically significant (all $p<0.01$).

Conclusions: Patient-reported pain scores were no different between PECS blocks and DI, but MMEs and LOS were significantly less in the PECS blocks group. These data demonstrate the advantages of an ERAS protocol using a peripheral nerve block prior to making an incision despite the longer operative time.

Table: Comparison of postoperative outcomes

	PECS (n =108)	DI (n=154)	p value
Maximum Pain Score, [Mean ± SD]			
Postoperative Day 0	6.6 ± 2.2	5.8 ± 2.3	**0.01**
Postoperative Day 1	5.0 ± 2.1	5.3 ± 2.2	0.14
Postoperative Day 2	5.60 ± 2.3	6.1 ± 1.5	0.43
Postoperative narcotic use, MMEs [Median (Q1-Q3)]	7.9 (2.5-22.5)	26.4 (15.0-50.6)	<**0.01**
Operating Room Time, min [Mean ± SD]			
Unilateral	207 ± 50	182 ± 35	**0.04**
Bilateral	236 ± 44	221 ± 40	**0.02**
Length of stay, hours [Mean ± SD]	31 ± 9	38 ± 13	<**0.01**

787086 - Trends in Palliative Care Utilization in Patients with Advanced Breast Cancer

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Background/Objective: When breast cancer is diagnosed at an advanced stage, patients have limited curative treatment options. Palliative care treatments including surgery, chemotherapy, radiation, and/or pain management, have been recognized as an important modality for patients at all stages of cancer, but especially in those with advanced disease. Given the limited research on the topic, we hypothesized that the utilization of palliative care would increase over time among patients with advanced breast cancer.

Methods: We identified patients with Stage IV breast cancer from the National Cancer Database (NCDB) data between 2005 and 2016. Chi-square tests were used to examine subgroup differences between patients based on the receipt of palliative care. Multivariate analyses including logistic regression were used to examine the clinical and demographic factors associated with the utilization of palliative care for these patients.

Results: Our final cohort included 57,444 patients, in whom there was a gradual trend towards increased receipt of some form of palliative care over the 12-year period. In earlier years, 2005-2006, only 18.3% of patients were utilizing palliative care services in 2005-2006. This increased to 25.2% in the later years, 2015-2016. Palliative chemotherapy utilization increased from 4.4% in 2005-2006 to 10.3% in 2015-2016 ($p<.001$), while combination increased from 2% to 5% over the same time period ($p<.001$). We also found that elderly patients, white Hispanics, those from the Midwest, South Atlantic, and West Coast, and patients without insurance were less likely to receive palliative care ($p<.001$). Of note, in more recent years (2015-2016 vs 2005-2006) patients were one and a half times as likely to receive palliative care (OR 1.510, $p<.001$) after controlling for the clinical and demographic factors.

Conclusions: Our study is the first to show that the utilization of palliative care in patients with advanced breast cancer has increased over this 12-year time period. However, a majority of

patients, 74.9%, diagnosed in 2015-2016 were still not receiving any palliative care. In addition, we found that certain population were less likely to utilize palliative care. This shows that there is much room for improvement in provider and patient education about palliative care options, as it is important for all cancer patients, especially in those with late-stage cancer. In addition, further studies to elucidate why certain population were less likely to partake in palliative care would be helpful.

Table: Palliative care utilization in Stage IV breast cancer patients over a 12-year period (entire cohort = 57,444)

	2005-2006 (N=5614)	2007-2008 (N=7416)	2009-2010 (N=9310)	2011-2012 (N=10523)	2013-2014 (N=11834)	2015-2016 (N=12747)	p value
Type of Palliative Care Provided							<0.001
No Palliative Care	4585 (81.7%)	6103 (82.3%)	7542 (81%)	8358 (79.4%)	9140 (77.2%)	9553 (74.8%)	
Surgery	43 (0.8%)	69 (0.9%)	76 (0.8%)	84 (0.8%)	83 (0.7%)	84 (0.7%)	
Radiation	567 (10.1%)	636 (8.6%)	829 (8.9%)	957 (9.1%)	1005 (8.5%)	1020 (8%)	
Chemotherapy	248 (4.4%)	353 (4.8%)	466 (5%)	660 (6.3%)	1008 (8.5%)	1309 (10.3%)	
Pain Management	56 (1%)	72 (1%)	100 (1.1%)	106 (1%)	100 (0.8%)	147 (1.2%)	
Combination Therapy	115 (2%)	183 (2.5%)	297 (3.2%)	358 (3.4%)	498 (4.2%)	634 (5%)	

788307 - Hospital Cost Reduction and Improved Outcomes with Intraoperative Administration of Pectoral Nerve Blocks During Mastectomy

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Background/Objective: Opioid dependence is a growing epidemic in our nation, and physicians across specialties are seeking to minimize prescription of narcotic pain medications by adopting multimodal analgesic modalities. Nevertheless, optimal pain control to facilitate rehabilitation promoting return to activities of daily living remain priorities. The purpose of this study was to evaluate the effectiveness of intraoperatively performing pectoral nerve blocks to reduce postoperative pain after mastectomy. Additionally, we aimed to demonstrate the efficiency of patient progression through care with optimal pain control.

Methods: A retrospective cohort study was conducted of all mastectomy procedures performed by a single surgeon at a tertiary hospital. Patients were grouped based on procedure date being before (February 2014 to January 2015) or after (February 2017 to January 2018) implementation of a novel intraoperative pectoral nerve block protocol. Inclusion criteria were females 18 to 74 years of age with a diagnosis of breast cancer opting for mastectomy as surgical treatment. Primary outcomes were postoperative morphine equivalents administered and pain scale ratings. Secondary outcomes included postoperative supplemental oxygen utilization, ambulation, oral intake, nausea, emesis, orientation, and duration of time in the post-anesthesia care unit (PACU).

Results: Eighty-eight female patients with breast cancer met inclusion criteria, with 47.7% (n=42 of 88) receiving intraoperative pectoral nerve block and 52.3% (n=46 of 88) not receiving

nerve block. Morphine milligram equivalents (MME) administered in the 23-hour postoperative period to those receiving the pectoral nerve block (median 23.88 MME, 95% CI 17.5-32.5) was statistically similar (p=.258) to those not receiving nerve block (median 20.25 MME, 95% CI 15.0-30.0). Duration of PACU stay was significantly shorter for those receiving intraoperative pectoral nerve blocks (p=.001; median 74 min 95% CI 69-79 vs 118 min 95% CI 86-164). Thereafter, patients requiring supplemental oxygen upon arriving to the floor was significantly fewer in those receiving pectoral nerve blocks (p<.001; 19%, n=8 of 42 vs 60.9%, n=28 of 46). Additionally, patient requiring supplemental oxygen at discharge was significantly fewer in those receiving pectoral nerve blocks (p=.005; 0%, n=0 of 42 vs. 17.4%, n=8 of 46). Median difference of PACU time was 44 minutes per patient, which translates into a cost savings of $352 per patients using estimated $8/min cost of PACU services. Cost incurred for intraoperative administration of pectoral nerve blocks are estimated at $10 for the vascular access catheter, $8.96 for the Kirschner wire, $16 for 0.25% bupivacaine with epinephrine, and $62 for the 1 minute of operating room utilization added to the procedure. This translates into a net hospital cost savings of approximately $255.04 per patient.

Conclusions: Intraoperative pectoral nerve blocks are an effective component of multimodal analgesic therapy for mastectomy with significantly decreased postoperative duration in the PACU, significantly decreased supplemental oxygen requirement on the floor, and significantly decreased supplemental oxygen requirement at discharge. The dramatically shortened stay in the PACU translates into cost savings for the health care system and increased efficiency by facilitating operating suite throughput. Decreased dependence on supplemental oxygen could be interpreted as an indication of higher quality of recovery and more appropriate use of narcotics to manage postoperative pain. It was surprising that overall morphine milligram equivalents were not significantly decreased in this cohort. Nevertheless, the localized administration of analgesics minimized systemic effects of otherwise enteral or parenteral administration, which could have contributed to this demonstrated improved postoperative respiratory performance. These data support the continued utilization of this intraoperative pectoral nerve block protocol. Further prospective long-term study is necessary to elucidate the contribution of confounding variability in other clinical practices across the timespan of these cohorts.

782458 - Has the National Accreditation Program for Breast Centers 50% Breast-conserving Surgery Standard Become Obsolete?

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Background/Objective: One of the National Accreditation Program for Breast Center's (NAPBC) standards requires that 50% of all eligible AJCC Stage 0-II patients undergo breast-conserving surgery (BCS). The objective of this study was to determine the proportion of centers that are not compliant with this standard and patient, tumor, and facility factors associated with noncompliance.

Methods: Centers were considered compliant with this standard if >=50% of Stage 0-II disease underwent BCS. Compliance rates were assessed before and after accreditation from 2008-2016 to determine the impact of accreditation on compliance rates. Patient and tumor characteristics were compared between non-compliant and compliant centers. A multivariate analysis adjusting for patient, tumor, and facility factors was conducted to determine independent predictors of non-compliance amongst NAPBC centers.

Results: There were a total of 65,819 patients treated at 451 NAPBC centers and 77,555 patients at 815 non-NAPBC centers from 2008-2016. In 2016, the most recent year available, 14 (3.1%) of NAPBC centers and 60 (7.4%) of 815 non-NAPBC centers were noncompliant with the 50% BCS standard. Overall, compliance rates were 90.8% in 2008 when NAPBC accreditation began compared to 96.9% in 2016 ($p<0.001$). Compliance rates increased from before to after accreditation for all years, but trends were only significant for NAPBC centers accredited from 2009 to 2013 ($p<0.05$). Ten of the 14 (71%) noncompliant NAPBC centers were at 40% compliance rates. Five (35.7%) of the noncompliant NAPBC centers were located in the West South Central and 3 (21.4%) in the South Atlantic region. Nine (64.2%) were community cancer centers. Ninety-three (20.6%) of noncompliant centers had annual breast cancer volumes <100, 233 (51.7%) had 100-250 cases and 125 (27.7%) had >250 cases. Multivariate analysis showed that older age, African American and Hispanic race, larger tumor size, longer facility distance, region of the country, lower annual case volume, and community cancer facility type were significant independent factors associated with noncompliance.

Conclusions: More than 95% of NAPBC centers are performing BCS on 50% of their Stage 0-II breast cancer patients. NAPBC accreditation was associated with increased compliance rates. These data suggest that NAPBC centers are performing well with the 50% BCS standard and perhaps this standard deserves some revision.

Radiation

787658 - 1200 Patients Treated with Intraoperative Radiation Therapy (IORT): Analyzed by Different Lengths of Follow-up

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Background/Objective: Intraoperative radiotherapy (IORT) permits accurate delivery of radiation therapy directly to the tumor bed at the time of surgery, greatly simplifying breast conservation. Two prospective randomized trials have been published (ELIOT and TARGIT A), supporting IORT as a possible alternative to whole breast radiation therapy (WBRT). This report analyzes the probability of local recurrence among 1200 patients treated with IORT at the same facility, with an average follow-up of 41 months. To determine whether 41 months of follow-up yielded accurate results, we looked as smaller groups of earlier patients with longer follow-up.

Methods: IORT was delivered using the Xoft Axxent eBxTM System to 1200 consecutive patients from May 2010 to September 2019. Local recurrence was the endpoint of the study. All ipsilateral tumor events were included, both invasive and DCIS, regardless of location (same or different quadrant). The patients were analyzed by the first 400 vs the first 600 vs the first 800 vs the first 1000 vs all 1200. Kaplan-Meier Analysis was used to calculate the probability of local recurrence for each group. Groups were compared using the log-rank test.

Results: The table shows the median follow-up, the number of recurrences, and the 4- and 5-year probabilities of local recurrence for each group. As the groups get larger, recurrences increase and follow-up decreases. In spite of the decreasing length of follow-up, there is no statistical difference between any of the groups. When the first 400 is compared with all 1200, the difference is not significant (p=0.31).

Conclusions: The 5-year probability of local recurrence for 1200 patients treated with IORT was 5.9%. Statistical evaluation suggests this is accurate. When invasive recurrence is the endpoint, the probability of local invasive recurrence at 5 years drops to 4.5%. If any recurrence (invasive and DCIS) in the same quadrant is the endpoint, the 5-year probability drops to 3.4%. IORT appears to be a safe alternative to WBRT in properly selected patients. Longer follow-up is not likely to increase the 5-year probability of recurrence.

Table: Follow-up, recurrences, and probabilities of local recurrence

By Date Rx	Follow-Up Years (Months)	Number of Recurrences	4-Year Recurrence	5-Year Recurrence
1st 400	5.6 years (68)	20	3.3%	4.8%
1st 600	5.1 years (61)	28	3.3%	4.8%
1st 800	4.5 years (54)	37	3.8%	5.5%
1st 1000	3.9 years (47)	43	4.3%	6.0%
1st 1200	3.4 years (41)	43	4.2%	5.9%

787582 - Effect of Oncoplastic Reduction Mammoplasty on Timing of Radiation Therapy in Women Undergoing Breast-conserving Surgery for Breast Cancer

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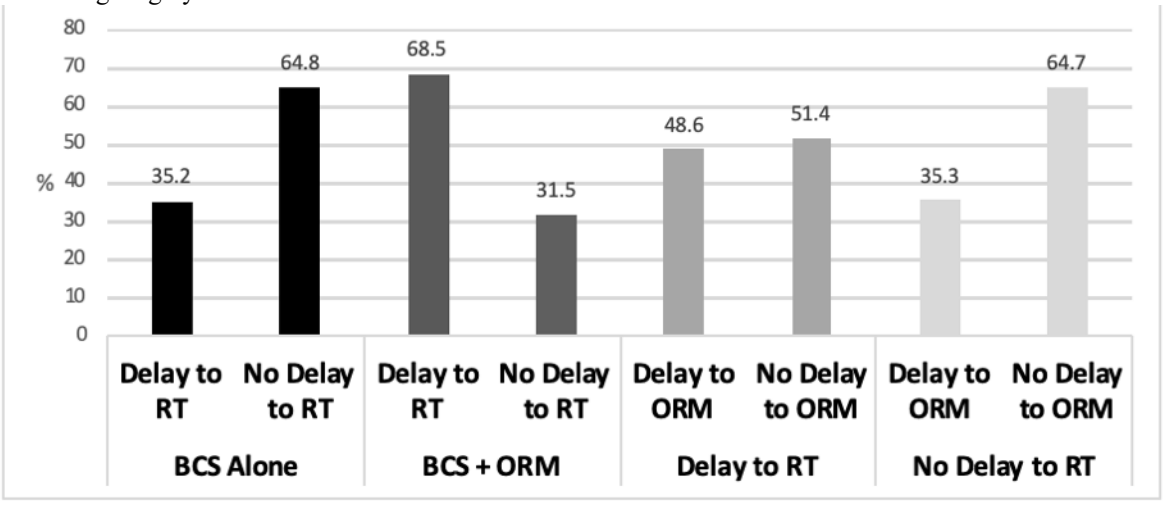
Background/Objective: Women undergoing breast-conserving surgery (BCS) for breast cancer have compromised local control rates if radiation treatment (RT) is delayed. Oncoplastic reduction mammoplasty (ORM) has expanded the utilization of breast-conservation therapy (BCT) by decreasing the rate of wound healing complications, asymmetry, and radiotoxicity otherwise seen when ORM is performed after RT. ORM can delay RT. To maximize oncological, functional, and cosmetic outcomes, we examined if ORM performed after BCS lead to delay in RT, and what factors may contribute to this delay.

Methods: Our tumor registry was queried for patients with primary breast cancer who had BCS +/- RM followed by RT from 2009-2017. We included patients ≥18 years with known stage and margins. We excluded patients who were male, pregnant, underwent adjuvant chemotherapy, or did not complete RT. We defined delay to RT as >8 weeks from BCS, and delay to RM as >14 days from BCS. A control cohort matched on age, BMI, and year of surgery was obtained using propensity matching. Univariable logistic regression models were used to estimate association age, BMI, tobacco use, diabetes, year of surgery, and insurance status with delay of BCS to ORM, and BCS to RT. Multivariable models controlling for the same variables were used to estimate association of time interval between BCS to ORM and BCS to RT.

Results: Of the 103 queried, 54 patients met criteria. In the control group, the median time between BCS and RT was 44 days (IQR=36-68). In patients who underwent ORM, the median time interval between BCS and ORM was 14 days (IQR=12-20), and 52 (IQR=40-72) days between ORM and RT. A delay from BCS to ORM was seen in 24 (44%) patients. Delay to ORM did not predict delay to RT; with 18 (75%) delayed to both ORM and RT, and 19 (63%) who were RT delayed but not ORM delayed (p=0.394). For patients delayed to RT, 19 (33.9%) had BCS alone, and 37 (66.1%) had ORM (Figure). In multivariable analysis, those undergoing ORM were 5 times more likely to have delayed RT compared to non-ORM patients (p=0004, OR 5.29, CI 2.09-13.4). BMI as a continuously increasing variable was also associated with RT delay for both groups (p=0.02, OR 1.07 95% CI 1.01-1.14). In ORM patients, delayed RT was not associated with delay to ORM, BMI, smoking, diabetes, insurance status, age, or year of surgery.

Conclusions: Women who underwent BCS for treatment of breast cancer experienced a 5 times greater risk for RT delay if they had ORM when compared to those who did not. Increasing BMI is also associated with risk of RT delay. Within the ORM group alone, delay to RM and clinicodemographic characteristics were not associated with delay to RT. Women undergoing BCS with ORM experience RT delays that are not solely accounted for by delay to ORM, suggesting role of additional risk factors yet to be identified.

Figure: Delay to oncoplastic reduction mammoplasty and radiation therapy for women undergoing breast-conserving surgery for breast cancer



786764 - Comparing Outcomes of Adjuvant Radiation Therapy Following Nipple-sparing Mastectomy with Prepectoral versus Subpectoral Implant-based Breast Reconstruction

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Background/Objective: Nipple-sparing mastectomy (NSM) is an increasingly popular breast reconstructive technique that offers superior cosmetic and psychological benefits to patients without compromising oncologic safety. In conjunction with this advancement, implant placement above the pectoralis muscle rather than below furthermore improves aesthetic outcome while decreasing morbidity. Adjuvant radiation therapy (XRT) is indicated after mastectomy in patients with advanced cancer or high-risk pathology. Although necessary for improved survival, it has been known to compromise surgical cosmetic results. Emerging evidence suggests capsular contracture may be reduced in prepectoral implant placement due to decreased fibrosis of the pectoralis muscle and use of acellular dermal matrix (ADM). However, research assessing the impact of post-operative radiation on acute and chronic outcomes of NSM with implant-based reconstruction placed in varying planes is limited. This study aims to compare complications and treatment timing of XRT in NSM with either subpectoral (SP) or prepectoral (PP) prosthetic-based reconstruction.

Methods: A single-institution, retrospective chart review identified all NSMs occurring from July 1989 through March 2019. Patient, surgical, and treatment characteristics were collected and allowed for identification of a subset of patients undergoing adjuvant radiotherapy with implant-based breast reconstruction. Chi-square analysis was performed to analyze acute and chronic complication rates based on plane of prosthetic reconstruction.

Results: A total of 52 breasts were included in the final cohort, with 33 (63.5%) receiving SP reconstruction and 19 (36.5%) undergoing PP reconstruction. Median follow-up time was 2.8 years with 3.9 years for SP and only 1.1 years for PP (p=<.001). In the SP group, 48.5% underwent radiation of tissue expander (TE) with implant exchange after, 21.2% were direct-to-implant, and 30.3% had radiation of implant after TE replacement. In the PP group these were 36.8% TE, 52.6% direct-implant, and 10.5% TE replacement. With regards to acute complications, there was no significant difference in SP vs. PP reconstruction for nipple necrosis (6.06% vs 0%, respectively; p=.527), flap necrosis (3.03% vs 0%, p=1.0), wound dehiscence (3.03% vs 0%, p=1.0) or infection (6.06% v 5.26%, p=1.0; Table). With regards to chronic complications in SP vs. PP implant placement prior to radiation, there was no significant difference including capsular contracture (15.15% vs 10.53%, respectively; p=1.0), or rippling (0% vs 1.53%, p=0.129). Unintended reoperation was seen in 39.39% of SP implants and 15.79% in PP placed implants (p=0.119). Average time from NSM to start of was 190.8 days in the SP group and 129.8 months in the PP group (p=0.124).

Conclusions: Following adjuvant radiation therapy, patients who underwent NSM with PP implantation had both less acute and chronic complications compared to those with RP implants. Even though the differences were not statistically significant, there could be a trend toward significance with a larger sample size. Our results showed that SP patients had a slightly longer time to radiation after reconstruction. Therefore, PP technique may reduce barriers to the onset of

radiation, thus offering both a superior oncologic and reconstructive outcome for breast cancer patients.

Table: Summary of complication rates stratified by reconstructive implant location

Complication	Total cohort n = 52	Subpectoral n = 33	Prepectoral n = 19	*p*
Capsular contracture				
Baker grade I-IV	18 (34.62)	13 (39.39%)	5 (26.32%)	0.340
Baker grade ≥ III	7 (13.46%)	5 (15.15%)	2 (10.53%)	1.0
Rippling	2 (3.85%)	0 (0%)	2 (10.53%)	0.129
Prosthetic plane change	0 (0%)	0 (0%)	0 (0%)	-
Fat grafting	4 (7.69%)	1 (3.03%)	3 (15.79%)	0.132
Wound dehiscence	1 (1.92%)	1 (3.03%)	0 (0%)	1.0
Seroma	0 (0%)	0 (0%)	0 (0%)	-
Infection	3 (5.77%)	2 (6.06%)	1 (5.26%)	1.0
Nipple Necrosis	2 (3.85%)	2 (6.06%)	0 (0%)	0.527
Flap Necrosis	1 (1.92%)	1 (3.03%)	0 (0%)	1.0
Implant loss	5 (9.62%)	5 (15.15%)	0 (0%)	0.145
Unintended reoperation	16 (30.77%)	13 (39.39%)	3 (15.79%)	0.119
Readmission				
Time from NSM to radiation (d)	168.5 (137.3)	190.8 (160.4)	129.8 (72.1)	0.124
Hematoma	0 (0%)	0 (0%)	0 (0%)	-
Follow-up (years)	2.8 (2.2)	3.9 (2.2)	1.1(0.6)	<0.001

787863 - Squamous Metaplasia with Atypia Is Common in Re-excised Breast Tissue After Intraoperative Radiotherapy for Breast Carcinoma

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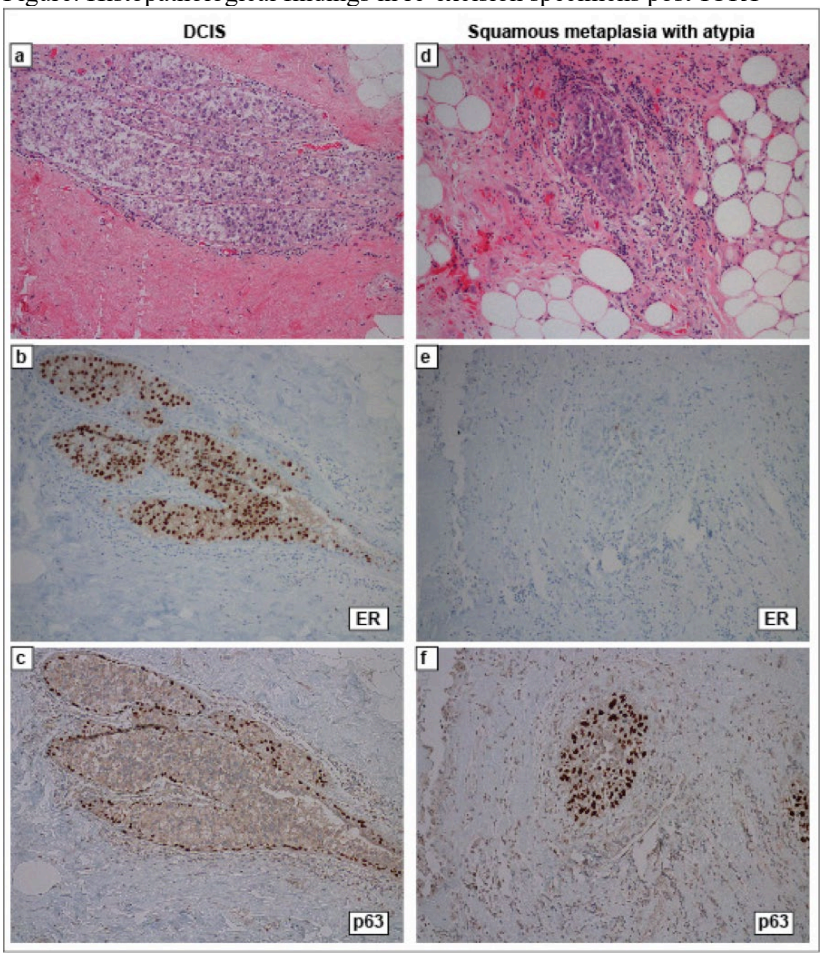
Background/Objective: Intraoperative breast radiotherapy (IORT) is a relatively new and increasingly used alternative to adjuvant whole breast external beam radiation therapy in the treatment of select breast cancer patients. This approach allows for a single accelerated dose of radiation treatment to the tumor bed at the time of breast-conserving surgery. The specific effects of IORT on the tumor microenvironment have not been well characterized, but have been hypothesized to play a large role in the efficacy of IORT. The aim of our study is to assess histologic differences in the post-surgery tumor bed of patients undergoing breast-conserving surgery with IORT (IORT) and without IORT (nIORT).

Methods: This retrospective study identified all patients undergoing breast-conserving surgery between October 2018-October 2019. Patients with invasive ductal carcinoma or ductal carcinoma in situ requiring re-excision of the partial mastectomy site for inadequate margins were included in this evaluation. A pathologist reviewed pathology slides from initial surgery and from the re-excision. Epithelial, stromal, or vascular changes were noted and compared between IORT and nIORT groups.

Results: Analysis included slides from 10 patients; 5 patients in the IORT group and 5 patients in the nIORT group. The time from initial surgery to re-excision ranged from 7 to 36 days. Squamous metaplasia was identified in the re-excision specimen in 7 out of 10 patients with 5 in the IORT group and 2 in the nIORT group. When squamous metaplasia was found in the nIORT group, it was unifocal and less cytologically atypical than in the IORT group. Squamous metaplasia with atypia, which could mimic high-grade DCIS, was a striking feature in the IORT group (4 in IORT vs none in nIORT). In 1 specimen, the diagnosis of squamous metaplasia with atypia was confirmed with negative estrogen receptor staining and positive p63 staining. (Figure) Neither squamous metaplasia nor squamous metaplasia with atypia was present in the initial partial mastectomy tissue.

Conclusions: The presence of squamous metaplasia with atypia in re-excised breast specimens represents a major histological difference in the tumor bed tissue from patients who have undergone intraoperative radiation therapy compared to those who have not. Squamous metaplasia with atypia can appear similar to DCIS, and careful interpretation is warranted to avoid unnecessary treatments. Staining with estrogen receptor and/or p63 can help with diagnosis. Further exploration of the molecular changes associated with the cellular transformation to squamous metaplasia with atypia seen after IORT may help better elucidate the effects of IORT on the tumor bed microenvironment.

Figure: Histopathological findings in re-excision specimens post-IORT



787941 - National Trends for Intra-operative Radiation Therapy in Favorable, Early-stage Breast Cancer: A Propensity Scoring Analysis of the National Cancer Database

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Background/Objective: Adjuvant whole breast irradiation (WBI) is recommended after breast-conserving surgery for most patients with early-stage breast cancer. Recently, partial breast intra-operative radiotherapy (TARGIT-IORT), supported by randomised evidence, has emerged as a potential alternative treatment modality for suitable patients. IORT involves a single treatment at the time of lumpectomy, which is more convenient for the patient compared with 3-5 weeks of daily fractionated external beam WBI. We examined national trends regarding the use of IORT for breast cancer.

Methods: We retrospectively reviewed the National Cancer Database (NCDB) and identified patients with clinical Stage I-III breast cancer who received breast-conserving surgery with either adjuvant WBI or IORT without adjuvant WBI between 2004-2014. Patient demographics, tumor characteristics, and survival were compared between the 2 groups. Univariate, multivariate, and stage-stratified propensity score weighted analyses were performed to compare study groups and survival.

Results: We identified 2,871 (0.42%) eligible patients treated with TARGIT-IORT delivered at the time of the initial lumpectomy ("immediate") and 675,429 (99.58%) patients treated with WBI. We excluded 141 patients treated with IORT during a procedure after the initial lumpectomy ("delayed"). Median follow-up was 54 months. The use of IORT significantly increased 16-fold in the 10 years from 0.07% in 2004 to 1.09% in 2014 ($p<0.001$). In comparison to WBI, IORT patients were more likely to have ER+/PR+/HER2- tumors, to be slightly older (median age (y): 66 [IQR: 59,72] vs. 61 [IQR:52, 69]), have more comorbidities, be of Asian, White, or non-Hispanic ethnicity, have insurance, have higher education and income levels, live in a metropolitan county, and be treated at an academic hospital (all with $p<0.001$). Performing TARGIT-IORT vs. WBI was significantly more likely to be done in patients with Stage 0 or 1 disease: 412 (0.27%) vs. 150,566 (99.73%) for Stage 0, 2,257 (0.59%) vs. 383,143 (99.41%) for Stage I, 196 (0.15%) vs. 128,432 (99.85%) for Stage II, and 6 (0.05%) vs. 13,288 (99.95%), for Stage III, respectively ($p<0.001$). In the adjusted stage-stratified propensity score weighted analysis, TARGIT-IORT patients had statistically similar survival compared to WBI in all stages combined (HR:0.89, $p=0.59$), as well as for stage 0 (HR:0.47, $p=0.19$), Stage I (HR:1.56, $P=0.054$), and Stage II (HR:0.42, $p=0.15$). Analysis was not performed on patients with Stage III disease due to the small number of patients in this group.

Conclusions: Utilization of partial breast TARGIT-IORT as an alternative to fractionated WBI is rising, and it is more commonly used for favorable early-stage breast cancer in better-educated patients in metropolitan academic hospitals. These real-world data suggest that survival after treatment with single dose TARGIT-IORT was similar to survival after adjuvant WBI given over several weeks in favorable early-stage breast cancer while greatly improving patient's cancer journey.

Reconstruction

782846 - Going Flat After Mastectomy: Patient-reported Outcomes by Survey

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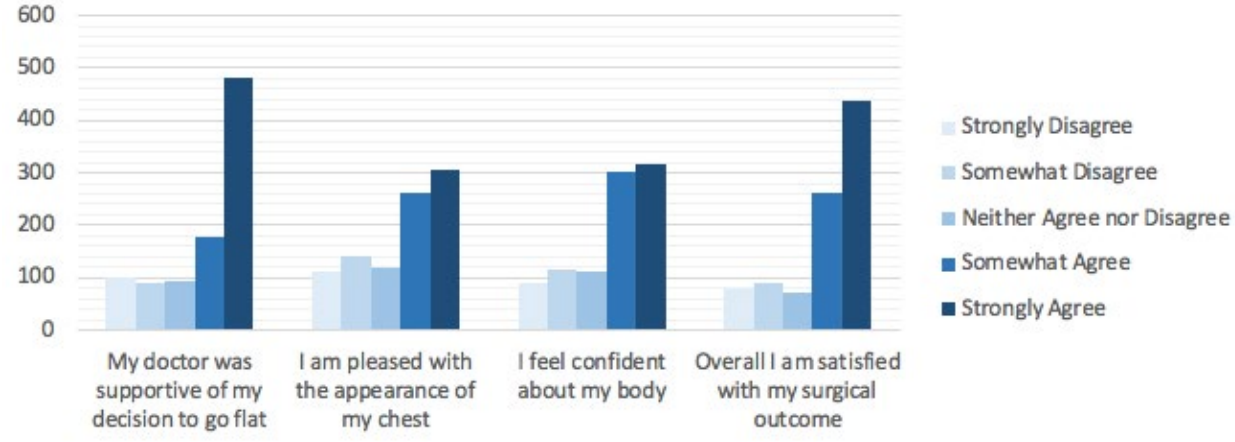
Background/Objective: Women who undergo mastectomy without reconstruction are reported to have lower satisfaction compared to those who have breast mound reconstruction. We designed a survey with input from patient advocates to investigate motivating considerations in the decision to forgo reconstruction and identify factors associated with post-operative satisfaction among these patients.

Methods: The survey was distributed in online forums comprising patients who do not currently have post-mastectomy reconstruction (the "Go Flat" community) using social media platforms including Twitter, Facebook, and blog posts. Demographic information, self-reported tumor data, and factors associated with the decision to go flat were summarized. Associations with satisfaction of post-operative outcomes were examined with univariable and multivariable adjusted logistic regression.

Results: A total of 940 women completed the online survey. Mean age was 53 (range 25-84). The majority of respondents were white (94%), had private insurance (70%), and were from the US (74%), although 22 countries were represented. Of these, 801 (85%) did not undergo reconstruction at the time of mastectomy, and 139 (15%) had reconstruction that was subsequently removed. The top 2 reasons for going flat were lower complication rate and desire to avoid placement of a foreign body (identified in 71% and 72% respondents, respectively). Only 64% of respondents were initially offered the option to go flat by their surgeon, and 30% of respondents felt their surgeon did not support their decision to go flat. Overall, 698 (74%) agreed/strongly agreed they were satisfied with surgical outcome (Figure). In multivariable analysis, having adequate information about surgical options (adj OR 3.01 95% CI 1.87-4.84), and surgeon being supportive of decision to go flat (adj OR 5.87 95% CI 3.73-9.25) were the strongest predictors of improved satisfaction with surgical outcome. Respondents from the US were less satisfied compared to those from other countries (adj OR 0.37 95% CI 0.19-0.71). Age, BMI, and cup size were not associated with post-operative satisfaction.

Conclusions: Among 940 participants in online Go Flat communities, a majority (74%) were satisfied with their surgical outcome. Pre-operative counseling and surgeon support of a patient's decision to go flat were the strongest predictors of post-operative satisfaction. Our findings reveal a need for additional research into factors that impact patient satisfaction and for surgeon education on how to optimally counsel and support women who are not interested in breast mound reconstruction.

Figure: Respondent answers to Likert scale questions regarding satisfaction after surgery



786926 - Prepectoral Direct-to-Implant Breast Reconstruction After Nipple-sparing Mastectomy Through the Inframammary Fold Without Use of Acellular Dermal Matrix: Results of 130 Cases

Alessandra Cordeiro Fornazari, Cleverton Spautz, Leonardo Nissen, Rubens de Lima, Maíra Dória, Iris Rabinovich, Karina Anselmi, Eduardo Schunemann Jr, Flavia Kuroda, Cicero Urban
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Background/Objective: Implant-based breast reconstruction is the most common reconstructive option after mastectomy for breast cancer. The prosthesis in the prepectoral position is progressively being used more due to advantages over submuscular prosthesis such as less postoperative pain, muscle deficit and breast animation, better aesthetic result, as well as reducing time and surgical morbidity. Usually, an acellular dermal matrix or synthetic mesh (ADM) is used to cover the implant to reduce complications. Due to the absence of studies using the prepectoral technique without ADM, the aim of this study was to review the results and complications of patients from our service who underwent this surgical technique for breast reconstruction.

Methods: A retrospective review of consecutive patients submitted to immediate reconstruction with definitive prepectoral implant after nipple-sparing mastectomy (NSM) through inframammary fold (IMF) without the use of ADM, between January 2018 and July 2019, was conducted. Data for the following characteristics were collected for each patient: age, BMI, menopausal status, previous breast surgery, diabetes, smoking history, breast characteristics, types of neoadjuvant and adjuvant therapies performed (chemotherapy or radiotherapy), and surgical analyses (surgical indication, laterality and axillary lymphadenectomy at the same procedure). Complications and secondary surgical interventions were also evaluated. For statistical analyses, Fischer's exact test was used, and the p-value established was less than 0.05.

Results: One hundred thirty reconstructions were performed in 87 patients with a mean follow-up of 6.5±4.7 months. The average age was 43.5±8.6 years. Patients' and surgical data are presented in the Table. Thirty-two mastectomies (24.6%) had at least 1 complication, the most common being flap necrosis (13 cases), persistent seroma (10 cases), and implant exposure (9

cases). Of these, 21 underwent a new surgical procedure, and 12 (9.2%) evolved with prosthesis loss with an average of 64 days (12 to 180 days) after the first surgery. Regarding prosthetic loss, the main risk factors associated were smoking history (OR 4; 1.48-10.8) and BMI over 25 (OR 4.4; 1.24-15.6), both with statistical significance ($p<0.05$). When analyzing all complications, the presence of previous radiotherapy (42.8% x 21.5%) or adjuvant radiotherapy (37.5% x 21.5%) and diabetes (42.9% x 23.6%) were more frequent in patients who had complications, yet these findings did not reach statistical significance. Other factors evaluated such as chemotherapy, axillary lymphadenectomy, previous breast surgery, breast size, and ptosis did not correlate with complications. In regard to late aesthetic results, only patients with follow-up over 6 months were evaluated. Of the 52 reconstructions, 69.3% had no capsular contracture and 28.8% had Baker's I or II contracture. Rippling was identified in 13 reconstructions (25%). No implant displacement or deformity animation were observed.

Conclusions: In conclusion, our preliminary data demonstrated that breast reconstruction with definitive prepectoral implant after NSM by IMF is a promising, safe, and economically advantageous technique, presenting similar results and complications rates to that with ADM or submuscular prosthesis. There are still few long-term results, but aesthetic results after 6 months were satisfactory.

Table: Demographic and patient outcomes

Total (n)	130
Mean age ± SD (yr.)	43.53±8.69
Intervention	
Unilateral	44 (33.8%)
Bilateral	86 (66.2%)
Axillary lymphadenectomy	8 (6.2%)
Mastectomy indication	
Prophylactic	59 (45.4%)
Therapeutics	71 (54.6%)
Chemoterapy	
Neoadjuvant	56 (43.1%)
Adjuvant	7 (5.4%)
Radiotherapy	
Preoperative	7 (5.4%)
Postoperative	16 (12.3%)
BMI	
BMI < 18 (underweight)	1 (0.08%)
BMI 18-25 (normal)	80 (64.5%)
BMI 25-30 (overweight)	34 (27.2%)
BMI > 30 (obesity)	9 (7.3%)
Diabetes	7 (5.4%)
Smoking history (previous or actual)	20 (15.4%)
Menopause	29 (22.3%)
Previous breast surgery	38 (29.2%)
Breast ptosis	
0	19 (14.6%)
1	68 (52.3%)
2	38 (29.2%)
3	5 (3.8%)
Breast size	
P	31 (23.8%)
M	55 (42.3%)
G	38 (29.2%)
GG	6 (4.6%)
Surgical complications	32 (24.5%)*
Flap necrosis	13 (9.62%)
NAC necrosis	1 (0.74%)
Implant exposure	9 (6.67%)
Persistent seroma	10 (7.4%)
Hematoma	4 (2.97%)
Implant loss	12 (9.23%)
Late complications (follow up > 6 months)**	
Rippling	13/52 (25%)
Capsular contracture Baker I	10/52 (19.2%)
Capsular contracture Baker II	5/52 (9.6%)
Capsular contracture Baker III	1/52 (1.92%)

BMI: body mass index; NAC: nipple areola complex
* 32 breasts (may be more than one complication for breast) ** 52 reconstructions evaluated

781974 - Neurotization of the Nipple-Areolar Complex After Implant-based Reconstruction: Evaluation of Sensation Recovery

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Background/Objective: The concept of sensate autologous breast reconstruction is not novel, and prior literature has focused mainly on sensate abdominally-based breast reconstruction. The goal is to determine the sensation recovery of the breast after nipple-sparing mastectomy and implant-based breast reconstruction associated with neurotization of the nipple areolar complex (NAC).

Methods: We performed a retrospective review of all patients who underwent nipple-sparing mastectomy with implant-based reconstruction and nipple neurotization. Neurotization was performed using a nerve allograft in combination with nerve connector. The coaptation was then supported with a nerve conduit around the repair sutured in place with 9-0 nylon suture on a spatulated needle. The sensory recovery process was objectively monitored using a pressure sensory device (static and dynamic test) at standardized post-operative time points.

Results: Thirteen patients underwent the proposed technique. Eight patients with 15 breasts were monitored for sensory recovery. Mean age, BMI and specimen weight were 38.12 (SD 7.5 years), 23.66 (SD 4.19 kg/m2) and 381.04 (SD 149.5g), respectively. For sensory measurement, the nipple had a mean threshold of 67.33±34.48g/nm2. The upper inner (29±26.75 g/nm2) and upper outer (46.82±32.72 g/nm2) NAC quadrants demonstrated better scores during moving test as compared to static test. Mean time between the test and surgery was 4.18±2.3 months, and mean time between the second test and surgery was 10.59±3.57 months. Thresholds improvement were documented after the second test for all NAC areas evaluated.

Conclusions: This is the first study to report on early results obtained after performing sensate implant-based breast reconstruction. More studies are required to determine the long-term outcomes, impact on quality of life, and assessment if patient or breast characteristics impact the success of this procedure.

786604 – Early- versus Late-onset of Free Movement of Upper Limbs After Mastectomy and Immediate Reconstruction with Alloplastic Material: Impact on Kinetic-Functional Recovery and Scar Complications

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Background/Objective: Physical therapy is important for prevention of motor and functional complications after breast cancer surgery, especially when started early, with restoration of motor function and improvement of patients' quality of life. However, there is no prospective randomized study on different physiotherapeutic treatments in patients undergoing radical breast surgery and immediate alloplastic reconstruction. The purpose of this study was to evaluate the impact of upper limb free exercise released 15 or 30 days after surgery on shoulder range of

motion (ROM), pain and limb function, and on the incidence of dehiscence, seroma, infection, and necrosis of patients after mastectomy and immediate reconstruction with alloplastic material.

Methods: Sixty women were included in a randomized controlled trial, registered in the Clinical Trials database (number NCT02480842) and approved by the research ethics committee (number 1.051.996). They underwent preoperative evaluations and 07, 15, 30, 60 and 90 days after surgery. They started exercises the day after surgery, with shoulder ROM limited to 90º. After 2 weeks, they were randomized into 2 groups of 30 patients: "Free Amplitude Group" - release of shoulder joint amplitude at the pain limit or until the surgical edges were detached, and "Limited Amplitude Group" - maintenance of shoulder movement restriction at 90º until 30 days after the surgery, at which time they were also released to free-range exercises. Active shoulder ROM of the homolateral limb after surgery was measured with a goniometer for flexion, extension, adduction, abduction, internal rotation, and external rotation movements. Pain was assessed by the Analog Verbal Scale, which ranges from 0 to 10, where 0 means no pain and 10 the worst possible pain. At the time of each assessment, the patient was asked about pain in the area of surgery, armpit, and homolateral upper limb. To verify motor function, the DASH (Disabilities of the Arm, Shoulder and Hand) questionnaire was used. The final score ranges from 0 to 100, and the higher the score, the higher the dysfunction of the upper limb (arm, shoulder or hand). The assessments of dehiscence, seroma, infection, and necrosis were performed by inspection and/or palpation. There was a description of "presence" or "absence" of complications at each postoperative period. Incidence was characterized as presence in at least 1 of the evaluations.

Results: Patients with free upper limb exercise release after 15 days of surgery had less pain, greater shoulder amplitude, and better upper limb function, compared to those who had restricted movement at 90º for 30 days. Variables with differences between groups are described in thr Table. There was no difference between the groups in the incidence of dehiscence, seroma, infection, and necrosis.

Conclusions: Postoperative protocol with free shoulder ROM released after 15 days of surgery is safe and beneficial for kinetic-functional recovery and pain control of patients after mastectomy and immediate reconstruction with alloplastic material for breast cancer.

Table: Range of motion, pain, and upper limbs function

		Pre	PO 07	PO 15	PO 30	PO 60	PO 90	P# Time	P& Groups
Flexion (degrees)								**<0.001**	**0.005**
Free	Mean (SD)	166.9 (9.2)	113.6* (20.9)	121.9* (21.1)	144.4* (18.7)	153.5* (18.5)	156.9 (15.9)		
Limited	Mean (SD)	163.3 (14.7)	99.7* (19.5)	115.2* (23.0)	129.7* (22.4)	136.7* (30.8)	148.7* (16.9)		
Abduction (degrees)								**<0.001**	**0.033**
Free	Mean (SD)	171.0 (9.9)	101..3* (27.8)	106.5* (28.1)	132.5* (28.5)	150.7* (25.8)	159.4 (21.5)		
Limited	Mean (SD)	168.3 (16.5)	86.8* (22.5)	102.4* (31.7)	113.3* (32.0)	136.5* (34.5)	148.5* (30.6)		
External Rotation (degrees)								**<0.001**	**0.011**
Free	Mean (SD)	87.6 (5.8)	82.1 (11.9)	82.3 (12.1)	85.5 (6.9)	86.3 (8.0)	85.5 (6.9)		
Limited	Mean (SD)	86.0 (8.4)	75.5* (13.9)	79.7 (9.3)	80.4 (8.6)	81.2 (9.1)	82.6 (7.5)		
Analog Verbal Scale for Pain								**<0.001**	**0.016**
Free	Mean (SD)	0.6 (1.40)	3.0* (2.9)	2.4 (3.0)	0.9 (1.9)	1.2 (1.5)	0.8 (2.0)		
Limited	Mean (SD)	1.1 (2.2)	3.3* (3.4)	3.3* (3.2)	2.2 (2.5)	3.3* (3.7)	2.2 (2.9)		
Disabilities of the Arm, Shoulder and Hand Questionnaire								**<0.001**	**0.022**
Free	Mean (SD)	5.1 (11.1)			11.7 (11.2)		9.4 (12.4)		
Limited	Mean (SD)	7.6 (13.1)			24.7* (20.5)		14.4 (13.9)		

Legend: SD - Standard Deviation; Repeated Measures ANOVA Test: p # for differences over time and p& for differences between groups; * for intragroup differences in relation to preoperative values by Tukey post-hoc test

780998 - Lipomodelling After Implant-based Breast Reconstruction: Evaluation of Patient-reported Outcome Using BREAST-Q

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Background/Objective: Lipomodelling offers an adjunct to breast reconstruction for management of secondary contour deformities using a simple, safe, effective treatment with low morbidity. With the advent of pre-pectoral implant reconstruction, lipomodelling may be used as a secondary treatment to improve cosmetic appearance. There is some evidence to suggest that satisfaction with cosmetic outcome of some procedures may decline over time, particularly following adjuvant treatment, and it is important that we are able to collect this information in order to counsel future patients appropriately and improve our practice. BREAST-Q is a validated, highly reliable patient-reported outcome measure used widely for breast reconstruction. This aim of the study was to assess patient satisfaction and quality of life following lipomodelling in implant-based breast reconstruction using BREAST-Q to evaluate service and identify ways of improving patient care.

Methods: This retrospective study collected BREAST-Q questionnaires from breast cancer patients undergoing lipomodelling following implant-based breast reconstruction surgery between 2016 and 2019. Patients were contacted by phone, invited to participate, and BREAST-Q questionnaire was sent by post. The BREAST-Q was to be given post-operatively to measure patient outcome measures using quality-of-life domains – psychosocial well-being, sexual well-being, physical well-being, and satisfaction domains - Rasch Transformed Score was calculated for each domain.

Results: BREAST-Q Questionnaires were returned by 37 women (response rate 52.9%). The mean participant age was 49.7 years (age range 36-78), and the mean time from lipomodelling surgery was 21 months (range 5-41 months). The majority had a single session of lipomodelling (68%), whilst 5% required 3 sessions. The median score for satisfaction with breasts was 58 (interquartile range IQR 47-71). They were generally satisfied with the implants and outcomes. Psychosocial and physical wellbeing scores were 64 (53-80) and 74 (66-87) respectively. The lowest score was for sexual wellbeing - median 47 (35-66). High satisfaction scores were recorded for the surgical team, medical team, and office staff. Multivariate analysis was performed between patient baseline demographics and BREAST Q responses.

Conclusions: This study collected data on BREAST-Q patient satisfaction following lipomodelling in implant-based breast reconstruction. Our study highlights patient satisfaction with this technique; however, this does not appear to impact upon patient's sexual wellbeing scores. Data from this study will inform a larger prospective study into this topic and direct further patient support in low-scoring domains.

Table: Results for BREAST-Q lipomodelling in implant-based reconstruction

Question	Number of patient replies to domain (n)	Median (IQR)	Mean (SD)
Satisfaction with breast	37	58 (47-71)	58 (17)
Satisfaction with implant	35	6 (4-8)	6 (2)
Satisfaction with outcome	37	17 (15-18)	16 (3)
Psychosocial wellbeing	37	64 (53-80)	68 (19)
Sexual wellbeing	30	47 (35-66)	49 (27)
Physical wellbeing	37	74 (66-87)	76 (16)
Satisfaction information	37	81 (67-91)	79 (17)
Satisfaction surgeon	37	100 (100-100)	97 (8)
Satisfaction medical team	37	100 (100-100)	92 (16)
Satisfaction office staff	37	100 (100-100)	94 (14)

787558 - National Trends in Immediate Breast Reconstruction: An Analysis of Implant-based versus Autologous Reconstruction After Mastectomy

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Background/Objective: Many factors affect access to immediate breast reconstruction (IR) after mastectomy. Autologous reconstruction (AR) may result in better quality of life and greater overall long-term patient satisfaction when compared to implant-based reconstruction, yet it is unclear how sociodemographic and hospital factors influence which IR is performed. Using a large national patient cohort, the objective of this study was to evaluate trends, compare outcomes, and identify predictors of implant-based versus AR after mastectomy

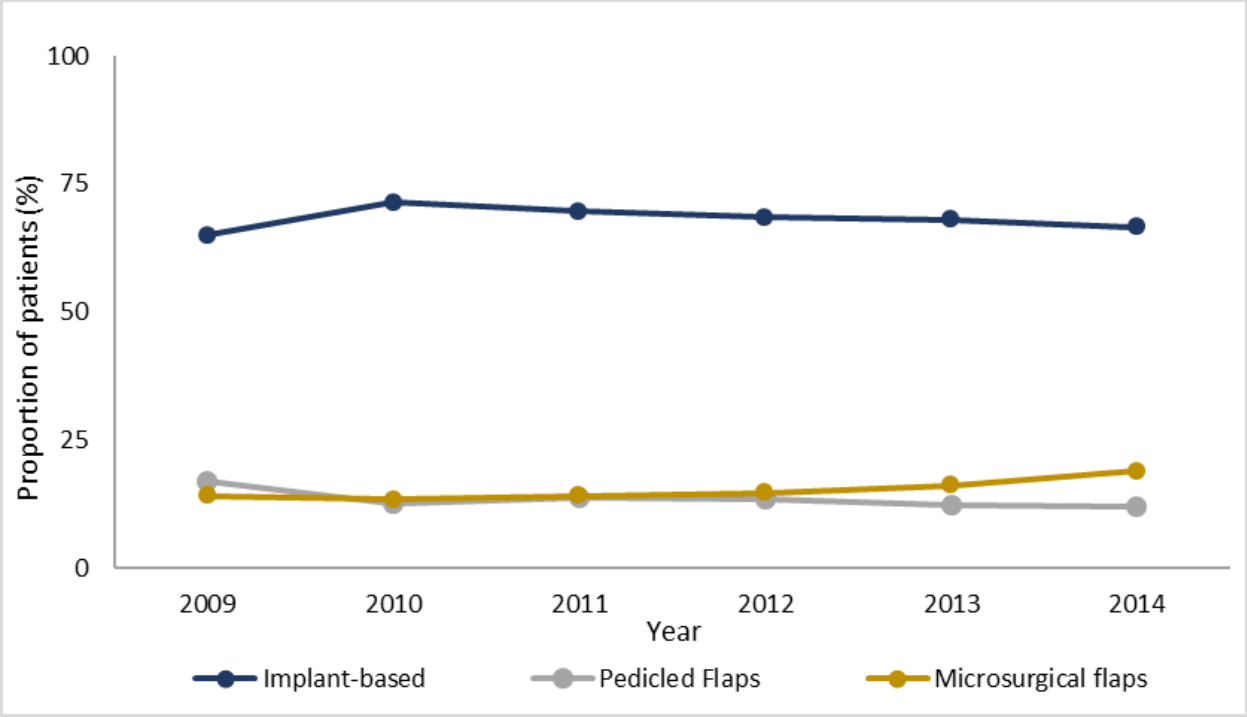
Methods: The 2009-2014 National Inpatient Sample (NIS), the largest all-payer inpatient database in the United States, was used to identify adult women who underwent mastectomy with IR. Patients were stratified and compared by type of reconstruction, implant-based versus autologous. AR was further classified as a microsurgical flap or pedicled flap procedure. Patient characteristics and comorbidities, as measured by the Elixhauser Comorbidity Index, as well as hospital factors were analyzed. Hospital procedural volume was calculated as tertiles of total reconstruction procedures per year. Primary outcomes included inpatient complications, resource utilization, and length of stay (LOS). Incidence, outcomes, and predictors were assessed using chi-squared univariate tests and multivariable logistic regression analyses.

Results: Of an estimated 194,833 women who underwent IR, 136,668 (70.1%) received implant-based reconstruction, and 58,165 (29.9%) received AR. Of the AR procedures, 31,350 (53.9%)

received microsurgical flaps, and 26,814 (46.1%) received pedicled flaps. Utilization of deep inferior epigastric perforator (DIEP) flaps increased significantly over the study period (28.6% to 42.1%, p<0.001). Independent predictors of AR were black race (AOR=1.4, p<0.001), lower Elixhauser Comorbidity Index (AOR=1.1, p=0.002), private insurance (AOR=1.1, p<0.001), body mass index ≥ 30 (AOR=1.3, p<0.001), history of radiation (AOR=3.0, p<0.001), teaching hospital designation (AOR=1.3, p<0.001), and high hospital volume (AOR=1.3, p<0.001). Similar factors were associated with the use of microsurgical flaps with the addition of age ≤45 (AOR=1.2, p=0.001), top income quartile (AOR=1.1, p=0.004), and performance of bilateral mastectomy (AOR=1.6, p<0.001). Compared to implant-based reconstruction, AR was associated with higher rates of inpatient complications (7.8% vs. 3.3%, p<0.001), resource utilization ($21,551 vs. $17,627, p<0.001), and LOS (3.7 vs. 1.9 days, p<0.001). Compared to pedicled flaps, microsurgical flaps had increased rates of acute inpatient complications (9.2% vs. 7.4%, p<0.001), resource utilization ($25664 vs. $18089, p<0.001), and LOS (4.3 vs. 3.3 days, p<0.001).

Conclusions: Implant-based reconstruction remains the most common type of IR although rates of microsurgical AR are on the rise. High-volume academic institutions and younger patients with a history of radiation and fewer comorbidities are associated with greater rates of AR. Despite more acute inpatient complications and increased costs associated with AR, the growing use of microsurgical flaps nationally may reflect a shift driven by long-term patient outcomes. Follow-up of complications, costs, and quality of life measures for each method of IR may show that AR provides long-term high-value care despite upfront morbidity, cost, and use of hospital resources.

Figure: Proportion of implant-based, pedicled flap, and microsurgical flap reconstructions over time



787368 - Implant-based Reconstruction Associated with Early Reduction in Cancer Recurrence and No Difference in Long-term Recurrence

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Background/Objective: While cancer recurrence has been well studied for tissue-based breast reconstruction in post-mastectomy cancer patients, there is sparse data regarding recurrence in patients undergoing implant-based reconstruction. We aim to compare ipsilateral breast cancer recurrence rates in node-negative, non-metastatic breast cancer patients undergoing implant-based reconstruction to patients not undergoing reconstruction using a large national database.

Methods: Women diagnosed with node-negative, non-metastatic invasive breast cancer undergoing mastectomy with either no reconstruction or implant-based reconstruction between the years of 1998 and 2016 were identified in the Surveillance, Epidemiology and End Results (SEER) database. Patients who had a previous cancer, breast or otherwise, as well as patients with an event of unknown laterality or bilateral disease were excluded. Events involving non-breast type cancer histologies were excluded. Kaplan-Meier curves were constructed for ipsilateral tumor recurrence, disease-specific survival, and overall survival and were compared using the log-rank test. Multivariate Cox analysis with time-varying coefficients was performed for the recurrence data. Multivariate analysis included patient age, breast cancer stage, cancer grade, estrogen receptor status, year of diagnosis, administration of chemotherapy, administration of radiation, and implant reconstruction status.

Results: A total of 454,554 women who had a total of 491,345 breast cancer events diagnosed between the years of 1998 and 2016 were identified in SEER. After applying criteria, 42,282 patients were included in the analysis. Median follow-up time was 7.4 years. Kaplan-Meier curves for ipsilateral second breast cancer events were not different between reconstruction groups by log-rank test ($p=0.2$) with 5- and 10-year cumulative event rates of 0.08% and 0.70% for patients undergoing implant-based reconstruction and 0.18% and 0.40% for patients who did not have reconstruction. Overall and disease-specific survival were significantly increased ($p<0.0001$) for patients undergoing implant-based reconstruction. In the multivariate Cox regression with time-varying coefficients for implant reconstruction, there was a significantly decreased risk of recurrence in the first 5 years after diagnosis in patients undergoing implant reconstruction (HR= 0.13, $p=0.04$) and no significant difference after the first 5 years. Other significant factors in the multivariate regression included age less than 40 years increasing recurrence risk (HR=2.6, $p=0.006$), and ER-negative lesions and Stage IIA disease (relative to Stage I disease) both decreasing recurrence risk (HR=0.5, $p=0.04$ and HR=0.5, $p=0.01$, respectively).

Conclusions: Implant-based reconstruction after mastectomy for cancer is known to be associated with improved survival; however, its impact on tumor recurrence has not been well-elucidated. We show here that for non-metastatic, node-negative disease, implant-based reconstruction reduces breast cancer recurrence rates within 5 years of diagnosis relative to patients not undergoing reconstruction, and does not significantly differ thereafter.

787397 - Outcomes Following 500 Cases of Immediate Prepectoral Implant-based Breast Reconstruction Using Acellular Dermal Matrix

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Background/Objective: Over the past 6 years, prepectoral implant-based breast reconstruction using an acellular dermal matrix (ADM) has become a popular option for selected patients undergoing mastectomy and reconstruction. There is no randomised data available to demonstrate outcomes, and our collective knowledge of the safety of this technique is reliant on small cohort studies. We aimed to undertake a large cohort study assessing outcomes of this technique.

Methods: We undertook analysis of a prospectively maintained database of prepectoral implant-based breast reconstructions at a large-volume tertiary referral centre. Between 2013 and 2019, 500 reconstructions have been performed and this is, to our knowledge, the largest single-centre cohort of its kind. Patient, clinical, and operative factors were studied, to assess their impact on complications and implant loss.

Results: The mean age of the cohort was 44.4 years, and the majority of reconstructions were performed using a one-stage direct-to-implant technique for risk reduction (47.3%) or malignancy (25.4%). The ADMs used were primarily StratticeTM (70.8%), ARTIATM (9.9%) or a combination of the 2 (15.8%). Minor complications were seen in 11.2% of procedures and major complications in 5.9% of procedures. Implant loss occurred at a rate of 3.3%. On univariable analysis, surgery for malignancy, concurrent axillary surgery, adjuvant radiotherapy, Wise-pattern incision (compared to inframammary crease and peri-areolar/ellipse), smoking, and mastectomy weight >500g were all predictive for complications. The use of an inferior dermal flap (following a Wise-pattern skin reduction mastectomy) was not associated with higher complications. In the multinominal regression model, smoking and mastectomy weight were independently associated with the development of a major complication. Implant loss was significantly predicted by concurrent axillary surgery and adjuvant radiotherapy, neither of which were independently predictive on the multinominal regression model.

Conclusions: We demonstrate safety and low morbidity of the prepectoral implant and ADM reconstruction technique. However, careful patient selection is advised, as this technique is not immune to the effects of the usual high-risk factors for complications.

788297 - Retrospective Review of Obesity and Its Impact on Complications in Patients Undergoing Autologous Abdominal Free Flap for Breast Reconstruction

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Background/Objective: Breast reconstruction with an autologous abdominal free flap allows a patient's own tissue to be used for reconstruction while also improving abdominal contour. However, these techniques are not without complications. Outcomes for obese patients have been mixed with some studies showing that obesity increases several recipient-site and donor-site complications, while others have reported similar complications between weight groups. However, current data reflects patient populations with an average BMI between 22 and 28. As we liberalized our criteria at our institution, we sought to identify the complications and potential associated co-morbidities that might influence the recommendations for autologous reconstruction inclusive of this higher-risk population.

Methods: We conducted a retrospective review of women undergoing muscle-sparing free transverse rectus abdominis muscle (msTRAM) or deep inferior epigastric perforator (DIEP) flap following mastectomy for breast cancer treatment or risk reduction from January 2013 through December 2018. The data collected on each subject included patient demographics (age, obesity status), pertinent co-morbidities (smoking, diabetes), treatment for breast cancer (chemotherapy, radiation), and presence of complications following autologous abdominal free flap reconstruction. Weight categories were defined as normal weight (18.5-24.9 kg/m2), overweight (25.0-29.9 kg/m2), and obese (>30 kg/m2). Total flap loss, partial flap loss, nipple loss, skin necrosis, hematoma, seroma, wound infection, delayed healing, fat necrosis, and hernia requiring return to OR were considered complications. Chi-squared test or Fisher's exact test were used for bivariate comparisons of complications by obesity status.

Results: We identified 212 patients who underwent autologous abdominal free flap for breast reconstruction (340 flaps). The average BMI was 30.4 kg/m2 (range 21.1-45.7 kg/m2). There were 50.9% of patients who were classified as obese. Total flap loss occurred in 3.8% of flaps (13 of 340 flaps). Total flap loss was statistically significantly increased in obese patients compared with normal weight and overweight patients (6.7% vs 0.0% vs. 1.6%, p=0.035). Partial flap loss occurred in 1.5% (5/340) of flaps. No difference in partial flap loss was observed based on obesity status (0.0% vs. 0.8% vs. 2.3%, p=0.43). Thirty-seven patients underwent 54 nipple-sparing mastectomies. Twenty-one (38.8%) total nipples were lost, which was observed in 9/15 obese, 11/33 overweight, and 1/6 normal weight nipple-sparing mastectomies. Obese patients had a statistically significant increase in recipient site re-operative complications (1.02 vs. 0.41 vs. 0.73, p=0.043) and overall re-operative complications (1.37 vs. 0.59 vs. 0.93, p=0.014) compared with normal and overweight patients.

Conclusions: Using a cohort of patients with a high proportion of obesity, we demonstrate that obesity status is associated with a higher likelihood of total flap loss and recipient site as well as overall re-operative complications. However, the overall flap loss rate remained relatively low suggesting that autologous reconstruction is a viable option in higher-risk women desiring

reconstruction. This data can be used to guide shared decision making regarding the best reconstruction options for patients based on their personal characteristics.

Table: Re-operative complications by patient

		Normal weight (BMI 18.5-24.9 kg/m2)	Overweight (BMI 25.0-29.9 kg/m2)	Obese (BMI >30 kg/m2)	p-value
	N (%)	22 (10.4)	82 (38.7)	108 (50.9)	
Recipient site	Partial flap loss	0 (0.0)	1 (1.2)	3 (2.8)	0.582
	Total flap loss	0 (0.0)	2 (2.4)	12 (11.1)	0.024
	Mastectomy flap skin necrosis	2 (9.1)	15 (18.3)	23 (21.3)	0.405
	Hematoma	0 (0.0)	8 (9.8)	5 (4.6)	0.155
	Seroma	0 (0.0)	0 (0.0)	0 (0.0)	NA
	Infection	0 (0.0)	1 (2.2)	1 (1.5)	0.854
	Delayed healing	0 (0.0)	3 (3.7)	6 (5.6)	0.472
	Fat necrosis	4 (18.2)	10 (12.2)	24 (22.2)	0.203
	Nipple loss*	1 (20.0)	8 (36.4)	6 (60.0)	0.315
	Total- mean (SD)	0.41 (0.80)	0.73 (1.12)	1.02 (1.23)	0.043
Donor site	Skin necrosis	1 (4.5)	4 (4.9)	5 (4.6)	0.996
	Hematoma	0 (0.0)	2 (2.4)	2 (1.9)	0.756
	Seroma	0 (0.0)	1 (1.2)	0 (0.0)	0.451
	Infection	0 (0.0)	0 (0.0)	3 (2.8)	0.231
	Delayed healing	3 (13.6)	5 (6.1)	18 (16.7)	0.087
	Fat necrosis	0 (0.0)	3 (3.7)	6 (5.6)	0.472
	Hernia	0 (0.0)	1 (1.2)	4 (3.7)	0.398
	Total- mean (SD)	0.18 (0.50)	0.20 (0.55)	0.35 (0.62)	0.139
Total re-operative complications-mean (SD)		0.59 (0.85)	0.93 (1.29)	1.37 (1.47)	0.014

*Denominator for nipple loss is patients with nipple-sparing mastectomy (5 normal weight patients, 22 overweight patients, and 10 obese patients)

788852 - The Impact of Pre- versus Post-mastectomy Radiation Therapy on Outcomes in Prepectoral Implant-based Breast Reconstruction

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Background/Objective: Prepectoral implant-based breast reconstruction is being increasingly performed over subpectoral post-mastectomy reconstruction because of the reduced invasiveness of the procedure, postoperative pain, and risk of animation deformity. Radiation therapy is a well-known risk factor for complications in implant-based breast reconstruction. However, the effect of pre-mastectomy versus post-mastectomy radiation therapy on outcomes after prepectoral breast reconstruction has not been well-defined. The purpose of this study was to compare the impact of pre- versus post-mastectomy radiation therapy on outcomes after prepectoral implant-based breast reconstruction.

Methods: A retrospective chart review was performed of all patients who underwent prepectoral implant-based breast reconstruction with inferior dermal flap and acellular dermal matrix (ADM)

performed by a single surgeon from 2010 to 2019. Demographic, clinical, and operative data were reviewed and recorded. Outcomes were assessed by comparing rates of capsular contracture, infection, seroma, hematoma, dehiscence, mastectomy skin flap necrosis, rippling, implant loss, local recurrence and metastatic disease, between patients receiving pre- and post-mastectomy radiation therapy and patients not receiving radiation therapy.

Results: During the study period, 369 patients (592 breasts) underwent prepectoral implant-based breast reconstruction. 26 patients (28 breasts) received pre-mastectomy radiation, 45 patients (71 breasts) received post-mastectomy radiation, and 305 patients (493 breasts) did not receive either pre- or post-mastectomy radiation therapy. Patients with pre-mastectomy radiation had higher rates of seroma (14.3% vs. 0.2%; $p<0.001$), minor infection (10.7% vs. 1.2%; $p=0.009$), implant loss (21.4% vs. 3.4%; $p=0.001$), and local recurrence (7.1% vs. 1.0%; $p=0.049$), when compared to those without radiation. Patients receiving pre-mastectomy radiation also had a capsular contracture rate 3 times that of non-radiated patients (10.7% vs. 3.2%; $p=0.075$), although the difference was not significant. Patients with post-mastectomy radiation had higher rates of major infection (8.4% vs. 2.4%; $p=0.017$), capsular contracture (19.7% vs. 3.2%; $p<0.001$), implant loss (9.9% vs. 3.4%; $p=0.022$), and local recurrence (5.6% vs. 1.0%; $p=0.018$), when compared to patients without radiation. Outcomes after prepectoral implant-based breast reconstruction were comparable between pre- and post-mastectomy radiation therapy groups, respectively, with regard to major infection (7.1% vs. 8.4%; $p=1.000$), dehiscence (3.6% vs. 1.4%; $p=0.488$), major mastectomy skin flap necrosis (7.1% vs. 2.8%; $p=0.317$), capsular contracture (10.7% vs. 19.7%; $p=0.382$), implant loss (21.4% vs. 9.9%; $p=0.184$), and local recurrence (7.1% vs. 5.6%; $p=1.000$). However, patients with pre-mastectomy radiation had a higher rate of seroma compared to those receiving post-mastectomy radiation therapy (14.3% vs. 0%; $p=0.005$).

Conclusions: In prepectoral implant-based breast reconstruction, both pre- and post-mastectomy radiation therapy were associated with higher rates of infection and implant loss compared to non-radiated patients. However, pre-mastectomy radiation was associated with a higher rate of seroma compared to non-radiated and post-mastectomy radiation therapy groups. Post-mastectomy radiation was associated with a higher rate of capsular contracture when compared to non-radiated patients, and a comparable rate of capsular contracture when compared to pre-mastectomy radiation therapy patients.

SLN

785362 - Comparing Overall Survival for Mastectomy with and without Axillary Lymphadenectomy in Sentinel Node-positive Early-stage Breast Cancer

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Background/Objective: ACOSOG Z0011, a randomized phase III trial initiated in 2005, compared overall survival between patients who underwent sentinel lymph node biopsy alone to axillary node dissection (ALND) in patients with T1-T2, clinically node-negative invasive breast cancers who underwent breast-conserving therapy (BCT) and sentinel lymph node biopsy (SLN) who were found to have 1-2 positive sentinel lymph nodes (SLN). The 10-year overall survival (OS) in the SLN group was noninferior to those in the ALND group. The aim of our study was to examine patterns of utilization of ALND for SLN+ early-stage breast cancer and to examine the impact of ALND after mastectomy on overall survival. Our study replicated the Z0011 trial using the National Cancer Database (NCDB) to determine if this concept could be applied to patients who underwent mastectomy. We hypothesized that the trial could be applied to patients undergoing mastectomy without negatively impacting overall survival.

Methods: The NCDB was queried from 2010-2016 including all women with cT1-2N0M0 and 1-2 positive lymph nodes discovered via SLN biopsy who underwent mastectomy, excluding patients who received neoadjuvant systemic therapy. For the purposes of this query, ALND was defined as >8 lymph nodes examined or removed. OS was defined as months from surgery. Descriptive statistics, univariate and multivariable Cox regression models, and Kaplan-Meier (KM) method were performed.

Results: A total of 6,888 eligible cases were included with a median follow-up of 34 months. The majority of the women were over the age of 60 (48%), white (86.2%), and had ER-positive (83.3%) disease. The rates of ALND decreased over years, from 47% of cases in 2010 to 25% in 2016. KM analyses demonstrated 5-year OS of 76.2% and 77.0% (p=0.242) with or without ALND, respectively. Setting performance of an ALND as the reference, SLN biopsy alone had a hazard ratio of 1.08 (95% CI = 0.95-1.24, p=0.243) in the univariate analysis, and 1.12 (95% CI = 0.98-1.29, p=0.106).

Conclusions: Patterns of care analyses show that axillary management based on Z0011 findings in BCT is being applied to mastectomy patients with fewer ALND for 1-2 positive lymph nodes over the last 7 years. These changes in axillary management do not appear to compromise OS in patients who underwent mastectomy without ALND for positive. ALND is associated with serious and long-term adverse events and decreased QOL, and applying ACOSOG Z0011-style axillary management to patients undergoing mastectomy may improve patient quality of life while not compromising OS. Prospective examinations of this approach are needed.

Table: MVA with overall survival for ALND

		Months form Surgery		
Covariate	**Level**	**Hazard Ratio (95% CI)**	**HR P-value**	**Type3 P-value**
Lymph Node Examined	1-3: SLN Biopsy	1.09 (0.94-1.28)	0.258	0.219
	4-8: In between	1.15 (0.98-1.36)	0.088	
	9+: ALND	-	-	
Age at Diagnosis	>60	2.24 (1.88-2.67)	**<.001**	**<.001**
	<=60	-	-	
Facility Type	Community Cancer Program/Other	1.35 (1.07-1.70)	**0.013**	**0.035**
	Comprehensive Community Cancer Program	1.21 (1.02-1.44)	**0.031**	
	Integrated Network Cancer Program	1.31 (1.05-1.63)	**0.016**	
	Academic/Research Program	-	-	
PR	Negative	1.35 (1.16-1.57)	**<.001**	**<.001**
	Unknown	0.58 (0.30-1.12)	0.102	
	Positive	-	-	
Grade	Cell Type Not Determined	1.10 (0.75-1.62)	0.625	**<.001**
	Poorly Differentiated/Undifferentiated	1.54 (1.21-1.96)	**<.001**	
	Moderately Differentiated	1.16 (0.92-1.46)	0.222	
	Well Differentiated	-	-	
Tumor Size (quartile)	>2.8, <=9.5	2.76 (2.27-3.36)	**<.001**	**<.001**
	>2, <=2.8	2.02 (1.65-2.47)	**<.001**	
	>1.5, <=2	1.78 (1.44-2.21)	**<.001**	
	>=0.1, <=1.5	-	-	
Hormone Therapy	No	6.57 (5.07-8.51)	**<.001**	**<.001**
	Unknown	4.83 (3.30-7.08)	**<.001**	
	Yes	-	-	

781783 - Omission of Surgical Axillary Lymph Node Staging in Patients with Tubular Carcinoma of the Breast

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Background/Objective: In our current era of personalized medicine with more effective screening strategies and systemic therapies, a debate has been initiated regarding whether surgical axillary staging should be deescalated for patients with small favorable breast cancers. Tubular carcinoma (TC) is known to convey an excellent prognosis, and as such we hypothesize that axillary staging can be omitted in this subtype of breast cancer.

Methods: Patients with TC and known surgical axillary staging were identified from our institutional database (2000-2018). Then using the National Cancer Database (NCDB) (2004-2015), we identified patients with TC, ductal carcinoma in situ (DCIS), and those with T1 invasive ductal carcinoma (IDC) that were estrogen receptor-positive. The rates of lymph node metastases were determined.

Results: Our institutional cohort identified 112 patients with pathologically confirmed TC who were T1, and only 1 (0.9%) case of nodal involvement was observed. Review of the NCDB identified 6938 patients with TC who were T1, and axillary lymph node disease was observed in 323 (4.7%) patients. Among the 323 lymph node-positive patients, 310 (4.5%) were N1, 12 (0.2%) were N2, and 1 (0.01%) was N3. Furthermore, the rate of axillary lymph node involvement for TC was comparable to that identified for patients with DCIS (4.2%) and much lower than that found for patients with T1 IDCs that were estrogen receptor-positive (20.5%).

Conclusions: In patients with TCs that are ≤2cm or stage T1, omission of surgical axillary staging can be considered given the low rate of nodal involvement.

787656 - Is Routine Axillary Staging Necessary in cT1aN0M0 Patients? A National Cancer Database Analysis

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Background/Objective: Axillary nodal status remains an important prognostic factor in the treatment of breast cancer. While the rate of T1a tumors are increasing, the incidence of nodal involvement in these tumors ranges widely in the literature. The utility of axillary surgery in these patients requires further examination. A National Cancer Database (NCDB) analysis was conducted to compare the clinicopathologic characteristics and clinical outcomes of patients with T1a tumors both with and without axillary lymph node metastases (ALNM).

Methods: The NCDB was queried for female patients from 2012 – 2015 with clinical T1aN0M0 breast cancers who underwent lumpectomy and regional lymph node sampling. During this time period, patients were treated according to ACOSOG Z0011 criteria (Z11). As such, we compared

patients with no nodal involvement, 1-2 positive sentinel lymph nodes (SLN), and 3 or more positive SLN.

Results: A total of 20,930 patients were identified with a median follow-up time of 33 months. Of the patients identified, 19,764 (95.1%) had no ALNM, and 880 (4.2%) had 1-2 positive SLN. Only 128 patients (0.6%) had 3 or more positive SLN and would require a full ALND by Z11. Patients with 3 or more positive SLN were more likely to have lymphovascular invasion (LVI) ($p < 0.01$), higher grade ($p < 0.01$), and HER2-positive ($p = 0.014$). Of the total cohort, 16,836 patients (84%) underwent post-lumpectomy radiation therapy, 2,288 (11.3%) underwent adjuvant chemotherapy, and 14,526 (70.5%) completed more than a year of adjuvant hormonal therapy. Patients who had ALNM were more likely to receive adjuvant chemotherapy. There was no difference in 30- or 90-day mortality or overall survival (OS) between the 3 groups.

Conclusions: This NCDB analysis of clinical T1aN0M0 patients who underwent breast-conserving surgery demonstrates a very low risk of ALNM, with altered surgical management (completion ALND) in only 0.6% of patients. These data call into question the need for routine axillary staging in this patient population, particularly those with low grade tumors without LVI that are not HER2 amplified.

Table: Tumor characteristics of cT1a patients based on nodal status

		0 SLN N = 19764	1-2 SLN N = 880	3+ SLN N = 128	p-value
Mean Age (SD)		64 (11)	62 (11)	61 (11)	
Grade	1	8506 (43%)	271 (31%)	26 (20%)	<0.01*
	2	7658 (39%)	426 (48%)	65 (51%)	
	3	2247 (11%)	140 (16%)	28 (22%)	
LVI	Present	513 (3%)	213 (24%)	57 (45%)	<0.01*
	Absent	16801 (85%)	555 (63%)	60 (47%)	
ER Positive		17946 (92%)	809 (93%)	113 (88%)	0.254
PR Positive		16110 (82%)	720 (82%)	93 (73%)	0.016*
HER2 Positive		1530 (8%)	88 (10%)	16 (13%)	0.014*
Type of LN Sampling	SLNBx	16168 (82%)	586 (67%)	17 (13%)	<0.01*
	SLNBx followed by ALND	1538 (8%)	109 (12%)	50 (39%)	
	ALND	2058 (10%)	185 (21%)	61 (48%)	
Receipt of XRT		15988 (84%)	741 (89%)	107 (87%)	0.004*
Receipt of adjuvant Chemotherapy		1784 (9%)	402 (47%)	101 (80%)	<0.01*
Receipt of 1+ years of Adjuvant Endocrine therapy		13725 (70%)	701 (80%)	100 (78%)	<0.01*
Mean Survival Time (months)		60	58	56	

787651 - Are Community Surgeons Choosing Wisely?

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Background/Objective: The Choosing Wisely campaign was initiated to start open dialogue between physicians and patients regarding what evidence-based tests are truly necessary. In July of 2016, the Surgical Society of Oncology listed 5 recommendations for patients to question specific commonly used tests and procedures. One recommendation was to avoid routine sentinel lymph node biopsy on early-stage hormone receptor-positive, HER2/Neu-negative invasive breast cancer in women greater than 70 years old. This recommendation was made because most of these patients would be treated with adjuvant endocrine therapy alone. For some larger institutions, the ability to choose wisely regarding sentinel lymph nodes have become a quality metric. The aim of our study was to evaluate whether a community hospital was choosing wisely regarding sentinel lymph node biopsies in women greater than 70 years old.

Methods: This was a single institution retrospective review at a large community hospital. First, using the lumpectomy CPT code, 920 patients were pulled from July of 2014 to July of 2018. We defined the pre-Choosing Wisely cohort as women who underwent lumpectomy with or without sentinel lymph node biopsy between July of 2014 and July of 2016. The post-Choosing Wisely cohort was defined as women who underwent lumpectomy with or without sentinel lymph node biopsy between July of 2016 and July of 2018. We excluded patients younger than 70 and any pathology other than invasive breast cancer, and were left with 266 patients to study. Within each cohort, we excluded patients with triple-negative invasive breast cancer and HER2/Neu-positive disease. We evaluated the percentage of patients who underwent sentinel lymph node biopsy between those cohorts.

Results: There were 124 patients in the pre-Choosing Wisely cohort and 140 patients in the post-Choosing Wisely cohort. In the pre-Choosing Wisely group, 69 patients met eligibility criteria, and of these, 61 patients had a sentinel lymph node biopsy. In the post-Choosing Wisely group, 81 patients met eligibility criteria, and 70 patients had a sentinel lymph node biopsy. The rate of sentinel lymph node biopsy prior to 2016 was 88.4%, and the rate after 2016 was 86.4%. Using a Fisher's 2 tailed t test there was no statistically significant difference in the pre and post Choosing Wisely groups with a p value of 0.8.

Conclusions: Our conclusions showed that our institution was not choosing wisely as there was no statistically significant change after the guidelines were released. This was our expected result, and it is extremely relevant. This brings to light the importance of continuing education amongst surgeons. However, given the multi-disciplinary approach to the treatment of breast cancer, both medical oncology and radiation oncology would need to be involved in this institutional change. Some specialists find it difficult to omit a pathological staging work-up of the nodes. Bringing this data to a forum such as breast tumor board may be beneficial to discuss ways to improve our adherence to Choosing Wisely. Not many institutions have commented on their sentinel lymph node rates in women above the age of 70, and it is important for every institution to evaluate their own ability to choose wisely. This study has sparked an interest in making institutional change regarding the treatment of these patients.

787771 - Meta-analysis of Sentinel Node Mapping Techniques Comparing Near-infrared Fluorescence Imaging to Blue Dye and Radioisotope

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Background/Objective: Sentinel lymph node(s) are the theoretical first axillary nodes that a cancer would spread to in the event of metastasis. In patients who appear to be node-negative, a sentinel lymph node biopsy (SLNB) has been used alongside the primary intervention of breast-conserving surgery or mastectomy to assess whether the tumor has spread beyond its primary site, as this then determines adjuvant treatment. The gold standard approach for SLNB is combined blue dye (BD) and radioisotope (RI) injections into or near the primary lesion, with in-vivo assessment of the drainage pathway. However, with the advent of fluorescent imaging, a new technique has emerged which enables 'real-time' visualisation of the sentinel node with less side effects (i.e., skin staining, allergy, cost, radiation) and potentially less burden on hospital infrastructure (i.e., ionising radiation medical exposure regulations and dwindling medical isotope stock). The aim of this meta-analysis was to compare fluorescence imaging with indocyanine green (ICG) to combined BD-RI technique for sentinel node mapping.

Methods: This study was registered with PROSPERO (CRD42019129224). Medline, Embase, Scopus, and Web of Science databases were searched for all articles published before September 2019. MESH terms included were 'Surgery' AND 'Lymph node' AND 'Near infrared fluorescence' AND 'Indocyanine green'. Clinical studies comparing ICG to BD or RI in sentinel node biopsies in breast surgery were included in the metanalysis if they included raw data pertaining to sentinel node identification rate and metastatic status. Studies were screened and data extracted using 'Covidence' software. Chi squared distribution was employed to characterize the study variance and both the fixed and random effects models were used to pool the odds ratios with 95% confidence intervals. A bivariate model was used to determine pooled sensitivity and specificity.

Results: A total of 1748 studies were identified, of which 18 studies met the inclusion criteria, but only the highest-quality studies (n=9) were included in the meta-analysis. The odds of identifying a sentinel node using ICG was equivalent to that of RI (OR 2.58, CI 0.35-19.08, $p<0.05$) but superior to BD (OR 9.07, CI 6.73-12.23, $p<0.05$). When compared to the gold standard dual technique, ICG was equivalent (OR 1, CI 0.1-9.8, $p<0.05$). Both ICG and RI were sensitive (sensitivity: ICG=0.96, RI=0.96) but not specific (specificity: ICG=0.02, RI=0.17) for detecting sentinel nodes with metastasis when compared to the other SLNB techniques. However, RI outperformed ICG mapping at identifying which nodes were cancerous [AUROC: RI= 0.87(CI 0.84-0.89), ICG=0.69 (CI 0.65-0.73)].

Conclusions: Pooled analysis suggests that ICG is indeed comparable to RI in sentinel node identification, sensitivity, and specificity. ICG is superior to BD in terms of sentinel node identification, which is consistent with the recognised superiority of RI compared to BD. However, there was insufficient data to be able to compare sensitivity, specificity, or accuracy of ICG to BD. Additionally, there were insufficient studies comparing ICG to the gold standard of

RI-BD. Certain hospitals have already shifted practice towards using ICG if they are limited by hospital infrastructure in view of the safe and timely delivery, storage, use, and disposal of RI. However, hospitals continuing to use RI could consider switching to ICG as it has comparable accuracy to RI and is radiation free.

787443 - Can Genomic Profiling and Preoperative Axillary Ultrasound Eliminate the Need for Sentinel Lymph Node Biopsy in Early-stage, ER-positive Breast Cancer?

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Background/Objective: NCCN guidelines now allow for genomic profiling to risk-stratify chemotherapy for patients with N1 disease. Given the risks of SLNB, there is interest in omitting SLNB when it will not benefit the patient. This study evaluates how SLNB influences treatment recommendations when Oncotype Dx Recurrence Score (RS) is used in node-positive patients.

Methods: We reviewed patients treated at our breast center from 11/2011-12/2015. We included postmenopausal women with ER-positive, HER2-negative, pT1-2 breast cancer (BC), and non-suspicious axillary ultrasound (axUS). For each patient, we compared the recommended adjuvant therapy (per NCCN guidelines) based on actual SLNB results, versus the recommendation had SLNB been not performed (presumed negative). The assumption was made that patients underwent breast-conserving therapy with a plan for whole-breast irradiation. ALND was recommended for >2 positive SLN, or any extranodal extension (ENE). For N0-N1 cases, we used RS to determine chemotherapy. For Nmi-N1 cases, chemotherapy was considered for RS 18-25 and recommended for RS >25. When not available, RS was estimated with the BC Recurrence Score Estimator from The Johns Hopkins University.

Results: Of 199 included patients, N category was as follows: N0, 84.4% (n=168), Nmi, 2.0% (n=4), N1, 11.6% (n=23), N2, 1.0% (n=2), N3, 1.0% (n=2). The table shows the proportion of patients for whom SLNB changed treatment recommendations. Of the 12 cases (6.0%) in which ALND was recommended, 2 were for >2 positive SLN, and 10 were for ENE. In 15.5% of cases, SLNB changed the recommendation for nodal radiation from not recommended to either considered or recommended. In 5% of patients, the recommendation to have chemotherapy changed from not recommended to either considered or recommended. Eight percent of patients had a change in the chemotherapy regimen recommended (e.g., from none or 2nd, to 3rd generation recommended or considered), based on SLNB. There were 6 node-positive cases with RS >25, in whom chemotherapy was recommended regardless of SLNB results. There were 15 Nmi-N1 cases with RS <18, for whom chemotherapy was not recommended regardless of SLNB results.

Conclusions: SLNB changed chemotherapy recommendation for only 5% of patients. With increasing role for genomic profiling and preoperative axUS, the role of SLNB in determining adjuvant therapy is diminishing. When chemotherapy would not be considered, omission of SLNB should be considered in postmenopausal patients with low-risk BC and non-suspicious axUS. If genomic profiling were performed prior to surgery, the results could change surgical

management, reserving SLNB for women with intermediate genomic risk in whom positive SLN could change chemotherapy recommendations. This approach requires prospective evaluation. A limitation of this study is that it did not examine how SLNB affects adjuvant hormonal therapy.

Table: Comparison of adjuvant treatment recommendations based on SLNB result vs. presumed negative SLNB

	Based on actual SLNB result	Based on presumed negative SLNB	% for whom SLNB would change treatment recommendation
ALND recommended[1]	12	0	6.0%
Nodal radiation recommended[2]	4	0	2.0%
Nodal radiation considered[3]	27	0	13.5%
Chemotherapy recommended[4]	33	30	1.5%
Chemotherapy considered[5]	7	0	3.5%
Third generation chemotherapy recommended[6]	9	0	4.5%
Third generation chemotherapy considered[7]	7	0	3.5%

1. For >2 positive SLN, or extranodal extension.
2. For N2-3 disease.
3. For Nmi-N1 disease.
4. For RS > 25.
5. For Nmi-N1 disease, with RS 18-25.
6. For Nmi-N1 disease, with RS > 25; or N2-N3.
7. For Nmi-N1 disease, with RS 18-25.

789400 - Lymphovascular Invasion, Regional Lymph Node, and Systemic Metastasis in Breast Cancer: Confirming the Anatomic Pathways Through the Sentinel Node

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Background/Objective: For at least 80 years following Halsted, breast cancer (BC) systemic metastases (smets) were thought to be dependent upon regional lymph node (RLN) mets. Following Fisher in the 1970s, and the recognition of peri-tumoral angiogenesis, it is believed by many that BC gains access to the systemic circulation early; while RLN mets are known to be associated with smets, BC is likely to be a systemic disease from early on, irrespective of lymph node mets. Clinical and experimental observations, however, make it likely in most cases that BC smets require RLN mets. We hypothesized that lympho-vascular invasion (LVI) is predominantly lymphatic invasion, and smets are dependent upon RLN mets. By comparing the incidence of smets in various LVI/RLN combinations, we might extrapolate that tumor micro-

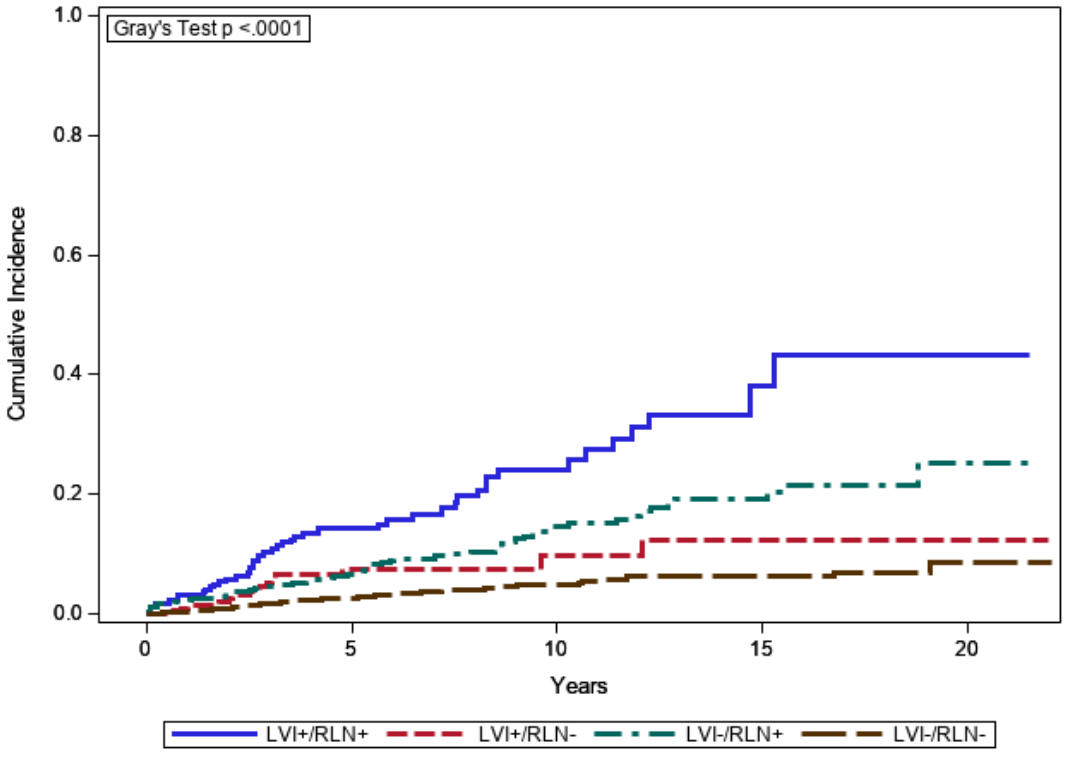
vessel invasion at the primary tumor site favors lymphatic, and not blood vessel capillaries, and that RLNs are the primary pathway to smets.

Methods: Demographic, clinicopathologic, treatment types, and molecular marker data were compared in 3329 BC patients undergoing RLN biopsy, prospectively and professionally abstracted over 22 years and maintained in a precisely managed, single institution database. Univariate and multivariate backward logistic regression models were constructed to estimate associations of variables with RLN mets and smets. We focused the analysis on LVI+/RLN+; LVI+/RLN negative; LVI neg/RLN +; and LVI neg/RLN neg and rates of smets in each group were analyzed using SAS 9.4.

Results: With a mean follow-up of 7.8 years (range <1 to 22 years), 742/3329 (22.3%) of patients had RLN mets; 262 (7.9%) smets; 463 (13.9%) of primary tumors showed LVI, 254/723 (35%) were RLN positive; 2312/2521 (92%) LVI negative were also RLN negative (p<0.001); smets occurred in 116/2301 (5%) with LVI/RLN negative; 52/252 (21%) with LVI/RLN positive (p<0.001);17/207 (8%) LVI positive/ RLN negative; 65/465 (14%) LVI negative/RLN positive (p=<0.001). Three variables predicted smets: RLN positive; tumor size; grade (p=<0.001); LVI did not.

Conclusions: LVI significantly predicts RLN mets. RLN is critical to smets from BC, and LVI on its own is not. Smets occur significantly more commonly when both LVI and RLN occur together. LVI is thus likely to be primarily 'lymphatic invasion' and, rarely, 'blood vessel' invasion, supporting the Halstedian paradigm. LVI and RLN together predict clinical outcome better than either alone.

Figure: Time to breast cancer metatasis: LVI+/RLN+;LVI neg/RLN+; LVI+/RLN neg; LVI neg/RLN neg



788049 - Is Contralateral Sentinel Lymph Node Biopsy Indicated in Breast Cancer Patients Undergoing Prophylactic Mastectomy for High-risk Lesions? A Comprehensive Single-institution Review

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Background/Objective: With improved preoperative imaging, contralateral high-risk lesions (cHRL) are more frequently identified. Among patients undergoing bilateral mastectomy for unilateral breast cancer, this may increase the incidence of contralateral sentinel lymph node biopsies (cSLNB) performed on the prophylactic side. The objective of this study is to evaluate the clinical utility of cSLNB in bilateral mastectomy patients with cHRL.

Methods: This is a single institution, IRB-approved, retrospective study of patients undergoing bilateral mastectomies from 2002-2017. Patients with invasive carcinoma or ductal carcinoma in situ and cHRL (carcinoma in situ or atypia) were included. Patients with bilateral invasive carcinoma were excluded. Preoperative cHRL diagnosis and utilization of cSLNB were analyzed using Fischer's exact test. 2017 Medicare reimbursement rates were used to calculate the costs of cSLNB.

Results: Among 172 patients with cHRL, 83 (47.2%) demonstrated atypia, 53 (30.8%) LCIS, 30 (17.4%) DCIS, and 6 (3.5%) had occult invasive cancer on final pathology. Fifty-seven (33.1%) underwent cSLNB. Patients with known cHRL were more likely to undergo a cSLNB than those with an occult contralateral lesion (61.6% vs 12.1%, $p<0.0001$). Patients who underwent a preoperative MRI were more likely to have a preoperatively diagnosed cHRL (50.5% vs 26.9%, $p=0.003$) and undergo a cSLNB than those who did not have a preoperative MRI (41.1% vs 19.4%, $p=0.03$). There were no positive cSLNB in the study population. At a median follow-up of 5.9 years, there were 2 local and 2 isolated axillary recurrences on the contralateral side. Three patients had recurrences at the primary site, and 8 patients had distant metastases. A total of $161,367 would have been saved if the cSLNB was omitted.

Conclusions: Breast MRIs identify more cHRL in women undergoing bilateral mastectomy for unilateral invasive malignancies. This yields in more frequently performed contralateral SLNBs. As the invasive malignancy determines prognosis, cSLNBs are costly, low-yield, and do not change management.

786868 - A Prospective Comparative Study of Sentinel Lymph Node Biopsy with Indo-Cyanine Green (ICG) Florescence Technique versus Dual Dye (Radio-colloid and Blue Dye) Technique for Early Breast Cancer - Going Beyond the Horizon

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Background/Objective: Axillary staging is an important component of the surgical procedure performed in patients with breast cancer. Sentinel lymph node (SLN) mapping is regarded as standard of care in staging of the axilla in breast cancer patients with clinically negative axillary lymph nodes. Dual dye technique with radio-colloid and blue dye is the gold standard for identification of SLNB. Limitations with dual dye have limited its penetration to clinical practice. Optical imaging using the near-infrared (NIR) fluorescence lymphatic tracer indocyanine green (ICG) has been put forward as an alternative for, or an addition to, conventional SLN mapping. The objective of the present study was to assess the performance of sentinel lymph node (SLN) biopsy using indocyanine green (ICG) fluorescence method compared with that using the conventional method in detection of sentinel lymph nodes.

Methods: One hundred patients diagnosed with early breast cancer underwent SLNB procedure using technetium-99m radio colloid (R), methylene blue dye (MB), and ICG. All SLNs that were removed during surgery were labeled as dual dye or/and fluorescent and sent for pathological examination. Baseline patient characteristics and the surgical details of patients were recorded. Outcome measures were the detection rate of SLNs, positive SLNs, and the number of SLNs identified with ICG, dual dye technique (MBD + technetium-99m), were compared. Injection safety of ICG and MBD was evaluated. The frequencies and percentages for categorical data were calculated. The data were recorded according to the institutional rules, including electronic archiving and video recording of the procedures.

Results: One hundred patients were involved in study, with median age being 52.3 (30-80 years). Most of the patients had BMI <25 (68%), presented with palpable lump (85%), were in outer quadrant (59%). Sentinel lymph node was identified in all 100 cases. Median transit time of ICG injection to fluorescence localization was 7 minutes (range 2 - 20 minutes). The detailed characteristics of SLNB procedure and comparison are represented in the Table. None of the patients had any local or systemic reaction with ICG, 3 patients with blue dye had tattooing and staining of skin

Conclusions: ICG is as effective as the dual dye for SLNB in early breast cancer. In addition, as a near-infrared dye, it has the advantages of real-time visualization, lower cost, and wider availability, since no radioactive material needs to be handled. It can be a boon for developing countries and second-tier centers of developed country where there is limited access to nuclear medicine department facility and the cost involved in its establishment.

Table: Sentinel lymph node characteristics

Characteristics	Numbers	Percentage
SLN Identified In Patients	100	100%
No Of SLN Harvested	290	
Mean No Of Nodes Detected	2.9 (1-6)	
SLN identification In No Of Cases Both by Gama probe and Blue dye (Dual Dye) By ICG	 92 96	 92.0% 96.0%
Number of patients with Positive nodes	32/100	32%
Number of positive nodes	44/290	15.1%
Positive Nodes Identified By Dual Dye (Radio-colloid & Blue Dye) ICG	 38 44	
Distribution Of Positive nodes identified : Lymph node 1: Lymph node 2 : Lymph node 3 :	 ICG 32 Dual Dye 28 ICG 8 Dual Dye 6 ICG 4 Dual Dye 4	
Positive Node Characteristics Macro-metastasis Micro-metastasis ITC	 38 05 01	 85% 10% 5%
Percutaneous Lymph Drainage Visualised Partially Complete	 38 62	

787778 - Evaluation of the Role of MR Spectroscopy in Evaluation of Sentinel Node in Breast Cancer

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Background/Objective: There is scant literature describing the role of MR spectroscopy (MRS) in the evaluation of sentinel lymph node (SLN) in breast cancer. Biochemical changes are known to occur in malignant tissues. Experimental studies have shown increased concentrations of certain metabolites like glycerophosphocholine (GPC), phosphocholine (PC), threonine (Thr), lactate (Lac), Choline (Cho) etc., in LNs with metastasis. Choline has been known to be a marker of cell replication and hence is elevated in malignant LN. As biochemical changes in tumor-infiltrated LNs occur earlier than morphological changes and MRS can detect these chemical changes, it can be a potentially useful investigation in evaluation of SLNin breast cancer. MRS

also offers the advantage of evaluating the entire lymph node and thus limiting sampling error. Aim: To evaluate the role of MRS in identifying biochemical changes in SLN in breast cancer and correlate its findings with histopathology (HP) of sentinel node (SN) to predict presence of metastasis.

Methods: SLNs were obtained from 59 patients with breast cancer who underwent surgery. Each LN was bisected into 2 equal halves. One half of LN was snap frozen in liquid nitrogen (-196°C) and then stored at −80°C until perchloric acid extraction was carried out. Other half of LN was subjected to HP evaluation with standard Eosin and Hematoxylin staining. MRS: Water-soluble metabolites from the tissue samples were extracted using PCA extraction procedure as reported previously. Proton (1H) NMR spectroscopy of specimen was performed by one of the investigators (US) who was blinded to results of HP. Concentration of glycerophosphocholine (GPC), phosphocholine (PC), threonine (Thr), lactate (Lac), Choline (Cho), and other metabolites were determined by comparing the integrated intensity of isolated resonances of the compounds of interest with that of the TSP signal, correcting for the number of contributing protons and with the tissue weight. Intensity ratio for metabolites, GPC, PC, and Thr (GPC+PC/Thr) was also determined. Statistical Analyses: Levels of concentrations of various metabolites were compared between involved and non-involved lymph nodes using Wilcoxon rank sum (Mann Whitney) test. Diagnostic indices of MRS were assessed in terms of sensitivity, specificity, positive predictive value, negative predictive value, likelihood ratios, and overall accuracy taking final histopathology as 'gold standard' with 95% confidence intervals.

Results: Mean concentrations of GPC, PC, CHO, Thr, and lactate were significantly increased in involved as compared to non-involved nodes and are given in the Table. A cut-off value of 0.80 for the GPC-PC/Thr ratio was chosen to obtain a maximum accuracy of 89% based on previous study. MRS accurately predicted metastasis in 21 of the 24 patients who had LN metastasis on HP. Out of 35 patients with no LN metastasis, MRS correlated accurately with HP in 30 of them. Sensitivity, specificity, PPV, NPV, and overall accuracy for MRS in detecting LN metastasis were 87.5%, 88%, 80.7%, 90.9%, and 86.4% respectively. Likelihood ratio for positive test and negative test for MRS to detect LN metastasis were 6.1 and 0.14 respectively.

Conclusions: MRS can accurately predict presence of metastasis in sentinel node in breast cancer. However, the role of in-vitro MR spectroscopy in evaluation of SLN is still experimental. Further studies with a larger sample size are essential to corroborate these findings.

Table: Mean concentrations of GPC, PC, CHO, Threonine and Lactate in involved and non-involved nodes

	Involved	Non-involved	P value
GPC	0.5923 (SD=0.5726)	0.3648 (SD=0.6774)	0.02
PC	0.7347 (SD=0.9466)	0.5286 (SD=1.1111)	0.03
Cho	0.6930 (SD=0.6756)	0.8435 (SD=0.5030)	0.21
Thr	2.9656 (SD=2.2397)	1.1674 (SD=1.2274)	0.02
Lactate	4.5515 (SD=2.3271)	3.2907 (SD=1.3296)	0.31

SLN/NAC

787502 - Predictors of Nodal Response After Neoadjuvant Therapy in Invasive Lobular Carcinoma of the Breast

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Background/Objective: Neoadjuvant therapy in breast cancer can result in down-staging of involved axillary nodes and therefore reduce the extent of axillary surgery required. However, accurately determining whether there has been resolution of nodal involvement after therapy is an area of active investigation. For patients with invasive lobular carcinoma (ILC), this issue is especially salient given the low sensitivity of imaging tools and limited available data for this tumor type. We therefore aimed to identify predictors of nodal response using a large cohort of neoadjuvantly treated ILC cases to better understand how to predict which patients can avoid axillary dissection.

Methods: We performed a cross-sectional analysis of 706 prospectively collected ILC cases who received surgical treatment at the University of California, San Francisco between 1981 and 2019. We identified all patients who had Stage 1-3 ILC and received either neoadjuvant chemotherapy or endocrine therapy. ILC was diagnosed by histology with E-cadherin staining performed selectively. Patients with a pre-treatment tissue diagnosis of node positivity (by needle biopsy) were considered clinically node positive. Stata 14.2 was used for statistical analysis.

Results: Of 132 neoadjuvantly treated ILC cases identified, 71 (53.8%) received neoadjuvant chemotherapy, and 61 (46.2%) received neoadjuvant endocrine therapy. Compared to the endocrine therapy cohort, the chemotherapy cohort was significantly more likely to be younger (53 years vs. 61 years, p=0.047), have HER2-positive disease (17.9% vs. 0%, p=0.002), have Stage 2 or 3 disease (67.6% vs. 45.9%, p=0.003), and be clinically node-positive (35.2% vs. 18.0%, p=0.027). The rate of pathologically positive nodes at surgery was higher in the chemotherapy cohort than the endocrine therapy cohort (57.8% vs. 39.3%, p=0.035). Overall, 96 patients (72.7%) were clinically node-negative. Of these patients, 32 (33.3%) were found to have pathologically positive nodes at surgery, and these patients were more likely to have lymphovascular invasion (80.7% vs. 36.7%, p<0.001) compared to those who had pathologically negative nodes. Among the 36 clinically node-positive patients, 19 (52.78%) had improvement in nodal disease on post-neoadjuvant imaging, 11 (30.6%) had no change, and 3 (8.3%) had worsening of nodal disease. At surgery, 33 patients (91.7%) in the clinically node-positive cohort still had pathologically positive nodes. Of the 3 patients with a nodal pathologic complete response, 2 patients had improvement in nodal disease on imaging, 2 patients had HER2-positive disease, and all 3 were treated with neoadjuvant chemotherapy rather than endocrine therapy.

Conclusions: We were unable to identify predictors of robust nodal response after neoadjuvant therapy in ILC. On the contrary, we found a high rate of positive nodes in patients who were

clinically node-negative. These patients were more likely to have lymphovascular invasion, which could be an indicator of undetected nodal involvement. For the 3 clinically node-positive patients with a pathologic complete response in the nodes, the high incidence of HER2 positivity is consistent with prior reports suggesting improved response to neoadjuvant chemotherapy in ILC with either triple-negative or HER2-positive status. These data suggest that new systemic treatment strategies specific to estrogen receptor positive HER2-negative ILC are needed to improve response to therapy. Additionally, improvement in adenopathy on post-treatment imaging should be interpreted with caution when making surgical plans for axillary management in neoadjuvantly treated patients with ILC.

788082 - Dual-tracer Sentinel Lymph Node Biopsy May Not Contribute Additional Information to Directed Sentinel Lymph Node Biopsy When Staging the Axilla Following Neoadjuvant Chemotherapy in Breast Cancer

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Background/Objective: Axillary lymph node dissection (ALND) is the standard of care for clinically node-positive patients receiving neoadjuvant chemotherapy (NAC) following a breast cancer diagnosis. The high rate of pathologic complete response prompted investigation of surgical alternatives to ALND to determine axillary response. Standard dual tracer sentinel lymph node biopsy (tr-SLNB), particularly if combined with identification of the biopsy-proven and clipped axillary lymph node (LN) is associated with an acceptably low false-negative rate. To ensure retrieval of this LN, it is our standard practice to perform a directed sentinel lymph node biopsy (d-SLNB) using an I-125 radioactive seed (RSL) to localize the biopsy-proven and clipped LN at the time of surgery. This study attempts to evaluate the relative contributions of tr-SLNB, when combined with d-SLNB, in staging the axilla following NAC.

Methods: A single-institution prospective NAC database was retrospectively reviewed for patients with percutaneous biopsy-proven and clipped axillary LN metastasis who received NAC. Patients were subsequently staged by d-SLNB followed immediately by tr-SLNB from July 2014 to August 2018. Dual tracers were administered as an intradermal technetium (Tc-99) and subdermal blue dye injections in the operating room after anesthesia induction. Demographics, clinicopathologic features, and surgical outcomes were evaluated.

Results: A total of 151 patients met inclusion criteria. Mean age was 50. In 4/151 patients (3%), d-SLNB was not successful because of poor RSL placement and were excluded from analysis. The d-SLNB was successful in 147/151 patients (97%). Mean and median number of LN excised by d-SLNB was 1. This was followed by tr-SLNB. Mean and median number of LNs excised by tr-SLNB was 3. There were 147 patients in the successful d-SLNB combined with tr-SLNB cohort. Sixty-seven patients had a positive d-SLNB, with 36 having additional positive tr-SLNBs and 31 having no additional disease in the tr-SLNBs. In the 80 patients with a negative d-SLNB, 75 had no disease in the additional tr-SLNBs, but 5 had additional tr-SLNBs with lymphatic involvement (Table). In these 5 patients, 1 had scattered tumor cells in a single node, and 4 had

metastatic foci ranging from 0.1 to 0.8 cm in 2 to 3 LN on ALND. Therefore, d-SLNB alone accurately characterized the axilla in 142/147 (97%) patients.

Conclusions: d-SLNB alone accurately characterized the axilla in 97% of patients allowing for decisions to omit or proceed to ALND by pathologic examination of a single LN. tr-SLNB contributed little to pathologic axillary staging of previously LN-positive patients receiving NAC. d-SLNB may decrease morbidity by avoiding retrieval of additional nodes. Further investigation of clinical, patient and tumor characteristics is planned to identify which patient subset can safely omit tr-SLNB and reliably undergo d-SLNB alone.

Table: Pathologic status of directed SLNB and tracer SLNB

N= 147	Tracer SLNB (-)	Tracer SLNB (+)
Directed SLNB (-)	75	5
Directed SLNB (+)	31	36

SLNB: sentinel lymph node biopsy

787789 - Is There Any Advantage of Targeted Axillary Dissection After Neoadjuvant Chemotherapy in Patients with Locally Advanced Breast Cancer with Initially Positive Clipped Axillary Node?

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Background/Objective: Detection of the clipped lymph node and removal by targeted interventions with sentinel lymph node biopsy (SLNB) have been shown to reduce the false-negative rates in patients with initially positive axilla following neoadjuvant chemotherapy (NAC). We aimed to evaluate the surgical advantage of targeted removal of the metastatic clipped node by various radiological methods in our clinic.

Methods: Between April 2017 and September 2019, a prospective study was performed in patients with clinically node-positive locally advanced breast cancer (T1-4, N1-2). The metastatic index lymph node was marked with a clip before NAC. Sentinel lymph node biopsy (SLNB) was performed by only blue dye or combined method (radioisotope and blue dye). Based on the surgeon and radiologist preference, the clipped lymph node was marked with radioactive isotope Tc99 or wire or carbon dye on the day of surgery and presence of the clip in the lymph node was demonstrated by specimen radiography.

Results: Forty patients with a clipped lymph node that was radiologically visible (ultrasound or mammogram or CT) were evaluated. The median age of the patients was 45 (24-70), 3 (7.5%) of the cases before NAC were clinically (c) T1, 24 (60%) of them were cT2, 11 (27.5%) were cT3 and 2 (2) were cT4 (5%). Thirty-one cases were N1 (77.5%), and 9 were N2 (22.5%). The clipped lymph node was removed by wire in 32 patients (80%), and by radio-guided occult

lesion localisation (ROLL) in 7 patients (17.5%) and by carbon dye injection in 1 patient (2.5%). SLNB was performed with only blue dye in 27 patients (67.5%), and combined method in 13 patients (32.5%). The median number of SLN was 2 (1-5) (1 SLN in 9 patients, 2 SLNs in 17 patients, and 3≤ SLNs in 14 patients). The clipped lymph node was detected in 34 patients (85%) in SLNs and in 6 patients (15%) in non-SLNs with axillary dissection. The clipped lymph node pathology was found to be regression in 14 (38%), metastasis in 17 (46%), metastasis and regression in 3 (8%) and reactive changes in 3 (8%) patients. Twenty-four patients (n=24) who had positive axillary lymph node in frozen section underwent axillary lymph node dissection. The non-sentinel lymph node positivity evaluated in those patients with a pathological positive lymph node and ALND were 12.5% with SLNB technique alone, 12.5% by removal of the clipped lymph node alone, and 4.2% by using both techniques, respectively.

Conclusions: In concordance with previous studies, our findings suggest that removal of the clipped lymph node by guidance of various radiological methods including ROLL, wire and carbon-dye injection in addition to SLNB may reduce the non-sentinel lymph node positivity even more compared to each technique alone. Therefore, ALND may be spared in selected patients with a limited positive intraoperative lymph node evaluation followed by removal of both SLN and clipped node provided nodal irradiation after surgery. However, experienced radiologists and surgical teams are required to perform these techniques successfully.

787231 - Node-positive Patients Treated with Neoadjuvant Therapy Are Spared Axillary Lymph Node Dissection with Non-radioactive Seed Localizers

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Background/Objective: The false-negative rate of sentinel lymph node biopsy (SNB) after neoadjuvant therapy (NAT) is significantly reduced when the biopsy-proven metastatic lymph node at presentation is clipped and removed. Because the clipped node is not a sentinel node in 23% of patients, pre-operative localization is necessary to ensure its removal. Non-radioactive localizers are an attractive alternative to radioactive seeds to avoid the limitations of signal decay as well as the strict handling/disposal regulations. This study evaluates our single-institution experience with non-radioactive localizers for targeted excision of clipped axillary lymph nodes at time of SNB.

Methods: All node-positive breast cancer patients treated with NAT and SNB with axillary lymph node localization were retrospectively identified. Axillary localizations were performed with the Savi Scout, Magseed, or Faxitron LOCalizer devices. The primary outcome measure was retrieval rate of the clipped node, with documented excision by specimen radiograph or clip visualization on pathology. Secondary outcomes included rates of complications, axillary pathologic complete response (pCR), and completion axillary lymph node dissection (cALND).

Results: A total of 46 patients treated by 6 breast surgeons met inclusion criteria. Median age was 50 years, 30 (65.2%) patients had a BMI ≥25. Receptor status was ER+/HER2- in 15

(32.6%), ER-/HER2- in 13 (28.3%) and any HER2+ in 18 (39.2%). Most (93.5%) had non-palpable nodes post-NAT. Pre-NAT, 44 (95.7%) patients had a nodal clip placed (1 with 2 lymph nodes clipped), 1 had a Magseed placed in lieu of a clip, and 1 had no clip. Post-NAT, 1 clip (2.2%) could not be identified on imaging for localization. The median duration from localizer placement to surgery was 1 day (range: 0-131); however, 12 (27.2%) localizers were placed >7 days before surgery. Of the 44 localized clipped nodes, all localizers were retrieved at surgery and 40 (90.9%) included the targeted clips. Retrieval rates did not appear to differ between those with >7 days between localizer placement and surgery, versus ≤7 days (91.4% vs. 88.9%). Given the low rate of non-retrieval events, we were unable to assess for factors associated with successful retrieval. Overall, 17 (37.0%) patients had immediate cALND and 3 (6.5%) had delayed cALND. Axillary pathologic complete response occurred in 18 (39.1%) patients, of whom 15 (83.3%) were spared cALND. In the 3 patients with axillary pCR and cALND, 2 were performed due to the clipped node not being retrieved and 1 for a false-positive frozen section. There were no axillary hematomas requiring re-operation. Six (13.0%) patients developed an axillary seroma requiring drainage, all of whom had SNB without cALND. Four (8.7%) patients developed a surgical site infection in the axilla: 2 in the setting of an axillary seroma after SNB and 2 following delayed cALND.

Conclusions: Using non-radioactive localizers, we achieved a 91% retrieval rate of clipped axillary nodes during SNB post-NAT. The absence of signal decay with these localizers allows greater flexibility in timing of placement without compromising successful retrieval of the target. A total of 83% of patients with axillary pCR were spared the morbidity of ALND using this approach.

787715 - Low Nodal Failure Rate with Sentinel Lymph Node Surgery After Neoadjuvant Chemotherapy for Node-positive Breast Cancer

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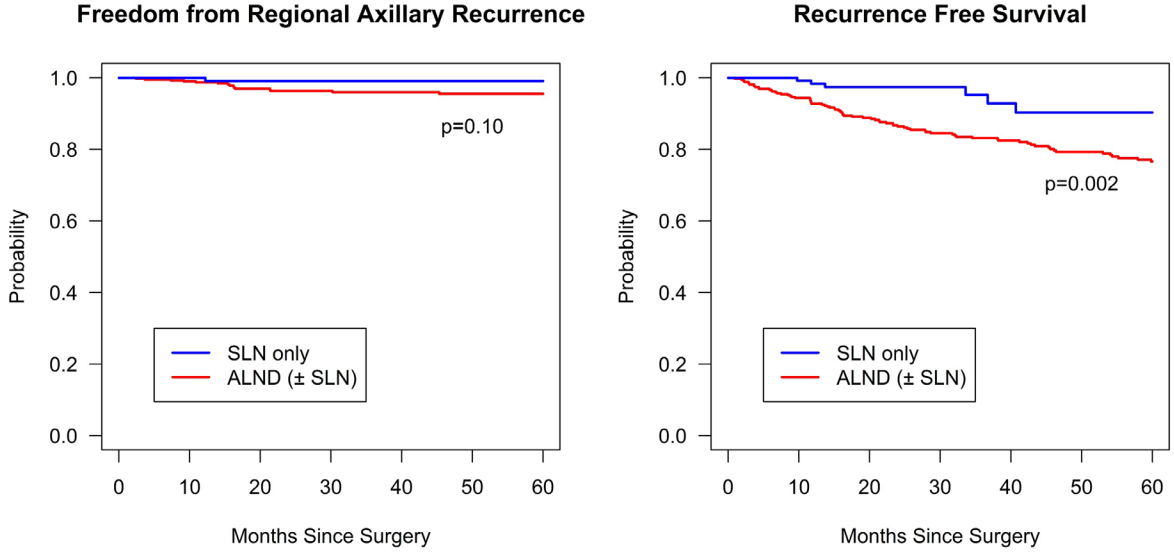
Background/Objective: Systemic therapy options continue to improve, thus increasing the response rates to neoadjuvant chemotherapy (NAC) and enabling de-escalation of surgery in both the breast and the axilla. The aim of this study is to evaluate the use of sentinel lymph node (SLN) surgery versus axillary lymph node dissection (ALND) in clinically node-positive patients treated with NAC and report on long-term outcomes.

Methods: With IRB approval, all patients who were clinically node-positive (cN1-cN3) with biopsy-proven nodal disease and undergoing axillary staging surgery after NAC from 2009-2019 at our institution were identified. Patients with inflammatory breast cancer, distant metastasis, or prior history of ipsilateral breast cancer were excluded. Practice patterns related to axillary surgery were evaluated, as well as outcomes with respect to local, distant, and regional nodal basin recurrences assessed. Multivariable logistic regression was used to analyze variables associated with axillary surgery choice. The Kaplan-Meier method and log-rank tests were utilized for time-to-event outcomes.

Results: Of 604 patients included, 543 (89.9%) were cN1, 19 (3.1%) were cN2, and 42 (7.0%) were cN3. Overall 52.2% (315/604) underwent SLN surgery (±ALND), and this percentage increased significantly from 31.3% in 2009 to 74.8% in 2015-2019 (p<0.001). Conversely, the percent of patients undergoing ALND (±SLN) decreased from 100% in 2009 to 56.5% 2015-2019. Rate of nodal positivity in patients who proceeded directly to ALND was 64.7% (187/289) and this increased significantly over time from 50% in 2009 to 84.6% in 2019 (p<0.001). Among patients undergoing SLN surgery, 162 (51.4%) were spared ALND, which increased significantly (p<0.001) over time (13.2% 2009-2012, 47.2% 2013-2014, 58.1% 2015-2019). Of the remaining 153 patient (48.6%) who underwent completion ALND, additional axillary disease was identified in 84/153 (54.9%) which did not change significantly over time (p=0.10). During the years 2015-2019, factors significantly associated with the decision to perform SLN surgery (rather than direct to ALND) on multivariable analysis were lower clinical T category at presentation (OR 8.2 cT1, 3.9 cT2, 3.1 cT3, each vs cT4, p=0.02), cN1 vs cN2-3 (OR 6.0, p<0.001), and nodal pathologic complete response (pCR) (OR 2.8, p=0.007). With a median follow-up of 34 months, 17 regional lymph node recurrences were observed (16/442 patients with ALND, 1/162 patients with SLN only) for a 2-year freedom from regional recurrence rate of 99.1% among SLN patients and 96.3% among ALND patients (p=0.10). Recurrence-free survival was significantly better in SLN only versus ALND patients (97.4% vs 86.4% at 2 years, p=0.002) (Figures).

Conclusions: Use of SLN surgery in patients with node-positive breast cancer treated with NAC has been incorporated into clinical practice and has significantly increased over recent years. Selection of patients for SLN surgery was based on clinical factors and response to chemotherapy. SLN surgery resulted in sparing ALND in more than half of those patients. Patients who were directed primarily to ALND had higher clinical N category, larger tumor size at presentation and poorer response to NAC than those who underwent SLN surgery for staging. We demonstrated a low nodal failure rate with SLN surgery and no survival disadvantage.

Figures: Freedom from regional recurrence and recurrence-free survival over time



Stage IV

787641 - Primary Tumor Extirpation in the Setting of Stage IV Breast Cancer
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Background/Objective: Patients with de novo Stage IV disease constitute 5-6% of patients with newly diagnosed breast cancer. The role of surgery in these patients is controversial. Although multiple retrospective studies have shown a survival benefit for patients undergoing removal of the primary tumor, they are limited by selection bias. The goal of this study is to report outcomes in patients with Stage IV breast cancer who were recommended for and elected to undergo surgical intervention of the breast primary.

Methods: We identified all patients who presented with de novo Stage IV breast cancer between 2008 and 2018. De novo Stage IV disease was defined as distant metastasis diagnosed within 4 months of breast cancer diagnosis according to the AJCC guidelines. Patients were included if they underwent surgical resection of the primary tumor. Patients with a history of a separate, prior diagnosis of breast cancer were excluded. Survival and progression-free survival times were defined from the date of surgery and analyzed using the Kaplan-Meier method and log-rank tests.

Results: Forty-five patients with Stage IV disease underwent resection of a breast primary. Of these, 49% of patients had single metastasis (n=22), 24% of patients had 2-4 sites of metastasis (n=11), 27% of patients had 5 or more metastasis (n=12). There were 93% (42/45) of patients who underwent induction systemic therapy (IST) prior to resection, 33% (15/45) had chemotherapy, 24% (11/45) had hormonal therapy, 18% (8/45) had HER2 therapy, 18% (8/45) had combination chemotherapy and hormonal therapy (±HER2-targeted therapy). Of those treated with IST, 29 (69%) underwent operative intervention after a complete or partial response of the primary tumor, and 13 (31%) underwent surgery after local disease progression. Overall survival was better in patients with primary tumor response (96% at 1 and 2 years) compared to patients who progressed on IST (83% and 69% respectively). Outcomes of patients following IST is shown in the Table.

Conclusions: In this single institution experience, patients with Stage IV breast cancer who underwent resection of the primary tumor, overall and progression-free survival was relatively favorable among women with a demonstrable primary tumor response to IST. Tumor response to IST is important to guide selection of patients for consideration of surgical resection of the breast primary.

Table: Outcomes among patients treated with induction systemic therapy

Outcomes among patients treated with induction systemic therapy (IST)			
	Overall N (%)	Progression of Primary Tumor on IST N (%)	No Progression of Primary Tumor to IST N (%)
No. of Patients	42	13 (31)	29 (69)
Primary disease response to systemic therapy			
Complete	6 (14)	0 (0)	6 (21)
Partial	23 (55)	0 (0)	23 (79)
Progression	13 (31)	13 (100)	0 (0)
Distant disease response to systemic therapy			
Complete*	16 (38)	3 (23)	13 (45)
Partial	14 (33)	4 (31)	10 (34)
Stable	6 (14)	1 (8)	5 (17)
Progression	4 (10)	4 (31)	0 (0)
NA	2 (5)	1 (8)	1 (3)
Patients achieving pCR	6 (14)	0 (0)	6 (21)
Months from diagnosis to surgery, median (range)*	8 (2-96)	19 (2-96)	7 (2-41)
Distant progression-free survival events	22	8	14
Median distant progression-free survival, months*	31.5	11.3	49.6
1-year distant progression-free survival (95% CI)	69% (55-86%)	44% (22-87%)	79% (64-97%)
2-year distant progression-free survival (95% CI)	56% (42-76%)	33% (13-80%)	66% (49-88%)
5-year distant progression-free survival (95% CI)	38% (24-61%)	NA	46% (28-73%)
Deaths	11	4	7
1-year survival (95% CI)	92% (84-100%)	83% (64-100%)	96% (89-100%)
2-year survival (95% CI)	89% (79-100%)	69% (45-100%)	96% (89-100%)
5-year survival (95% CI)	68% (52-89%)	NA	74% (56-98%)

788252 - Are Clinicopathologic Features of Invasive Breast Cancer at Initial Diagnosis Predictive of Metastatic Disease?

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Background/Objective: The NCCN, ASCO and ESMO recommend radiological imaging to stage symptomatic patients and those with clinical stage III breast cancer. Despite these guidelines, physician variability in obtaining metastatic workup has been reported often resulting in overutilization of diagnostic tests, with false positive results warranting additional workup, delay in care and an increase in health care costs. We sought to identify clinicopathological features at diagnosis that could be predictive of metastatic disease to guide future testing.

Methods: Breast cancer patients, diagnosed from January 2014 to December 2015 were identified from a prospectively maintained institutional database. Patient variables collected included demographics, pathology, receptor profiles, clinical TNM staging and rates of upstaging to stage 4 disease. Frequencies were calculated for categorical variables. Nonparametric statistical analyses using Pearson's $\chi 2$ test were performed using SPSS, version 22.0. P value less than 0.05 was considered significant.

Results: 378 patients met inclusion criteria. Overall 70/378 (18.5%) had metastatic disease at presentation. With advancing clinical stage, both tumor size and nodal status independently as well as when combined as per the AJCC 8th edition criteria, resulted in a higher and statistically significant rate ($p<0.001$) of upstaging to M1 disease. No upstaging was seen in patients with stage 1 disease. Of the 107 stage IIA patients 6/107 (5.6%), while 19/102 (18.6%) of Stage IIB and 40/120 (33.3%) of stage III were upstaged to M1 once staging imaging was obtained. Age and hormone receptor status did not independently appear to have a statistically significant effect on upstaging to stage IV disease. Majority of tumors (39.6%) were Grade II and were associated with the highest proportion of upstaging ($p=0.02$).

Conclusions: Advancing clinical stage at presentation, consisting of tumor size and nodal status, was predictive of upstaging to M1 disease in patients with invasive breast cancer. The higher rate of upstaging in grade II versus grade III tumors warrants further study to explore variability in grade interpretation or a subset of more aggressive tumors within grade II.

Table: Clinico-pathologic features

Clinicopathologic Features		M0	Upstaged to M1	Total	p-value
Clinical Stage	I	40 (100%)	0 (0%)	40 (100%)	<0.001
	IIA	101 (94.4%)	6 (5.6%)	107 (100%)	
	IIB	83 (81.4%)	19 (18.6%)	102 (100%)	
	III	80 (66.7%)	40 (33.3%)	120 (100%)	
T size	T1	58 (92.1%)	5 (7.9%)	63 (100%)	<0.001
	T2	158 (87.3%)	23 (12.7%)	181 (100%)	
	T3	41 (75.9%)	13 (24.1%)	54 (100%)	
	T4	50 (63.3%)	29 (36.7%)	79 (100%)	
Nodal Status	N0	151 (94.4%)	9 (5.6%)	160 (100%)	<0.001
	N1	137 (77.8%)	39 (22.2%)	176 (100%)	
	N2	14 (51.9%)	13 (48.1%)	27 (100%)	
	N3	2 (33.3%)	4 (66.7%)	6 (100%)	
	Unknown	4 (44.4%)	5 (55.6%)	9 (100%)	
Age at diagnosis	< 40 years	60 (75.9%)	19 (24.1%)	79 (100%)	0.115
	≥ 40 years	248 (82.9%)	51 (17.1%)	299 (100%)	
Hormone Receptor Status	Hormone positive	170 (80.2%)	42 (19.8%)	212 (100%)	0.802
	Her2 positive	29 (80.6%)	7 (19.4%)	36 (100%)	
	Triple negative	45 (81.8%)	10 (18.2%)	55 (100%)	
	Unknown	64 (85.3%)	11 (14.7%)	75 (100%)	
Grade	I	14 (100%)	0 (0%)	14 (100%)	0.02
	II	117 (78%)	33 (22%)	150 (100%)	
	III	162 (84.8%)	29 (15.2%)	191 (100%)	
	Unknown	15 (65.2%)	8 (34.8%)	23 (100%)	

Time to Treatment

786405 - Improved Access to Surgery Following Centralization of Breast Cancer Surgical Consultations

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Background/Objective: Timely access to definitive surgical management for breast cancer is crucial for ensuring good patient outcome. A number of innovative care delivery models have shown that streamlining the diagnostic process reduced wait times to breast cancer diagnosis, without significant reduction in wait time to definitive surgery. Our group has previously shown that navigation through diagnostic imaging and surgical consultation reduced wait times to diagnosis as well as surgery. To further reduce waits, 5 breast surgeons centralized all breast surgical referrals using principles of central intake, pooled referrals, and nurse navigator triage to specific programs. The goal of this study was to investigate whether centralized intake and triage to first available surgeon can further improve access to definitive surgical management of breast cancer.

Methods: This study was designed as a before-after series through a retrospective review of a prospectively maintained database, comparing wait times for patients who had surgery for breast cancer prior to centralized breast referrals (2017) and after (2018). Adult patients who were referred and treated for invasive and in situ breast cancer between January 2017 and Dec 2018 were included. Patients with benign diagnoses including high-risk lesions, recurrent or palliative disease, or patients referred for prophylactic risk reducing mastectomy were excluded. Primary outcome was wait time from diagnosis to surgery, and secondary outcomes included median wait time to surgery as well as the number of days required to achieve 90% case completion, number of available operating room days, and number of patients who underwent breast reconstruction and neoadjuvant therapy.

Results: Overall, centralization of breast cancer surgical referrals reduced wait time between core biopsy and surgery from 47 to 41 days (p=0.0008). The time between core biopsy to surgical consultation was reduced from 21 to 17 days (p=0.0013), and the time between surgical consultation to surgery was reduced from 26 to 24 days (p=0.06). We then stratified our data according to the procedure performed. For patients who underwent skin or nipple-sparing mastectomy followed by immediate reconstruction, the overall wait time between core biopsy and surgery was reduced from 60 to 49 days (p=0.01), with time between core biopsy to consult going from 22 to 19 days (p=0.22) and consult to surgery from 38 to 30 days (p=0.008). For patients undergoing mastectomy without reconstruction, the overall wait time was reduced from 46 to 43 days (p=0.27), with the intervals between core biopsy to consult going from 20 to 15 days (p=0.01) and consult to surgery from 26 to 28 days (p=0.31). Lastly, patients that underwent partial mastectomy had their wait time decrease from 43 to 39 days (p=0.04), with the intervals between core biopsy to consult decreasing from 20 to 17 days (p=0.02) and consult to surgery going from 23 to 22 days (p=0.26). The median wait time from biopsy to surgery was reduced from 37 to 36 days following centralization, and 90% of cases were completed within 81 days prior to centralization, and 63 days following centralization. Interestingly, the number of operating days assigned to general surgery was 349 days in 2017, and this was reduced to 324

days in 2018. The number of patients who underwent neoadjuvant therapy decreased from 79 to 56 patients following centralization, and the number of patients who underwent breast reconstruction increased from 78 to 116 patients.

Conclusions: Centralized referral for breast cancer surgical consultations and subsequent triaging to the first available breast surgeon led to shorter wait time to definitive surgery, despite reduced access to the operating room. The group of patients that benefitted the most following centralization was patients undergoing mastectomy with immediate reconstruction, as they had the most significant reduction in wait time compared to patients that underwent mastectomy without reconstruction or partial mastectomy. A number of previously published innovative care delivery models have shown to reduce time to breast cancer diagnosis; however, our report is novel and significant as we reduced time to definitive surgery. Caring for patients with breast cancer should continue to prioritize timely delivery of care, which has proven to improve patient outcome.

782814 - Trends in and Determinants of Time to Primary Surgical Treatment for Females with Early Breast Cancer

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Background/Objective: Emerging evidence suggests geographic variation in time to initiation and type of surgery performed for early-stage breast cancer (ESBCa). Multiple factors affect time to surgical treatment (TtS), including the time for diagnosis, comorbidity management, and second opinions. While breast quality recommendations suggest optimal time to radiation and chemotherapy for accountability, there is not a standard TtS for breast-conserving surgery (BCS) or mastectomy (MAST). Access to and time to surgical treatment has been proposed as a quality measure since it has an impact on initiation of chemotherapy or radiation. This real-world evidence study examined the association of patient characteristics, sociodemographic factors, and health care supply measures following diagnosis of ESBCa to understand factors influencing variations in breast cancer treatment.

Methods: A retrospective study was conducted using the MarketScan® Research databases from January 2012 to March 2018. Eligibility criteria were: 1) female sex, 2) non-metastatic breast cancer diagnosis, 3) >6 months of continuous insurance eligibility pre- and post- diagnosis, 4) evidence of BCS or MAST following initial diagnosis based on ICD9/10 codes. Factors examined included age, policyholder status, health plan type, geographic region, use of genetic testing, presence of in situ diagnosis, chronic comorbidities, and select health care supply measures from the 2019 Area Health Resource Files. Days elapsed between diagnosis and first surgery was the primary dependent variable. Univariate and bivariate analyses were conducted, along with a quantile regression model of the median TtS.

Results: A total of 53,060 women met study criteria. For BCS, the mean TtS (days) increased from 24.1 (median 21) in 2012 to 27.9 (median 25) in 2017. For MAST, mean TtS increased from 37.0 (median 31) in 2012 to 38.9 (median 36) in 2017. Among patients receiving MAST, TtS decreased with age, with individuals ages 70-79 waiting 7.3 ($p<.0001$) fewer days compared to those less than age 50 while TtS for BCS was 2.1-2.6 ($p<.0001$) days shorter for all women over 50 compared to the younger group. Relative to the Northeast, residents in all other regions had lower TtS for MAST (-6.2 to -3.1, $p<.0001$ - $p=.01$), but only those in the South had significantly lower TtS for BCS (-2.9, $p<.0001$). A pre-index in situ diagnosis was associated with 5.4 ($p<.0001$) and 8.7 ($p<.01$) fewer days TtS for MAST and BCS, respectively. Further, patients residing in areas with a higher density of radiation oncologists had a shorter TtS for MAST (-9.59, $p=.02$). Several comorbid conditions (congestive heart failure [2.0, $p=.04$], cerebrovascular disease [1.9, $p<.01$], chronic obstructive pulmonary disease [1.1, $p<.01$]) were related to longer TtS for BCS, but none for MAST. Patients in urban areas (12.4, $p<.0001$; 4.87, $p=.03$) or those with a greater percentage of college educated graduates (15.3, $p=.03$; 9.2, $p=.06$) had longer TtS for both MAST and BCS respectively. (See Table).

Conclusions: Our findings show TtS for both BCS and MAST in commercially insured females is increasing over time. Geography is a strong influence in TtS especially residing in an urban area. This study adds to the literature in highlighting the important association of comorbid conditions in TtS for BCS. Understanding key determinants and factors affecting TtS should help inform policy and clinical practice efforts critical for optimizing quality care for patients with ESBCa.

Table: Quantile median regression of days from first breast cancer diagnosis to primary surgery [Positive coefficient values reflect a longer time-to-surgery (N=53,060)]

FACTOR	BCS N = 36,270		MAST N = 16,790	
	Coefficient	p-value	Coefficient	p-value
Year 2012	1		1	
Year 2013	0.81	0.02	0.90	0.15
Year 2014	2.15	p<.0001	1.74	0.01
Year 2015	2.85	p<.0001	2.53	p<.0001
Year 2016	3.38	p<.0001	2.90	p<.0001
Year 2017	4.01	p<.0001	3.06	p<.01
Age <50	1	-	1	-
Age 50-59	-2.27	p<.0001	-1.28	0.01
Age 60-69	-2.05	p<.0001	-2.86	p<.0001
Age 70-79	-2.13	p<.0001	-7.25	p<.0001
Age 80+	-2.62	p<.0001	-9.25	p<.0001
Northeast	1	-	1	-
Midwest	-0.71	0.45	-3.10	0.01
South	-2.90	P=.001	-4.79	p<.0001
West	-1.00	0.32	-6.23	p<.0001
Employer-Sponsored (versus Health Plan)	0.66	0.16	-0.05	0.94
Policyholder (versus Spouse or Other Dependent)	0.09	0.71	0.19	0.65
Plan Type: EPO or HMO	0.14	0.81	2.45	p<.01
Plan Type: CDHP	0.29	0.51	1.56	0.04
Plan Type: HDHP	0.24	0.68	1.24	0.21
Had a Genetic Test	3.33	p<.0001	0.21	0.80
Also Had In Situ on Index Date	-4.99	p<.0001	0.17	0.79
Also Had In Situ Pre-Index Date	-8.72	p<.0001	-5.39	p<.0001
Comorbid Conditions				
Congestive heart failure	2.01	0.04	1.01	0.65
Chronic Obstructive Pulmonary Disease	1.11	p<.01	-0.46	0.57
Cerebrovascular disease	1.94	p<.01	-1.40	0.20
Dementia	3.41	0.18	0.70	0.79
Diabetes	0.92	0.06	0.72	0.33
Diabetes w/complications	-0.53	0.48	-1.12	0.52
HIV-AIDS	3.98	0.06	3.85	0.40
Hemiplegia or Paraplegia	-0.12	0.98	6.67	0.45
Mild Liver Disease	-1.53	0.34	-1.46	0.52
Moderate/Severe Liver Disease	-0.43	0.95	0.14	0.98
Acute Myocardial Infarction	0.26	0.93	-1.86	0.54
Peptic Ulcer	0.73	0.73	0.94	0.74
Peripheral Vascular Disease	0.84	0.23	3.53	0.17
Renal Disease	1.43	0.06	-0.14	0.96
Rheumatoid Disease	-0.53	0.53	2.15	0.30
Healthcare Supply Measures (ZIP3-Level Variables)				
Percent Urban	4.87	0.03	12.36	p<.0001
Percent Black	-0.11	0.97	-5.72	0.18
Percent Asian	-1.30	0.81	1.62	0.82
Percent Hispanic	4.07	0.10	2.89	0.37
Percent Other Race/Ethnicity	-0.91	0.94	-11.24	0.40
Percent with 4-Year College Degree	9.20	0.06	15.33	0.03
Median Household Income ($10 thousands)	-0.41	0.27	-0.69	0.15
# Ob-Gyn Physicians (per 10k residents)	-0.72	0.27	0.38	0.71
# Plastic Surgery Physicians (per 10k residents)	3.90	0.07	1.72	0.53
# Diagnostic Radiology Physicians (per 10k residents)	-1.28	0.19	-0.96	0.34
# Medical Genetics Physicians (per 10k residents)	5.95	0.53	20.69	0.16
# Nuclear Medicine Physicians (per 10k residents)	9.13	0.32	2.99	0.75
# Radiation Oncology Physicians (per 10k residents)	-2.67	0.40	-9.59	0.02
# Hospitals with General Medicine/Surgical Center (per 10k residents)	-1.24	0.86	-0.48	0.96
# Hospitals with Chemotherapy (per 10k residents)	-1.31	0.87	-15.58	0.11
Constant	18.14	p<.0001	29.01	p<.0001

Note: p-values for ZIP3-level variables are based on clustered standard errors.
EPO – Exclusive Provider Organization; CDHP – Consumer-driven Health Plan; HDHP – High deductible Health Plan; HMO – Health maintenance organization.

787075 - Critical Evaluation of Factors Contributing to Time to Mastectomy Within a Single Health Care System

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Background/Objective: Prolonged time to mastectomy (TTM) after breast cancer diagnosis has been associated with higher mortality. Certain underserved populations may be subject to patient-level, provider-level, and system-level disparities contributing to increases in TTM. Through analysis of the largest health care provider in the District of Columbia and Maryland, this study examines the vulnerable populations that experience delay in TTM with the goal of improved understanding of patient-, provider-, and system-level barriers to care.

Methods: Patients undergoing mastectomy for breast cancer between 2014 to 2018 across 10 hospitals in a single health care system were retrospectively reviewed. Our cohort includes patients treated at academic, urban, community, and rural hospitals. Patients exceeding 365 days from diagnosis to mastectomy or with incomplete demographic information were excluded. The time from biopsy-proven diagnosis to mastectomy was calculated. Demographic information including race, insurance type, location of hospital, median income by ZIP code, and disease characteristics were collected. Provider-level and systems-level variables, such as hospital of operation and insurance status, were determined. TTM was divided into quartiles. Univariate analysis was performed to identify which variables to include in the multivariable linear regression model evaluating factors associated with increased TTM.

Results: A population of 1375 patients was identified. Median TTM across all patients was 55 days. Statistically significant patient-, provider-, and system-level factors were associated with TTM. On multivariate analysis, time to surgery was 15.8% longer for patients with median salary by ZIP code <$75,000 when compared to those with salaries >$125,000 (65 days vs 49 days, p=0.0077). Black patients were found to have 11.8% longer TTM compared to white patients (69 days vs 56 days, p=0.0156). Patients who saw a plastic surgeon prior to mastectomy had a 20% longer time to surgery (p=0.0009). Lastly, system-level factors identified in delay to mastectomy included the type of insurance, as patients with Medicaid waited 14.6% longer compared to patients with commercial insurance (94 days vs. 62 days, p=0.0149).

Conclusions: In our review of care across a large health care system, we identified patient-, provider-, and systems-level disparities in surgical care after breast cancer diagnosis. Factors leading to increased TTM may explain differences in breast cancer survival amongst at-risk populations. Identification of these disparities offer valuable insight to process improvement and intervention.

Tumor Genetics

787543 - Novel Use of a Precision Medicine Tool in the Neoadjuvant Therapy Setting

Paul Baron[1], Pat Whitworth[2], Peter Beitsch[3], Eric Brown[4], Linsey Gold[4], Barry Rosen[5], Gia Compagnoni[5], Laura Lee[6], Tony Ruiz[7]

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Background/Objective: Molecular genomic profiles are increasingly used to guide treatment of refractory cancers and are on the forefront of personalized medicine for select patients. The neoadjuvant chemotherapy (NAC) setting provides a meaningful opportunity to compare genomic profiles to pathologic response. We report profiles to response in a novel on going multi center registry.

Methods: An ongoing IRB (WIRB) approved registry lead by breast surgeons at 8 community breast practices submitted tumor samples prior to treatment for genomic/proteomic analysis (Paradigm, Phoenix, AZ.) Tumor response and associated molecular profiles were analyzed. The test evaluated more than 137 genomic alterations with known actionable variations including mutations, gene-fusions, copy number variations, MRNA expression, and protein expression analysis by IHC.

Results: A total of 76 patients were enrolled, and 42 have completed treatment including definitive surgery and have reported data as of this date. The vast majority of patients had invasive ductal carcinoma, with 16% having triple-negative biology and 20% having HER2 biology. Of the triple-negative patients with reported surgical results, 42% had a complete response or minimal residual disease, and the remaining 58% had a partial response. Of the patients with HER2 biology, 85% had a complete response and the remaining a partial response. Seventeen percent of patients with luminal biology had a complete response; the remaining had only a partial response or progression. Overall, 15 patients had a complete response, 4 had minimal residual disease, and the remaining (more than 50%) had a partial response, stable, or progressive disease. Patients who did not achieve a complete response had multiple molecular aberrations with unique markers not present in patients with PCR. These included markers of known or possible drug resistance (IGFR1, CAIX), poor prognostic markers (TP53, MET, PTEN), biomarkers of response to approved treatment that were not utilized and other markers of potential response and research. Enrollment is ongoing.

Conclusions: Comprehensive genomic testing may predict resistant biology and provide additional targets for treatment or clinical study. Surgeons are identifying more patients who may benefit from neoadjuvant therapies including endocrine therapy. Genomic analysis earlier in the patient's care path may improve response rates by suggesting modifications in standard protocols or identifying clinical trials as potential first-line options. Repeat genomic analysis may also suggest options for targeted adjuvant therapy for residual cancer after neoadjuvant therapy.

784993 - Metformin Is Associated with More Hormone Receptor-positive Breast Cancers

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Background/Objective: Type 2 diabetes mellitus has been linked to increased risks of various malignancies, including breast cancer (BC). While the elevated risk is often attributed to the proliferative effects of insulin and/or the hyperglycemic state, there are very few studies that have evaluated the effects of oral hypoglycemics on BC and the different BC subtypes. We previously observed a very low incidence of triple-negative BC (TNBC) among metformin users. This study examined the effect of metformin on the receptor status. We hypothesized that when compared to the other diabetic medications, metformin is associated with a decreased incidence of TNBC.

Methods: This study is a retrospective review of a cohort of 1137 female adult BC patients who underwent surgeries for their primary BC between 2010 and 2015 at 2 institutions in Canada. A patient list was generated using CO-PATH, the Anatomical Pathology Laboratory Information system. Operative reports, pathology reports, and consult notes were reviewed to determine the tumour histology and the past medical history. SAS 9.4 (SAS Institute, Cary NC) and R3.5.3 were used to perform statistical analyses. Descriptive statistics were provided for categorical variables and Fisher's exact tests and chi-squared tests were used to determine the statistical significance between the medication use and the BC subtypes.

Results: Compared to diabetic patients who were not on metformin (n=53), metformin users (n=74) were found to have a statistically significant increase incidence of hormone receptor positive and HER2-negative BC (88% vs 72%, p= 0.026) (Table). When analyzed separately, the increase in the proportion of estrogen receptor (ER)-positive cases (95% vs 84%, p=0.008) and progesterone receptor (PR)-positive cases (85% vs 73%, p=0.02) for metformin users persisted. Metformin was found to be an independent predictor for an increase in hormone receptor-positive BC. For comparison, we grouped all forms of injectable insulin and all oral hypoglycemics (e.g., glyburide) and compared them with metformin. There were no statistically significant associations found between the other groups of medications and the receptor status. For example, insulin did not have a statistically significant increase in ER+/PR+/HER2- BC (69% vs 73%, p=0.69), nor did glyburide (75% vs 73%, p=0.93), even when each receptor subtype was analyzed separately. We also examined age as a potential confounding factor as older patients are more likely to be prescribed a greater number of medications. Our results did not show a statistically significant effect of age and medication on the receptor status.

Conclusions: In this study, we demonstrated that metformin is independently associated with an increase in hormone receptor-positive BCs, which in turn led to the observed reduced incidence of TNBC among metformin users. Few studies have examined metformin's association with diabetes and individual receptor status; however, our findings are consistent with existing reports that metformin use is associated with a decreased incidence of TNBC. Furthermore, our results suggested that the mechanism of action of metformin is likely related to the increase in the

expression of hormone receptors as opposed to a direct inhibitory effect of metformin on TNBC. As hormone receptor positivity is a good prognostic indicator for BC patients, further study is needed to determine if metformin use is also associated with an improved long-term treatment outcomes.

Table: Comparing patient with or without metformin and the receptor status

Covariate	Full Sample (n=1137)	No metformin (n=1063)	Metformin (n=74)	p-value
Metformin vs no metformin				
Receptor				**0.026**
ERPR+HER2-	769 (73)	708 (72)	61 (88)	
ERPR+HER2+	131 (12)	126 (13)	5 (7)	
ERPR-HER2-	100 (9)	98 (10)	2 (3)	
ERPR-HER2+	53 (5)	52 (5)	1 (1)	
Missing	**84**	**79**	**5**	

ER = estrogen receptor. PR = progesterone receptor. HER2 = HER2/neu receptor.

781478 - Can Oncotype DX Testing Be Omitted in Invasive Breast Cancer Patients with Clinicopathologic Factors Predicting Very High Pre-test Probability of a Concordant Result?

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Background/Objective: Oncotype DX (ODX) is a 21-gene assay utilized to stratify patients with estrogen receptor (ER)-positive, human epidermal growth factor receptor 2 (HER2)-negative, node-negative invasive breast cancer by risk of development of systemic disease to guide adjuvant chemotherapy recommendations. Prior studies have established the role of ODX in adjuvant therapy decisions, and that standard clinicopathologic (CP) factors cannot adequately predict ODX score groups. However, the aim of this study is to determine if CP factors can identify patients at extremes of "very low" and/or "very high" pre-test probability of recurrence in which the ODX findings did not change treatment recommendations.

Methods: All patients with invasive breast cancer who underwent ODX testing at a single institution were identified using a prospectively maintained log from 2008-2018. Clinical and pathologic factors including tumor size, lymph node status, histology, grade, lymphovascular invasion (LVI), proliferative indices (S-phase fraction, Ki67, or DNA proliferative index), and ER and progesterone receptor (PR) status were retrospectively collected and categorized as low, intermediate, and high-risk. Univariate and multivariate analyses of CP factors were performed to determine which factors are predictive of ODX score groups. Significant CP factors were then used to select 2 subgroups of patients, 1 with all low-risk, and the other with all high-risk factors. The "all low" and "all high" risk subgroups were then analyzed to determine whether performance of the ODX assay changed treatment recommendations.

Results: Of the 217 patients in the study cohort with median age of 58 years, 113 (52.1%) were classified as low-risk, 76 (35%) intermediate-risk, and 28 (12.9%) high-risk by the ODX assay. Furthermore, TAILORx (Trial Assigning Individualized Options for Treatment)-based recommendations were for chemotherapy in 61 (28.1%) and no chemotherapy in 156 (71.9%) patients. Multivariate analysis demonstrated significant association with ODX score group and TAILORx recommendations for the following CP factors: tumor grade, proliferative indices, and PR status. Of 50 (23%) patients with "all low risk" CP factors, 45 had TAILORx recommendation for no chemotherapy. Five patients had "intermediate" ODX results with TAILORx recommendation for chemotherapy, and all 5 were age 50 or younger. Conversely, of 16 (7.4%) patients with "all high" risk CP factors, all had high-risk ODX scores, with recommendation for chemotherapy.

Conclusions: In our cohort of patients with node-negative, ER-positive, HER2-negative invasive breast cancer, ODX findings did not change chemotherapy recommendations in those with high tumor grade, high proliferative indices, and PR ≤10%. Furthermore, for those over 50 years of age, chemotherapy recommendations were also not changed by ODX findings in those with low grade, low proliferative indices, and PR ≥20%. Thus, there may be a subset of patients with "very high" or "very low" pre-test probability of recurrence based on standard CP factors in whom ODX is non-contributory to oncologic decisions regarding chemotherapy and of limited clinical benefit.

Table: Multivariate odds ratio analysis of TAILORx outcomes

	TAILORx – No Chemotherapy	**TAILORx – Chemotherapy**
Grade	**0.2 (0.1-0.6, p=0.002)**	**4.1 (1.7-10.1, p=0.002)**
Lymph-vascular invasion	2.7 (0.2-34.8, p=0.5)	NA
Proliferative indices	**0.5 (0.3-0.9, p=0.02)**	**1.9 (1.1-3.4, p=0.02)**
PR%	**1.03 (1.02-1.05, p<0.0001)**	**0.97 (0.96-0.98, p<0.0001)**

787711 - Prediction of Adjuvant Chemotherapy Benefit in Hormone-positive Node-negative Early Breast Cancer Patients by EndoPredict - A Multicentre Pan Indian Study

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Background/Objective: Treatment strategies in case of early breast cancer (EBC) patients have been tremendously advancing. The selection of the patients who actually benefit from additional adjuvant chemotherapy depends on the tumor aggressiveness which causes recurrence; hence in

order to optimize the treatment plan, gene expression profiling has become the important tool for carrying out such analysis. EndoPredict is a second-generation 12-gene signature-based expression profiling for ER-positive and HER2-negative early breast cancer patients, it provides EPclin score to select patients who can have absolute benefit from the additional adjuvant chemotherapy. It provides individualized absolute chemo-benefit and it also provides likelihood of recurrence for 5-15 years for patients who are only treated with endocrine therapy hence, it is important to study the landscape of absolute chemotherapy benefit in Indian patients.

Methods: All patients diagnosed with hormone-positive, HER2-negative, node-negative early breast cancer post-surgery were evaluated with EndoPredict test. The patients underwent the breast cancer recurrence test EndoPredict provided by Myriad Genetics. The statistical analysis was carried using correlation coefficient and multiple regression analysis.

Results: In the Indian cohort of 308 ER-positive, HER2-negative early breast cancer patients, among the 259 (84.09%) node-negative patients, around 52.12% fall in the low-risk category and did safely forgo additional adjuvant chemotherapy. After stratification of the early breast cancer patients on the basis of tumor size, it was found that the percentage of the low-risk patients in T1N0, T2N0 category was 69 and 40% respectively. Further, the correlation between EPclin Score and Absolute chemotherapy benefit at 10 years in node-negative EBC patients was studied. The average absolute chemotherapy benefit was 6.06% ±6.50% with a range of 0-31% as shown in Figure 1A. It was found that for every 1 unit increase in EPclin Score, absolute chemotherapy benefit at 10 years (%) increases by 6.82% (same is shown in Figure 1B). The average likelihood of recurrence 5-15 years for extended endocrine therapy was 11.77% ±9.80% with a range of 1-51% as shown in Figure 2A.The correlation study between the EPclin Score and likelihood of recurrence 5-15 years for extended endocrine therapy in node-negative EBC patients (%) revealed that for every 1 unit increase in EPclin Score, the likelihood of recurrence 5-15 years for extended endocrine therapy in node-negative EBC patients (%) increases by 10.34 % (same is shown in Figure 2B). Analyzing the relationship of the several factors in predicting the 10-year recurrence and further calculating the EPclin score, we found that it is not significantly correlated with age ($p=0.398$ and $r=0.05$). However, EPclin score is significantly dependent on gene expression score with a factor of 0.295, $r=0.86$ and $p<0.001$. Similarly, it is dependent on nodal status with a factor of 0.793, $r=0.33$ and $p<0.001$ and tumor size with a factor of 0.412, $r=0.24$ and $p<0.001$. The same was confirmed with the multiple regression equation: EPclin score= 0.92+ 0.29 (EP score) + 0.39 (Tumor size) + 0.78 (Nodal status)

Conclusions: EPclin score is a reliable predictor of 10-year recurrence, the landscape of chemotherapy benefit is validated in Indian breast cancer patients. Further, follow-up data will establish the prognostic power of this tool in the Indian population.

Figures: Prediction of adjuvant chemotherapy benefit in hormone-positive, node-negative early breast cancer patients

Figure 1A

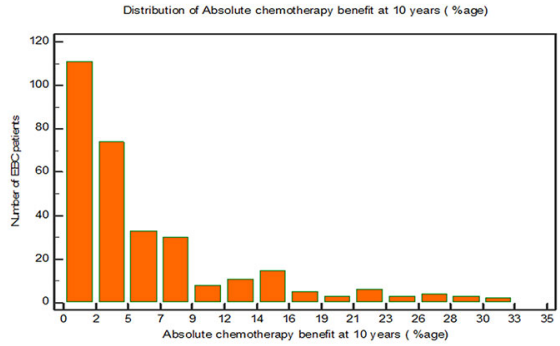


Figure 2A

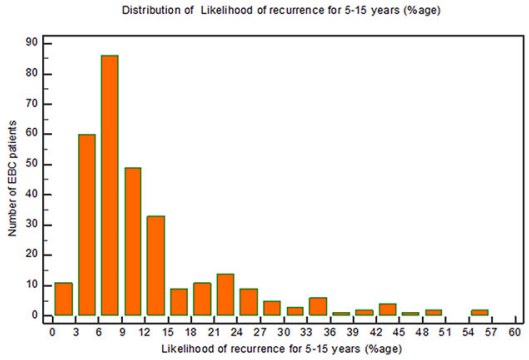


Figure 1B

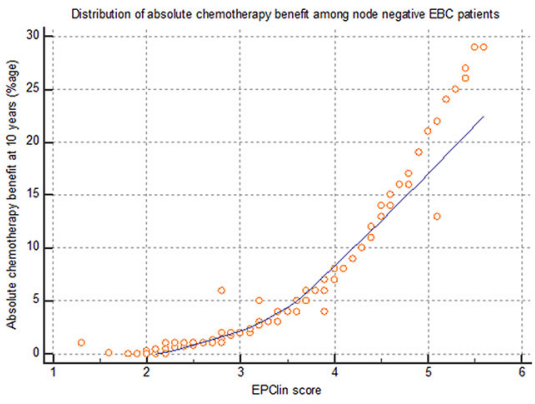
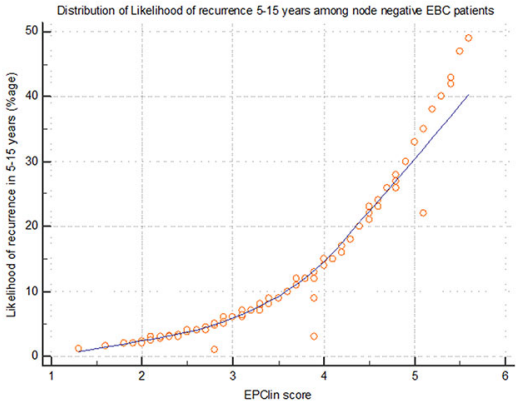


Figure 2B



787119 - High KRAS Signaling Is Associated with Favorable Tumor Immune Microenvironment and Better Survival in Triple-negative Breast Cancer Patients

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Background/Objective: KRAS is one of the best known oncogenes and frequently altered in various cancers. Mutation of KRAS is frequently observed with pancreatic cancer, colorectal cancer, and non-small cell lung cancer. Within those cancers, mutated KRAS functions as immune suppressor. In the current study, we try to elucidate the role of KRAS signaling and tumor immune microenvironment (TIME) in breast cancer. We hypothesized that the upregulation of KRAS signaling associate with better tumor immune microenvironment in triple-negative (TN) breast cancer patients.

Methods: We analyzed the KRAS expressions of breast cancer cell lines by Western blotting (WB). Also, cell viability assay was performed to investigate the effect of PI3K inhibitor and MEK inhibitor to MB-231. The clinicopathological and survival information of 755 breast cancer patients from The Cancer Genome Atlas (TCGA) database and 1904 breast cancer patients with METABRIC (Molecular Taxonomy of Breast Cancer International Consortium) database. To investigate the association of KRAS signaling and the tumor immune microenvironment, the intratumoral immune cell compositions were calculated by performing CIBERSORT and other immunological scoring. Survival analysis of overall survival (OS) and disease-free survival (DFS) were conducted comparing high and low groups.

Results: The expression levels of KRAS in breast cancer cell lines were upregulated in most of the breast cancer cell lines, MCF-7, BT-474, MB-231, when compared with normal epithelia cell line, MCF-10A. The critical role of KRAS signaling with survival of breast cancer cell line, MB-231, was implied by the result of the cell viability assay, in which MB-231 was treated with PI3K inhibitor, MEK inhibitor, and combination of those drugs. Given that importance of KRAS signaling is suggested in preclinical study, we next examined the clinical significance of KRAS signaling using clinical data of breast cancer patients. At first, we calculated the enrichment score of HALLMARK_KRAS_SIGNALING_UP using Gene Set Variation Analysis (GSVA), which estimates variation of gene set enrichment through the isamples of expression data set. The patients were divided into high and low groups using median cutoff of GSVA score. Gene sets enrichment analysis was performed between high and low groups. The result of CIBERSORT revealed that the cell composition of anti-tumor infiltrating lymphocytes, gamma delta T cells, were significantly higher with HALLMARK_KRAS_SIGNALING_UP high group in whole group and TN subgroup ($p<0.001$ and $p<0.001$ respectively) in METABRIC cohort. Also, the percentage of regulatory T cells was significantly lower with HALLMARK_KRAS_SIGNALING_UP high group in whole and TN subgroup ($p<0.001$ and $p<0.001$ respectively). Regarding about TCGA cohort, Th 1 was significantly higher in HALLMARK_KRAS_SIGNALING_UP high group in whole and TN subgroup ($p<0.001$ and $p<0.001$ respectively). On the contrary, pro-cancer immune cell, Th2, was significantly lower in HALLMARK_KRAS_SIGNALING_UP low group of whole cohort ($p<0.001$). We investigated how these results of TIME analysis reflect to the clinical outcome by performing survival analysis. The result of survival analysis revealed that HALLMARK_KRAS_SIGNALING_UP high group was associated with better OS in whole and TN subgroups in METABRIC database. Furthermore, it was associated with improved DFS in TN subgroup.

Conclusions: In conclusion, our results implied that enrichment of genes related with KRAS signaling was associated with improved OS in whole and TN breast cancer patients and better DFS in TN patients. Also, KRAS_SIGNALING_UP high group was found to associate with high infiltration of anti-cancer immune cells and low pro-cancer immune cells, which may explain the favorable role of KRAS signaling in TN breast cancer.

787100 - MiR-143 Suppresses Breast Cancer Proliferation Through Targeting KRAS and Associates Favorable Tumor Immune Microenvironment with Improved Survival for ER-positive Breast Cancer Patients

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Background/Objective: MicroRNA-143 (miR-143) is a well-known tumor-suppressive microRNA with anti-tumor functions. We have previously shown that miR-143 inhibits gastric cancer growth by targeting KRAS, but its role in breast cancer was unknown. Recently, it became increasingly clear that the tumor immune microenvironment (TIME) play critical roles in breast cancer biology. Given the notion that miRs can function as inter-cellular communication tool via extracellular vesicles, we hypothesized that high expression of miR-143 not only suppresses breast cancer growth by targeting KRAS and its effector molecules, but also associates with favorable TIME and better survival of ER-positive breast cancer patients.

Methods: The expression levels of miR-143 were examined by qRT-PCR. Also, the expression levels of KRAS and it effector molecules were evaluated by Western Blotting (WB) and qRT-PCR. We also assessed the anti-tumor effect of syn-miR-143 in vivo, by using the experiment with the breast cancer xenograft tumors model. We obtained the clinicopathological data and survival information of 755 breast cancer patients from The Cancer Genome Atlas (TCGA) database and 1283 patients from Molecular Taxonomy of Breast Cancer International Consortium (METABRIC). We conducted overall survival (OS) for survival analysis. To investigate the role of miR-143 in the tumor immune microenvironment, CYT score, CIBERSORT, and other immunological factors were used to estimate intratumoral immune cell composition in breast cancer patients. Also, gene set enrichment analysis (GSEA) was performed between miR-143 high and low expression groups.

Results: The expression levels of miR-143 in breast cancer cell lines, MCF-7, BT-474, and MB-231, were significantly downregulated compared with a normal breast epithelial cell line, MCF-10A. The cell growth suppression was observed by transfection with syn-miR-143 in the breast cancer cell lines, MCF-7 and MB-231. The expression levels of KRAS were downregulated in both cell lines after the transfection, which was evaluated by WB and qRT-PCR. We inoculated MB-231 cells subcutaneously into nude mice and treated with control miR or syn-miR-143. As a result, the significant suppression of tumor growth was observed in the treated group of syn-miR-143. Given that miR-143 demonstrated anti-tumor effect in preclinical study, we next investigated that same notion can be observed in the clinical samples of breast cancer patients. At first, we divided the patients into 2 groups with the expression levels of miR-143 by using a higher quartile. High expression of miR-143 significantly enriched the genes related to Th1 cells compared with that of Th2 cells in whole group by analyzing GSEA, which represents the enrichment of gene sets of interest. This result was strikingly echoed by analysis of TIME using CIBERSORT and other immune cells dataset. The anti-cancer immune cells, such as Th1 and M1 were higher in miR-143 high groups ($p<0.01$ and $p<0.001$ respectively). Also, CYT score that reflect cytolytic activity was significantly higher in the high miR-143 expression group ($p=0.012$). Next, we examined how these results reflect to the clinical outcome by performing

survival analysis. As a result, high expression of miR-143 demonstrated significant association with prolonged OS only in ER-positive breast cancer patients (p=0.014). The analysis of TIME was performed comparing ER-positive subgroup and TN subgroup. Immune cell composition with ER-positive subgroup demonstrated that anti-tumor cells, such as Th1 and M1 were higher ($p<0.01$ and $p<0.05$ respectively) and pro-cancer cells, Th2 and M2 were lower in miR-143 high expression group ($p<0.01$ and $p<0.001$ respectively). However, interestingly, these results were not consistent with TN subgroups; there was no significant difference in both pro-cancer cells and anti-cancer cells.

Conclusions: In the current study, our results implied that miR-143 has suppressive role in breast cancer through targeting KRAS and its effector molecules. Also, we demonstrated high expression of miR-143 was associated with improved OS in ER-positive breast cancer patients. Furthermore, miR-143 was found to associate with high infiltration of anti-cancer immune cells and low pro-cancer immune cells as well as enriching the genes relating to Th1 cells, which may explain the favorable role of miR-143 in ER-positive breast cancer.

788189 - The American Joint Committee on Cancer (AJCC) Breast Cancer Staging 8th Edition Is More Reflective of Cancer Biology Than the 7th Edition

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Background/Objective: To determine if the AJCC 8th edition Breast Cancer Staging system is more biologically accurate than the 7th edition.

Methods: We analyzed the TCGA and TIES database according to both the 7th and 8th edition of the breast cancer staging system with different biologic markers, using bioinformatics.

Results: The Breast Cancer Chapter of the AJCC recently added cancer biology to traditional anatomic staging in the 8th edition. They added biomarkers (ER, PR, HER2, grade, multigene assays), which have strong predictive and prognostic impact. We found 696 breast cancer patients from The Cancer Genome Atlas and Text Information Extraction System database who had all the information available for staging by both 7th and 8th edition criteria. From the 7th to 8th editions, there was some stage migration, mostly downstaging. 66% of Stage 2 patients migrated (64% to Stage 1, 1.5% to Stage 3). Thirty-six percent of Stage 3 patients migrated (22% to Stage 1, 13% to Stage 2). We analyzed the differences between Stage 1 and 2 in both editions, and the overall survival hazard ration calculated using Cox regression was greater in the 8th edition than the 7th. We analyzed the differences between Stage I and II, and found that the difference was greater in the 8th edition than 7th. The overall survival hazard ratio calculated using Cox regression between Stage I and II was greater in the 8th edition compared to the 7th edition (HR=1.50 and 1.22, respectively). We performed Gene Set Enrichment Analysis and found that gene sets related to cell perforation and cycle were significantly associated with Stage 2 in the 8th edition. That trend was not seen in the 7th edition. When the immune cells (PD1, PDL1, NK cells) were analyzed with a bioinformatics approach, they were found to be higher in Stage 2 tumors than in Stage 1, in the 8th edition. Also, TCR diversity, CYT, and T-cell exhaustion markers were found to be higher in Stage 2, 8th edition.

Conclusions: The 8th edition AJCC Breast Cancer Staging system separates out cancers with more aggressive biology better than the 7th edition. We also found that Stage 2 tumors trigger a higher immune response than Stage 1 tumors, but may become exhausted over time. Immune response is now found to be playing a major role in cancer biology. We hypothesize that the immune system is working hard, but cannot match the aggressiveness of the tumors in Stage 2. Therefore, perhaps future immune therapies can help overcome these cancers for further improvement in treatment.

Published Abstracts

Age Extremes

785500 - Should Women Over 70 Routinely Undergo Sentinel Lymph Node Evaluation?

Elisabeth Dupont[1], Sarah Mulaparthi[2], Noreen McGowan[1], Brian Yoder[3]
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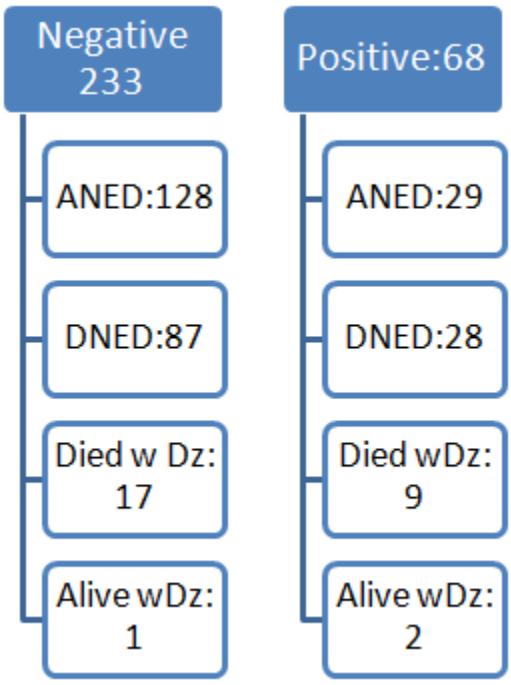
Background/Objective: While an increasing number of cancer survivors are over 70 years of age, senior adult patients are understudied. In women who are clinically node-negative and have an early-stage breast cancer, there is ongoing debate as to whether there is sufficient benefit of the sentinel node biopsy (SLN Bx) to warrant the procedure. We sought to retrospectively evaluate the benefit of sentinel lymph node biopsy (SLN Bx) for women over 70 and identify whether there is a group in which it could be avoided.

Methods: A retrospective chart review was performed on female patients 70 and above diagnosed with breast cancer clinical Stages 1-3, who received treatment at our institution from Jan 2004 to December 2012.

Results: We began with 446 patients, for which 108 were lost to follow-up leaving 338 evaluable patients. We excluded 37 more that had no SLN Bx either due to poor performance status or a positive core biopsy. Mean follow-up was 80 months, and age range was 70 to 95.5. Of the 301 remaining, 233 had a negative SLN evaluation, and 68 (22.5%) were positive. Comparing follow-up status, a positive SLN Bx correlated with a significantly worse outcome (p= 0.04), 16% were either alive with disease or died from disease, while only 8% of the node-negative were affected by their disease. Comparing age of the total population and results of SLN Bx, 41% (123) were 70-75 and had 41% (28) of the positive SLN. The remaining 40 SLN + patients were aged 75+ and accounted for 59% of the node + patients. Subgroup analysis showed most were hormone receptor-positive (HR +) 81% (244), 79% (239) were T1 tumors, and 59% (178) were over 75. In the HR+ population 52 (21%) had positive SLN Bx, of which 35 (67%) were T1 tumors. There were 123 women who fit in the over 75, T1 tumor, HR+ subgroup, which was 41% of our study population. In this group, we had an 18% node-positive rate or 32% of the total node-positive group. Overall, 19% of the T1 patients had + SLN Bx, 21% of the HR+ were SLN Bx +, and of those over age 75, 22% had + SLN Bx.

Conclusions: Conclusions: There are unique concerns in this demographic that affect treatment. Oncologists treating the senior adult patient have cautioned not to underestimate or under treat these patients. Diagnosis of a positive SLN Bx can influence treatment decisions such as loco regional and systemic. We sought to define a subset with favorable features that could avoid nodal evaluation but could not. This is important as we approach the ideas of less is more and biology trumps stage. Factors to make these decisions must be elucidated. We recommend further investigation and continuing nodal evaluation of senior adult women until data suggests otherwise.

Figure: Patient outcomes



785360 - Adjuvant Radiation Therapy After Breast-conserving Surgery in Women ≥70 Years of Age: Analysis of Recent Provincial Practice Patterns

Matthew Mah[1], Antoine Bouchard-Fortier[2], May Lynn Quan[3], Jeffrey Cao[4], Winson Cheung[5], Shiying Kong[6], Yuan Xu[6]

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Background/Objective: Previous randomized controlled trials and meta-analysis have concluded that women ≥70 years of age with early-stage, hormone-positive, node-negative invasive breast cancer may not benefit from adjuvant radiotherapy (RT) after breast-conserving surgery (BCS), if treated with adjuvant endocrine therapy. Therefore, the objective of this study was to perform a real-world, population-based evaluation of 1) current practice patterns after BCS, 2) predictors of adjuvant RT administration, and 3) the impact of RT on cancer-specific survival (CSS) and overall survival (OS).

Methods: All patients age ≥70 with favourable tumour characteristics (ER+, HER2-, pT1, node neg) undergoing BCS were identified from the Alberta Cancer Registry between 2010-2015. Logistic regression was used to determine if radiation and recurrence respectively were

associated with patient and tumour factors (age, tumour grade, adjuvant therapy, Charlson Comorbidity Index) and social factors (treatment institution, travel time to cancer centre, and estimates of socioeconomic status (SES)). CSS was determined by Cox regression and Kaplan-Meier curves were generated comparing treatment with and without RT.

Results: A total of 788 patients met inclusion criteria during the study period, of which 275 (35%) received both RT and hormonal therapy, while 118 (15%) received hormonal therapy only (see Table). Analysis was performed on the entire cohort, with a mean age of 75.8 years. Younger age (OR 0.87, p<0.0001) was the only significant factor associated with administration of adjuvant RT. Those treated at an academic centre (OR 0.62, p0.024), and with hormonal therapy (OR 0.65, p0.019) were less likely to have received adjuvant RT. Use of RT did not influence CSS, while older age did. Older age (HR 1.12, CI 1.06-1.19, p<0.0001), later diagnosis year (HR 1.48, CI 1.17-1.87, p0.001), higher Charlson comorbidity index (score of 2; HR 3.03, CI 1.51-6.05, p0.002), and lack of RT (HR 0.46, CI 0.23-0.9, p0.025) all influenced OS. After a median 2.5 years of follow-up, 18 (2.2%) patients developed recurrence (8 both RT and hormonal, 9 hormonal only, 1 no adjuvant therapy).

Conclusions: Younger age seems to influence administration of adjuvant RT; however, administration of adjuvant RT did not appear to affect CCS. This study supports current literature that adjuvant breast irradiation may be safely omitted in patients with favourable risk tumours treated with breast-conserving surgery and adjuvant endocrine therapy; patient care should be individualized.

Table: Number of patients treated with RT, hormonal therapy, or both

	RT	No RT	Total
Hormone	275	118	393
No Hormone	286	109	395
Total	561	227	788

788134 - Intraoperative Radiation Therapy: Elderly Patient Preference at a Large Integrated Health Care System

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Background/Objective: For patients over 65 years of age with early hormone receptor (HR)-positive breast cancer, radiation is not routinely recommended because it does not improve overall survival. The aim of this study is to evaluate radiation preference of patients over 65 with early HR-positive breast cancer when intraoperative radiation therapy (IORT) is an option along with omission and whole breast radiation

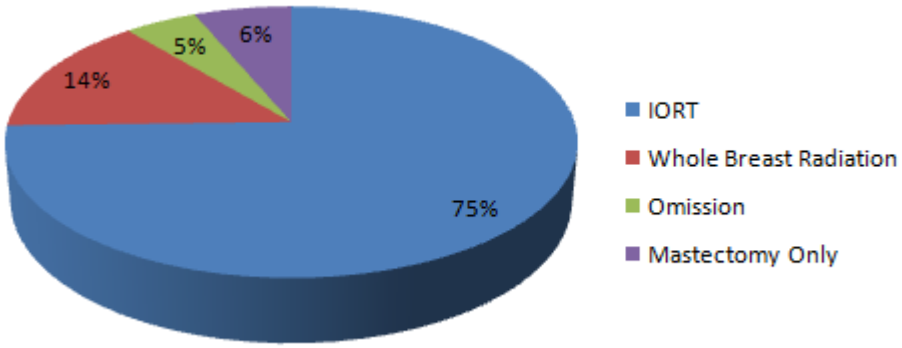
Methods: A retrospective chart review was conducted among patients over 65 years old with early HR-positive breast cancer at a single large integrated system. We identified patients who were offered IORT as an option. At our institution, every breast cancer patient is reviewed at a

multi-disciplinary breast conference with an internal IORT eligibility criteria and a tracking system. All patients in this study met with breast surgeons and radiation oncologists prior to their locoregional treatment decisions. The tumor board discussion, treatment team recommendation, and the final patient decision for radiation were obtained from the chart review. Demographics including age, race, and co-morbidities (Charlson Comorbidity Index) were collected. Logistic regression analysis was used to evaluate if any factors were associated with patient's radiation choice.

Results: A total of 63 patients were identified who met the study guideline. The patient preference was IORT at 74.6%, followed by whole breast radiation at 14.3%. Only 4.8% of our patients chose to omit radiation, and 6.3% chose mastectomy. Age and co-morbidities were not associated with choice of IORT (OR 0.95, p=0.34 and OR 1.15, p=0.53, respectively).

Conclusions: Among early breast cancer patients over 65 years old with HR-positive disease, patients preferred adding radiation to their breast treatment over omission. In addition, patients preferred IORT over whole breast radiation. This indicates that women over 65 years old do not want to get local recurrence regardless of its impact on overall survival and prefer the more convenient radiation delivery modality. Further studies need to be completed on patient-reported outcomes in this study population.

Figure: Patient preferences



Benign

787897 - Malignancy Upgrade Rates and Natural History of Intraductal Papillomas without Atypia: A 10-year Experience

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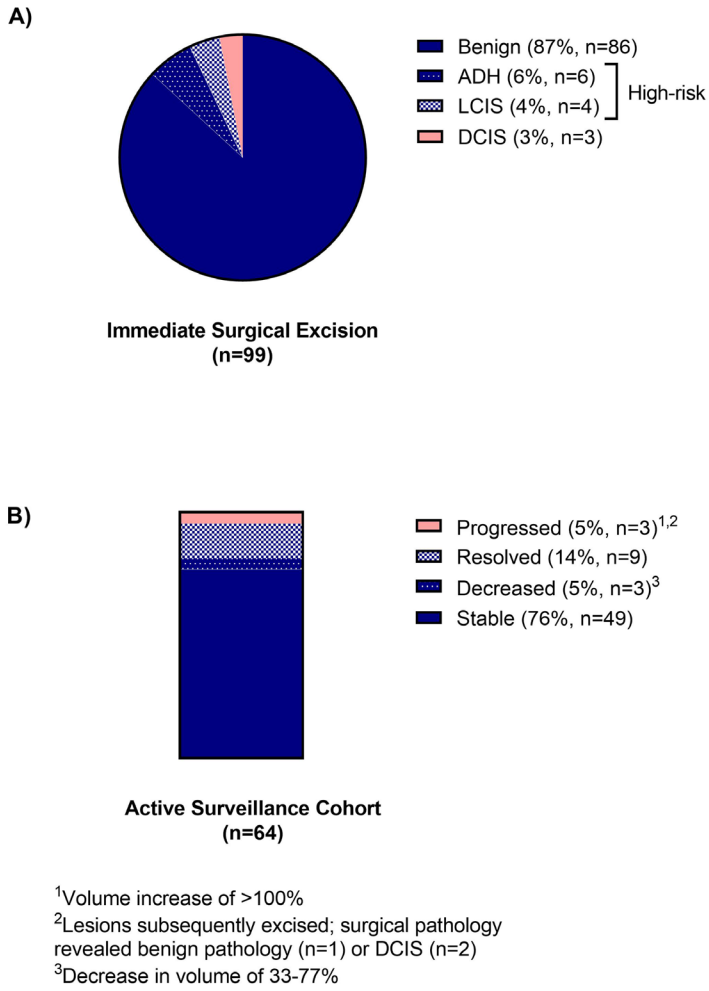
Background/Objective: The management of intraductal papillomas (IPs) without atypia on needle core biopsy (NCB) is controversial. In the modern era, the upgrade rate to malignancy is low (0.8-9%). We aimed to analyze the risk of malignancy in immediately excised IPs, and characterize the natural history of IPs undergoing active surveillance (AS).

Methods: We retrospectively analyzed data from 143 patients with NCB revealing IP without atypia from 2009-2019. Patients with concurrent breast cancer or high-risk lesions were excluded. Imaging reports and pathology records were carefully reviewed. Descriptive statistics were used to compare demographic and clinicopathologic variables and associations with pathologic findings.

Results: In total, 163 IPs were identified in 143 patients, with a mean age of 51 (STDV+13) years old. Thirty-one patients (19%) had a palpable mass, and 10% (n=16) presented with nipple discharge. Most patients (61%, n=99) underwent immediate excision, whereas 39% (n=64) underwent AS with interval imaging. Ultrasound-guided CNB was performed in 87%, stereotactic biopsy of calcifications or asymmetry/distortion in 12%, and MRI guided biopsy in 1%. Median lesion size was 7mm (range 3-19). Of the IPs that were excised, surgical pathology revealed benign findings in 97%. High-risk lesions were encountered in 10% of lesions: atypical ductal hyperplasia (n=6), or lobular carcinoma in-situ (n=4). Ductal carcinoma in-situ (DCIS) was encountered in in 3% (Figure 1A). All patients with DCIS were asymptomatic with a mass <1cm detectable on ultrasound. Sixty-four patients were observed with a median follow-up of 12.5 months (range 4-98). The majority of observed IPs remained stable (77%), decreased in size (5%), or resolved (14%) (Figure 1B). Only 5% (n=3) progressed (worsening calcifications, or doubling in volume on ultrasound) and were subsequently excised—with DCIS (n=2) and benign pathology (n=1) noted on final pathology.

Conclusions: We report clinicopathologic characteristics of a large series of breast IPs without atypia, and describe the natural history of IPs undergoing AS. Although immediate surgical excision is often practiced for patients with IPs on NCB, we found an upgrade rate of 0% for invasive carcinoma. When actively observed, 95% of lesions remained stable, decreased in size, or resolved. For the 5% of IPs that progressed, no invasive cancers were identified upon subsequent excision. These data suggest that patients with IP on NCB can safely undergo AS, with surgery reserved for lesions that exhibit radiographic signs of progression. This could potentially spare women the unnecessary risk, anxiety, and economic burden of surgery.

Figure: Upgrade rates of excised papillomas (A). Natural history of papillomas undergoing active surveillance (B)



787209 - Success at the Breast: Capturing Breastfeeding Experiences, Attitudes, and Challenges

Shannon Mallo, Laura Nuzzi, Joseph Firriolo, Catherine McNamara, Brian Labow
Boston Children's Hospital, Boston, MA

Background/Objective: The Mother Infant Lactation Questionnaire (MILQ) was designed as the first standardized research tool to effectively measure breastfeeding experiences and lactation capability. This study aims to capture the wide range of experiences, perceptions, and challenges breastfeeding mothers face.

Methods: The MILQ was piloted in a cohort of mothers between the ages of 18 and 45 years who were between 6 months and 5 years postpartum.

Results: A total of 85 participants completed the MILQ, with a mean age of 33.6 years. Mothers overwhelmingly believed that breast milk is significantly healthier than formula (71%). Although 93% of respondents attempted to breastfeed, only 74% were successfully able to nourish their

child through breastmilk alone. The majority of mothers (80%) utilized some sort of device to aid in breastfeeding, most commonly breast pumps (87%) and nipple shields (43%). Roughly 40% of mothers did not meet their own breastfeeding goals, primarily due to insufficient milk production (41%), inability to breastfeed for the desired duration (19%), and limited time and resources to breastfeed or pump milk at work, school, or home (19%). More than one-third (35%) of mothers were dissatisfied with their breastfeeding experience.

Conclusions: Despite national campaigns to increase breastfeeding prevalence and normalization, many mothers still struggle to fulfill their breastfeeding expectations. Our results support that breastfeeding can be a physically and emotionally challenging experience, often requiring device intervention. Postpartum services should support mothers by 1) increasing awareness regarding the difficulties of lactation and breastfeeding, and 2) teaching tangible skills to overcome common problems to optimize the breastfeeding experience.

787218 - Breastfeeding Capability After Benign Breast Surgery

Shannon Malloy, Laura Nuzzi, Joseph Firriolo, Catherine McNamara, Brian Labow
Boston Children's Hospital, Boston, MA

Background/Objective: Many breast surgeons are fearful of operating on young women due to the potential impact on future lactation ability. Despite these concerns, there is extremely sparse data regarding the effect of benign breast surgery on breastfeeding capability. This study aims to elucidate the impact of benign breast surgery on breastfeeding and lactation performance.

Methods: Eligible mothers between the ages of 18 and 45 years and between 6 months and 5 years postpartum were recruited to capture their breastfeeding experiences and prior breast surgery history. All data were self-reported.

Results: A total of 85 participants were included in analyses, with a mean age of 33.6 years. Fifteen mothers were previously diagnosed with a breast condition, most commonly breast cysts (6), fibroadenoma (3), and macromastia (2). Sixteen mothers underwent breast surgery: augmentation (5), reduction mammaplasty (4), and biopsy (4). More than 80% of mothers successfully breastfed or fed breast milk from the bottle, regardless of history of breast surgery ($p = 0.578$). Most mothers with and without previous breast surgical history reported moderate to extreme difficulty while breastfeeding (40% v. 60%, respectively, $p=0.338$). Breastfeeding satisfaction did not differ significantly by breast surgery status ($p=0.999$).

Conclusions: This study is among the first to suggest that breast surgery does not significantly impact breastfeeding ability. Although more data are necessary to generalize results, our findings suggest that benign breast surgery is safe in young women and should not preclude otherwise healthy young women from enjoying the benefits of breast surgery for fear of impairing future lactation.

787015 - Estrogen-containing Hormonal Contraceptives May Prevent Additional Breast Hypertrophy in Adolescents with Macromastia

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Background/Objective: Hormonal contraceptives (HC) are commonly prescribed in adolescents for a myriad of health benefits. However, providers worry that HC use in adolescents with macromastia (breast hypertrophy) may exacerbate breast growth. This study explores the association between HC use, its formulation, and macromastia severity.

Methods: Symptomology and medication use were collected from both patients undergoing bilateral reduction mammaplasty and age-matched, female controls (12-21 years old). To account for difference in body habitus, degree of hypertrophy was calculated for each breast patient, in which their total amount of breast tissue resected was divided by their body surface area.

Results: A total of 756 subjects were included, with a 1:1 ratio of macromastia to control subjects. Although more controls used HCs (65% vs 37%; $p<0.05$), macromastia subjects were more often prescribed estrogen-containing HCs (85% vs 58%; $p<0.05$). Macromastia patients prescribed estrogen-containing HCs experienced less hypertrophy than all other breast subjects ($p<0.05$, all). Furthermore, macromastia patients using progesterone-only HCs had greater breast pain and more severe hypertrophy ($p<0.05$, all).

Conclusions: Macromastia patients who took progesterone-only HC types had greater breast hypertrophy and more breast pain, while those on estrogen-containing HCs had less severe hypertrophy than those not on any HC. Additional research is needed regarding the effect of exogenous progesterone on breast hypertrophy, and providers are encouraged to consider estrogen-containing HCs for their adolescent patients with macromastia when indicated.

787028 - Risk Factors for Severe Macromastia in Adolescents

Catherine McNamara, Gabrielle Massey, Laura Nuzzi, Joseph Firriolo, Brian Labow
Boston Children's Hospital, Harvard Medical School, Boston, MA

Background/Objective: There is an increasing incidence of adolescents undergoing reduction mammaplasty. However, the etiology of adolescent macromastia (breast hypertrophy) is poorly understood. This study is the first of its kind to explore the association between potential risk factors and macromastia severity using a robust sample size.

Methods: Symptomology and medical history were collected using standardized clinical forms from patients between the ages of 12-21 years undergoing bilateral reduction mammaplasty. To account for differences in body habitus, macromastia severity was determined by dividing the amount of breast tissue resected for each patient by their body surface area.

Results: A total of 357 subjects were included, with median surgical age of 17.9 (IQR: 2.5) years. The following factors were associated with having significantly worse macromastia: hormonal dysregulation, racial minority status, overweight or obesity status, and precocious menarche ($p<0.05$, all). In particular, girls who were overweight or obese, or experienced precocious menarche were 3 to 4 times more likely to have severe breast hypertrophy. Conversely, precocious thelarche and having a first-degree relative with macromastia or breast cancer did not increase patients' odds of having increased hypertrophy ($p>0.05$, all).

Conclusions: Adolescent girls with macromastia who experienced hormonal dysregulation, are racial minorities, are overweight or obese, or had precocious menarche are at greater risk for developing more severe breast hypertrophy. Health care providers should screen for these risk-factors in their adolescent macromastia patients and make early referral to a surgeon for treatment when appropriate.

786913 - Evaluating Biopsy Techniques in the Upstage Rate of Papillary Breast Lesions

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Background/Objective: Benign papillary lesions (BPL) continue to be a controversial topic with controversy in both the literature and management of these lesions. The purpose of this study is to examine various biopsy techniques along with lesion characteristics to determine if there is an association between the method of biopsy and the upstage rate of BPL.

Methods: A retrospective review of all breast biopsies performed at Rush University Medical Center from January 1, 2011 to July 9, 2019 was performed to identify patients with papillary breast lesions on biopsy. Lesions were divided into 2 groups: BPL and papillomas with atypia or other high-risk lesions (HRL) which was defined as atypical ductal hyperplasia (ADH), atypical lobular hyperplasia (ALH), or lobular carcinoma in situ (LCIS). Surgical pathologies of those who underwent excision were reviewed to determine the upstage rate. Upstaged papillomas were compared to non-upstaged papillomas for the variables of interest.

Results: Three hundred thirty papillary lesions were biopsied, with 270 lesions classified as BPL, and 60 lesions classified as papillomas with atypia or HRL. Of the 270 BPL, 167 underwent surgical excision, 80 elected for follow-up, and 23 were lost to follow-up. Of the 60 papillomas with atypia/HRL, 50 underwent surgical excision, 7 elected for follow-up due to patient choice or comorbid factors, and 3 were lost to follow-up. The majority of lesions, 80.6% (n=175), had either concordant pathology or were downstaged on surgical specimen: BPL to BPL 85.5% (n=141), atypia/HRL to atypia/HRL 38.5% (n=20), or atypia/HRL to BPL 26.9% (n=14). Forty-two lesions, 19.4%, were upstaged from biopsy to surgical pathology: BPL to atypia/HRL 12.1% (n=20), BPL to DCIS 1.2% (n=2), BPL to invasive carcinoma 1.2% (n=2) or papilloma with atypia/HRL to DCIS or invasive carcinoma 34.6% (n=18). There was no statistical difference in upstage rate between the various biopsy techniques, including number of

samples taken or use of a vacuum-assisted device (Table). In examining lesion characteristics between non-upstaged and upstaged lesions, there was no difference in the mean size of lesion (8.3 mm +/- 7.4 vs 10.8 mm +/- 11.3, p=0.09), presence of ipsilateral synchronous cancer (10 (5.7%) vs 4 (9.5%), p=0.37), or presence of contralateral synchronous cancer (26 (14.9%) vs 11 (26.2%), p=0.08). Older age at the time of biopsy was associated with higher upstage rates (53.9 +/- 12.0 vs. 63.4 +/- 12.0, p<0.001).

Conclusions: This study supports the standard practice of surgical excision in papillomas with atypia or HRL, with an upstage rate to malignancy of 34.6%. Shared decision making is necessary to discuss excision for BPL, with an upstage rate of 14.5%. This study did not find an association between the biopsy techniques utilized and the rate of upstaged papillomas.

Table: Biopsy techniques

	NOT UPSTAGED	UPSTAGED	P-VALUE
METHOD OF BIOPSY (%)			0.94
FNA	40 (22.9)	8 (19.0)	
US CORE	83 (47.4)	22 (52.4)	
STEREOTACTIC CORE	34 (19.4)	8 (19.0)	
MRI CORE	18 (10.3)	4 (9.5)	
NUMBER OF SAMPLES (MEAN (SD))	4.79 (2.8)	4.20 (2.6)	0.22
VAC = YES (%)	46 (26.3)	10 (23.8)	0.74

FNA, fine needle aspiration; US core, ultrasound core needle biopsy; MRI core, magnetic-resonance imaging core needle biopsy; Vac, vacuum-assisted biopsy.

766113 - Patient Reported Cosmetic Outcome After Vacuum-assisted Excision of Benign Breast Lesions: A Cross-sectional Study

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Franciscus Gasthuis & Vlietland, Rotterdam, Zuid-Holland, Netherlands

Background/Objective: Benign breast lesions can be excised through a vacuum assisted excision (VAE) under local anesthetics. Although one of the main advantages of VAE is a presumed better cosmetic outcome, hardly any studies on this subject are available. Therefore, we evaluated the patient-reported cosmetic outcome after VAE and identify the factors that influence this cosmetic outcome.

Methods: In this cross-sectional study, patients who underwent VAE between July 2017 and December 2018 completed the 9-item cosmetic subscale of the Dutch Breast Cancer Treatment Outcome Scale (BCTOS-cs). The mean cosmetic outcome score (0-4) was evaluated and dichotomized after categorization (good vs. suboptimal). All clinically relevant variables were independently tested for the influence on cosmetic outcome. All variables possibly associated with cosmetic outcome (univariate p<0.2) were included in a multiple regression analysis.

Internal consistency and content validity of the BCTOS-cs were analyzed using Cronbachs-alpha and the floor and ceiling effect.

Results: The response rate was 72.3% (47/65), and overall cosmetic outcome was good in 74% of patients (mean score <1.75). Cronbach's alpha was 0.75, and a floor effect >20% was reached in all items. Mean cosmetic outcome did not significantly differ between tumors ≥3cm (mean 1.74, SD 0.66) and <3cm (mean 1.53, SD 0.45, p=0.36). The absence of follow-up complications was the only significant factor associated with a better mean cosmetic outcome score (β= 0.359, SE=0.150, p=0.02) and with the dichotomized cosmetic outcome (OR=12.5, 95% CI 1.10-140.79, p=0.04) in the multiple regression analyses. No serious adverse events occurred during or after VAE.

Conclusions: This study confirms that the patient-reported cosmetic outcome after VAE is good. Based on previous studies, the cosmetic results after VAE seem to be better than after surgical excision. The absence of complications was the only factor that significantly contributed to a better cosmetic outcome. Patients with benign lesions, even with lesions >3cm, could benefit from VAE over surgical excision, but this needs to be corroborated in a formal comparative study with longer follow-up.

Table: Distribution of scores for each item of the BCTOS-cs

Item	N	1 (N, %)	2 (N, %)	3 (N, %)	4 (N, %)	Median (IQR)
Breast texture (hardening)	47	31, 66%	7, 15%	7, 15%	2, 4%	1 (1-2)
Nipple appearance	47	46, 98%	-	-	1, 2%	1 (1-1)
Breast elevation/ position	47	40, 85%	4, 9%	1, 2%	2, 4%	1 (1-1)
Scar tissue	46	12, 26%	23, 50%	7, 10%	4, 9%	2 (1-2.25)
Breast swelling	46	32, 70%	10, 22%	2, 4%	2, 4%	1 (1-2)
Fit of bra	47	41, 87%	5, 7%	1, 2%	1, 2%	1 (1-1)
Breast sensitivity	47	27, 57%	10, 21%	5, 11%	5, 11%	1 (1-2)
Overall skin appearance	47	31, 66%	10, 21%	3, 6%	3, 6%	1 (1-2)
Breast tenderness	47	19, 40%	15, 32%	7, 15%	6, 13%	2 (1-3)

Complications

787416 - A Comparison of Necrotic Complications in Nipple-sparing versus Skin-sparing Mastectomy with Tumescence

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Northwestern University, Chicago, IL

Background/Objective: Flap necrosis is a concerning reported complication following nipple-sparing mastectomy (NSM) or use of tumescence during mastectomy when performed with immediate breast reconstruction. The purpose of this study was to compare the rate of necrosis for patients undergoing NSM or skin-sparing mastectomy (SSM) with tumescence.

Methods: A retrospective review of patients receiving NSM or SSM with tumescence and sharp dissection was reviewed at a single institution from 2015 through 2018. All patients received immediate reconstruction. Flap or nipple necrosis occurring within 30 days from initial surgery was studied.

Results: Patient characteristics are summarized in the Table. A total of 245 women underwent NSM, with 202 of them undergoing bilateral NSM; 447 breasts were operated on. There were 286 women who underwent SSM, with 153 of them undergoing bilateral SSM, and 9 undergoing contralateral NSM; 439 breasts were operated on. The patients who developed necrosis requiring excision were 4 NSM (1.6%) and 4 SSM patients (1.4%) (p=0.85). These patients all had reconstruction with tissue expanders, except for 2 of the SSM patients who had flaps.

Conclusions: Patients undergoing NSM were more likely to be younger, have a lower BMI, and have prophylaxis as a surgical indication than SSM patients. The rate of necrosis requiring surgical excision following NSM or SSM with tumescence was low and not statistically different. Tumescence is a safe technique for patients undergoing NSM or SSM with immediate breast reconstruction for prophylaxis or breast cancer surgery.

Table: Patient characteristics

Patient Characteristics	NSM	SSM	p value
Number of Patients	245	286	
Number of breasts operated	447	439	
Mean Age (yrs) (SD)	43.2 (8.4)	50.9 (11.0)	<0.0001
Mean BMI (kg/m²) (SD)	23.8 (4.9)	27.8 (6.4)	<0.0001
Prophylactic Surgery (%)	61 (24.9%)	20 (7.0%)	<0.0001
Necrosis requiring excision (%)	4 (1.6%)	4 (1.4%)	0.85

779587 - Risk Factors for Seroma/Hematoma Development Following Surgical Repair of Adolescent Gynecomastia

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Background/Objective: Seroma/hematoma formation following surgical correction of gynecomastia (male breast gland hypertrophy) is common. However, there are currently no data detailing the risk factors for developing a hematoma/seroma following surgical repair of gynecomastia. This study aims to reveal risk factors associated with postoperative development of a seroma/hematoma in adolescent gynecomastia patients.

Methods: Demographic information, procedure type, and early (≤1 month) postoperative seroma/hematoma formation were collected from clinical outcomes forms and hospital medical records for patients 12-21 years of age undergoing surgical correction of unilateral or bilateral gynecomastia.

Results: A total of 135 breasts from 72 male patients (mean age at surgery: 16.9 ± 1.8 years) were included in the study. Bilateral and unilateral gynecomastia were diagnosed in 63 and 9 patients, respectively. Seromas/hematomas were reported in 20% of breasts, and there was a significant association between undergoing suction lipectomy and developing a postoperative seroma/hematoma ($p<0.05$). Breasts that received suction lipectomy were 63.2% less likely to develop a postoperative seroma/hematoma compared to all other patients. Ethnicity, age, BMI category, and all other procedure types (reduction mammaplasty; mastopexy; simple mastectomy for gynecomastia, and breast mass excision) were not significantly associated with seroma/hematoma development ($p>0.05$, all).

Conclusions: Although seroma/hematoma formation is common following gynecomastia repair, patient characteristics, such as BMI category, ethnicity, and age, were not significant predictors of seroma/hematoma development in our cohort. These data propose that demographics should not preclude adolescent males from receiving surgical treatment for gynecomastia repair due to fear of developing a seroma/hematoma. Our findings also suggest that the use of suction lipectomy may offer protection against seroma/hematoma development; however, more research is needed to confirm.

787838 – BMI-specific Complications in Reduction Mammoplasty

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Background/Objective: Breast reduction mammoplasty presents one of the most frequent procedures in elective plastic surgery in Europe and the United States. It is an effective treatment option to alleviate upper torso complaints resulting from macromastia with a modest risk for complications. However, access to surgery has been difficult for obese patients, as some studies have indicated higher rates of complications in patients with increased Body Mass Index (BMI). The aim of this study was to illustrate and compare complication rates among our collective of breast reduction patients, stratified by BMI.

Methods: We retrospectively analyzed the data of all patients who have undergone bilateral breast reduction mammoplasty at our institution from 2001 to 2017 using the digital medical records database including history, physical examination, intraoperative data, and the most recent postoperative follow-up for complications. According to BMI, we categorized our patients into 3 groups: BMI 18.5-24.9 (normal weight), 25-29.9 (overweight), and >30 (obese). These groups were examined for significant differences associated to their respective complication rates. Complications were determined as major (requiring re-surgery) and minor (requiring conservative treatment).

Results: Of our patient cohort of 228 patients, the mean age was 37.9 years, and median BMI was 25.5. The average follow-up period was 11.3 months. In total, 54 (23.6%) patients experienced complications, 22 (9.6%) major complications and 32 (14.0%) minor complications. The most frequent major complications were fat necrosis (10) and hematomas (4). Minor infections and fever (12), anemia (7), and delayed wound healing with pus secretion (3) were the most common minor complications observed. In our group of 20 obese patients with a BMI >30, the complication rate was observed to be 40%, while the overall complication rate for overweight patients (110) and patients with normal weight (98) was 22.1%.

Conclusions: Our study shows increased complication rates within our group of patients with BMI>30. However, our sample size within this group (20 patients) is too small for our results to be significant. With an increasing average BMI in our modern society, the number of obese patients will keep growing and surgeons will have to deal with an increased complication rate.

DCIS

785893 - Intraoperative Radiation Therapy to Avoid Whole-breast Radiation Therapy for Patients with Ductal Carcinoma In Situ

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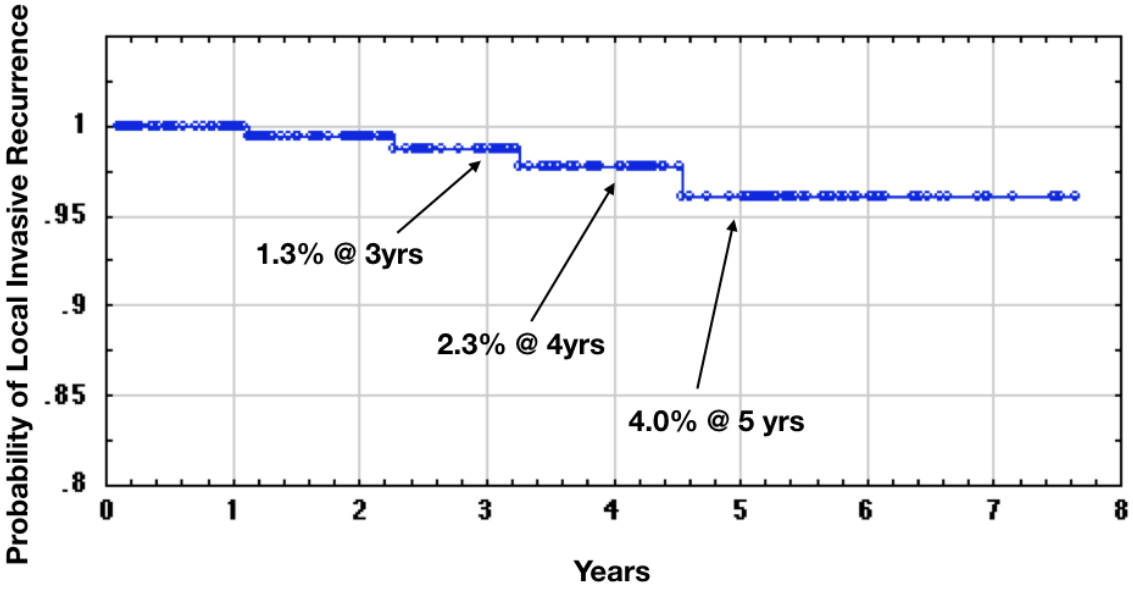
Background/Objective: For years, patients with DCIS have suffered from overtreatment. Initially, accepted treatment was mastectomy. This transitioned to segmental excision plus whole breast radiation therapy (WBRT). In 2008, NCCN Guidelines listed excision alone as acceptable treatment for low-risk patients. Today, many patients who are advised to have excision alone as local treatment for ductal carcinoma in situ (DCIS) often end up having WBRT at another facility, following additional opinions. In 2010, we began an intraoperative radiation therapy (IORT)-DCIS program hoping to eliminate the knee-jerk temptation to add WBRT to most conservatively treated patients with DCIS.

Methods: A total of 270 patients with pure DCIS (no microinvasion) were treated with IORT as part of a prospective study from September 2011 to September 2019. For IORT to be their only local treatment, tumor spans had to be ≤30mm in greatest extent on final histopathology, and all excised tumor margins had to be ≥2mm. Patients who did not meet these criteria were advised to undergo re-excision and/or receive supplemental WBRT. Kaplan-Meier analysis was used to estimate local recurrence probability. All local events, regardless of which quadrant they occurred, or whether they were invasive carcinoma or DCIS, were included in the analysis. Median follow-up from date of diagnosis was 36 months.

Results: Twenty-six patients received supplemental WBRT. There were no local recurrences or distant disease in this group. The remaining 244 patients received IORT as their only local treatment. There were 9 local recurrences, 6 of which were in the same quadrant. Four of the 9 local recurrences were invasive carcinoma. The 4-year Kaplan-Meier probability of any local recurrence (all quadrants, invasive or DCIS) for the 244 patients treated with IORT alone was 4.8%. For invasive local recurrence, all quadrants, it was 2.3%. There were no regional or distant recurrences and no breast cancer-related deaths among DCIS patients.

Conclusions: There are more than 60,000 new cases of DCIS yearly in the United States with very few related mortalities. Since survival is equal and excellent regardless of treatment, we should strive for the minimum effect treatment. The ongoing Surveillance Trials use invasive local recurrence as the endpoint, since by definition, all patients randomized to surveillance continue to have DCIS present. We agree with that approach and believe that a DCIS recurrence in a patient with prior DCIS is simply more of the same disease, with no impact on staging or survival. Using invasive local recurrence as our endpoint, 2.4% recurrence at 4 years is acceptably low.

Figure: Probability of locally invasive recurrence



788301 - Title: SLNB with Microinvasive Disease: Does Primary versus Secondary SLNB Affect Adjuvant Treatment and Outcomes?

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Background/Objective: DCIS with microinvasion (DCISM) has an excellent prognosis. Sentinel lymph node biopsy (SLNB) remains the standard of care for invasion, but often requires a second surgery. We sought to identify whether SLNB at the time of primary surgery vs secondary surgery for DCISM was associated with differences in treatment and survival. We also sought to identify preoperative radiographic and pathological features associated with primary versus secondary SLNB.

Methods: A retrospective review was performed of consecutive women diagnosed with pure DCIS at needle biopsy from 2007 to 2016. DCIS cases diagnosed with invasive disease on surgical excision were identified. Medical records were reviewed for mode of presentation, imaging findings, biopsy pathology results, and surgical outcomes. Time to event outcome (5-year survival) was estimated using Kaplan-Meier methods.

Results: We identified 1400 women diagnosed with DCIS on core needle biopsy over a 10-year period. Of these, 268 (18.4%) patients (mean age 58, range 28-89) were diagnosed with invasive disease on surgical excision, of whom 213 had a SLNB. There was a slight improvement in 5-year survival between patients undergoing a SLNB at secondary surgery vs those who underwent SLNB at primary surgery, 100% vs. 94% ($p=0.03$). There was no difference in adjuvant endocrine therapy or chemotherapy between groups. However, there was a difference in the use of radiation therapy ($p<0.001$). Patients undergoing SLNB at primary surgery were more likely to have a positive SLNB (8.2% vs 0%). Preoperative factors that predicted primary (versus

secondary) SLNB were dense breasts (p=0.015) and the use of mastectomy as initial surgical choice (p=0.001).

Conclusions: Timing of SLNB does not change adjuvant treatment, raising questions regarding its utility as a treatment aid choice. Mastectomy as the primary surgery may be an indicator of a larger lesion with more risk of invasion. In addition, dense breast tissue and patient choice of mastectomy are associated with a higher likelihood of undergoing primary vs secondary SLNB.

787591 - A Retrospective Review of DCIS Margin Depth and Residual Cancers in a Single Surgeon's Practice

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Background/Objective: In 2014, the Society of Surgical Oncology and the American Society for Radiation Oncology (SSO-ASTRO) released new guidelines updating appropriate margin depth in early-stage cancers receiving partial mastectomy for treatment from 2mm to no tumor on ink. There remains debate regarding applying this guideline to ductal carcinoma in situ (DCIS), and the standard remains at 2mm margins for this pathology.

Methods: A retrospective chart review was undertaken to assess the change in re-excision rate if "no ink on tumor" was applied to DCIS partial mastectomies, and to evaluate the number of missed invasive or in situ cancers if re-excision had not been performed. Female patients over the age of 18 with DCIS who underwent partial mastectomy by a single surgeon at 1 institution from June 2012 – February 2016 were the initial target group. A total of 1069 entries were obtained from CPT code search including codes 19301, 19302, 19125, 19120 (variations of partial mastectomy). Of these entries, 175 had DCIS. A total of 60 unique re-excisions were identified, with 24 for positive margins and 36 for close (2mm or less) margins. Statistical analysis was performed.

Results: Of the 36 patients having re-excision for close margins, 21 had residual DCIS or an invasive cancer on final pathology (58.33%). Of the 24 re-excisions for positive margins, 21 (87.50%) had residual DCIS or an invasive cancer on final pathology. The OR (P-R): 0.200 (0.05, 0.79) remains higher of having positive pathology for involved margins, as expected.

Conclusions: Our findings appear in line with previously published data regarding rate of residual/additional cancers in DCIS specimens based on margin depth. Given the high percentage of residual disease and variability of post-surgical treatment modalities (endocrine therapy, radiation), it is difficult to argue for adoption of the "no ink on tumor" guideline without long-term prospective studies.

Disparities

784671 - Adoptees in a Contemporary Cohort of Newly Diagnosed Breast Cancers

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Background/Objective: According to the US Census data, adoptees account for 2.5% of the US population (7.8 million). However, the number of adoptees diagnosed with breast cancer is unknown. Many adoptees face the unique challenge of lacking access to their family health history and limited access to screening and risk-reducing interventions. This important health disparity among adoptees has raised awareness in the importance genetic testing (GT), although it does not completely fill the disparity gap of lacking family history. The National Society of Genetic Counselors (NSGC) released an updated position statement in 2018 that supported the use of genetic testing, including genome-wide testing, for adopted adults. The purpose of our study was to investigate the adoptees in a cohort of newly diagnosed breast cancers and to look at the clinicopathologic characteristics, including the uptake of genetic testing, and to see if there were any differences compared to the non-adopted breast cancer patients.

Methods: The Institutional Breast Cancer Database was queried for all patients diagnosed with breast cancer between 2010-2018. Variables of interest included adoption status and other clinical and tumor characteristics. Statistical analyses included descriptive and Pearson's Chi Square tests.

Results: Out of 3,507 patients newly diagnosed with breast cancer, 34 (1%) were adopted. The median age at diagnosis for the total population was 60 years (range 23-96 years). When we compared the adopted and non-adopted groups, age was not statistically different (p=0.817); race was not statistically different (p=0.077), although there was a slightly higher proportion of Hispanics in the adopted vs. non-adopted cohorts (15% vs. 6%). When we looked at genetic testing, 56% of the adoptees were tested compared to 45% of non-adopted patients, but this was not significant (p=0.229). All adopted patients were negative for BRCA1/2 and other mutations. Interestingly, 29% of the adopted patients had a first-degree relative with breast cancer compared to 31% of non-adopted patients. The tumor characteristics between the adopted and non-adopted cohorts were not statistically different. The majority had early stage (Stage 0, I, II) disease (93%), invasive ductal and lobular carcinoma (73%), and ER/PR-positive and HER2-negative cancers (71%).

Conclusions: In a contemporary cohort of newly diagnosed breast cancer patients, we found no difference between the adopted and non-adopted patients based on age, race, education, and tumor characteristics. However, there was a higher proportion of adopted patients who got genetic testing compared to the non-adopted cohort. Both groups also reported a similar proportion of having a first-degree relative with breast cancer, which indicates the increased communication between the adoptees and their biological parents.

787707 - Disparities in Postmastectomy Reconstruction in the Asian and Pacific Islander Population: A NCDB Review

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Background/Objective: Asian and Pacific Islanders (API) historically compose one of the smallest proportions of breast cancer patients in the United States due to inherently lower disease incidence rates and smaller population size. As a result, much of the information related to disparities in breast cancer care for API is extrapolated from studies where the API population represents a minority proportion of the analysis. A small study focused on Asian immigrants living in the United States recently found that Asian women are less likely than Caucasian women to undergo breast reconstruction; however, the reasons are complex. Our study focused on APIs in the United States who underwent mastectomy for breast cancer treatment, with the goal of elucidating factors associated with reconstruction or no reconstruction.

Methods: A review of the National Cancer Database (NCDB) from 2010-2015 was performed. Breast cancer patients listed as Asian or Pacific Islander ethnicity and who underwent mastectomy with or without reconstruction were included in the final study cohort. Descriptive statistics and multivariate logistic regression were used for final analysis.

Results: In our review, 4,149 API breast cancer patients underwent mastectomy and were included in our study. Of these, 981(23.6%) underwent post-mastectomy reconstruction, and 3,168 (76.4%) did not opt for any reconstructive options. Of those who underwent reconstruction, 486 (49.5%) had implant-based reconstruction compared to 369 (37.6%) who underwent autologous reconstruction. A small subset of 126 (12.8%) underwent combined reconstruction (implant and autologous). On multivariate analysis, statistical findings associated with higher rates of reconstruction included lower stage, younger age, and those who undergo endocrine therapy (Table). Factors associated with decreased rates of reconstruction include lower socioeconomic status (SES) (OR 0.58, CI 0.49-0.69), uninsured patients (OR 0.23, CI 0.12-0.43), and those living on the West coast of the United States (OR 0.49, CI 0.38-0.62). (Table)

Conclusions: The choice to pursue post-mastectomy reconstruction or not is complex and multifactorial. Better understanding of the associated factors in API breast cancer patients and post-mastectomy reconstruction will help continue to improve patient satisfaction and assist breast surgeons in guiding patient decision making.

Table: Multivariate analysis for postmastectomy reconstruction in APIs

Odds Ratio Estimates of Receiving Postmastectomy Reconstruction		
	Point Estimate	95% Confidence Interval
Geographic		
Midwest vs Northeast	0.988	0.744 - 1.313
South vs Northeast	0.841	0.645-1.096
West vs Northeast	0.486	0.382-0.619
Income		
Low SES vs High SES	0.58	0.487-0.69
Insurance		
Uninsured vs Insured	0.23	0.122-0.431
Clinical Stage		
Stage 0 vs 4	6.886	2.6-18.235
Stage 1 vs 4	4.794	2.016-11.403
Stage 2 vs 4	4.044	1.731-9.446
Stage 3 vs 4	3.029	1.285-7.138
Facility Type		
Academic vs Other	0.975	0.812-1.17
Age		
18-44 vs >70	11.68	6.781-20.119
45-69 vs >70	5.83	3.459-9.826
Tumor Grade		
Grade 1 vs 4	1.607	0.429-6.012
Grade 2 vs 4	1.591	0.437-5.789
Grade 3 vs 4	1.502	0.414-5.45
Treatment		
No Radiation vs Radiation	3.034	0.895-10.285
Endocrine Therapy vs No Endocrine Therapy	1.306	1.05-1.624
Chemotherapy vs No Chemotherapy	0.847	0.706-1.27

783713 - Rising Breast Reconstruction Rates May Signify Better Health Care Access

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Background/Objective: Breast reconstruction after mastectomy has been shown to improve quality of life for breast cancer survivors, but previous research demonstrates a disparity in breast cancer reconstruction rates in some minority groups, due in part to poor insurance coverage or lack of access to a qualified reconstructive surgeons. The purpose of our study was to investigate reconstruction rates before and after widespread implementation of the Affordable Care Act to assess whether reconstruction rates may change with Medicaid expansion.

Methods: We conducted a retrospective review of the available NSQIP data for patients undergoing mastectomy with or without reconstruction between 2012, with the start of Medicaid

expansion, and 2017, at peak expansion. Overall rates as well as rates stratified by race were compared between years via a chi-squared test.
Results: Total breast reconstruction rates increased significantly from 29.6% in 2012 to 40.3% in 2017. The biggest increase was for minorities, with a rise from 22.7% to 38.6% in blacks and from 24.8% to 42.2% in Hispanics. This is compared to a more modest rise from 29.7% to 41.0% in whites. All rate increases were significant at the $p<0.001$ level. Implant-based reconstruction was the most prevalent type in all groups for both years.

Conclusions: The overall rate of breast reconstructions has increased significantly from 2012 to 2017, most notably in minorities. Although this favorable trend could be resultant from a variety of factors such as improved awareness of breast reconstruction options, we suspect that improvements in insurance coverage played a large role. Further study will be needed to confirm these results. *Research reported in this publication was supported by the National Cancer Institute of the National Institutes of Health under Award Number T32CA121938. The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Institutes of Health.*

785416 - Do Low-income Service Programs Affect Timeliness of Care for Breast Disease?
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Background/Objective: Equitable access is a tenet of quality breast cancer care. However, access to care is a known barrier for at risk populations. Every Woman Counts (EWC) and the Medically Indigent Service Program (MISP) are 2 programs available to adults seeking care who do not qualify for Medi-Cal, California's Medicaid program. EWC provides free breast cancer screening and diagnostic services. MISP serves adults who require treatment for acute illness. We sought to evaluate the effect of these programs on timeliness of care for breast disease.

Methods: We performed a retrospective cohort review of patients referred to a safety net hospital breast clinic from 8/1/2018-8/31/2019. Dates of initial referral, first appointment, and final disposition (definitive cancer surgery/neoadjuvant therapy, benign percutaneous biopsy, follow-up imaging, or initial clinic visit for issues resolved at first visit) and patient characteristics were compared by EWC and MISP status. Statistical analyses utilized Pearson's chi-square test and one-way analysis of variance.

Results: Of 111 patients (mean+SD age 47.4+13.8 years; 70.3% [n=78] Hispanic; 48.7% [n=54] Spanish-speaking), 10.8% (n=12) were referred through EWC. Coverage included MISP in 19.8% (n=22) and Medi-Cal in 76.6% (n=85). Referring diagnoses were breast cancer (35.1% [n=39]), abnormal imaging (19.8% [n=22]), mass (19.8% [n=22]), infection (8.1% [n=9]), breast pain (4.5% [n=5]), and high risk (12.6% [n=14]). There were no significant demographic differences between patients with and without EWC. The primary language was Spanish for 86.4% of patients with MISP vs. 39.3% without MISP (p=0.0003). More patients with MISP had EWC compared to those without MISP (22.7% vs. 7.9% [p=0.04]). Of 34 patients who failed to

attend the first referral appointment, 9 (26.5%) had chart reviews resolving the chief complaint prior to appointment and 25 (73.5%) no-showed. All EWC patients attended their first appointment; 1 MISP patient no-showed. In the MISP cohort, more patients had a pre-visit percutaneous needle biopsy, surgical excisional biopsy, or skin punch biopsy (68.4% vs 44.9% without MISP; p=0.002). Overall disposition was surgery (27.9% [n=31]), imaging 24.3% [n=27]), neoadjuvant therapy (6.3% [n=7]), percutaneous biopsy (4.5% [n=5]), imaging follow-up (4.5% [n=5]), pathology review only (4.5% [n=5]), and no further follow-up (32.4% [n=36]). Complete follow-up was available for analysis of timelines of care for 59 patients with EWC status and 61 with MISP status. There were no significant differences in times from referral to first appointment, first appointment to final disposition, or referral to final disposition based on EWC or MISP status (Table).

Conclusions: Timeliness of care for breast disease at a safety net hospital is not adversely affected by use of screening and treatment services for low-income patients. Rather, these findings attest to EWC and MISP efforts to improve access to care. Though not statistically significant, longer delays to first appointments for MISP patients and wide variability in referral, appointment, and disposition times demonstrate room for improvement in ensuring efficient and safe patient navigation through the treatment process.

Table: Comparison of referral to disposition timeline (median days [IQR]) by EWC status (N=59) and MISP status (N=61)

	EWC (N=10)	Not EWC (N=49)	p value	MISP (N=17)	Not MISP (N=44)	p value
Referral to First Appointment	29.5 [21.3-104.3]	29 [13-77]	0.8	49 [32-97]	24 [12-52.8]	0.3
First Appointment to Final disposition	28.5 [0-37.5]	23 [0-65]	1.0	0 [0-49.5]	29 [0-65]	0.9
Referral to Final Disposition	69 [47.5-149.5]	69 [29.5-160.0]	0.8	85 [36-161.5]	58.5 [34.5-148]	0.6

787251 - Impact of Language on Time to Chemotherapy Treatment in Breast Cancer

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Background/Objective: Despite advances in health care and improved chemotherapy agents, disparities in breast cancer outcomes continue to persist between different socioeconomic communities. Studies have shown that language may be associated with delays in diagnosis; however, little is known about its effect on time during each part of a patient's treatment course.

The aim of this study is to evaluate socioeconomic factors that may impact the timing of neoadjuvant and adjuvant chemotherapy therapy for patients in underserved communities.

Methods: A 5-year review of breast cancer patients was conducted at a safety net hospital. We identified 100 patients diagnosed with breast cancer who received neoadjuvant or adjuvant chemotherapy from 2015 to 2019. The primary outcome measured was time from breast cancer diagnosis to chemotherapy initiation. Time to surgery was also obtained as a secondary outcome. Multivariable regression analysis was performed to evaluate for association between patient factors and the outcomes. Factors included: language (English and non-English), ZIP code (surrogate for mean household income), comorbities (Charlson Comorbidity Index), stage, and age.

Results: Our cohort consisted of 35% African American, 31% Hispanic, 23% Asian, and 11% Caucasian breast cancer patients. The average time from diagnosis to treatment was 79 ± 11.8 days and 119 ± 11.5 days for neoadjuvant and adjuvant chemotherapy, respectively. Language was not associated with increased time to chemotherapy in the neoadjuvant group ($p=0.78$). In contrast, non-English language speakers in the adjuvant group experienced increased time to treatment after adjusting for significant confounders ($p=0.03$). Language was not significant for increased time from diagnosis to surgery in the adjuvant group ($p=0.23$). Race, age, comorbidities, and income were not associated with increase time to treatment in either group.

Conclusions: In patients undergoing adjuvant chemotherapy for breast cancer, language may impact timely treatment initiation. In particular, non-English language is associated with prolonged time to adjuvant therapy after a patient undergoes surgery. Interventions directed at patient education and decreasing language barriers especially post-operatively may decrease delays in treatment and subsequently reduce health disparities seen in the breast cancer population.

Genetics

782912 - Patterns of Surgery in Non-BRCA Mutation Carriers with Breast Cancer
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Background/Objective: Genetic mutations in BRCA1 and BRCA 2 are well known to cause breast cancer. There are several other genes that cause an increased risk of breast cancer including CHEK2, PALB2, ATM, and CDH1, among others. Little is known about surgical decision-making in these patients. This study aims to describe the patterns of surgery in non-BRCA mutation carriers with breast cancer.

Methods: A retrospective review of an institutional breast cancer database was performed of patients who were diagnosed with breast cancer, found to carry a non-BRCA pathogenic mutation, and underwent surgery between September 4, 2011 and March 3, 2019 at a single institution. Exclusion criteria included BRCA mutations and VUS results. Three types of surgery were defined: breast-conserving treatment (BCT), unilateral mastectomy, and bilateral mastectomies. Variables included age, unifocal versus multicentric disease, invasive cancer versus ductal carcinoma in situ (DCIS), family history of breast and ovarian cancer, tumor size, and molecular profile. Univariate analyses were performed.

Results: A total of 33 patients with both breast cancer and a non-BRCA pathogenic mutation were included in the analysis. There were 39 cancers and 36 mutations. There were 9 (25%) high-risk mutations including CDH1, PALB2, and PTEN. There were 27 (75%) moderate-risk mutations including BRIP1, CHEK2, ATM, MSH6, APC, MUTYH, PMS 2, FANCC, and BARD1. Two patients had more than 1 genetic mutation. The age range was 32 to 68 years old, and the mean age was 46.9. Most patients had a family history of breast or ovarian cancer (75.8%) (see Table). The majority of patients underwent mastectomy (72.7%). The groups were similar in terms of family history of breast cancer (mastectomy group 75% versus 77.8% BCT group). Within the subset of the 24 mastectomy patients, 20 (83.3%) underwent bilateral mastectomies. Only 5 (25%) of these had bilateral breast cancers, and most of these cases (76%) had unifocal disease. There were no patients with bilateral breast cancer with bilateral multicentric disease. The majority of patients in the mastectomy subset had estrogen receptor positive (86%) and HER2-negative (84%) disease. Ten (90.9%) patients with DCIS underwent mastectomy compared to 19 (67.9%) patients with invasive breast cancer.

Conclusions: Although a small cohort, our study demonstrates that non-BRCA pathogenic mutation carriers with breast cancer tend to undergo mastectomy regardless of age and extent of tumor. Larger studies are needed to confirm our findings.

Table: Patient and tumor characteristics of non-BRCA mutation carriers by surgery type

Patient Characteristics	BCT	Unilateral mastectomy	Bilateral mastectomy	Total
Age	**n= 9**	**n= 4**	**n= 20**	**n= 33**
<40	0	1 (25%)	5 (25%)	6 (18.2%)
40-49	5 (55.6%)	2 (50%)	5 (25%)	12 (36.3%)
50-74	4 (44.4%)	1 (25%)	10 (50%)	15 (45.5%)
>=75	0	0	0	0
Extent of tumor	**n= 10**	**n= 4**	**n= 25**	**n= 39**
Unifocal	10 (100%)	3 (75%)	19 (76%)	32 (82.1%)
Multicentric	0	1 (25%)	6 (24%)	7 (17.9%)
Cancer type	**n= 10**	**n= 4**	**n= 25**	**n= 39**
IBC	9 (90%)	3 (75%)	16 (64%)	28 (71.8%)
DCIS	1 (10%)	1 (25%)	9 (36%)	11 (28.2%)
Family history	**n= 9**	**n= 4**	**n= 20**	**n= 33**
Breast/ovarian	7 (77.8%)	2 (50%)	16 (80%)	25 (75.8%)
None	2 (22.2%)	2 (50%)	4 (20%)	8 (24.2%)
T stage	**n= 10**	**n= 4**	**n= 25**	**n= 39**
Tis	1 (10%)	1 (25%)	9 (36%)	11 (28.2%)
1	9 (90%)	1 (25%)	8 (32%)	18 (46.2%)
2	0	2 (50%)	8 (32%)	10 (25.6%)
3	0	0	0	0
4	0	0	0	0
Nodal status*	**n= 9**	**n= 4**	**n= 25**	**n= 38**
N0	9 (100%)	1 (25%)	18 (72%)	28 (73.7%)
N1	0	2 (50%)	5 (20%)	7 (18.4%)
N2	0	1 (25%)	2 (8%)	3 (7.9%)
N3	0	0	0	0
Hormone Status	**n= 10**	**n= 4**	**n= 25**	**n= 39**
ER/PR positive	8 (80%)	4 (100%)	19 (76%)	31 (79.5%)
ER+/PR-	2 (20%)	0	1 (4%)	3 (7.7%)
ER/PR -	0	0	5 (20%)	5 (12.8%)
HER 2**	**n= 9**	**n= 3**	**n= 16**	**n= 28**
HER2 -	8 (88.9%)	3 (100%)	13 (81.2%)	24 (85.7%)
HER2 +	1 (11.1%)	0	3 (18.8%)	4 (14.3%)

Total number of patients is 33 and total number of cancers is 39.
* Sentinel node biopsy was not performed in BCT for DCIS
** HER2 testing was not performed for DCIS

787947 - Analysis of Surgical Choice of Patients with Actionable Non-BRCA Carriers in Comparison to BRCA Gene Mutation Carriers

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Background/Objective: Multigene panel testing identifies individuals with an inherited risk for developing breast cancer. Actionable genes (BRCA1, BRCA 2, CDH1, PALB2, PTEN, SKT11, P53, ATM, and CHEK2) are associated with a significant risk of breast cancer. Surgical choice of patients with these genes in comparison to BRCA1/2 carriers is underreported. We analyzed the surgical choice of patients with actionable genes in comparison to BRCA1/2 carriers.

Methods: We performed a retrospective study on patients with breast cancer who underwent multigene panel testing at our institution from February 2015 to February 2019. Patient demographics, test result, and surgical choice were evaluated. Chi-square or Fischer's exact test was used to compare variables.

Results: A total of 860 breast cancer patients were tested. All patients received genetic counseling with genetic testing. Sixty-seven patients had a breast cancer related genetic mutation. BRCA1 mutation was seen in 17 women, and 19 had BRCA2 mutations. ATM mutations were found in 13 patients, and 11 patients had CHEK2 mutations. The table shows the other mutations. When compared to BRCA1/2 carriers, there was no difference between contralateral prophylactic mutation and PALB2 (p=.906) mutations. Patients with CHEK2 mutations received fewer CPM in comparison to BRCA1/2 patients (p=0.0054).

Conclusions: Multigene panel testing identifies breast cancer patients who have actionable genetic mutations. CPM was less likely in CHEK2 patients in our cohort in comparison to BRCA patients. More research is needed to understand the surgical management of patients with non-BRCA breast cancer associated genes.

Table: Identified genetic mutations

Gene	Number
BRCA1	17
BRCA2	19
ATM	13
CHEK2	11
PALB2	4
SKT11	2
PTEN	1
CDH1	0
P53	0

785257 - Contraceptive Use Patterns Among Premenopausal BRCA Mutation Carriers

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Background/Objective: Genetic testing is an important part of risk assessment in patients with family history of breast and ovarian cancer. BRCA1 and BRCA2 are the most common and well-studied mutations in hereditary breast-ovarian cancer syndrome. BRCA mutation carriers are usually identified at a young age and are faced with challenging reproductive choices. Studies of the use of oral contraceptives in BRCA carriers have shown mixed results regarding the risk of breast and ovarian cancer. Breast cancer risk may be increased in these patients with long-term oral contraceptive use, while the use of OCPs offers significant ovarian cancer risk reduction when taken for 5 or more years. This study assessed patterns of contraceptive use in BRCA carriers before and after diagnosis or prophylactic mastectomy.

Methods: Female, premenopausal, unaffected BRCA carriers diagnosed between 2007-2017 were identified through a single institution genetic testing database. Surveys were distributed to the study cohort collecting information regarding demographics, menstrual and pregnancy history, contraceptive use history, BRCA diagnosis, and risk-reducing strategies.

Results: From a cohort of 114 patients, 26 survey responses were collected (23% response rate). Prior to genetic testing, 61% used hormonal contraception, and 15% used no method. After diagnosis, 42% changed their form of contraception: 61% reported using hormonal contraception (vs national average 26%), and 15% used no method. The majority (75%) of the patients using no method after diagnosis previously used contraception. Twenty-three percent of patients converted from OCPs to another method. Twenty-three percent of patients began hormonal contraceptives after diagnosis. Thirty-four percent had oophorectomies an average of 5.3 years after diagnosis. Fifty-eight percent of patients had prophylactic mastectomy, of which 33% reported use of no method after the surgery. Most patients (81.25%) received contraception after BRCA diagnosis from their gynecologists.

Conclusions: This study shows that a large proportion of premenopausal BRCA carriers changed contraceptive method after diagnosis. Hormonal contraception was the most common method used in this cohort. Most patients obtained contraception from their gynecologists, making it important for these providers to discuss the risks and benefits of contraceptive options following a BRCA diagnosis.

787745 - Landscape of BRCA Mutations in Indian Cohort

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Background/Objective: The study was designed to evaluate the prevalence BRCA mutations in the Indian cohort. Germline BRCA mutations has become a major tool in planning the treatment of breast and ovarian cancer and also to find the risk associated for individuals having family history of cancer.

Methods: The subjects including both healthy individuals and cancer patients were screened for germline BRCA1 and BRCA2 mutations using Illumina Next generation sequencing with 1000X coverage.

Results: In the overall study of 315 cases tested for BRCA mutation, 66 (20.95%) cases were reported with BRCA1 or BRCA2 mutation positive, and 249 (79.04%) cases were reported BRCA1 or BRCA2 negative, irrespective of the family or personal history. Among all the 45 BRCA1 positive cases, p.Glu23Valfs, p.E23Vfs*17, c.5074+1G>A, p.Glu23ValfsTer17 were reported in 6.67% respectively, considering the most prevalent variants, p.Leu165Terfs, p.Gly484Ter, c.5137+1G>A, p.Leu702Ter variants were reported in 4.44% cases respectively. Among all the 21 BRCA2 mutation cases, c.426-2A>G were reported in 14.29% cases respectively, considering the most prevalent variants, p.Leu105Ter, c.486 delG variants were reported in 9.52% of cases respectively. Among all the 66 cases, in 30% cases, variants of unknown significance were reported, of which 9 cases of BRCA1 VUS and 11 cases of BRCA2 VUS were reported. A total of 31 patients with personal history of breast cancer were studied, of which 23 (74.19%) cases had family history of cancer (different type of cancer such as breast, ovarian, prostate, uterus, etc.), and 8 (25.80%) did not had any family history of cancer. Among these 31 cases, 15 (48.38%) case with family history of cancer and 6 (19.35%) without any family history of cancer reported with BRCA1 mutation. Eight (25.80%) cases with family history of cancer and 2 (06.45%) without any family history of cancer reported with BRCA2 mutation. A total of 14 patients with personal history of ovarian cancer were studied, of which 8 (57.14%) cases had family history of cancer (different type of cancer such as breast, ovarian, prostate, uterus, etc.), and 6 (42.85%) did not had any family history of cancer. Among these 14 cases, 5 (35.71%) case with family history of cancer and 5 (35.71%) without any family history of cancer reported with BRCA1 mutation. Five (35.71%) cases with family history of cancer and 1 (07.14%) case without any family history of cancer reported with BRCA2 mutation. A total of 21 cases without any personal history were studied, of which 10 (47.61%) cases had family history of cancer (different type of cancer such as breast, ovarian, prostate, uterus, etc.), and 9 (42.85%) cases did not had any family history of cancer. Among these 21 cases, 5 (23.80%) cases with family history of cancer and 9 (42.85%) without any family history of cancer reported with BRCA1 mutation, and 5 (23.80%) cases with family history of cancer and 2 (09.52% case without any family history of cancer reported with BRCA2 mutation.

Conclusions: This study implicates BRCA mutation screening as important not only for Indian breast and ovarian cancer patients but also for their families. The prophylactic surgeries and risk-management strategies can be used definitely to detect diagnose and treat breast cancer more effectively. A VUS rate of 30% is identified in the Indian cohort.

Figures: Landscape of BRCA mutations in Indian cohort

Figure 1

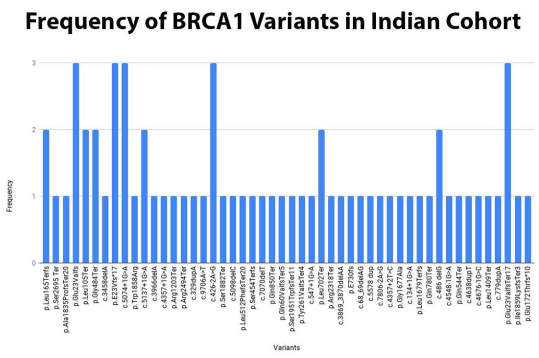


Figure 2

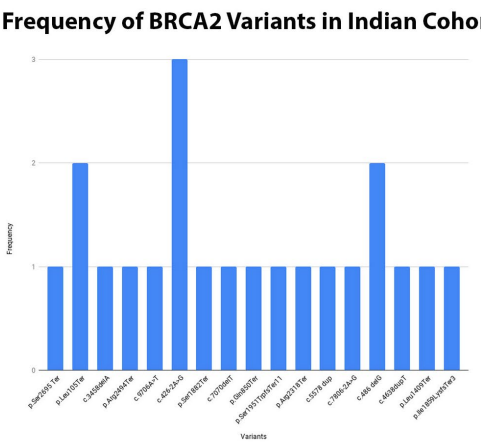
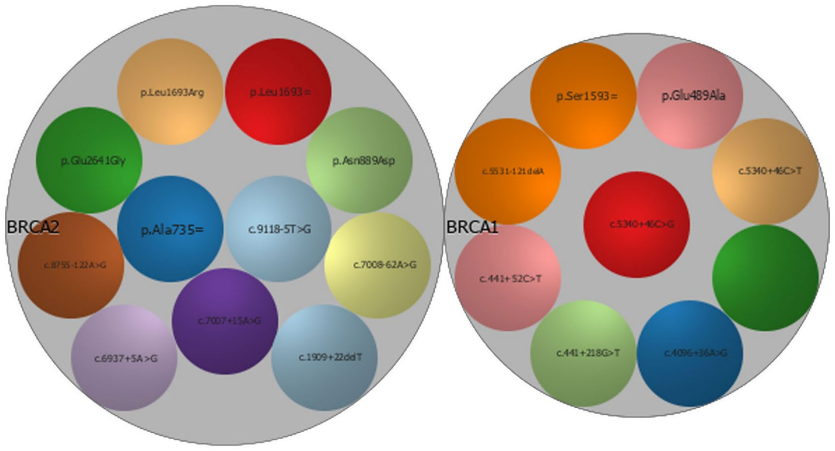


Figure 3



Imaging

785244 - Does Digital Breast Tomosynthesis in Combination with Breast Ultrasound Decrease the Imaging Recall Rate in Women with Dense Breast Tissue?

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Background/Objective: Compared to digital mammography, digital breast tomosynthesis (DBT) has resulted in a 15%-40% reduction in the need for additional imaging following screening mammography and therefore, decreased the imaging recall rate. However, mammography in women with increased breast density is associated with decreased sensitivity and specificity for breast cancer screening. The aim of our case series is to assess DBT with synthetic 2D in conjunction with breast ultrasound in further reducing the recall rate in women with dense breasts.

Methods: A retrospective chart review was conducted on women with mammography-diagnosed dense breast tissue (categories C and D) who received DBT in combination with ultrasounds between 2015 and 2019. DBT with synthetic 2D evaluations were captured in craniocaudal and mediolateral oblique projections. Ultrasound included assessment of the entire breast and axillary regions. DBT and ultrasound images were categorized by the BIRADS and those identified as BIRADS 0 warranted further imaging, contributing to the recall rate. Additional measures recorded were: history of breast cancer, family history of breast cancer, prior breast surgery, genetic status, subsequent imaging, biopsy, and surgery following initial DBT. All imaging was interpreted by a radiologist, and imaging results were discussed with patients.

Results: Among the cohort of 306 women with categories C and D dense breast tissue, the average age was 57.25 years. Of these, 280 women underwent DBT along with breast ultrasound (91.50%). Demographics: 94% were Caucasian and 6% were African American, Asian, or Hispanic. Of the 280 women who underwent DBT with breast ultrasound, only 1 was categorized as BIRADS 0 and required additional imaging. Hence the recall rate was 0.36%. Most of the women (210; 75%) were categorized as BIRADS 2. Forty-three women underwent subsequent ultrasound-guided vacuum core biopsy (15.36%). Ten biopsy-proven cancers were diagnosed (3.57%).

Conclusions: Since its FDA approval in 2011, DBT has been increasingly implemented in breast cancer screening. DBT has decreased overall recall rates (15-40%) and increased cancer detection rates by up to 29%. The ACR recommends a target recall rate of 5-12% to maximize sensitivity and specificity. Our study shows that the addition of breast ultrasound to screening DBT decreases the need for additional mammographic recall imaging to less than 1%, even in patients with higher breast density. With significant decrease in the recall rate, this combination of imaging techniques alleviates patient anxiety and return for additional imaging.

Tables: Patient demographics and imaging characteristics

	N	%
Age		
<40	15	5.56
40-49	[illegible]	[illegible]
50-59	[illegible]	[illegible]
60-69	[illegible]	[illegible]
70-79	[illegible]	[illegible]
>80	[illegible]	[illegible]
Race		
White	202	81.57
Black	[illegible]	[illegible]
Hispanic	[illegible]	[illegible]
Asian	[illegible]	[illegible]
History of Breast Cancer		
Yes	37	13.21
No	243	86.79
Family History of Breast Cancer		
Yes	[illegible]	[illegible]
No	[illegible]	[illegible]
History of Breast Surgery		
Yes	67	23.93
No	213	76.07
BRCA Positivity		
Yes	[illegible]	[illegible]
No	[illegible]	[illegible]
Not Tested	[illegible]	[illegible]
Other Gene Mutations	[illegible]	[illegible]

	N	%
BIRADS		
0	1	0.36
1	[illegible]	[illegible]
2	[illegible]	[illegible]
3	[illegible]	[illegible]
4	[illegible]	[illegible]
5	[illegible]	[illegible]
Additional DBT Views		
Yes	2	0.71
No	[illegible]	[illegible]
Additional Breast MRI		
Yes	[illegible]	[illegible]
No	[illegible]	[illegible]
Additional Biopsy		
Yes	43	15.36
No	[illegible]	[illegible]
Additional Surgery		
Yes	[illegible]	[illegible]
No	[illegible]	[illegible]

787478 - Atypical Ductal Hyperplasia: Are There Indicators on Imaging to Predict Upgrade?

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Background/Objective: Atypical ductal hyperplasia (ADH) is a high-risk breast lesion associated with a 4-fold increased risk of developing invasive breast cancer. It is present in up to 23% of breast biopsies with studies showing an upgrade rate to ductal carcinoma in situ (DCIS) or invasive carcinoma as high as 31%. The aim of this study is to look at imaging characteristics of lesions biopsied as ADH that were subsequently upgraded on final pathology to identify characteristics predictive of upgrade.

Methods: We performed a retrospective chart review of patients from 2016 to 2019 with a diagnosis of ADH on core needle biopsy (CNB) who underwent surgical excision and identified those whose final pathology upgraded to DCIS, invasive ductal carcinoma (IDC), or invasive lobular carcinoma (ILC). We evaluated size, distribution, and morphology of calcifications on mammography as well as size, distribution, and type of enhancement on MRI. Additional data collected included age, gender, ethnicity, surgical procedure performed, and final pathology. We analyzed the imaging characteristics using bivariate analysis to determine if there were any significant differences between patients who did and did not upgrade.

Results: A total of 65 patients with ADH on CNB who subsequently underwent surgical excision were identified. Imaging was reviewed for each, including 65 mammograms and 8 MRIs. The total upgrade rate was 24% (16/65). Within the subset of upgraded patients, the final pathology showed that 13 (81%) upgraded to DCIS, 2 (12.5%) upgraded to IDC, and 1 (6.25%) to ILC. Of the 49 non-upgraded patients, pathology reports noted residual ADH, additional benign pathology, or no residual abnormality. Of those upgraded, a mass with ultrasound correlate was seen in 7/16 (44%), while calcifications were the only mammographic finding in another 8 patients (50%). One patient had enhancement on MRI only with no mammographic abnormality. The table presents patients stratified by upgrade status.

Conclusions: Pathologic upgrade of ADH remains a significant risk requiring surgical excision for definitive diagnosis. The current study adds to the literature supporting upgrade rates in lesions seen as a mass; however, there were otherwise no identifiable characteristics that could be used as predictive of patients who may ultimately omit surgical resection with the opportunity for risk-reduction treatment only. Further studies are needed to perhaps elucidate a more prognostic relationship in the future, but at this time, surgical excision remains the standard.

Table: Patients stratified by upgrade status

	Upgraded		
	No (n = 49)	Yes (n= 16)	p-value
Age	57.86 ± 10.61	61.93 ± 11.93	0.114
Race			
Black	15 (30.61%)	7 (43.75%)	0.373
Hispanic	4 (8.16%)	0 (0.00%)	
White	30 (61.22%)	9 (56.25%)	
Asymmetry	3 (6.12%)	0 (0.00%)	0.311
Architectural distortion	4 (8.33%)	0 (0.00%)	0.233
Mass	14 (28.57%)	7 (43.75%)	0.272
Calcifications	28 (57.14%)	8 (50.00%)	0.618
Distribution			
Grouped	24 (85.71%)	5 (62.50%)	0.114
Linear	4 (16.00%)	2 (25.00%)	
Segmental	0 (0.00%)	1 (12.50%)	
Morphology			
Amorphous	13 (48.15%)	3 (37.50%)	0.664
Course heterogeneous	5 (17.86%)	3 (37.50%)	
Fine pleomorphic	9 (32.14%)	2 (25.00%)	
Unable to classify	1 (3.57%)	0 (0.00%)	

787895 - Main Findings and Effect of Intraoperative Radiotherapy on the Interpretation of Follow-up Mammography After Breast-conserving Surgery

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Background/Objective: Intraoperative radiotherapy (IORT) is a technique that enables single-dose treatment while the breast-conserving surgery (BCS) is being performed. This impacts the patient's quality of life, represents lower costs, and does not interfere with the systemic treatment. Specific data on the imaging changes in the follow-up exams are still rare. The present study aims to identify the main mammographic findings after IORT and their influence in the demand for more invasive diagnostic procedures.

Methods: A retrospective analysis has been made from 69 patients submitted to BCS and IORT between 2004 and 2017 in a single Brazilian institution according to the following criteria: ≥40 years, unicentric tumor ≤3cm with confirmed diagnosis of breast cancer and negative lymph nodes. These criteria were later modified according to the publication of the American and European Society of Radiation Oncology guidelines for age ≥50 years, tumor ≤2cm and the inclusion of other histologies with ductal characteristics. The main findings in the imaging exams were then highlighted and correlated with the rate of biopsies performed and anatomopathological results. Most patients were submitted to mammographies annually. All exams were evaluated by experienced radiologists in breast pathology.

Results: A total of 265 mammographies were analyzed during the first 5 years of follow-up. The main findings were: steatonecrosis (35%), calcifications (22%), and nodules (22%). Non-suspicious and stable postoperative alterations were not considered. Biopsy was necessary in 6% (18/265) of the cases with 50% positivity and diagnosis of 9 relapses, 8 invasive carcinomas, and 1 ductal carcinoma in situ (DCIS). In these cases, the most frequent alterations were nodule (66%) and architectural distortion (22%), and in 2 cases, the nodule was associated with adjacent architectural distortion. Relapse with DCIS was correlated with cluster of microcalcifications on the mammography.

Conclusions: This study identified steatonecrosis, calcifications, and nodules as the main alterations in mammographies after IORT, and its frequency is concordant with the current literature. The necessity of diagnostic procedures due to unclear findings was also similar and our higher identification of recurrence may be associated with the previous inclusion of patients with less restrictive criteria, and requires further investigation.

744720 - To Scan or Not to Scan: An Evaluation of Preoperative MRI Use in Primary Breast Cancer Assessments

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Background/Objective: The role of preoperative MRI in assessing the extent of primary breast cancer remains controversial. This study's objective is to determine if MRIs performed after the diagnosis of invasive/non-invasive-breast cancer will identify additional breast cancers. We hypothesize that preoperative MRIs will result in the discovery of additional significant lesions, leading to changes in surgical treatment.

Methods: A retrospective study of 389 breast cancer patient charts were reviewed, dated from January 2000- July 2019. Files were collected from an office of the JSUMC Breast Cancer Surgery Department. Information on each patient's imaging studies, treatment, demographics, surgery, and pathology were collected and stored in the JSUMC online cloud system. Statistics calculated using R, included proportions, percentages, counts, t-tests, and difference of proportion hypothesis tests. All statistical tests were conducted at a 95% confidence interval.

Results: We reviewed the charts of 331 patients that met eligibility criteria, and 4 had records of 2 separate breast cancers making the total number of cancers 335. In 233 cancers (60%), an MRI was taken before treatment. Ninety-four MRIs (40%) identified a new finding. The new findings corresponded to a change in the treatment plan in 31 of the 94 new findings, or 33%. Of the 94 new findings, 57 were a true-positive report (61%), 35 were a false-positive report (37%), and 2 were a false-negative report (2%). Hence, 33% of cases' treatment plans changed as a result of an MRI. We did not consider an increase in lumpectomy size a change in the treatment plan. The true-positive rate for all pretreatment MRIs in known breast cancer was 24%, the false-positive rate was 14%, and the false-negative rate was 0.1%, with no true-negative results found. When comparing our false-positive rate with that of baseline mammogram studies, there was not a statistically significant difference ($p=0.86$).

Conclusions: We believe that preoperative MRI studies are useful for surgical treatment planning. Further studies to demonstrate the impact on local recurrence rates and overall survival may clarify the true role of pre-operative MRI in these cases.

770686 - Extra-mammary Findings on Breast MRI in Patients with Breast Cancer: Follow-up and Yield

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Background/Objective: The objective of this study was to determine the frequency of extra-mammary findings in newly diagnosed breast cancer patients on breast MRI with contrast, and to determine how often further imaging was required to assess the extra-mammary findings.

Methods: An IRB-approved retrospective analysis of patients diagnosed with breast cancer from October 2018-2019 was performed. Clinico-pathologic features were collected, including type of breast cancer, size, and whether the patients had a breast MRI. Those who had MRI were reviewed to determine if the MRI had noted extra-mammary findings and whether the findings led to additional imaging.

Results: Of the 481 patients included in this cohort, 126 (26%) had DCIS while the remainder had invasive cancer. In our study, 291 patients (61%) underwent MRI. Forty-nine (17%) of these patients had extra-mammary findings on MRI. Furthermore, of those that had findings observed, 25 (58%) needed additional imaging with only 2 patients requiring surveillance: 1 for a large liver hemangioma and the other for gallbladder polyps. No invasive procedures were required.

Conclusions: MRIs are frequently obtained for newly diagnosed breast cancer patients, and additional findings can be anxiety-provoking to patients. Our results demonstrate that extra-mammary findings discovered via breast MRI are common and sometimes lead to additional imaging. However, results often prove insignificant. Therefore, patients can be reassured that delaying surgery to further evaluate these findings is not necessary.

Table: Summary of incidental findings

MRI, n (%)	
Yes	291 (61%)
No	188 (39%)
Unknown	2 (<1%)
Extra Mammary Findings on MRI, n (%)	
Yes	49 (17%)
No	242 (83%)
Additional Imaging, n (%)	
Yes	25 (58%)
No	18 (42%)
Unknown	6 (12%)
Type of Imaging, n (%)	
CT	5 (10%)
MRI	6 (12%)
Ultrasound	13 (27%)
PET	1 (2%)
Additional Findings, n (%)	
Liver	15 (60%)
Liver + Gallbladder	1 (4%)
Liver + Lung	1 (4%)
Lung	1 (4%)
Renal	3 (12%)
Mediastinum/thymus	1 (4%)
Thyroid	1 (4%)
Spleen	1 (4%)
Unknown	1 (4%)

Localization

787342 - Is It Time? Axillary Lymph Node Needle Biopsy with Concomitant Wire-free Localization May Decrease Redundant Needle Procedures and Improve Accuracy of Preoperative Needle Localization in BI-RADS 5, 6 Breast Cancer Patients

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Background/Objective: BI-RADS 5, 6 patients with suspicious axillary lymph nodes (LN) often require both needle biopsy (Bx) by the radiologist and subsequent preoperative needle localization (LOC) to guide surgical axillary staging. Standard practice is for patients to undergo repeat redundant needle procedures of the same suspicious LN on separate days. For those patients who proceed to neoadjuvant chemotherapy (NACT), an excellent response achieved in 41-74% of patients renders LOC of the post-NACT "normalized" LN more difficult and less accurate. The LN LOC success rate is only 72% . Therefore, a clinical practice of LN Bx and up-front wire-free localization (WFL), when the abnormal LN is best visualized, is evolving. We review our clinical experience of up-front concomitant axillary LN needle biopsy with WFL to report a potential opportunity to de-escalate the number of redundant needle procedures of the same lesion, assess accuracy of LN WFL, review MRI visualization of the LN and WFL in-vivo, and document any WFL complications.

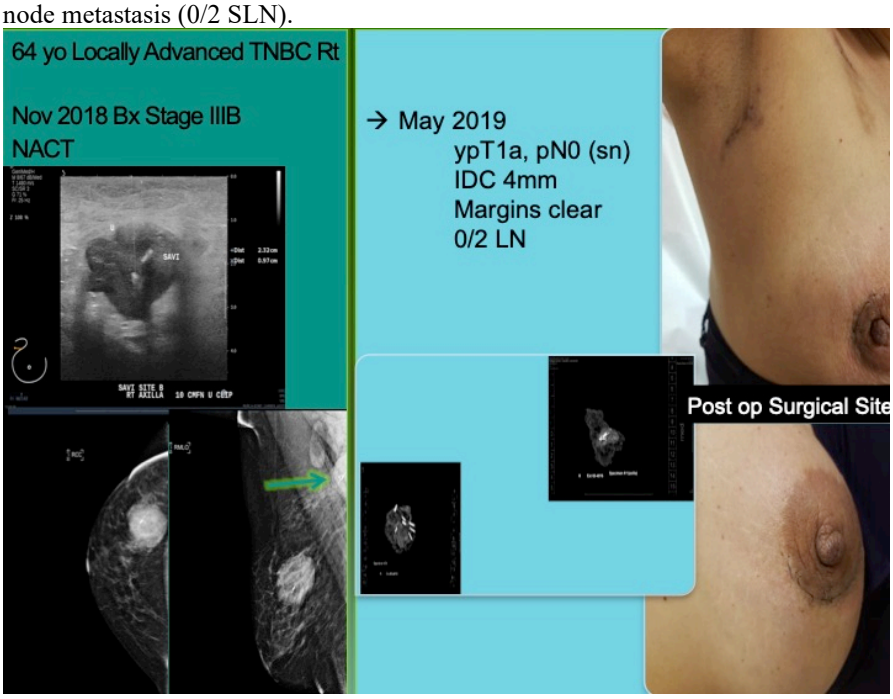
Methods: In this IRB-approved, HIPAA-compliant, single site retrospective study, we reviewed all patients who had SCOUT WFL (Cianna Medical, Inc. Aliso Viejo, CA, USA) placed at the time of LN Bx between August 2017 and May 2019. Time (days) to surgery, number of LN procedures, success rate of WFL, visualization on MRI, and complications were recorded from radiology, surgery, pathology records. Descriptive statistics were used (Excel 2013, Microsoft spreadsheet software).

Results: There were 52 US-guided LN BX with concomitant SCOUT WFL performed in 48 BI-BI-RADS 5, 6 women. The mean age was 52 years (range 28-74 years). All (100%) up-front SCOUT WFL were successful. Of the 32 patients who completed surgery to date, all (100%) had successful LN excision without complication. The mean time interval between WFL and surgery was 162 days (range 4-270, median 191 days). A single supplementary wire was performed for surgeon's learning curve. No obscuring artifact was noted in 25 MRI exams.

Conclusions: In BI-RADS 5, 6 patients, LN Bx with up-front concomitant WFL performed when the lesion is best visualized, improves LOC success, preserves options to de-escalate surgery, decreases redundant technically challenging pre-operative LN LOC, and causes no harm to standard of care MRI for diagnosis/re-staging of adjacent breast, axilla, chest wall, or brachial plexus tissues. This information supports a clinically relevant paradigm shift for BI-RADS 5, 6 patients who are likely require LN surgery. Larger scale multi-site outcomes study is needed to confirm our clinical experience and could provide a data source for cost analysis of WFL devices including department staffing costs for radioactive versus non-radioactive devices, cost savings

realized with on time OR start and shorter surgery duration associated with more accurate preoperative LOCs, and cost savings of a decreased number of redundant needle appointments, as well as additional potential increased offset costs such as the number of WFL patients who do not proceed to LN surgery.

Figures: In November 2018, a 64-year-old BI-RADS 5 female patient underwent concomitant axillary LN needle core biopsy and localization. The pathology report confirmed triple-negative invasive ductal carcinoma (TNBC). Neoadjuvant chemotherapy (NACT) yielded an excellent clinical response. In May 2019, the patient proceeded to de-escalated LN surgery without any supplementary needle localization. Final pathology reported no residual lymph node metastasis (0/2 SLN).



787742 - Cost-effective Accurate Impalpable Localization: Using Surgeon's Skills

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Background/Objective: Today, most newly diagnosed breast cancers are non-palpable requiring image guidance localization. Commonly, a marking clip is placed at the core biopsy site to identify the tumor. Preoperative wire localization in the radiology department is burdened by delays, wire migration, patient anxiety, and other problems. Several new methods to localize the cancer use “unique markers” placed prior to the day of surgery, which avoids many of the existing problems. In the OR, the new marker is visualized with a "unique monitor" in the operating room. While many problems of standard wire localization are eliminated with these "unique markers," new problems arise including cost of “unique” image localization. We believe that ultrasound-trained surgeons may improve existing localizing procedures while lowering costs using intraoperative ultrasound.

Methods: The new localizing methods require a second separate localizing procedure to "mark the marker" placed at original biopsy. Intraoperative ultrasound localization does not require an extra procedure. We studied 320 consecutive breast cancer patients taken to the operating room for image-guided lumpectomy from 4/2017 through 8/2019 (28 months). Patients needing localization were preoperatively examined to confirm adequate visualization of the ultrasound-visible clip previously place at biopsy. Patient characteristics included 91% invasive breast cancer, 9% DCIS, average size 1.8cm (range 3-40mm), 91% estrogen-positive, 16% HER2-positive, 26% node-positive, with average age 64 years. At surgery, intraoperative ultrasound measurements of the target tumor was immediately followed with localization using 1 or more methods of skin marking over tumor, blue dye injection at tumor, and/or wire localization.

Results: All localized cancers were retrieved. Three clips were not found in the specimens, but all cancers were accurately removed. Re-excision rate was 9%. Average OR time for ultrasound localization was 8.1 minutes. Average additional cost of ultrasound localization was $125 per procedure. Had the "unique markers" and "unique monitors" been used with an additional separate localizing procedure, the added cost was estimated at $1,170 per procedure (including average costs of marker, monitor use, and separate localizing procedure costs). This yields a net savings of $1,045 per case.

Conclusions: Intraoperative ultrasound localization avoids the delays of standard wire localization by prompt placement in 8 minutes allowing a morning start time of 7:38AM. In comparison to the new localizing methods, intraoperative ultrasound localization provides a cost savings of approximately $1,045 per procedure, avoids a second invasive procedure, allows the surgeon's choice of entry and optimal orientation to cancer location, and improves the patient's overall experience. We believe this established technique provides a win-win situation for both patient and surgeon.

Table: Pros and cons of intraoperative ultrasound localization

PRO	CON
Start Case at 7:38AM	Must learn ultrasound skills
Surgeon controls entry and trajectory of localization	Must use ultrasound visible clips at original biopsy
No radiation compliance	Requires 8 minutes of OR time
Avoid repeated sensor handling	
May use steel retractors	
Patient Avoids second localizing procedure	
Less capital costs / less disposable costs	
Improved patient experience	

787334 - Effective Localization of Non-palpable Breast Lesions Using Magseed

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Background/Objective: Non-palpable breast lesions require precise preoperative localization for excisional biopsy or breast-conserving surgery for malignancy. The use of wires for localization has several challenges including patient discomfort, wire migration, and coordination of OR and breast imaging scheduling on the day of surgery. Radioactive seed localization has been successfully utilized to overcome some of these challenges; however, its widespread adoption has been limited by regulatory processes due to radiation safety requirements. In addition, in some jurisdictions, radioactive seeds must be removed within 5 days of placement, which is not always feasible. Magseed, a ferrous marker approved by the FDA in 2016, can be placed in any soft tissue site, does not have a time limit for removal, and does not require any special disposal procedures. We examined our institutional experience with Magseed as a preoperative breast localization option to determine if it could overcome disadvantages of other methods.

Methods: An IRB-approved retrospective data collection and analysis was performed in patients who underwent excisional biopsy or segmental mastectomy at a single institution after Magseed localization from July 2017 to May 2019. Descriptive statistics were used to report Magseed retrieval rate and secondary outcome measures, including accuracy of Magseed placement, adverse events, and reoperation rates.

Results: Three hundred thirty Magseeds were placed in 251 patients to localize 291 breast lesions. Four patients had bilateral disease and underwent bilateral breast surgery. One hundred seventy-four (68%) localizations were performed with ultrasound guidance, 73 (29%) with mammography guidance, and 8 (3%) with a combination of ultrasound and mammography. Patients in this study had a varying range of breast density (Table). Sixty-three (25%) localizations were performed with more than 1 Magseed in a single breast: 33 to bracket a large target area and 30 to localize more than 1 target in a single breast. Magseeds were placed to target 199 masses (68%), 45 calcifications (15%), 20 architectural distortions and asymmetries (7%), 12 MRI enhancements (4%), 12 biopsy clips (4%) in patients who had complete radiographic response after neoadjuvant chemotherapy, and 3 combinations of masses and calcifications. In 92%, the Magseeds were placed within 5mm of target lesion. Only 2 Magseeds were more than 5mm away from the target lesion. Mean lesion size was 16mm (range 3 – 100mm, median 12mm) on imaging and 16mm (range 0.6 – 80mm, median 13mm) on final pathology. We achieved 100% surgical retrieval rate of Magseeds. There were no grade 2 or higher device-related adverse events. Twenty-five patients (10%) required re-operation for close/positive margins. Five patients underwent completion mastectomy, and 20 patients underwent margin re-excision.

Conclusions: Localization of non-palpable breast lesions using Magseed is a safe and reliable method for various target lesions and in breasts of varying density. We found that bracketing of large lesions and excision of multifocal, multicentric, and bilateral breast tumors was feasible

and effective. Magseed offers an alternative to wire-guided or radioactive seed localization with the convenience of uncoupling operative and breast imaging procedure schedules.

Table: Patient characteristics

Table 1	n(%)
Mean age (range)	59 (27-86)
Breast Density	
Fatty	2 (0.8)
Scattered fibroglandular density	94 (37.5)
Heterogeneously dense	133 (53.0)
Extremely dense	15 (6.0)
Unknown	7 (2.8)
Neoadjuvant chemotherapy	
Yes	53 (21.1)
No	198 (78.9)
Method for localization	
Ultrasound guided	174 (68.2)
Mammography guided	73 (28.6)
Combination of ultrasound and mammography	8 (3.1)
Number of lesions in a breast	
1	225 (88.2)
2	26 (10.2)
3 or more	4 (1.6)
Number of seeds in a breast	
1	191 (74.9)
2	54 (21.2)
3 or more	10 (3.9)
Re-operation for inadequate margin	
Re-excision of margin	20
Completion mastectomy	5

787867 - The Feasibility of Bracketing Localization of Large Non-palpable Breast Cancer Using Radar Reflector in Patients Undergoing Lumpectomy

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Background/Objective: Radar reflectors (RR) have shown to be a safe alternative to wire localization (WL) for non-palpable breast cancer; however, little is known about its utility when used in bracketing technique (BT). In this study, we compared RR vs. WL.

Methods: We retrospectively reviewed the clinic-pathological data of 152 women treated with lumpectomy using BT at a single institution from January 2016 to September 2019. Data collected included incidence of reoperation, positive and close margins, and tumor features. Wilcoxon rank sum test or Kruskal-Wallis test was used to compare continuous variables and Chi-Square test was used to compare categorical variables.

Results: There were a total of 152 patients undergoing BT, 58.5% (n=89) had WL, and 41.4% (n=63) had RR. There was no significant difference in patient's age, tumor size, grade, ER, PR, HER2 status, lymph node status, or presence of lymphovascular invasion between the 2 groups. Re-operation due to positive or close margins was significantly higher in patients using WL, occurring in 30% (n=27) patients compared to 15.9% (n=10) that had RR (p= .041). Positive margin was found in 15.7% (n=14) patients that had WL and 12.6% (n=8) that used RR (p=.70); close margins, defined as DCIS within 1-1.9mm from the inked margin, was found in 36% (32) of the cases with WL and 12.7% (8) of the cases of RR (p.003). Oncoplastic reduction was performed in 33.6% (n=51) patients, of which 24.3% had RR (n=37), and 9.3% had WL (n=14) (p<.01). The median specimen volume was significantly larger in RR (n=23000cm3) compared to WL (7700cm3) (p<.01). Failure to localize the RR occurred in 1.5% (n=1) case, and there were no complications in the WL group. Despite the RR failure, the tumor resection was successful with no positive margin or need for reoperation.

Conclusions: Bracketed localization with RR showed a significantly lower rate of close margin and re-operation compared to WL, with a low rate of failure of localization of the RR. Bracketed RR showed to be a safe method that can be used to perform lumpectomies in larger non-palpable breast cancer.

Table: RR vs WL using BT in patients undergoing lumpectomy for breast cancer

	Bracketed WL (n=89)	Bracketed RR (n=63)	p-value
Median Age	63	59	0.063
Median pathologic Tumor size (mm)	15 (0-104)	17 (0-138)	0.802
Median Specimen Volume (cm3)	7700	23000	<0.001
Histology IDC ILC DCIS Other	% 48.3 7.9 38.2 5.6	% 58.7 7.9 30.2 3.2	0.588
ER Positive	86.4%	77.8%	0.168
PR Positive	73.9%	68.3%	0.451
HER2 Negative	80.8%	72.4%	0.221
Tumor Grade 1 2 3	% 12.5 40.9 46.6	% 6.3 44.4 49.2	0.459
Final pathology close margin	36%	12.7%	0.003
Final pathology positive margin	15.7%	12.6%	0.710
Re-operation rate	30.3%	15.9%	0.041

Lymphedema

787242 - Use of a Hand-held Infrared Device to Measure Limb Volume in a Safety Net Hospital Breast Cancer Clinic

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Background/Objective: Lymphedema (LE) is a common functional impairment of breast cancer (BC) treatment, yet there is no standardized method for diagnosing it in the subclinical range. The objective of this study was to determine the feasibility of utilizing an infrared scanner attached to an iPad to measure limb volume in a safety net BC clinic. Secondary aims of this study were to identify correlates with patient demographics, peri-operative limb volume changes, and upper extremity functionality.

Methods: Twenty-one patients with Stage 0-III BC were enrolled prospectively at a safety net hospital for 3 months. Limb volume measurements were taken with an infrared scanner attached to an iPad, and patient symptoms were assessed via the Upper Extremity Functional Index (UEFI) survey. Data was collected pre-operatively and post-operatively at 1-4 weeks. Limb volume change was considered clinically relevant if there was a >5% difference, and UEFI score clinically relevant if there was a decrease of >11 points. Logistic regression models and multivariate analysis were used to assess correlates between patient demographics, surgical factors, limb volume changes, and upper extremity functionality.

Results: Fourteen percent (3/21) of participants were found to have relative volume increases of >5% post-operatively in the affected arm, and 67% (14/21) of patients had a decrease of >11 in UEFI score. Neo-adjuvant chemotherapy was found to be associated with increased limb volume (p=0.0272, OR=46.203). Increased pain post-operatively was associated with a decrease in limb functionality (p=0.0386, OR=1.572). Functionality as assessed by UEFI score changes and relative limb volume changes were not correlated.

Conclusions: This study found that neo-adjuvant chemotherapy was associated with clinically significant post-operative limb swelling and higher post-op pain was associated with lower limb functionality. Assessing limb volume via an iPad with infrared scanner was simple to implement in the clinic setting.

Male Breast Cancer

780540 - Radiomics to Predict Nodal Status in Male Breast Cancer

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Background/Objective: Male breast cancer has a higher adjusted overall mortality compared with female breast cancer after adjusting for clinical characteristics, treatment factors, race/ethnicity, age, and access to care. Our study explores the feasibility of using radiomic (quantitative metrics extracted from clinical imaging) signatures to non-invasively discriminate primary tumors in pathologically node-positive vs node-negative male breast cancer patients.

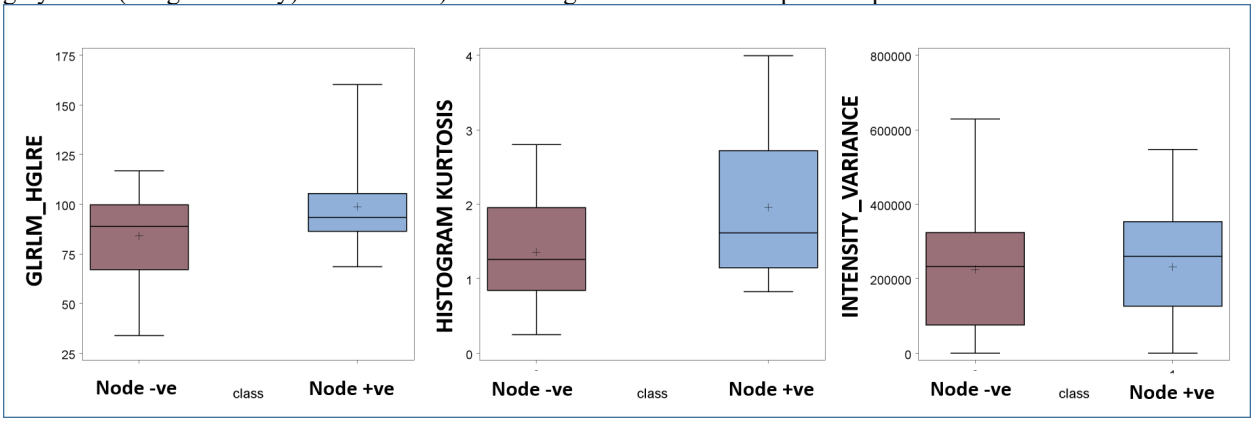
Methods: Pre-surgical mammograms of male patients with pathologically confirmed breast carcinoma, diagnosed between 2009-2019, were included in this study. All tumors were digitally segmented on ITK-SNAP by an experienced breast physician from the mammograms. Cancer imaging phenomics toolkit (CaPTk) was used for radiomics analysis. A panel of 1360 shape (morphologic features), textural (GLCM, GLRLM, GLSZM, Histogram, Intensity, LBP, NGTDM) and volumetric metrics were automatically calculated from each segmented tumor per patient. Independent t-test or Wilcoxon rank sum test was conducted depending on data normality to filter signals potentially associated with nodal status using an alpha value of 0.05. Further restriction of signal select was conducted using Benjamini and Hochberg False Discovery Rate.

Results: Forty-six patients were included in the final cohort (median age 68, Stage 0 (3 patients), Stage I (12 patients), Stage II (25 patients), Stage 3 (6 patients)). While only 5/46 of these patients were clinically node-positive (cN1) following surgery, 20/46 were node-positive (pN1) on histopathology. All 46/46 patients were ER+, and 44/46 were HER2-neu negative. All patients were ER+, and 44 were HER2-negative. All but 5 patients were clinically node-negative. The majority (75%) of pN1 patients were luminal B (defined by ER positive, PR25). The majority of pN0 patients were luminal A. Radiomic analysis revealed that pN1 patients had a radiomic signature that was different from pN0 patients. There were 276 out of 1360 radiomic metrics who were found with $p<0.05$. The best-performing metrics after Benjamini and Hochberg False Discovery Rate restriction were based on first-order texture approaches (i.e., histogram and intensity), followed by GLRLM, a second-order texture approach. Texture metrics capturing the heterogeneity of the grey-levels (signal intensities) constituting the primary tumor were observed to be significantly higher in the pN1 compared to the pN0 group (Figure).

Conclusions: Our pilot study suggests that radiomic analysis of the primary tumor may predict nodal status in a clinically node-negative patient by assessment of the heterogeneity of the grey-levels (signal intensities) constituting the primary tumor captured by the texture metrics. Despite our small sample size, our pilot data merits further investigation in a larger sample to confirm the association with pathological findings and to correlate radiomic characteristics with additional biologic characteristics like genomic risk, luminal versus non-luminal biology, etc. This may

help identify early on which male breast cancer patients might be good candidates for neoadjuvant therapy to improve treatment approaches and outcomes for these patients.

Figures: Whisker-Box plots of radiomic metrics that showed significant ($p<0.01$) difference between node-negative and node-positive male breast carcinomas. The radiomic metrics related to textural heterogeneity (variability in grey-level (image intensity) distributions) showed higher values in node-positive patients.



788287 - Compliance with Endocrine Therapy in Male Breast Cancer

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Background/Objective: Male breast cancer accounts for about 1% of annual breast cancer diagnoses in the United States, and most cases are hormone responsive warranting endocrine therapy. Female compliance with endocrine therapy is well documented, but less studied in men. The purpose of this study is to examine the rate of noncompliance and type of side effects associated with endocrine therapy, and determine factors associated with compliance with endocrine therapy among male breast cancer patients.

Methods: A single institution, IRB-approved, retrospective review was performed of the charts of male breast cancer patients seen from 2007-2017. Patient and tumor characteristics, such as demographics, stage, histology, ER status, and treatment, including endocrine therapy use, side effects, and adherence, were evaluated.

Results: Twenty patients meeting study criteria with data available for review were identified. Ages ranged from 48 to 89 years (median 67). Most of the patients were Caucasian (n=15), and most had invasive carcinoma (90%). Two patients presented with DCIS (10%), and 2 presented with distant metastasis (10%). Most patients underwent mastectomy (80%), and 4 of 20 patients had breast-conservation surgery. Estrogen receptor status was positive in 19 of 20 patients (95%), and of the 19 patients with hormone-sensitive male breast cancer, 89% (n=17) received any endocrine therapy. Of the patients on endocrine therapy, 59% (n=10) took tamoxifen alone, 24% (n=4) started with tamoxifen and were changed to an aromatase inhibitor (AI) due to side effects, and 18% (n=3) took an AI alone. In all, 25% experienced adverse events including thromboembolic events, bone pain, hot flashes, or decreased libido, and 2 of 10 patients (20%) discontinued their hormone therapy prior to the recommended 5 years. The average length of endocrine therapy use was 61 months (range 28-99).

Conclusions: Endocrine therapy remains a mainstay in male breast cancer treatment as most cancers are hormone receptor-positive; however, 1 in 5 male patients are non-compliant with therapy. Furthermore, approximately one-quarter of male breast cancer patients will experience side effects. Further studies on factors associated with endocrine compliance in men should be performed.

Margins

787765 - Improving the Diagnostic Accuracy of the Intelligent Knife (iKnife) by Identifying DCIS

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Background/Objective: Breast-conserving surgery has many advantages but is associated with re-excision surgery, which carries significant human and economic burden. In-situ disease is more frequent than invasive disease as the cause of involved margins. For novel intra-operative margin assessment (IMA) tools, the ability to recognise DCIS in a timely manner to facilitate clinical use remains a challenge. Rapid evaporative ionisation mass spectrometry (REIMS) uses mass spectrometry to analyse electrosurgical aerosol from tissues in real time, known as the intelligent knife (iKnife). The Bovie scalpel has been used to successfully identify metabolites that discern normal breast tissue and invasive breast cancer ex-vivo; however in-situ disease has not been captured. Therefore, laser-assisted REIMS (LA-REIMS) has been developed to enable accurate identification and analysis of ex-vivo in-situ disease. The aim is to improve the diagnostic accuracy of the iKnife for immediate IMA of both invasive and in-situ disease.

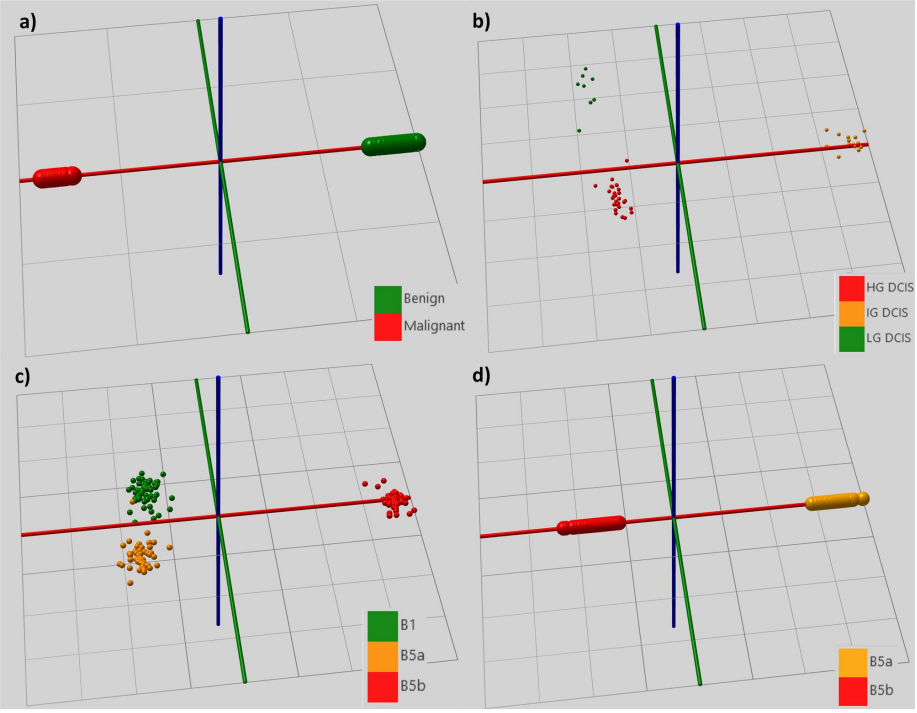
Methods: Following REC ethics approval (ID: 14/EE/0024), a total of 55 patient samples were collected from patients undergoing a mastectomy for >4cm DCIS. From these, 19 were found to contain DCIS; 5 low grade (LG), 4 intermediate grade (IG) and 10 high grade (HG). LA-REIMS was performed on each sample using an OPOTEK Opolette IR532 Optical Parametric Oscillator (OPO) laser at 35mW with a custom made focusing unit, and the aersol plume ('surgical smoke') was aspirated into and analysed by the mass spectrometer (Xevo G2-XS QTOF mass spectrometer; Waters, London). Following standard processing, the tissue type was validated by a consultant histopathologist. Results were combined with LA-REIMS data from 12 invasive breast cancer samples and subsequently compared to normal breast tissue and benign breast disease. Multivariate analysis of significant peaks was conducted to identify biochemical differences between cancerous and normal tissues.

Results: Principle component analysis and linear discriminant analysis using bespoke software, (Abstract Model Builder; Waters Corporation, Hungry) was conducted using 194 histologically validated spectra acquired from 67 tissue samples as follows; 21xB1 (normal), 13xB2 (benign), 2xB3 (indeterminate), 19xB5a (in-situ disease), 12xB5b (invasive disease). Spectral differences were observed in the lipid range (600 – 1000m/z) between tissue types. LA-REIMS recognition accuracy with model generation of benign (B1 and B2) (n=34) and malignant tissue samples (B5a and B5b) (n=31) provided sensitivity of 89% and specificity of 82% (Figure 1a) and correct classification rate (CCR) of 75%. Moreover, spectral differences were observed between low-, intermediate-, and high-grade DCIS (CCR 95%), B1 vs B5a vs B5b (CCR 75%), and B5a vs B5b (CCR 79%) (Figure 1b, c, d).

Conclusions: This work demonstrates that spectral data can be collected using LA-REIMS from non-mass forming DCIS samples. The analysis suggests that differences in mass spectral peaks

are distinct enough to enable accurate separation between benign and malignant breast tissue on multivariate analysis. This data will now be capitalised on in ongoing work to train an IMA tool to accurately recognise DCIS to facilitate improved real-time oncological margin control. Further work will aim to consolidate the DCIS spectral dataset to establish whether separation between tissue types reaches statistical significance compared to invasive and normal breast tissue.

Figures: LDA is a well-established machine learning technique and classification method for predicting the accuracy for predicting categories. These LDA plots demonstrate clear distinctions between tissue type in: a) B1 and B2 vs B5a and B5b; b) LG vs IG vs HG DCIS; c) B1 vs B5a vs B5b; and d) B5a vs B5b.



787475 - Tumor Bed Extending to Margins After Neoadjuvant Chemotherapy: Is Re-excision Necessary?

Marie-Helene Ngo[1], Mai-Kim Gervais[2], Pierre Dubé[2], Lucas Sidéris[2], Guy Leblanc[2], Michael Yassa[2], Marie-Christine Guilbert[2]

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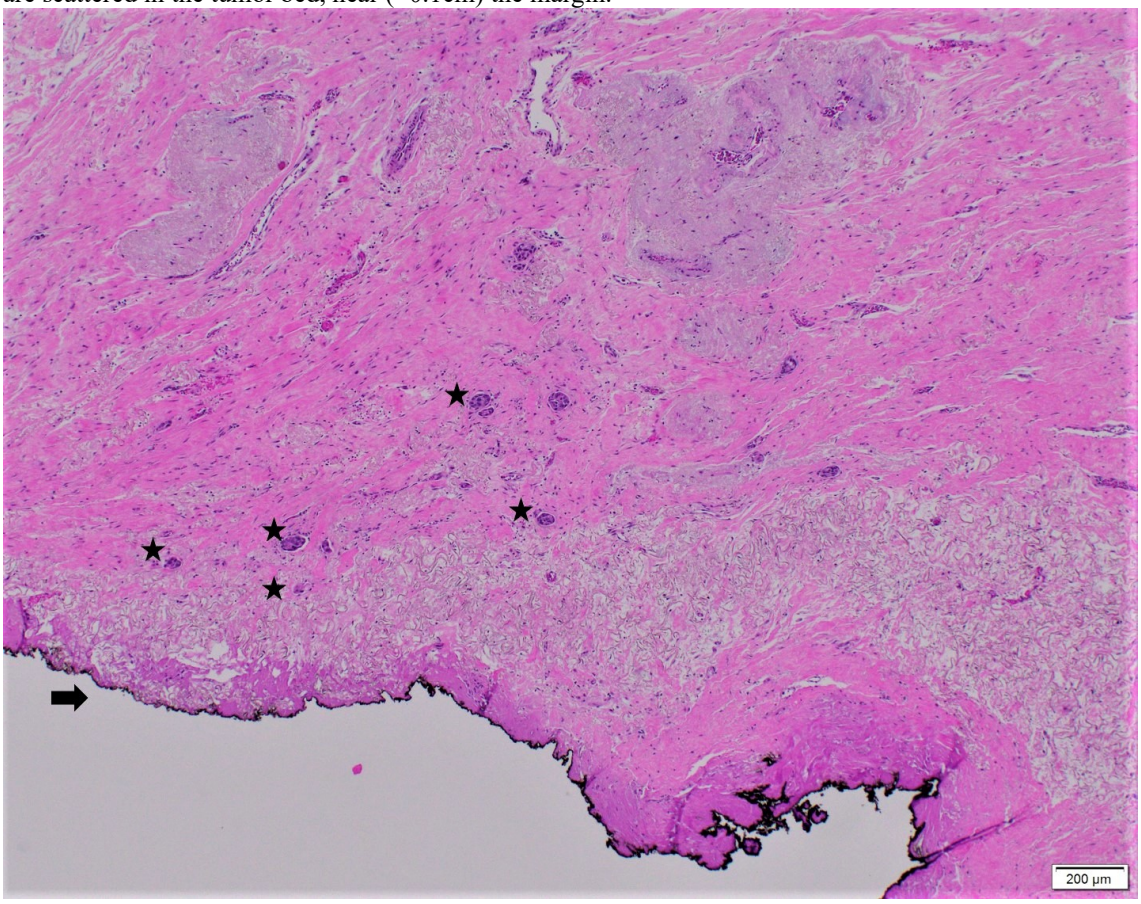
Background/Objective: Neoadjuvant systemic therapy (NAST) is increasingly used in the treatment of breast cancer. Pathologic examination of post-NAST surgical specimen includes assessment of margins. Positive margins for invasive carcinoma and/or ductal carcinoma in situ (DCIS) significantly increase the risk of local recurrence. In addition, it has been recommended that tumor bed (TB) changes extending to margins should be documented; however, its clinical significance has not yet been established. The aim of our study was to gather prognostic data on this histological finding.

Methods: We retrospectively identified all cases where TB was reported at margin (TB on ink) from our pathology database. Cases where margins were also positive for invasive carcinoma or DCIS were excluded. The patients' clinical charts and imaging reports were reviewed

Results: Over a 3-year period (2016-2019), 19 cases were identified. On the pre-NAST biopsy, the majority of cases were invasive ductal carcinoma (15/19). Six cases were negative for estrogen receptor (ER) and HER2, 8 were HER2-positive, and 5 were ER-positive and HER2-negative. Post-NAST, 17 patients underwent a partial mastectomy, and 2 underwent a total mastectomy. Seven patients had a pathological complete response (pCR), while the others had a partial response to treatment (Residual Cancer Burden I or II). In 10 cases, only 1 margin was positive for TB, whereas the other 9 cases had more than 1 positive margin for TB. In 10 cases, additional cavity shave margins were taken during the initial surgery, but complete re-excision of all TB positive margins was only performed in 2 cases. None of the remaining 17 patients underwent a second surgery for margin re-excision. With an average follow-up of 11 months (3-32 months), there have been no local recurrences.

Conclusions: This is, to our knowledge, the first study assessing the clinical significance of TB extending to margins in post-NAST breast surgical specimens. Our results show no increased risk of local recurrence when a positive margin for TB is not re-excised. Further data and follow-up will be needed to confirm the adequacy of conservative management in this setting.

Figure: Tumor bed extending to surgical cauterized margin (arrow). Clusters of residual invasive carcinoma (stars) are scattered in the tumor bed, near (<0.1cm) the margin.



787808 - Impact of Intraoperative Pathology Consultation on Lowering Re-excision Rates for Invasive Ductal Carcinoma at a Community Hospital

Anna Shu[1], Shahrzad Abbassi-Rahbar[2], Amy Kirby[2], Kenna Thompson[2]
[1]St Joseph Mercy Oakland, Northville, MI, [2]St Joseph Mercy Oakland, Pontiac, MI

Background/Objective: Our objective was to evaluate the impact of intra-operative pathology consultation on re-excision rates for patients who undergo breast-conserving therapy (BCT) for invasive ductal carcinoma.

Methods: We performed a prospective study of patients undergoing BCT at our institution in collaboration with our pathology department. Patients were included if they had a confirmed pre-operative diagnosis of invasive ductal per core needle biopsy results. All breast specimens were oriented in standard protocol with 6 ink colors to indicate specific margins, and delivered to the pathologist by an operating room staff member following mammography for gross evaluation of margins. Results were discussed directly with the surgeon by the pathologist.

Results: A total of 54 patients met inclusion criteria. Of these, a total of 7 (12.9%) patients underwent re-excision for microscopically positive margins. All of these patients negative gross margins on intraoperative pathology consultation. There were 22 (40.7%) patients who were found to have grossly positive margins intra-operatively and required excision of additional tissue during the index procedure. A total of 29 (53.7%) patients would have required re-excision if intraoperative pathology had not identified grossly positive margins.

Conclusions: There was a 40.8% reduction re-excision rates for patients undergoing BCT for invasive ductal carcinoma with the introduction of our intraoperative pathology consultation protocol. Our results demonstrate that this strategy is a feasible and cost-effective method to significantly reduce re-excision rates in a community hospital.

786852 - The Quest to Identify the Molecular Margin

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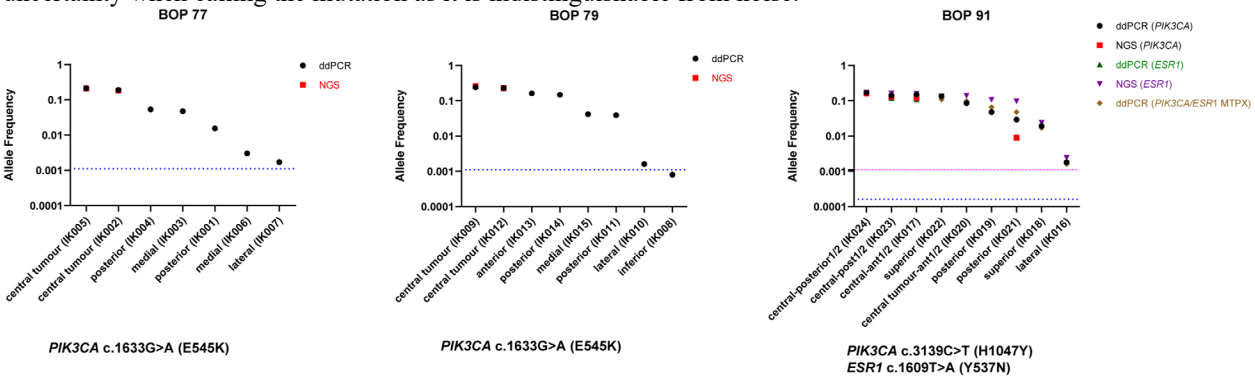
Background/Objective: Breast-conserving surgery is associated with a high risk of re-excision surgery for positive margins. Metabolomic signatures give a suggestion that the true margin may lie beyond the histopathological margin. The aim of this proof-of-principle study was to identify the genomic “molecular margin” using next-generation sequencing (NGS). This could change the way in which margins are assessed by novel intra-operative margin assessment technologies, improve the accuracy of identification, and reduce the need for re-excision surgery. Accurate, objective identification of the margin would allow precise excision of the tumor, which may also reduce local recurrence rates.

Methods: Ethics and transfer agreements were approved for this study (14/EE/0024). Formalin Fixed Paraffin Embedded (FFPE) blocks were used from 3 patients' specimens with the following breast tumors (15mm G2 IDC ER 8/PR 8/HER2, 22mm G2 ER 8/PR 8/HER2 0, 28mm G2 IDC ER8/PR7/HER2 3+). We sequenced 22 regions from these 3 patients using an Ion AmpliSeq Breast Cancer Panel targeting 14 known breast cancer driver genes. We sequenced the central region of the primary tumor with read depth of at least x500 to identify driver mutations. We developed digital PCR (dPCR) assays to the identified mutations and validated these assays on the extracted tumor DNA with 100% concordance in mutation detection and very high concordance in allele frequency ($r=0.96$, $p<0.0001$, Pearson's correlation). We further validated the assays on FFPE derived DNA and buffy coat DNA from unrelated patients known not to harbor the mutations to model the assays' error as well as the error attributed to fixation artefacts.

Results: dPCR assays were used to track the identified mutations away from the central region into the histological margins as well as just beyond the histological margins (Figure). Mutations were identified on all tested regions with a reduction in the allele frequency (AF) of the identified mutations the further they were from the central region at and then beyond histopathological margins, demonstrating a centrifugal gradient in AF towards the tumor periphery just beyond the histological margins. All the tested margins except 1 had allele frequencies above the assay error indicating detection of potentially true events at very low AF.

Conclusions: This novel proof-of-principle pilot study demonstrates the feasibility of the approach in identifying mutations in the center of the tumor that can be tracked towards and even beyond the histopathological margins in order to identify "molecular margins." We are continuing this work to extend these findings and determine the distance at which this "molecular margin" signal drops off in relation to the tumour's histological edge.

Figures: Mutation tracking from the central region towards and beyond the histopathological margins in 3 patients. Sample BOP 91 had 2 identified mutations by NGS that were both tracked. The dotted lines represent the error threshold associated with that particular assay on FFPE derived DNA. Below that threshold there is a level of uncertainty when calling the mutation as it is indistinguishable from noise.



785603 - Inaccuracies with Suture Specimen Orientation for Breast-conserving Surgery

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Background/Objective: Intra-operative suture orientation of breast lumpectomy specimens is routine in many centers. For both invasive and in-situ disease, the presence of involved margins increases the risk of local recurrence. Focal re-excision is recommended for involved radial margins; however, in approximately 50% of re-excisions, no residual tumor is found. A possible explanation could be excising the wrong margin due to specimen disorientation. Furthermore, involved anterior and posterior (deep) margins frequently are not recommended for re-excision due to lack of further tissue for excision. The aim of this study was to assess if marking sutures placed intra-operatively by the surgeon for specimen orientation correlated with correct margin identification in the pathology laboratory.

Methods: Local clinical audit committee approval was granted for this study (Approval BR162). Data was prospectively collected from patients undergoing lumpectomy for breast cancer at 1 institution for 6 months between April 2019 and October 2019. Dimensions (mm) and weight (g) of the lumpectomy specimens were collected. All specimens were orientated intra-operatively with long lateral/short superior dyed silk marking stitches, whilst some surgeons also used a third, double-deep, dyed silk suture. For all specimens, an additional undyed Vicryl stitch was placed intra-operatively by surgeons at a random margin location (anterior, posterior, inferior, superior, medial, lateral) on the specimen, and this data was recorded intra-operatively. The pathology team, blinded to the intra-operative data, also recorded the location of the additional stitch along with specimen dimensions and weights.

Results: Of 107 patients enrolled, 100 specimens for which complete data on margin audit stitch location was available were included. Overall, margin face discordance between surgeons and pathologist was 35% (n=35/100) ($p<0.01$). Fifty-four percent of radially-placed sutures were mislabeled by the pathology team as anterior (n=11) or posterior (n=8). Compared to intra-operative measurements, mean specimen height and length increased by 18% ($p<0.05$) and 9% ($p>0.05$) respectively, whereas width and weight decreased by 3% in the pathology laboratory ($p>0.05$). In total, 22% (22/100) had an involved margin, of which 6 patients with margin-face discordance underwent a re-excision. Subgroup analysis showed no significant difference in margin disorientation, either with tumor size or with intra-operative placement of 2 versus 3 orientation marking stitches.

Conclusions: A high rate of margin discordance is demonstrated between intra-operative suture orientation and pathology reporting. One possible explanation is that with deformity of fatty breast tissue, the specimen dimensions can change between surgery and time of pathology reporting. As focal re-excision for positive radial margins is recommended, correct orientation is important. Margins incorrectly labeled as anterior/posterior would often avoid re-excision. Techniques should be identified to optimize specimen orientation (e.g., intra-operative specimen inking). Ongoing work is required to evaluate this further.

786719 - Re-excision Rates After Margin Guideline Changes: A Single Surgeon's Practice

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Background/Objective: In 2014, the Society of Surgical Oncology and the American Society for Radiation Oncology (SSO-ASTRO) released new guidelines regarding appropriate margin width in early-stage cancers receiving partial mastectomy for treatment. Prior to this update, appropriate margins were 2mm. The new standard became "no ink on tumor," or microscopically negative margins. With this change, patients who would previously have undergone repeat surgery for wider margins now could avoid a second procedure. We evaluated the re-excision rate in a single surgeon's practice following adoption of the new guideline.

Methods: Prior to the 2014 publication, this surgeon performed re-excision for margins <2mm. The more liberal guideline was implemented immediately. A retrospective chart review was undertaken to assess the re-excision rates before and after implementing the new guideline changes for margin status. Female patients over the age of 18 with IDC, ILC, or DCIS who underwent partial mastectomy by a single surgeon at 1 institution from June 2012 – February 2016 were the initial target group. There wre 1069 entries obtained from CPT code search including codes 19301, 19302, 19125, 19120 (variations of partial mastectomy). Of these, 454 were unique patients with invasive cancer, 179 had DCIS, and 432 were benign lesions or repeat codings. Of the unique invasive cancer patients, another 113 were eliminated due to receiving neoadjuvant therapy, a more advanced cancer stage, or a rarer non-IDC/ILC cancer, leaving a total of 341 subjects. Statistical analysis was performed.

Results: When all invasive cancers were included, there was a significant difference between re-excision rates before and after the guideline practice change (19.64% to 10.98%, p=0.0261), and this did represent an overall decrease of 8.66%. When these cases were further broken down into IDC vs ILC/mixed, the differences were striking. IDC had an overall re-excision rate of 16.55%, which dropped after the change to 6.29%. This reflected a 62% decrease in re-excisions and was statistically significant (p=0.0066). The absolute number of cases not taken for re-excision due to the more liberal guideline was 25. The re-excision rate for the ILC and ILC/IDC mixed-type tumor groupings basically showed no change at from 34.8% to 33.3% (p=0.9257).

Conclusions: After adopting the 2014 consensus guideline of no tumor on ink, fewer re-excisions were performed in IDC patients. In this surgeon's practice, with early adoption of the guideline changes, 25 re-operations for close margins were prevented. At an average cost of $5,000 per re-operation, this potentially represents a cost savings of $125,000. In addition to monetary value, the stress of re-operation, lost work, travel, and other personal factors for the patient to avoid should be considered. When compared to other similar studies comparing re-excision rates in this timeframe, this practice had a larger overall decrease in re-excisions. The ILC group had no change in re-excisions following the guideline change. The nature of lobular cancer likely explains why a change margin depth would not have an effect on re-excision rates. Unlike IDC, ILC does not tend to form a distinct mass but instead has a more diffuse growth pattern. It can have outgrowths of tumor not easily identified on pre-operative imaging, and not palpable on examination. This makes operative planning more difficult and leads to more grossly positive margins than IDC. With an overall high re-excision rate and only a small number of close margins, it is clear why no statistical change occurred.

NAC

785157 - Factors Required for Individual Immune Responses to Achieve Pathological and Therapeutic Effects of Neoadjuvant Chemotherapy in Breast Cancer Patients

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Background/Objective: Activation of the immune response, including T lymphocytes, natural killer (NK) cells, and tumor microenvironmental factors (TMEFs), plays an important role in inducing a therapeutic effect after neoadjuvant chemotherapy (NAC) in breast cancer. However, how an individual patient´s immune response is involved in different pathological and therapeutic effects in breast cancer after NAC, as well as the role of TMEFs in the pathological response, is still unclear. We examined immune activation of local and systemic immune responses to different pathological and therapeutic effects of NAC in breast cancer.

Methods: From January 2013 to June 2018, 38 patients with Stage II–III breast cancer received NAC with anthracyclines and taxanes followed by surgery. Pathological and therapeutic effects were evaluated according to histopathological criteria for the assessment of therapeutic effects outlined by the Japanese Breast Cancer Society. A systemic immune response was evaluated by measuring peripheral (p)NK cell activity, and peripheral CD4 to CD8 (pCD4/8), neutrophil to lymphocyte (NLR), lymphocyte to monocyte (LMR), and platelet to lymphocyte (PLR) ratios, before and after NAC. pNK cell activity was measured by chromium release assay, and pCD4 and pCD8 T cell subsets were evaluated by flow cytometric analysis. The local immune response was evaluated by assessing tumor-infiltrating lymphocytes (TILs) and levels of 14 TMEFs: CD4, CD8, NK, forkhead box protein P3 (FOXP3), cytotoxic T lymphocyte antigen 4 (CTLA-4), programmed cell death 1 (PD-1), programmed cell death ligand 1 (PD-L1), interleukin (IL)-2, IL-6, IL-12, interferon (IFN)-γ, IL-10, transforming growth factor (TGF)-β, and vascular endothelial growth factor (VEGF); using next-generation sequencing in formalin-fixed paraffin-embedded sections collected from preoperative vacuum-assisted biopsy samples and surgical specimens.

Results: Therapeutic outcomes were as follows: G1a (n=8), G1b (n=13), G2a (n=7), G2b (n=4), G3 (i.e., complete; n=6). In univariate analysis, grade 2 (G2) or better therapeutic effects was significantly associated with higher NK levels and increased IL-6 after NAC. The disappearance of axillary lymph node metastasis (Ax+) was significantly associated with increased pNK cell activity and NK levels, as well as decreased VEGF levels after NAC, and associated with the presence of ≥5% TILs, as well as being potentially associated with higher CTLA-4 in regulatory T cells (Tregs) before NAC. The decrease in NLR was significantly associated with increased NK, CD8, and TGF-β levels, and decreased VEGF after NAC, and associated with higher IL-6 and VEGF levels before NAC. The increase in LMR was significantly associated with decreased VEGF after NAC, and associated with higher IL-6, IL-10, and VEGF levels before NAC. The decrease in PLR was significantly associated with increased pNK cell activity, and CD8, IFN-γ,

and FOXP3 after NAC. With subset analysis of 16 patients, an increased reduction rate in pCD4/8 was significantly associated with increased pNK cell activity and NLR. Multivariate analysis revealed that a G2 or better therapeutic effect was significantly associated with higher NK levels after NAC (odds ratio [OR]=1.07, 95% confidence interval [CI] 1.00–1.14; p=0.0255), and that pre-NAC TILs were significantly associated with the disappearance of Ax+ after NAC (OR=19.87, 95% CI 2.24–175.80; p=0.0072).

Conclusions: Factors required for individual immune responses to achieve pathological and therapeutic effects of NAC in breast cancer patients are as follows: 1) Increased NK and CD8 levels after NAC at the local level, as reflected in the presence of TILs before NAC; 2) Increased pNK cell activity, decreased pCD4/8, NLR and PLR, and increased LMR levels at the systemic level; 3) Release of immunosuppression by VEGF, a tumor-derived soluble factor, and CTLA-4 in Tregs. Individual immune activation of local and systemic immune responses results in the different pathological and therapeutic effects of NAC in breast cancer patients, regardless of tumor subtype.

Oncoplastics

788077 - Tissue Rearrangement with Selective Use of 3D Bioabsorbable Markers for Breast-conserving Therapy Improves Overall Satisfaction Without Compromising Physical Well-Being: A Single Institutional Experience with Breast QTM Surveys

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Geisinger, Wilkes Barre, PA

Background/Objective: With the development of oncoplastic techniques, more patients are offered breast-conserving therapy (BCT) with improved cosmetic outcomes. Local tissue rearrangement (TR) is a basic oncoplastic technique that can be utilized to reshape a breast after BCT using volume displacement. However, patients with larger tumors, tumor multifocality, or smaller breasts may also benefit from volume replacement. We hypothesize that the selective use of 3-dimensional bioabsorbable markers (3DBM) provides volume replacement to prevent significant changes in breast shape and size, thus allowing less aggressive oncoplastic techniques to be used. We aim to evaluate patients' overall satisfaction and physical well-being following BCT utilizing these techniques.

Methods: The Memorial Sloan Kettering BREAST-QTM postoperative BCT satisfaction and physical well-being surveys were completed by patients receiving BCT with adjuvant radiotherapy (RT) at a single institution between 2008 and 2019. Surveys were distributed no earlier than 6 months after completion of adjuvant RT. Utilization of 3DBM, breast tissue rearrangement, specimen volume, tumor size, tumor location, margin re-excision, axillary lymph node dissection (ALND), and re-operation for positive margins were evaluated. Surveys were compared between patients who received lumpectomy alone vs. 3DBM and/or tissue rearrangement (TR).

Results: Sixty-eight patients were included: 56 (82%) patients underwent lumpectomy alone, 10 (15%) had lumpectomy with TR and 3DBM placement, and 2 (3%) underwent TR and lumpectomy. Mean main specimen volume was 130 cc, while 39 (60.9%) had additional margins resected. Mean tumor size was 1.6 cm (range 0.1-4.6cm). Six (9.2%) had multifocal tumors. Forty-two (64.6%) patients had lesions in the upper outer quadrant (UOQ). The 2 patients who underwent TR without 3DBM had tumors in the UOQ with tumor size of 0.1cm and 1.1cm. Overall satisfaction score was 37.5 of 44, and overall physical well-being score was 11.9 of 27. When comparing BCT vs. BCT with TR, no significant difference was seen in overall physical well-being scores or any of the independent questions (overall p=0.28); however, overall breast satisfaction was significantly improved for patients undergoing tissue rearrangement (p=0.01). Significant improvements were seen for BCT with TR: feeling normal in clothes (p=0.03), able to wear more fitting clothes (p=0.01), how lumpectomy breast sits/hangs (p=0.03), how smoothly shaped breast looks (p=0.01), breast contour (p=0.02), equality in size of breasts (p=0.01), and how normal breast looks (p=0.05). Tumor volume and tumor size did not significantly impact satisfaction (p=0.86 and 0.37) and physical well-being (p=0.36 and p=0.93) results. When comparing BCT with TR and 3DBM vs. lumpectomy alone, again, overall physical well-being was not significantly different (p=0.39) and significant improvements were seen in overall breast satisfaction (p=0.01). (Table)

Conclusions: TR with selective use of 3DBM improved overall patient satisfaction without negatively impacting physical well-being. While larger, prospective studies are needed to better evaluate the effect of these techniques, TR with use of 3DBM may allow surgeons more basic oncoplastic options to improve patient satisfaction.

Table: Physical well-being survey results

Physical Wellbeing Survey
How often have you experienced the following: (mean score (SD))
(1=None of the time, 2=Some of the time, 3=All of the time)

	Lumpectomy Alone n=53	Lumpectomy and 3DBM with Tissue Rearrangement n=12	p value
Difficulty lifting or moving your arm	1.3 (0.5)	1.5 (0.5)	0.1499
Difficulty Sleeping because of discomfort in your breast area	1.2 (0.5)	1.5 (0.5)	0.0900
Tightness in your breast area	1.3 (0.5)	1.3 (0.5)	0.6805
Pulling in your breast area	1.3 (0.5)	1.5 (0.5)	0.2129
Tenderness in your breast area	1.6 (0.6)	1.5 (0.5)	0.8362
Sharp pains in your breast area	1.4 (0.5)	1.5 (0.5)	0.3995
Aching feeling in your breast area	1.3 (0.4)	1.4 (0.5)	0.4148
Difficulty laying on the side of your lumpectomy breast?	1.3 (0.5)	1.4 (0.5)	0.5849
Swelling of the arm (lymphedema) on the side(s) that you had your breast surgery?	1.2 (0.6)	1.1 (0.3)	0.5538
Overall Physical Satisfaction	11.7 (2.9)	12.7 (3.4)	0.3943

Satisfaction Survey
In the past week, how satisfied or dissatisfied have you been with the following: (mean score (SD))
(1=Very dissatisfied, 2=Somewhat dissatisfied, 3=Somewhat Satisfied, 4=Very Satisfied)

How you look in the mirror clothed?	3.5 (0.8)	3.9 (0.3)	0.1286
The shape of your lumpectomy breast when you are wearing a bra?	3.5 (0.8)	4.0 (0)	0.0454
How normal you feel in your clothes?	3.6 (0.7)	4.0 (0)	0.0504
Being able to wear clothing that is more fitted?	3.3 (0.9)	3.9 (0.3)	0.0300
How your lumpectomy breast sits, hangs?	3.3 (0.8)	3.9 (0.3)	0.0209
How smoothly shaped your lumpectomy breast looks?	3.4 (0.8)	4.0 (0)	0.0064
The contour (outline) of your lumpectomy breast?	3.4 (0.8)	4.0 (0)	0.0098
How equal in size your breasts are to each other?	3.3 (0.8)	3.9 (0.3)	0.0080
How normal your lumpectomy breast looks?	3.4 (0.8)	3.9 (0.3)	0.0314
How much your breasts look the same?	3.2 (0.9)	3.9 (0.3)	0.0080
How you look in the mirror unclothed?	3.2 (1.0)	3.6 (0.5)	0.3427
Overall Satisfaction Survey Total	36.4 (8.4)	43.0 (1.4)	**0.0088**

788157 - The Angel Flap - Feasibility of a Novel Thoracic Advancement Flap for Breast Defects

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Background/Objective: To assess the feasibility of the Angel Flap, a novel thoracic advancement flap, to fill breast defects in patients in which chest wall perforator flaps may not be a suitable option, such as where no suitable anterior intercostal artery perforator (AICAP) vessels are identified with pre-operative handheld Doppler assessment, or where AICAP vessels are deemed too small to adequately perfuse a flap.

Methods: Eight patients were included in the study. Six patients presented with diagnosis of at least 1 carcinoma in the lower pole of a single breast requiring excision, where local flap volume replacement was necessary. Two patients presented with significant volume defects in the lower pole with beak deformity, having previously been treated for lower-pole breast cancers with conservation surgery and radiotherapy. For each patient, a winged thoracic advancement flap was de-epithelialised, mobilized, and inset in the defect through an infra-mammary crease incision. Patients were included from 14th August 2018 to 21st November 2019.

Results: All 8 patients were female. Median age was 55.8 years (range 46-64). Of the 6 patients with carcinoma: 1 had localization with 3 quidewires, 1 with dual guidewires, 1 with a single guidewire, 2 with single RFID tags, and 1 patient had a palpable tumour without need for localization. Mean total specimen weight was 53.5g (range 19-87.4). Two of the 8 patients required re-excision of margins for close or positive margins on histology: 1 of these patients went on to have subsequent mastectomy and immediate implant reconstruction for unanticipated extensive multicentric disease. No patients suffered with flap necrosis. One patient suffered with a wound infection and successfully underwent return to theatre for washout and re-suturing of wound, following failed initial treatment with aspiration and oral antibiotic therapy. All patients, and the operating surgeon were satisfied with the post-operative cosmesis, and none required further lipofilling or cosmetic adjustments.

Conclusions: The Angel Flap appears to be a robust thoracic advancement flap, which has been demonstrated to successfully fill breast defects with volume replacement in the immediate and delayed setting, with an acceptable complication rate. The Angel Flap does not require pre-operative handheld Doppler assessment, is technically simple, and may be used in placed of AICAP flaps to fill lower-pole breast defects. Cosmetic outcomes should be formally assessed in future studies.

Other

785373 - An 8-year Review of a Single Breast Surgeon's Experience with Same-day Discharge for Mastectomy Patients, Including Patients with Bilateral Procedures with or without Immediate Reconstruction

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Background/Objective: The study objective was to compare outcomes of same-day discharge (SDD) mastectomies with those of traditional overnight stay patients. We evaluated these 2 groups for complication and reconstructive rates.

Methods: All mastectomies in this review were performed by a single breast surgeon (JB) who utilizes the ASBrS Mastery of Breast Surgery database to track breast procedures. The Mastery database was queried for all operative cases (n=2058) performed between 2011 (the first full year of tracking) and 2018. All mastectomies (n=663) performed (425 unique patients) during the study period were included in the review and formed the study cohort. Lumpectomies (n=498) were counted only to provide a comparison data set. All other surgical operations (n=897) were excluded from the review. The chart of every mastectomy patient was reviewed by one of the authors (JB or CY) for major complications. For this evaluation, major complications were defined as post-op complications resulting in unplanned hospitalization or return to the operating room during the first 3 post-operative months. Patients were stratified by year of surgery, discharge versus overnight stay and type of surgery (unilateral or bilateral mastectomy +/- reconstruction). Other factors such as age, location of surgery, neoadjuvant therapy, and indication for surgery were also reviewed.

Results: Results of our 8-year experience are summarized in the Table.

Conclusions: The results of our multi-year review demonstrate that SDD for mastectomy patients, even those with bilateral procedures with or without reconstruction, is safe. Overall complication rates were similar (9.3% v 8.3%), but slightly lower in SDD patients, and in all but 1 year of the review (2013), complications occurred more frequently in the overnight stay patients. The number of SDD procedures increased throughout the 8 years of review, reflecting an increased comfort level with this concept. In the 5th year of our review, SDD cases outnumbered overnight stays, and by the end of our review, total SDD mastectomies (n=436) nearly doubled the number of overnight stay procedures (n=227). In 2018, the final year of review, 88% of mastectomies were performed as SDD. Reconstructions were also performed at a higher rate in the SDD group (76.8% v 52.4%). Predictably, complication rates were nearly twice as high in the reconstructed subset (10.1%, n=46) compared to those without reconstruction (5.3%, n=11). This compares favorably to the published literature. The most common complications were wound problems (skin necrosis, implant removal, etc.), with 24 of 26 wound issues occurring in reconstructed patients. Rates for operable hematomas/seromas were slightly higher in patients without reconstruction, while infection issues were more common in reconstructed patients. More than half (n=242) of patients underwent bilateral procedures, and 70% (n=170 v n=72) of these were performed as SDD operations. Our review of the literature did not identify any significant cohort of patients who underwent mastectomy with

reconstruction and were discharged on the same day, but our experience demonstrates this is safe and satisfying to patients. When we initiated SDD many patients were skeptical with the concept of going home, but this fear was allayed with assurance that no patient would be forced to leave the same day unless the patient agreed. Today, most patients are eager to go home and excited to hear they won't have to spend a night in the hospital.

Table: Summary of results (23-hour stay vs same-day discharge)

	Year of surgery																	
	2011		2012		2013		2014		2015		2016		2017		2018		Totals	
	23hr	SDD	23hr	SDD	23hr	SDD	23hr	SDD	23hr	SDD	23hr	SDD	23hr	SDD	23hr	SDD	23hr	SDD
# of Masctecomies	52	6	47	14	27	22	33	29	30	52	12	81	9	113	17	119	227	436
Unique pts	40	4	33	12	19	16	21	19	19	29	8	48	6	69	11	71	157	268
Avg age	64	48	59	56	66	62	60	58	63	57	64	55	58	57	66	57	62	57
Youngest	38	34	28	30	51	36	37	38	31	32	45	22	36	33	47	31	28	22
Oldest	81	59	84	77	83	79	79	73	101	78	86	81	75	84	86	89	101	89
Major complications	5	0	3	0	1	1	2	1	0	0	2	10	3	8	5	16	21	36
hematoma/seroma			1				1	1			1	4	3	1	3	3	9	9
cellulilitis/infection					1						1	3		6	1	1	3	10
necrosis/dehiscence	5		2			1	1					3		1	1	12	9	17
Comp%	9.6%	0.0%	6.4%	0.0%	3.7%	4.5%	6.1%	3.4%	0.0%	0.0%	16.7%	12.3%	33.3%	7.1%	29.4%	13.4%	9.3%	8.3%
Operation performed																		
Unilateral mastectomy (UM)	16	2	13	10	7	6	5	4	8	3	3	7	3	12	3	13	58	57
Bilateral mastectomy (BM)	5	0	6	2	4	1	3	2	2	2	1	6	1	5	4	5	26	23
UM with reconstruction	11	0	5	0	4	4	4	5	0	3	1	8	0	11	2	10	27	41
BM with reconstruction	8	2	9	0	4	5	9	8	9	21	3	27	2	41	2	43	46	147
Total # of reconstructions	27	4	23	0	12	14	22	21	18	45	7	62	4	93	6	96	119	335
%reconstruction	51.9%	66.7%	48.9%	0.0%	44.4%	63.6%	66.7%	72.4%	60.0%	86.5%	58.3%	76.5%	44.4%	82.3%	35.3%	80.7%	52.4%	76.8%

786902 - An Observational Study of Breast Tuberculosis in an End-referral Breast Care Center

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Background/Objective: The prevalence of tuberculosis (TB) in low- and middle-income countries (LMIC) are steadily increasing. Extrapulmonary tuberculosis incidence (15-20%) is in a rise in recent years in both developed and developing countries. TB bacilli is inhaled, deposited and grown in the lungs and transferred blood-borne to extrapulmonary sites like the lymph nodes of the neck, pleura, meninges, bone, intraabdominal, urogenital and rarely, to the breast. Breast tuberculosis (BTB) is a rare form of extrapulmonary tuberculosis with an estimated incidence of 0.1% of breast lesions examined histologically and constitutes about 0.025% - 0.1% of surgically treated breast in LMICs. Scarcity of information is limited only in case reports and case series in developing countries. Clinical dilemma in diagnosis and management post great challenge in handling BTB since it can mimic breast carcinoma and pyogenic abscess. It has no defined clinical features, and it is often confused with a neoplasm or infection both clinically and radiologically. The objective of our study is to describe the demographics, clinical presentation, imaging, histopathology, management, and outcomes of our patients with breast tuberculosis.

Methods: We reviewed our institutional data for the past 4.5-year duration. A manual review of all our breast tissue core needle biopsy as well as mastectomy pathology reports were done. We retrieved the patient charts and reviewed their management and outcomes.

Results: Our data found 10 female patients diagnosed by core needle biopsy and 2 female patients diagnosed after mastectomy. All were females with ages 26 to 63 years old. They all presented with fungating breast mass mimicking breast cancer. Those diagnosed from core needle biopsy had additional sputum acid fast bacilli done and chest radiography. Regardless of result, they were treated with Anti-Koch's and showed complete resolution of mass in 3-6 months of treatment. The 2 others incidentally discovered after mastectomy for histopathologically diagnosed breast cancer were not given any anti-tuberculosis treatment. They are currently cancer free and on good follow-up with no contralateral recurrence.

Conclusions: We conclude that in a low-income and resource country where tuberculosis is endemic, clinical presentation and a core needle biopsy of chronic granulomatous mastitis may be adequate basis of treatment for tuberculosis of the breast.

784337 - Diagnostic Accuracy of Nipple Aspirate Fluid Cytology in Asymptomatic Patients: A Meta-analysis

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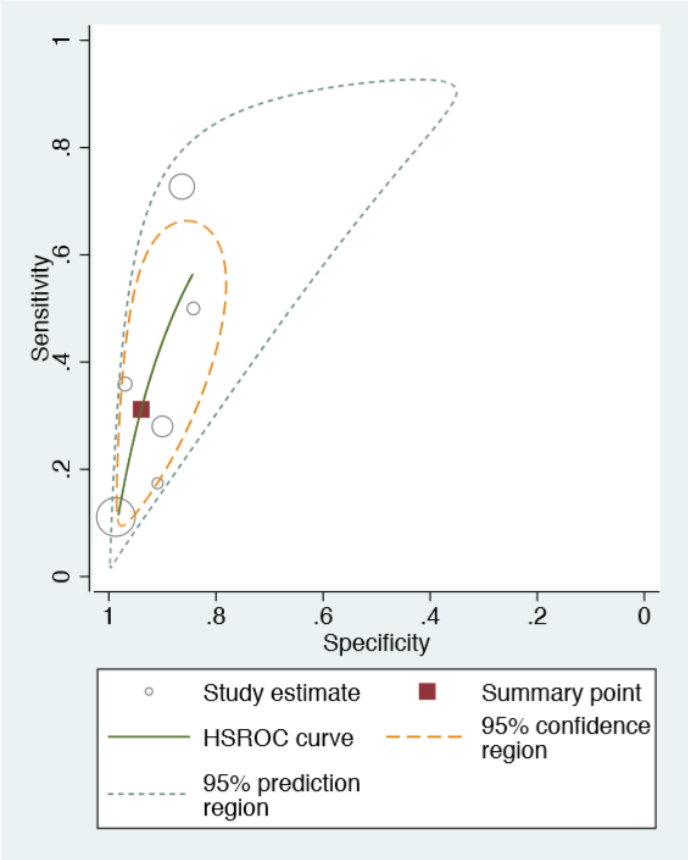
Background/Objective: Methods for early breast cancer detection remain vital in view of enabling lesions to be treated at the earliest possible time-point, increase survival and improve patient outcomes (e.g., lumpectomy versus mastectomy). Evaluation of nipple aspirate fluid (NAF) in asymptomatic women for novel chemical biomarkers of disease offers tremendous promise as a tool to supplement screening and facilitate early detection. Emerging analytical technologies are being developed to test miniscule volumes of fluid and compare these to cytopathological assessment. Nipple cytology is the current gold standard assessment of nipple fluid in patients with symptomatic pathological duct discharge and has also been investigated in asymptomatic women given the feasibility of NAF production with either massage, negative suction systems or ductal lavage. However, studies evaluating the diagnostic accuracy of NAF cytology in asymptomatic women have not been reviewed systematically. The aim of this paper was to perform a systematic review and meta-analysis to compute the diagnostic accuracy of nipple aspirate fluid cytology in asymptomatic women.

Methods: An electronic search using MEDLINE, EMBASE, and SCOPUS was performed updated to August 2019. Search terms included 'Nipple Aspirate Fluid' and 'Cytology' in all their forms. Only clinical studies with primary data on diagnostic accuracy of nipple aspirate fluid cytology compared with either follow-up imaging and/or histology were included. Both hierarchical and bivariate models for diagnostic meta-analysis were used to attain overall pooled sensitivity and specificity.

Results: A total of 938 studies were identified in the initial search, and following title and abstract review, exclusions and de-duplication using 'Covidence' software, a total of 19 studies fulfilled the inclusion criteria. Pooled sensitivity and specificity and an area under the receiver operating characteristic curve (HSROC) values were calculated for all NAF acquisition methods and subsequently for each collection method independently. There were 9,308 patients who were examined, with a total 10,147 samples acquired, including bilateral samples (age=49.73 ± 4.09 years). The overall sensitivity of nipple aspirate fluid was 0.31 and specificity was 0.93 from the pooled meta-analysis. This varied according to the method of collection as follows: ductal lavage – sensitivity=0.26 (p=0.03) and specificity=0.88 (p=0.0005); manual compression – sensitivity=0.1 and specificity=0.99 (p=0.0005); manual pump – sensitivity 0.32 and specificity 0.91 (p=0.0005).

Conclusions: Pooled data from the studies included demonstrate that the diagnostic accuracy of nipple cytology is limited and has poor sensitivity in asymptomatic women. Methods of collection of nipple aspirate fluid had little effect on the diagnostic potential. Emerging technologies for analysis nipple fluid must have a higher diagnostic accuracy than nipple cytology, whilst offering advantages in terms of cost, reproducibility, user dependency and turn-around time.

Figure: Meta-analysis HSROC curve for cytology for the 6 studies included in the meta-analysis. The x-axis demonstrates specificity (true negatives) and the y-axis demonstrates the sensitivity (true positives). The curve delineates the true positive rate of nipple cytology at each true negative value. A perfect test is one in which the results are closest to 1, i.e. 100% accuracy.



777808 - Radial Scars/Complex Sclerosing Lesions of the Breast: Is Routine Excision Always Necessary?

Elizabeth Kraft[1], Jessica Limberg[2], Katerina Dodelzon[2], Lisa Newman[2], Paula Ginter[2], Jennifer Marti[2]

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Background/Objective: When needle core biopsies (NCB) of the breast reveal radial scar or complex sclerosing lesions (RS), excision is often performed to rule out carcinoma, despite a low upgrade rate to malignancy (0-5% in the modern era). The management of RS on NCB is controversial, and the natural history of observed RS is not well described. The objective of this study was to analyze the upgrade rate to malignancy in patients with NCB showing RS, and describe the natural history of patients with RS undergoing active surveillance (AS).

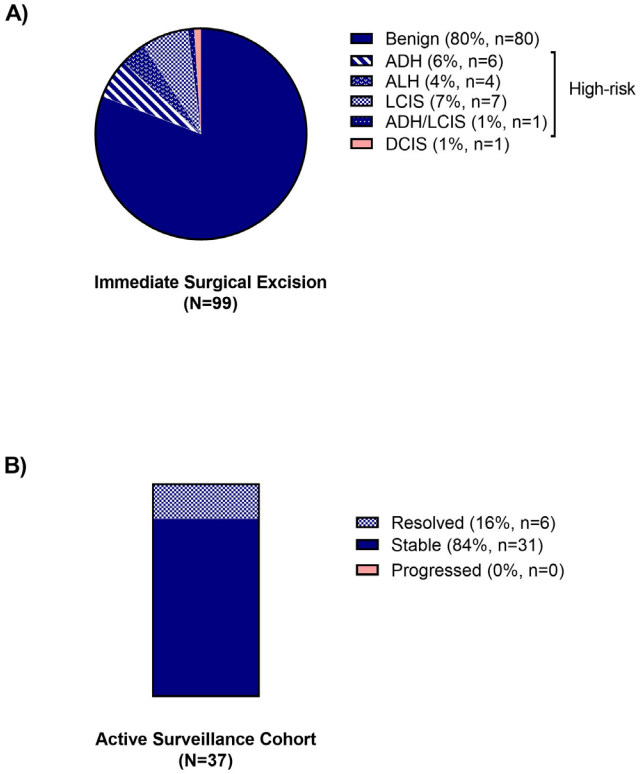
Methods: We retrospectively analyzed the clinicopathologic records of 136 consecutive patients with NCB revealing RS without atypia from 2012-2019. Surgical pathology records of excised RS, and analysis of growth or change in appearance (via follow-up imaging) of RS undergoing

AS, were reviewed. Clinical risk factors and imaging characteristics were reviewed to identify factors associated with high-risk lesions or malignancy.

Results: The mean age of patients was 52 years (SDTV+/-11.4), and 10% of patients presented with a palpable mass. RS was diagnosed via stereotactic NCB in 63% (n=85, median lesion size 8 mm), ultrasound guided NCB in 35% (n=47, median lesion size of 6 mm), or MRI guided NCB in 3% (n=4, median lesion size 22 mm). The median lesion size was 6.5 mm (1-39). Most patients underwent immediate surgery (73%, n=99); 27% (n=37) underwent AS, with a median follow-up of 13 months (range 6-51). Of the excised RSs, 99% (n=98) were benign, and 1% (n=1) revealed DCIS. High-risk lesions were encountered in 18% (n=18) of lesions: lobular carcinoma in situ (LCIS) in 7% (n=7), atypical lobular hyperplasia in 4% (n=4), atypical ductal hyperplasia (ADH) in 6%, (n=6), or ADH/LCIS in 1% (n=1). Clinical risk factors or imaging characteristics were not associated with risk of malignancy. Of the patients undergoing AS (n=37), no lesions progressed in size or appearance. The majority of lesions remained stable (84%, n=31), and 16% (n=6) resolved.

Conclusions: In our experience, 99% of patients with NCB of RS who underwent surgery were found to have benign lesions upon excision, with only 1 case of DCIS, and 0 cases of invasive cancer. Of patients who underwent AS, lesions remained stable or resolved. We propose that the vast majority of patients with RS on NCB can be safely followed, and that surgery can be reserved for patients with RSs that are large, growing or exhibit suspicious radiographic findings. This could potentially spare women with RSs the unnecessary risk, anxiety, and economic cost of surgery.

Figures: Upgrade rates of excised radial scars (A). Natural history of radial scars undergoing active surveillance (B).



788188 - Surgical Treatment Patterns for Women with Newly Diagnosed Breast Cancer by Age at Diagnosis

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Background/Objective: To describe the surgical treatment patterns and use of neoadjuvant and adjuvant chemotherapy among women who receive a diagnosis of breast cancer. This analysis evaluates variation in treatment patterns and overall health care costs in the year following surgery by age at diagnosis and surgery type.

Methods: The IBM MarketScan Commercial and Medicare database was used to identify a retrospective cohort of women aged 40 and older with a new diagnosis of breast cancer recorded between 2013 and 2018. Eligible women had 12 months of continuous insurance enrollment pre- and post-diagnosis. Women with a diagnosis of breast cancer in the prior 12 months were excluded. Forty was used as the lower limit for age to better represent a screening population. The use of specific procedure codes related to breast cancer surgical and chemotherapeutic treatment were evaluated in the 12-month period following diagnosis. These codes encompass lumpectomy, mastectomy, repeat surgery, breast reconstruction, and use of neo-adjuvant/adjuvant chemotherapy. Use of radiation therapy was not evaluated among women with evidence of surgical treatment.

Results: A total of 9,691 women with a newly diagnosed breast cancer were included. Within 1 year of diagnosis, approximately half (51%) of women received lumpectomy and one-third (30%) received mastectomy. Lumpectomy rates remained similar among age categories, declining slightly from 50% to 41% , while mastectomy rates progressively declined with age, from 47% to 16%. Rates of both neo-adjuvant and adjuvant chemotherapy were higher in women receiving mastectomy than lumpectomy and declined with age, regardless of surgical treatment. The median time between the start of neo-adjuvant chemotherapy and surgery was ~150 days and did not vary significantly be age or surgery type. The median time between surgery and start of adjuvant chemotherapy was ~40 days and did not vary significantly by age or surgery type. The rate of women undergoing breast reconstruction was higher for women receiving mastectomy than lumpectomy and declined with age regardless of surgery type. The median time between surgery and breast reconstruction was 12 days for women who received lumpectomy and 0 days for women who received mastectomy. One-quarter (25%) of women who underwent lumpectomy initially had a repeat surgical procedure (lumpectomy or mastectomy) within 1 year of the original surgery. Rates of repeat surgery following lumpectomy did not vary significantly by age. For women with multiple lumpectomy procedures, the median time between the original lumpectomy and subsequent lumpectomy was 15 days. Overall health care costs in the year following surgery were higher for younger women and women who received mastectomy vs lumpectomy. The cost difference between mastectomy and lumpectomy patients was lowest for women 75 and older. A higher percentage of older women had no record of surgical treatment in the 12 months following diagnosis. Among women with no record of surgical treatment, 10% had evidence of radiation therapy, and 9% had evidence of chemotherapy.

Conclusions: Treatment patterns following the diagnosis of breast cancer varied with age and surgery type. Younger women were more likely to receive mastectomy, chemotherapy, and breast reconstruction than older women. Younger women and women who underwent mastectomy had higher average overall health care costs within 1 year of surgical treatment.

Table: Procedure rates among women with newly diagnosed breast cancer by age at diagnosis

	Entire Cohort	**Age 40-49**	**Age 50-64**	**Age 65-74**	**Age ≥75**
Total women with breast cancer diagnosis	**9,691**	1,803	5,149	1,479	1,260
Women undergoing lumpectomy	**4,921 (51%)**	898 (50%)	2,741 (53%)	762 (52%)	520 (41%)
- Neo-adjuvant chemotherapy	**386 (8%)**	107 (12%)	236 (9%)	34 (4%)	9 (2%)
- Adjuvant chemotherapy	**1,242 (25%)**	319 (36%)	757 (28%)	132 (17%)	34 (7%)
- Repeat surgery	**1,229 (25%)**	266 (30%)	671 (25%)	170 (22%)	122 (23%)
- Breast Reconstruction	**535 (11%)**	167 (19%)	313 (11%)	43 (6%)	12 (2%)
- Avg 1-year healthcare costs	**$81,090**	$96,164	$84,415	$68,312	$56,257
Women undergoing mastectomy	**2,2913 (30%)**	840 (47%)	1,574 (31%)	301 (20%)	198 (16%)
- Neo-adjuvant chemotherapy	**500 (17%)**	180 (21%)	282 (18%)	34 (11%)	4 (2%)
- Adjuvant chemotherapy	**1,016 (35%)**	307 (37%)	579 (37%)	106 (35%)	24 (12%)
- Repeat surgery	**N/A**	N/A	N/A	N/A	N/A
- Breast Reconstruction	**1,808 (62%)**	666 (79%)	1,018 (65%)	109 (36%)	15 (8%)
- Avg 1-year healthcare costs	**$102,386**	$117,292	$105,766	$77,463	$50,168

787856 - Trends, Survival Outcomes, and Predictors of Non-adherence to Mastectomy Guidelines for Non-metastatic Inflammatory Breast Cancer: Stage-stratified Propensity Scoring Analysis of NCDB

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Background/Objective: Current National Comprehensive Cancer Network (NCCN) guidelines recommend modified radical mastectomy (MRM) as the surgical treatment of choice for non-metastatic inflammatory breast cancer (IBC). Using data from the National Cancer Database (NCDB), our study compared the national trends and outcomes of breast-conserving surgery (BCS) vs. MRM for the treatment of IBC.

Methods: NCDB data from 2004 to 2014 were retrospectively analyzed. Patients' demographics, tumor characteristics, and overall mortality (OM) trends were compared between BCS and MRM cases of IBC. Univariate, multivariate, and propensity score weighted analyses were done to compare study groups and build a predictive model for undergoing BCS.

Results: A total of 445 (4.01%) BCS and 10,645 (95.99%) MRM cases were identified. Median follow-up was 58.48 months. Compared to MRM, BCS patients were more likely to be older (Mean:61, SD:15.4 vs. Mean:56, SD:12.9- $p<0.001$), non-White race, have Medicare, or be un-insured, and less educated. BCS tumors were more likely to be ER+/PR+/HER2+ and diagnosed at Stage I (5-6.25% vs 75-93.75%) or II (23-6.67% vs. 322-93.33%) than Stage III (417-3.91% vs. 10,248-96.06%), $p<0.05$. BCS rates significantly decreased from 6.16% in 2004 to 3.64% in 2014 ($p<0.001$). Significant predictors of BCS include older age, treatment at academic programs, non-White race, metropolitan county residence, Stage II disease, and a tumor primary site of the nipple, lower inner or outer quadrants, or axillary tail (all $p<0.05$). Ninety-day OM (4.84% vs 1.60%), and 30-day readmission (5.17% vs 3.81%) were significantly higher in BCS cases ($p<0.05$). In the adjusted stage-stratified propensity score weighted analysis, Stage III BCS had a 51% higher hazard of OM compared to MRM (HR:1.51; $p<0.001$), while no difference in OM was found for Stage I (HR:0.45; $p=0.42$) and II (HR:1.13; $p=0.42$) cases.

Conclusions: BCS was done in a few number of cases. The adjusted analysis showed an associated significant OM with Stage III BCS but not Stages I and II. These data further support adhering to current MRM treatment guidelines.

769349 - Encapsulated Papillary Carcinoma of the Breast. Experience of 58 Cases in Our Local Institution and Review of the Literature

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Background/Objective: Encapsulated papillary carcinoma of the breast (EPC) is a rare entity of breast cancer accounting for 0.5-1% of breast cancer. It is often difficult to diagnose on core biopsy, resulting in several patients requiring an excision biopsy before definitive surgery. There is limited evidence-based guidelines on the management of EPC. The aim of this study is to further elucidate the clinic-pathological characteristics, treatment, and survival outcome of this group of patients.

Methods: A total of 58 patients were diagnosed with EPC from 2014 to 2018, with a median follow-up duration of 48 months. Patients' demographics data, radiological, and clinicopathological characteristics, treatment, adjuvant therapies, as well as survival data were analysed.

Results: Thirteen (27.1%) patients required excision biopsy because core biopsy results were inconclusive, and histology often returned as hematoma. Common radiological features of EPCs were mixed solid cystic mass lesion with increased vascularity in the solid lesions. Twenty-five (43.1%) cases were pure EPC, 15 (25.9%) were EPC associated with ductal carcinoma in situ (DCIS), and 18 (31.0%) cases had concurrent invasive ductal carcinoma (IDC). Median tumour size was largest in the EPC with IDC group, which was 25mm, followed by the pure EPC group (16mm) and EPC with DCIS (10mm). Forty-seven patients (81.0%) had positive estrogen and progesterone receptor (ER/PR) status in all subgroups, and only 3 patients were HER2 receptor-

positive. Lymph node evaluation was performed in 38 patients across all groups. Two patients (11.1%) from the IDC group had metastatic lymph node involvement and had adjuvant chemotherapy. Only 1 patient developed loco-regional recurrence, and none had distant metastasis during follow-up. Overall survival was longest in pure EPC group, 60 months, whereas EPC with associated DCIS group, and EPC with IDC group reported 37.5 and 47 months' overall survival respectively.

Conclusions: EPC is a rare tumour mainly affecting post-menopausal woman with excellent prognosis. Long-term outcome in patients with pure EPC is good, and the tumour should be managed in a similar manner to DCIS.

773522 - Anterior Axillary Arch of the Latissimus: An Anatomic Variant Every Breast Surgeon Should Be Familiar With

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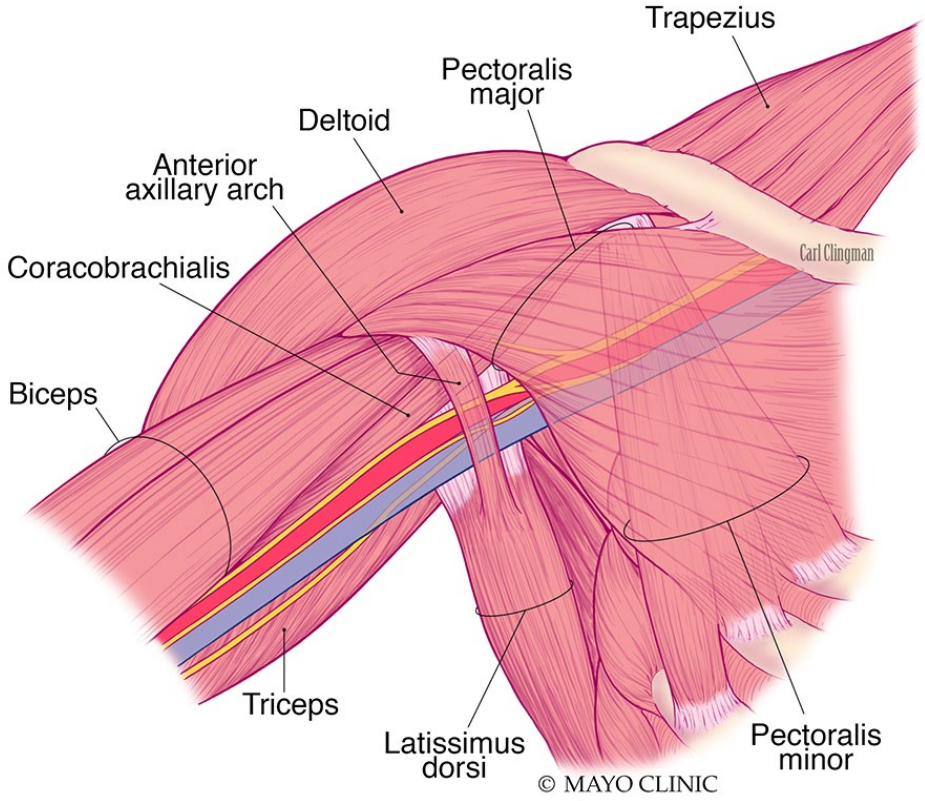
Background/Objective: Anterior axillary arch (AAA) is a slip of latissimus dorsi muscle, of variable thickness, which crosses anterior to the axillary vessels and brachial plexus. It is the most common anatomic variant in the axilla, and surgeons operating in this area should be familiar with this finding to prevent confusion and optimize the procedure. The aim of this study is to enhance surgeon's awareness of AAA, report the prevalence and to describe our experience with this anomaly.

Methods: An institutionally maintained database was used to search a single surgeon's operative reports for AAA from 2008-2019. Patient characteristics, including tumor type, laterality, and pathologic node counts were compared with patients undergoing axillary lymph node dissection (ALND) without this anatomic anomaly. Statistical analysis was performed to determine prevalence of the anomaly, to determine if there was a bias for a particular sex, and analyze for any impact of lymph node count associated with AAA. Prevalence was calculated based on ALND procedures as AAA would likely not be seen in many SLNB secondary to the limited dissection.

Results: Nineteen patients with AAA were identified in 1,763 ALND or SLNB procedures: 13 during ALND and 6 during sentinel lymph node biopsy (SLNB). Indications for ALND included breast cancer (12), melanoma (5), and Merkel cell carcinoma (2). The prevalence of AAA in patients who underwent ALND was 3.1% (13/422). The laterality of the variant was more often left sided (14/19). The majority of patients with AAA were female 72% (14/19), and there was no increased predilection of the anomaly for male or female compared to the entire cohort. In patients with AAA undergoing an ALND, the median number of lymph nodes pathologically identified was 23 and 26 for those without AAA, p=0.08.

Conclusions: Our study demonstrated AAA prevalence of 3.1%. Surgeons who operate often in the axilla are likely to encounter this anomaly during their careers. Knowledge of this variant should improve operative efficiency may prevent technical errors and minimize the risk of leaving SLNs or regional nodes in situ during a SLNB or ALND.

Figure: Anatomic illustration of the anterior axillary arch



Patient Education

787831 - Implementation of Preoperative Teaching Program Prior to Breast Cancer Surgery Is Feasible and Decreases Patient Anxiety

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Background/Objective: Prior work from our institution has shown that preoperative patient education prior to breast cancer surgery decreases patient anxiety. Different service lines (obgyn and orthopedics) offer standardized group educational classes that instruct patients on how to prepare for surgery, what to expect on the day of surgery, and normal expected postoperative course. The aim of this project was to implement a similar group preoperative educational class for breast cancer patients, and then to assess uptake, impact on patient anxiety, and patient satisfaction.

Methods: A nurse practitioner working with a single surgeon offered the class to all patients from the practice with newly diagnosed breast cancer from June 2018 to November of 2019. The group class was offered once a week, with separate classes for breast conservation or mastectomy patients. Instruction was offered on showering prior to surgery and medications (what supplements to stop and what to take on the morning of surgery). Patients were given a health care proxy form to fill out and add to their medical record as per their wishes. They were given instructions on where to park and where to register at the hospital on the day of surgery. Patients were also instructed on what type of clothing to wear, and the post-surgical bra was displayed. Mastectomy patients were given drain teaching and were able to practice drain emptying. Postoperative pain management was discussed, including narcotic and non-narcotic options. Lymphedema education was given, and L-dex measurements were taken for those patients getting sentinel lymph node biopsy. Nuclear medicine and blue dye injections were also reviewed. Additional support resources available from our cancer center, as well as literature from the American Cancer Society, was given to patients. Patients also had the option to watch a video explaining the surgical procedure (a commercial program that had been purchased by the hospital) explaining their upcoming procedure in more detail. Participating patients filled out an anxiety questionnaire (NCCN psychosocial distress tool) at the initial surgical consultation, after the preoperative teaching class, and at the time of their postoperative visit.

Results: There were a total of 99 new cancer patients going to surgery first during this time period (neoadjuvant chemotherapy patients were excluded.) Of the 99, 54 patients (56%) elected to attend the preoperative teaching session. Of the patients that attended, self-reported anxiety scores decreased by 34% after the preoperative teaching class. There was no difference in anxiety scores between the groups at the postoperative visit, and we hypothesize that this is likely due to other factors including discussion of pathology results and further systemic therapy at the postoperative visit. Average patient satisfaction with the program was 9.65/10. The class took about 3 hours a week of the nurse practitioner's time.

Conclusions: This study presents a low-cost and easily implemented method of decreasing patient anxiety and improving patient satisfaction during a very stressful time in their lives. Preoperative anxiety scores decreased in the patients who had the teaching, and patient

comments were overwhelmingly positive about the program. The program was easy to implement, by following the model of a group class from other service lines. The group class model decreased the amount of time taken out of the nurse practitioner's schedule needed for this endeavor, and we were happy to observe that friendships also developed between the patients attending the class as they prepared for their breast cancer treatment. Although it did take 3 hours a week of the nurse practitioner's time, we anecdotally observed that the number of phone calls to the office with questions went down significantly (which freed up time for the nurse practitioner as well as the office staff.) Addition of a preoperative teaching class for breast cancer patients is feasible and effective in decreasing patient anxiety.

785943 - Global Breast Surgery: Increasing Uptake to Clinical Screening Programme Through Breast Cancer Awareness Campaign – A West African Approach

Natasha Jiwa[1], Dawn Chaplin[2], Isaac Antwi[3], Sanjay Baldota[2]
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Background/Objective: Despite a progressive increase in the awareness of breast diseases in the Ghanaian population over the last 10 years, a lot remains to be done to reduce the presentation of advanced and locally advanced breast cancer. The incidence to mortality ratio is higher in West Africa compared to the United States due to the lack of awareness of presenting symptoms, misconceptions about the disease and its management, and the barriers posed in seeking formal medical treatment, leading to more than 60% of women presenting with Stage 3 or 4 disease. The Lancet Global Surgery 2030 landmark paper advocates that investing in surgical services in low-to-middle income counties (LMICs) is affordable, saves lives, and promotes economic growth. Nkawkaw is a small, rural town in the Eastern Region of Ghana, with a hospital that has limited facilities: no mammography, ultrasound, or biopsy services were available at the time of the working visit. At present, for those requiring surgical and oncological treatment for breast cancer, referrals are made to the central teaching hospital, which is the only centre accommodating single-site imaging, radiotherapy, and oncological facilities. The aim of this project was to increase awareness of the presenting symptoms of breast cancer among the general population in a small, rural village in the Eastern region of Ghana, West Africa. Furthermore, through this, we aim to increase uptake into the clinical screening programme (history and examination) mandated by the Ghanaian government.

Methods: Information was gathered in a community setting from a Hospital-School-Charity collaboration in Nkawkaw, Ghana. In October 2019, 250 male and female student volunteers, aged between 15-17, led and conducted a Breast Awareness Programme that included a procession through neighbouring townships, leaflet distribution, doctor-led consultations, breast cancer awareness talks, and free breast examination to all local attendees.

Results: Uptake to the Ghanaian clinical screening population has increased - 163 women presented for assessment over the programme dates, with at least 500 men and women receiving both verbal and written breast cancer information through the initiative. All women with significant findings were referred to a specialist for further assessment and management.

Conclusions: This initiative offers a bottom-up approach as the first step to breast cancer screening in West Africa. The participation of motivated youth in the delivery of breast education has seen a significant change in the uptake of breast cancer screening. Moreover, it reduces the stigma associated with medical intervention for breast cancer. The initiative inculcates breast cancer awareness at an early age, engraining self-examination into cultural norms of what is otherwise a tabooed society. This aligns with the recommended guidance from the Ghanaian department of health, which fulfils the mandate of breast education as the key to the future of early detection and diagnosis.

787573 - Tacit Knowledge Transfer: The Breast Cancer Patient Educational Video Series

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Background/Objective: Breast cancer is the most common cancer in Canadian women, with 1 in 8 being diagnosed over their lifetime. Newly diagnosed patients often face many psychosocial aspects following their diagnosis. This would include coping with the diagnosis, emotional distress, and decisions pertaining to their treatments. Research has shown that improvement in overall wellness and recovery relies on developing strategies for tacit knowledge sharing. Therefore, the aim of this project was to generate a different platform to help deliver tacit knowledge to newly diagnosed breast cancer patients to help them better cope. This will be achieved by creating a series of patient educational videos in which breast cancer survivors in an interview/storytelling format can share their experiences with newly diagnosed patients. The goal of this project is to determine whether patient tacit knowledge-sharing is better achieved through patient-patient experiences versus physician-patient education.

Methods: A series of educational videos is being developed using a panel of breast cancer survivors, identified and consented for participation from London's Breast Care Follow-up Clinic. These participants will be interviewed on different topics for the videos. These topics include: how they coped with their diagnosis, how they broke the news to their family, treatments they underwent. To evaluate for the effectiveness of a video platform to deliver the tacit knowledge, a survey with questions addressing the patient's feelings, how they rate their understanding of their diagnosis, and anxiety level will be used with a scale of 1 to 10. This survey will be provided to them prior and following the video. This will be offered to every newly diagnosed breast cancer patient at a preoperative meeting with a surgical resident. A control group will undergo the same questionnaire but will not be provided the video but be asked to complete the questionnaire before and after meeting with a surgical resident. The data will then be statistically analyzed using Student's t-test and Chi-square to test the differences between the 2 cohorts.

Results: The results of tacit knowledge transfer on impact on patient's wellness will be presented at the April 2020 conference as we are currently in the process of conducting the study.

Conclusions: Tacit knowledge sharing through story telling has been shown to be effective in improving patient heath care outcomes. We anticipate that providing the video series to newly diagnosed patients will help with alleviating psychosocial concerns that arise with the new diagnosis of breast cancer. We expect it will also help patients better understand their medical journey.

Phyllodes

787681 - Management and Outcomes of Phyllodes Tumours – 10-year Experience
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Mater Misericordiae University Hospital, Dublin, Ireland

Background/Objective: Phyllodes tumours account for 0.3% - 1.0% of all primary breast tumours. These fibroepithelial tumours are thought to carry a high risk of local recurrence. There is currently no consensus regarding acceptable margin width. Our aim was to analyse clinicopathological characteristics, surgical management, and outcomes of phyllodes tumours in a single institution.

Methods: This is a retrospective review of a prospectively maintained database of patients who underwent surgical management for phyllodes tumours in a single tertiary referral centre between the years 2007-2017. Patient demographics, tumor characteristics, surgical treatment and follow-up data were analysed. Tumour margins were classified as positive (0mm), close (≤2mm), and clear (>2mm).

Results: A total of 57 patients underwent surgical excision of a phyllodes tumor. The median age was 37 years (range: ages 14 – 91) with mean follow-up of 38.5 months (range: 0.5 – 133 months). There were 44 (77%) benign, 4 (7%) borderline, and 9 (16%) malignant phyllodes cases. Fifty-four patients had breast-conserving surgery (BCS), and 3 underwent mastectomy. Thirty (53%) patients underwent re-excision of margins. Three patients had a third and 1 had a fourth surgery. The final margin status was clear in 32 (56%), close in 13 (23%), and positive in 12 (21%). During follow-up, 4 patients were diagnosed with local recurrence (2 malignant, 1 borderline, and 1 benign pathology on recurrence samples). Of the 44 patients with benign phyllodes, 2 (5%) had recurrence, and of those with malignant phyllodes, 2(22%) had recurred. There were no recurrences in the borderline phyllodes group. Two (17%) of the patients with positive final margin recurred, while 1 (8%) of those with close final margin and 1 (3%) of those with clear final margin had recurred. Both of the patients with benign phyllodes who recurred had previously positive final margin. Regarding the patients with malignant phyllodes which recurred, 1 previously had a close final margin, and 1 had a clear final margin. For treatment of the recurrences, 2 patients had BCS, 1 had a mastectomy, and 1 had a local excision (having had a previous mastectomy). None received adjuvant therapy.

Conclusions: Currently, there are no clear guidelines for the surgical management and follow-up of phyllodes tumours. Although numbers were small, this data suggests that patients with malignant phyllodes and positive margins are more likely to develop local recurrence. These results highlight the need for large prospective studies to steer the development of guidelines.

Quality Measures

788248 - Growing Impact of the Financial Navigator on Comprehensive Care and Quality of Life for Patients with Breast Cancer

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Background/Objective: The financial consequences of health care for patients newly diagnosed with breast cancer can be overwhelming. We wanted to determine the extent of financial toxicity that has been ameliorated over the last 5 years by the addition of our financial navigator to the health care team at our community hospital.

Methods: We examined total savings aggregated by our financial navigator for medication, insurance coverage, preventive care, and local foundation support for fiscal years 2015 to 2019. This was categorized by total savings in dollar amounts for medication received prior to treatment (patient assistance programs from pharmaceutical companies), replacement medication (oral drugs), co-pay assistance (cards and grants for diagnosis), Medicare only (patients without secondary insurance coverage), marketplace health insurance enrollment, and other (including Wayne County Breast & Cervical Cancer Control Program and local foundation assistance to cover living expenses).

Results: A combination of patient demographics such as household size and income, as well as insurance status, determine the extent of financial toxicity and therefore the total impact of dollar savings accrued by our financial navigator. In other words, the number of patients does not have a direct relationship with the amount of financial cost incurred. The total impact of the financial navigator on patient care and reduction in financial toxicity has increased over time with optimization of resources. Additionally, patients with breast cancer are the only group of patients newly diagnosed with cancer who are eligible for grassroots or local foundation support for living expenses.

Conclusions: Emergence of the financial navigator as part of the cancer treatment team in the last decade has significantly improved medical management by reducing patients' financial stress. This is especially true in the setting of unemployment and insufficient or complete lack of insurance coverage prior to diagnosis. While the long-term solution to reducing financial toxicity for patients with breast cancer lies in reconstructing insurance models, reducing prescription drug prices, and ultimately changing health care policy, the role of the financial navigator is pivotal in reducing financial toxicity and increasing patient health literacy by using resources based on patient age, household size, income, and insurance status.

Table: Growing impact of the financial navigator on comprehensive care and quality of life for patients with breast cancer

Total savings in out-of-pocket costs for patients with cancer

Fiscal year	Medication received prior to treatment	Replacement medication	Co-pay assistance	Medicare only	Marketplace enrollment	Other	Total impact
2015 (n=56)	$422,273	$63,822	$289,100	$65,000	$247,211	$413,286	$1,508,192
Amount for BC (n=14)	$13,699	$63,822	$186,700	$22,500	$100,723	$175,953	$563,397
% BC patients	4%	100%	65%	35%	41%	43%	
2016 (n=30)	$592,590	$97,552	$514,550	$57,500	$461,280	$180,062	$1,488,374
Amount for BC (n=10)	$25,979	$82,949	$324,300	$10,000	$180,270	$131,549	$755,047
% BC patients	4%	85%	63%	17%	39%	73%	
2017 (n=37)	$806,275	$27,071	$364,950	$35,000	$222,454	$293,656	$1,749,406
Amount for BC (n=11)	$23,004	$7,482	$152,750	$2,500	$67,176	$147,267	$400,179
% BC patients	3%	27%	42%	7%	30%	50%	
2018 (n=61)	$1,631,681	$40,345	$255,300	$27,500	$173,335	$178,062	$2,306,223
Amount for BC (n=14)	$23,361	$1,028	$223,600	$5,000	$85,026	$152,080	$490,095
% BC patients	1%	3%	88%	18%	49%	85%	
2019 (n=55)	$1,603,387	$56,184	$427,950	$55,000	$443,652	$86,805	$2,672,978
Amount for BC (n=10)	$63,744	$18,087	$276,500	$17,500	$165,273	$78,792	$619,896
% BC patients	4%	32%	65%	32%	37%	92%	

BC: breast cancer

787102 - Ambulatory Mastectomy with Reconstruction: A Paradigm Shift from Inpatient Admission to Same Day Discharge

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Background/Objective: The concept of a hospital stay after mastectomy is pervasive among patients and referring providers alike. Historically, patients undergoing mastectomy with reconstruction have required hospitalization due to the invasive nature of the oncologic resection and reconstruction. However, a growing body evidence indicates that same-day discharge mastectomy is possible. Advances in surgical techniques, such as prepectoral reconstruction in conjunction with enhanced recovery after surgery pathways (ERAS), greatly limits pain compared to historical controls. Despite these advances, more than 80% of patients undergoing mastectomy are still admitted to the hospital. Our group hypothesizes that advances techniques in breast surgery affords not only mastectomy, but also mastectomy and reconstruction for an ambulatory “breast in a day.” Herein, we present our pilot program for SDS after NSM and prepectoral reconstruction.

Methods: A single-arm study was designed to examine the post-operative period the feasibility of same-day discharge in patients undergoing NSM with prepectoral implant reconstruction. Exclusion criteria included patients at higher risk of flap necrosis such as: prior breast reduction, breast radiation, or active smokers. Patients were further evaluated for risk of flap necrosis intra-operatively with indocyanine green perfusion (ICG) scans. Patients found to have suboptimal mastectomy flap perfusion and those at higher risk for medical complications were deemed ineligible. Retrospective review of this cohort examined complications, such as infections, hematomas, emergency room visits, urgent clinic appointments, extra office visits, and patient phone calls.

Results: The pilot study constituted 8 patients: 7 underwent NSM, and 1 had skin-sparing mastectomy. Of the 8 patients, 6 underwent prepectoral implant, and 2 had prepectoral expanders. Six of the 8 patient received ERAS protocol. All 8 patients received Exparel (liposomal bupivicaine local anesthetic). There was an average of 18.7 mg of oral morphine equivalent (OME) given in the PACU. The average time in hospital (OR + PACU) 6 hours, 7 minutes. Chart review found that the study group had no incidence off ER visits, readmission, or narcotics given at follow-up visit.

Conclusions: This study proposes a pathway that incorporates the latest mastectomy and reconstruction techniques, as well as multi-modality pain and nausea management, to reduce pain after surgery and to facilitate same-day discharge. Following the annual meeting in May 2019, The American Society of Breast Surgeons released a consensus statement supporting that same-day mastectomy benefits patients at no increased risk. This pilot study supports the feasibility of reconstruction for ambulatory "breast in a day." Future direction includes a larger cohort and randomization of our cohort.

788038 - Lumpectomy Re-excision Rate vs Benign Tissue Volume Removal – A Balancing Act

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Background/Objective: Following the SSO consensus statement on margins, we explored our multi-hospital institution lumpectomy records evaluating re-excision rates and tumor to tissue removed. The expected goal was to have a relatively low re-excision rate, while removing a small amount of benign tissue relative to tumor volume. We are exploring if surgical techniques, namely the volume of tumor-to-total tissue excised, affects re-excision rates and if volume of practice (high vs low) and type of training (General Surgery, Fellowship trained) plays a role.

Methods: Adult patients who underwent BCT for Stage 1-3 invasive breast cancer between January 1, 2012 to December 31, 2016 were identified from our 11-hospital cancer registry. Patients who underwent neo-adjuvant chemotherapy or who had Stage 0 or 4 breast cancer were excluded. Patients were assigned to groups based 2 factors related to the treating surgeon: the average yearly case volume (greater than or less than 10 lumpectomies per year) and type of surgeon training. This resulted in 3 groups for comparison: low-volume general surgeons, high-volume general surgeons, high-volume, fellowship-trained surgeons. Tumor-to-total tissue

volume ratio was calculated as the tumor volume divided by the total volume of tissue excised, and rate of positive margins and re-excisions were compared for the groups of interest.

Results: This study includes a total of 1886 lumpectomies. Of those, 186 were ultimately re-excised for an institutional re-excision rate of 9.9%. High-volume surgeons had a significantly lower re-excision rate than low-volume surgeons (8.3% vs. 14.3%, p<0.001), which corresponded to fewer positive margins (7.2% vs. 11.1%, p=0.007). When comparing subgroups of interest, re-excision rates were similar between high-volume general surgeons (8.6%) and high-volume fellowship-trained (8.9%); both groups had lower re-excision rates than low-volume general surgeons (14.5%). Median tumor volumes were similar across groups (1.58 to 1.8 cm3); however, there were significant differences between groups when comparing the amount of total tissue removed, which resulted in significant differences in the tumor-to-total tissue removed ratios. Specifically, low-volume general surgeons and high-volume fellowship-trained surgeons remove the smallest amount of overall tissue (median volume 114.27 cm3 and 109.83 cm3, respectively) and thus had significantly higher tumor-to-tissue ratio (0.0178) and (0.01645) respectively, compared to high-volume general surgeons. High-volume general surgeons had the lowest tumor-to-tissue ratio (0.0106) and highest lumpectomy volume excised (median: 159.93 cm3).

Conclusions: In our community multi-hospital institution, variation in clinical practice is evident. But, are we trading cosmesis for re-operations, or is there an optimal way to have both? We found it is possible to have both. Removal of larger volumes of tissue overall does not correspond to reduced risk of re-excision.

Tables: Comparison of outcomes by surgical volume and by surgical volume and training combinations

Comparison of Outcomes by Surgical Volume.

Parameter/Statistic	Total	Surgeries conducted by low-volume surgeons (≤10/year)	Surgeries conducted by high-volume surgeons (>10/year)	P-Value
Tumor Volume (cm3)				0.04
N	1413	292	1121	
Mean±SD	4.19 ± 9.50	4.52 ± 8.46	4.10 ± 9.75	
Range	0.01 to 183.00	0.04 to 104.08	0.01 to 183.00	
Median	1.73	1.8	1.68	
Lumpectomy Volume (cm3)				<0.001
N	1817	438	1379	
Mean±SD	177.47 ± 186.77	157.16 ± 202.40	183.92 ± 181.12	
Range	6.46 to 3354.75	6.46 to 3354.75	7.73 to 3080.00	
Median	132.16	114.27	140.4	
Ratio (Tumor to Excision)				<0.001
N	1405	289	1116	
Mean±SD	2.51 ± 4.71	3.56 ± 8.26	2.24 ± 3.15	
Range	0.00 to 124.29	0.03 to 124.29	0.00 to 36.11	
Median	1.32	1.78	1.23	
Margins				0.007
Neg	1726 (91.8 %)	434 (88.9 %)	1292 (92.8 %)	
Pos	154 (8.2 %)	54 (11.1 %)	100 (7.2 %)	
Excision				<0.001
Neg	1694 (90.1 %)	418 (85.7 %)	1276 (91.7 %)	
Pos	186 (9.9 %)	70 (14.3 %)	116 (8.3 %)	

Comparison of Outcomes by Surgical Volume and Training Combinations.

Parameter/ Statistic	Total	Low Volume, General Training (LG)	High Volume, General Training (HG)	High Volume, Fellowship Trained (FT)	P-Values LG vs. HG, LG vs. HS, LG vs. HB, HG vs. HS, HG vs. HB, HS vs. HB
Tumor Volume (cm3)					0.05, 0.23, 0.08, 0.62, 0.89, 0.64
N	1411	290	616	505	
Mean±SD	4.18 ± 9.50	4.50 ± 8.47	4.17 ± 11.22	3.2±9.08	
Range	0.01 to 183.00	0.04 to 104.08	0.01 to 183.00	0.01 to 97.50	
Median	1.73	1.8	1.65	1.66	
Lumpectomy Volume (cm3)					
N	1815	436	765	614	<0.001, <0.001, <0.001, 0.001, <0.001, <0.001
Mean±SD	177.51 ± 186.84	157.24 ± 202.77	208.83 ± 199.20	120.87 ± 187.24	
Range	6.46 to 3354.75	6.46 to 3354.75	14.40 to 3080.00	7.73 to 2287.60	
Median	132.16	114.27	159.93	109.83	
Ratio (Tumor to Excision)					<0.001, 0.008, 0.26, 0.01, <0.001, <0.001
N	1403	287	616	500	
Mean±SD	2.51 ± 4.71	3.56 ± 8.29	1.76 ± 2.34	2.53 ±4.01	
Range	0.00 to 124.29	0.03 to 124.29	0.00 to 20.34	0.01 to 36.11	
Median	1.32	1.78	1.06	1.645	
Margins					0.02, 0.002, 0.56, 0.16, 0.24, 0.03
Neg	1721 (91.8 %)	429 (88.8 %)	714 (92.6 %)	578 (92.55%)	
Pos	154 (8.2 %)	54 (11.2%)	57 (7.4 %)	43 (7.45%)	
Excision					0.001, <0.001, 0.42, 0.06, 0.09, 0.002
Neg	1689 (90.1 %)	413 (85.5 %)	705 (91.4 %)	571(91.1%))	
Pos	186 (9.9 %)	70 (14.5 %)	66 (8.6 %)	50 (8.9%)	

*To reduce the likelihood of a type I error due to multiple comparisons, a stricter overall alpha-level was used and only results with p-value less than or equal to 0.001 are considered statistically significant.

786270 - Does It Matter Who Performs the Breast Ultrasound Guided Core Biopsy? Radiologist versus Surgeon - A Cost and Quality Analysis

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Background/Objective: In the setting of affordable care models and multidisciplinary breast cancer care, fiscal responsibility is increasingly important. The purpose of this study was to evaluate the most cost-effective approach to evaluate a patient with a newly diagnosed breast mass.

Methods: This was an IRB-approved retrospective review patients at our comprehensive breast care facility. A total of 117 patients were identified as having an ultrasound-guided breast biopsy from January through December 2018. Patients were then divided into 2 groups based on whether their ultrasound guided core-needle biopsy was performed by a breast surgeon in the office versus radiologist in the breast center. Medicare reimbursement amounts were applied to procedure and billing codes as estimates of reimbursement of both pathways. Additionally, time to biopsy and rate of re-biopsy were recorded.

Results: A total of 117 patients were identified as having an ultrasound-guided core needle biopsy at a comprehensive care center in 2018. Seventy patients (60.3%) had an ultrasound-guided biopsy pathway by the breast surgeon - Breast Surgeon Pathway (BSP). Forty-six patients (39.6%) had an ultrasound guided biopsy by the radiologist - Radiologist Pathway (RP). Average age was 60.1 for the BSP and 59.8 years for RP, with no significant difference in race or pathologic stage between the 2 cohorts. The average reimbursement of the RP was $2,069.28 with professional fees of $728.18 and facility reimbursement fees of $1,341.10. The average reimbursement of the BSP was $2,296.96 with professional fees of $955.86 and facility fees of $1,341.10. This reveals a difference of $226.72 between the 2 pathways per patient. This would result in a reimbursement yearly cost to a multi-disciplinary breast center of $26,526 in a fee-for-diagnosis model. The time from screening mammogram to core biopsy was 6.2 days in the BSP and 11.0 days in the RP ($p>0.05$). However, time from diagnostic mammogram to core biopsy was 4.3 and 5.1 days respectively ($p>0.05$). The rate of re-biopsy was 11.1 % for BSP and 8.9% for RP ($p>0.05$). There was a trend toward increased time to core biopsy and decreased rate of re-biopsy in the RP; however, this was not statistically significant. Direct patient satisfaction was not analyzed.

Conclusions: An average increase in cost of $226.72 per patient and $26,526 per breast center was identified in the BSP model versus the RP. There was no measurable improvement in care delivery. In the future, moving to a fee-for-diagnosis rather than fee-for-service model, multidisciplinary centers may wish to implement RP for ultrasound guided core needle biopsies to increase net reimbursement.

788254 - Outcomes of Non-BRCA Mutation Carrier and High-risk Breast Cancer Patients Followed in a High-risk Clinic

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Background/Objective: Patients at increased risk of developing breast cancer should be followed more closely than the average-risk population. We sought to discover the effectiveness of more aggressive screening in our patients who are at high risk for breast cancer. For those who do develop breast cancer or ductal carcinoma in situ while being followed in our clinic, we sought to identify the stage and therapies required in their treatment.

Methods: This was a retrospective review of the patients who developed a breast cancer while being followed in our high-risk clinic who had a non-BRCA genetic mutation* known to be associated with breast cancer or who do not have a genetic mutation but are high risk based on previous biopsies. Data points of interest included age at diagnosis, time interval from enrollment to diagnosis, pathology, histology, stage at diagnosis, hormone receptor status, and recommended/completed treatments. *BRCA mutation patients have previously been reported.

Results: From 12/2003 to 12/2017, 30 patients age 35-74 (median of 58 years) met inclusion criteria. Two patients had 2 separate breast cancers for a total of 32 cancers included in this analysis. Nine patients had genetic mutations putting them at higher risk. Twenty-one patients were high risk based on previous biopsies. Of the cancers, 56% were DCIS, 28% were IDC. Patients had been followed for a range of 1 month to 13 years (median of 2.5 years) before a cancer had been found. Fifty-six percent (n=18) were Stage 0, 34% (n=11) were Stage I, 6% (n=2) were Stage II, and 3% (n=1) were Stage III at the time of diagnosis. Of the 14 cancers that were invasive, 3 required axillary node dissections in their treatment, whereas in the other 11, sentinel lymph node biopsy was sufficient to stage the axilla. Eighty-four percent of the cancers were ER+. One cancer was HER2+. Five patients (17%) were recommended to have chemotherapy, 2 of which were neoadjuvant. Nineteen (63%) patients chose lumpectomy as their surgical treatment, and 10 (33%) patients were either recommended for or chose to have mastectomy. Seven of the 10 mastectomy patients chose to have a contralateral prophylactic mastectomy. Two patients following mastectomy required radiation. Per the standard, all patients who had lumpectomy were recommended to have radiation. Also, per the standard, patients with ER+ cancers were offered endocrine therapy. One patient refused endocrine therapy, and 1 patient was lost to follow-up after her initial encounter as a cancer patient. For the patients who had mastectomy, 8 of the 10 had reconstruction. Of the 2 who were not reconstructed, 1 was per patient preference, and the other was due to medical comorbidities. No mortalities occurred that were directly related to breast cancer.

Conclusions: The goal of a high-risk program is to prevent or detect breast cancer at an early stage, minimizing mortality risk as well as morbidity of additional treatments required to successfully treat the cancer. In our population, 84% of the non-BRCA mutation, high-risk patients who developed disease were diagnosed with Stage 0 or I cancer. The majority of patients had the option of breast conservation if desired and most did not require axillary node dissection or chemotherapy thus reducing the morbidity of cancer treatment.

787628 - Re-excision Rates After Breast-conserving Therapy: Quality Metric or Cost?

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Background/Objective: Re-excision rate after breast-conserving therapy (BCT) has been proposed as a quality metric for breast surgery. Re-excision for positive margins after BCT is costly both financially for the medical system, and physically and emotionally for patients. Conceptually, precise re-excision in the breast is difficult which may lead to false-negative margins on re-excision. Due to lack of precise localization of the re-excision, and variation in size of re-excisions, we hypothesize that local regional recurrence in this population may be higher than in patients who do not require re-excision. This has remained a controversial topic with varying results in the literature. We aim to determine if re-excision for positive or close margins compromises true oncologic quality, as measured by local regional recurrence.

Methods: We queried the electronic medical records at a tertiary care academic medical center, and evaluated patients treated between 2000 and 2012 with partial mastectomy and radiation for either ductal carcinoma in situ (DCIS) or invasive breast cancer. Data were reviewed for re-excision rates and recurrence rates following surgical intervention. We compared recurrence rates in patients who required re-excision to those who did not. Subgroup analysis of both invasive and non-invasive groups were analyzed. We used chi squared testing to analyze our results. During the study period our institutional protocols suggested re-excision for margins less than 1mm for both DCIS and IDC.

Results: We reviewed a total of 1439 patients who underwent partial mastectomy with radiation in the study period: 1118 patients with invasive cancer and 321 with DCIS. Overall re-excision rate was 37.7%. The local regional recurrence rate was significantly higher for patients undergoing re-excision compared to those who did not require re-excision (6.1% vs 3.2%; p=0.01). Subgroup analysis reinforced that re-excision for positive margin was associated with higher recurrence rates for patients with invasive breast cancer (5.6% vs 3.1% p=.04) and with DCIS (7.5% vs 3.2% p=.07)

Conclusions: In this single-institution study, re-excision was associated with increased local regional recurrence in women who undergo BCT. Further investigation into risk factors for re-excision, multivariate analysis to help control for bias, and larger studies assessing the impact of re-excision are warranted to better guide surgical planning, and to define the importance of re-excision as a quality metric in breast cancer surgery.

787670 - An Institutional Comparison of Oncologic Quality Measurements Among Breast Cancer Patients with Community Breast Centers and Regional Academic Tertiary Centers

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Background/Objective: Although surgical treatment of breast cancer has evolved over the past several decades, historically, there was a difference between metropolitan area academic hospitals using more breast conservative techniques compared to rural non-academic hospitals. In addition, when specialty services were not readily available in the past, patients were less likely to receive radiation therapy when undergoing breast-conserving surgery. This made proximity to academic tertiary care centers advantageous. In the present time, community medical centers in the United States make up approximately 75% of surgical treatment for breast cancer. Specialty care services at these local institutions also became more readily available such as radiation oncology and reconstructive surgery. However, community hospitals may lose a large percentage of their patient population to regional academic tertiary care centers as patients opt to receive surgical care due to academic prestige and reputation. The purpose of this study is to elaborate on quality measures of breast cancer management in a community hospital with fellowship-trained breast surgeons compared to regional academic tertiary care centers, as patients are likely to receive similar care from either type of institutions.

Methods: Information from the Cancer Quality Improvement Program (CQIP) will be used for this study. Reports from the following variables will be used from years 2013 to 2016: 1. Radiation is administered within 1 year (365 days) of diagnosis for women under age of 70 receiving breast conservation therapy for breast cancer 2. Tamoxifen or third-generation aromatase inhibitor is recommended or administered within 1 year (365 days) of diagnosis for women with AJCC T1c or Stage 1b-3 hormone receptor-positive breast cancer 3. Radiation therapy is recommended or administered following any mastectomy within 1 year (365 days) of diagnosis of diagnosis of breast cancer for women with >=4 positive regional lymph nodes 4. Image- or palpation-guided needle biopsy to the primary site is performed to establish diagnosis of breast cancer 5. Breast conservation surgery rate for women with AJCC clinical Stage 0, 1, or 2 breast cancer 6. Combination chemotherapy is recommended or administered within 4 months (120 days) of diagnosis for women under 70 with AJCC T1cN0, or Stage 1b-3 hormone receptor-negative breast cancer. The patient population includes all those who met the criteria for the selected quality measures. Estimated performance rates (EPR) were measured for each category and compared to other Commission on Cancer (CoC) programs within the region that included community and academic medical centers.

Results: In 2016, out of the 6 variables, radiation therapy being recommended or administered following any mastectomy within 1 year of diagnosis of diagnosis of breast cancer for women with >=4 positive regional lymph nodes, our institution had an EPR of 9.70, which was higher than the national mean, or lower 95% confidence interval above the mean. The other categories had EPRs that were not of statistical significance than that of other CoC programs that included comprehensive community programs and academic programs. Data was compared with programs across the state of New York, the Middle Atlantic region, the Northeast region, and across all CoC programs.

Conclusions: With many community programs now having access to specialties involved in the management of malignant breast diseases such as radiation oncology and plastic surgery, the quality measures from a single community CoC program is not statistically significant from that of other community and academic CoC programs. Survival rates among the different stages of breast cancer would need to be measured to determine if there is a correlation with these selected measures.

787479 – Patient-reported Outcomes Associated with Surgical Intervention for Breast Cancer

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Background/Objective: The BREAST-Q is a patient-reported outcome instrument used to evaluate satisfaction in various domains in patients undergoing breast cancer surgery. The aim of our study is to assess the quality of life and patient satisfaction after breast cancer surgery and to investigate clinical factors for better satisfaction using the BREAST-Q questionnaire.

Methods: Participants in this prospective study were women, (age 18–81 years) who were newly diagnosed with breast carcinoma. All consecutive patients who underwent breast surgery mastectomy (MT) and breast-conserving therapy (BCT) between January 2018 and January 2019 were asked to complete the BREAST-Q questionnaire module before and 1 month after surgery. We compared the mean difference before and after surgery between MT and BCT groups using Wilcoxon test. Inclusion criteria were women aged ≥18 years without a prior history of breast surgery or breast cancer.

Results: The BREAST-Q was completed by 74 women (34 MT, 39 BCT). Mean age was 54 +- 15 in MT group and 60 +- 12 in BCT (p=0.08). Patients undergoing BCT reported higher psychosocial well-being when compared to MT (8.6 +- 27 vs. – 15 +- 25, respectively, p=0.008). There was a trend towards higher satisfaction with breasts in the BCT group when compared with MT (-6.7 +- 24 vs. – 25 +- 34, respectively, p=0.06). There was no difference between groups in terms of physical (p=0.6) and sexual well-being (p=0.4).

Conclusions: The BREAST-Q questionnaire is a valuable tool to provide patient satisfaction information on breast cancer surgery. BCT appears superior to MT in terms of psychosocial well-being and satisfaction with breasts.

785892 - Optimization of Intraoperative Lumpectomy Specimen Labeling Improves Concordance Between Surgeon and Pathology

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Background/Objective: Accurate lumpectomy specimen orientation is critical since an incorrectly oriented specimen may result in excision of the wrong additional margin leaving a close or positive margin behind. The goal of this study was to determine if specimen orientation achieved by labeling 3 sides is superior to labeling 2.

Methods: This was a prospective single-institution study including 22 breast surgical oncologists. Intraoperative labeling of either 2 or 3 sides of the lumpectomy specimen was based on surgeon preference. The specimen was then delivered to Pathology, where it was oriented by a pathology representative. The surgeon then determined if the specimen was correctly oriented by the pathology representative or if re-orientation was required. Surgeons subsequently recorded orientation technique and if re-orientation was required. Specimen weight, patient age, and BMI were also recorded. Fisher's exact test and 2-sample Wilcoxon rank-sum test were used to determine p-values.

Results: Of the 268 lumpectomy specimens recorded, 40 (14.9%) required re-orientation by the surgeon. Labeling a specimen on 3 sides was superior to 2 sides resulting in less need for re-orientation by the surgeon (22/195 (11.2%) versus 18/73 (24.6%), p=0.01). Specimens requiring re-orientation were more likely to be heavier than specimens not requiring re-orientation (36 grams vs. 24 grams, p=0.02). In a multivariable analysis, labeling a specimen on 3 sides resulted in a 65% reduction in discordance rates between the surgeon and pathology representative (OR 0.35, SE 0.14, p=0.007, CI 0.16-0.75). When the mean weight of the lumpectomy specimens was used for multivariable analysis, specimens greater than 33 grams were 3.37 times more likely to require reorientation than specimens weighing 33 grams or less (OR 3.37, SE 1.30, p=0.002, CI 1.58-7.18). Patient age and BMI did not impact the need for specimen re-orientation.

Conclusions: In our study, lumpectomy specimen labeling using 3 sides was superior to 2, resulting in a 65% reduction in need for re-orientation. Surgeons should routinely orient their specimens on 3 or more sides to decrease discordance rates.

Table: Patient and specimen factors in relation to need for re-orientation

	Whole cohort	Re-Orientation Yes N=40 (%)	Re-Orientation No N=228 (%)	P value
Labeling Method				0.01^
Two sides	73 (27.2)	18 (45.0)	55 (24.1)	
Three sides	195 (72.8)	22 (55.0)	173 (75.9)	
Weight in grams				0.02*
Mean	33.3	44.2	31.6	
Median (range)	25 (2-187)	36 (7-187)	24 (2-154)	
Age				0.8
Mean	60	60	60	
Median (range)	60.5 (33-85)	59.5 (33-83)	61 (34-85)	
BMI				0.9*
Mean	29.7	30.5	29.6	
Median (range)	29.2 (17.8-52)	28.9 (19.9-52)	29.2 (17.8-44.5)	

^Fisher's exact test; *Two-sample Wilcoxon rank-sum (Mann-Whitney) test

784809 - Time Allocation Affects Physician Work Satisfaction and Balance in Academic Breast Surgery Office Visits

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Background/Objective: Cancer survivors' office visits and annual patient time costs are almost twice as much as patients' without a cancer history. Patient experience is an important component of cancer care, which is proven to be strongly correlated with physician interaction time, physician burnout, and work satisfaction levels. However, the relationship of physician time allocation and life/work balance levels need further investigation to improve this experience for patients and physicians.

Methods: A time motion study of 3 academic surgical oncology surgeons at a metropolitan teaching hospital was performed. The center utilizes an electronic health record (EHR), and all data was collected by an independent observer during office hours. The majority of patients required care related to a breast, melanoma, or soft tissue diagnosis. The time spent on patient care, documentation, communication, education, and preclinical preparation was documented in minutes on a full day of office visits. Seven days of data was collected on each physician along with a daily physician-reported work happiness score (WHS, maximum total score=35), a life/work balanced score (BS, maximum total score=7), and whether balanced day or not-balanced day. Time allocation in life/work balanced days versus Not-balanced days were compared using univariate Chi-Squared analysis.

Results: Among 3 physicians, 18 to 28% of total work time was spent on direct patient care, 16 to 40% on documentation, 13 to 25% on communication, 1 to 7% on education, 3 to 6% on personal time, 0 to 42% on preclinical preparation (primarily reviewing charts before clinic). Of

all 21 days of encounters, 12 days (57%) were rated as balanced days. On an average balanced day, physicians spent more time documenting, communicating with other health providers, educating trainees, personal time, than on not-balanced days. Physicians spent more time in preclinical preparation on not-balanced days. However, the difference is not statistically significant due to the small sample size. The physician who has the highest WHS and BS spent more time in on-site documentation, and direct patient care.

Conclusions: More time allocated to direct patient care, on-site documentation, communication, and education leads to higher physician work satisfaction and balance in an academic surgery office. A larger study is needed to validate these findings.

Figures: Physician time study

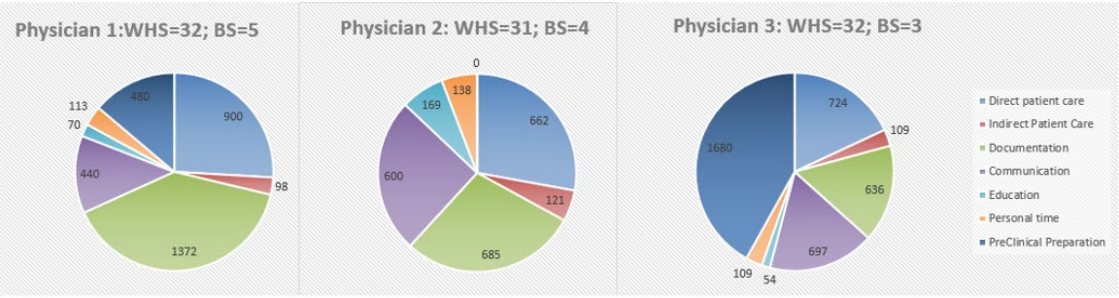

Figure 1: Amount of time (in minutes) each physician spent on each task. WHS (Work Happiness Score); BS (Life/Work Balanced Score)

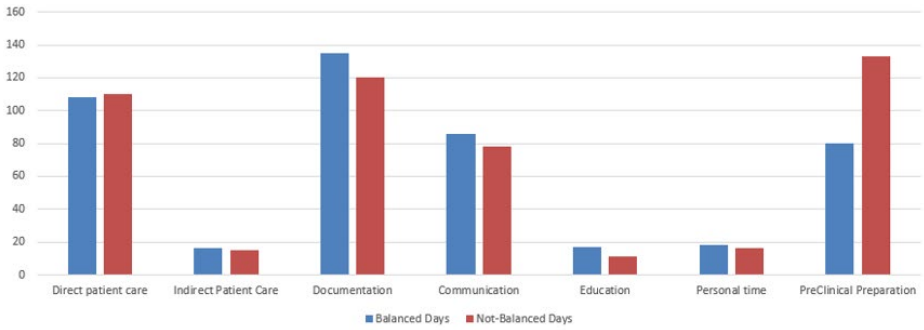

Figure 2: Amount of time (in minutes) spent on each task on Life/Work Balanced days vs. Not-Balanced Days

Radiation

788366 - Intraoperative Radiation Therapy in Early Breast Cancer Using a Linear Accelerator: Experience from a Single Brazilian Institution

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Background/Objective: Radiotherapy (RT) plays a crucial role in the treatment of early breast cancer (EBC). The intraoperative radiation therapy (IORT) is a technique that enables single dose treatment of 21 Gy. The ELIOT trial demonstrated an increase in local recurrence rates, with no difference in overall survival compared to standard treatment. Some factors seem to be related to higher risk of recurrence: patient age, lymph node (LN) spread, hormone receptor (HR) status, and tumor size. The aim of this work is to describe the frequency and pattern of local recurrences (LR) among patients with EBC, submitted to IORT in a philanthropic cancer center in São Paulo - Brazil.

Methods: A single-center retrospective analysis of data from medical records was performed among patients diagnosed with EBC eligible for IORT, with signed consent, from year to year. The IORT assignment followed the assistant radiotherapist indication, as defined in institutional oncology boards for selected cases of low risk. To evaluate the correlation between LR and potential predictors in addition to primary surgery at enrollment, a multivariable Cox regression model was applied with the variables: age, tumor size, LN spread, HR status - estrogen receptor (ER) and progesterone receptor (PR) -, HER2 expression, ductal carcinoma in situ (DCIS), lymphovascular invasion (LVI), and indication of adjuvant chemotherapy (CT). Categorical variables were analyzed by Chi2 correlation. Statistical analysis was made with STATA.15 software.

Results: Fifty-five patients were included in this report. The mean age was 68 years old (range 49-92). ER-positive was found in 49 (89%) cases, 12/55 (21%) had PR-negative, and 3/55 (5.4%) had HER2 3+. LN spread was found in 7/55 (12.7%) patients, where 1/7 detected macrometastasis. LVI was found in 8 (14.5%) cases. DCIS was found in 30 (54.5%) cases. Adjuvant CT was scheduled for 23 (41.8%) patients. External RT was indicated in 1 case of HER2 3+. LR was detected in 8 (14.5%) cases. In the univariate analysis, LN spread and LVI were associated with LR; however, the multivariate model didn't find statistically significant predictors (p=0.4). IORT was overall well-tolerated, with no toxicities reported.

Conclusions: Among clinical low-risk EBC patients, IORT was well-tolerated and showed a LR rate of 14.5%. In this retrospective analysis, clinical risk factors were not significant predictors of LR. Further interventional studies must be strengthened to quantify the benefit of IORT in this population.

775043 - Electron Accelerated Partial Breast Irradiation (APBI): A Dosimetric and Toxicity Comparison of Electrons, Tangents, Intensity Modulated Radiotherapy (IMRT), and Volumetric Modulated Arc Therapy (VMAT) and Analysis of Skin Dose

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Background/Objective: Compared to the sophisticated photon beam arrangements (IMRT) typically utilized for external beam APBI, electrons demonstrate higher skin dose but are better at sparing deep structures, and are also more cost-effective. We report on the use of electron APBI in a select small group of patients with shallow lumpectomy cavities, with the hypothesis that due to superficial cavity location, they would not have reaped the skin-sparing benefits of IMRT anyway.

Methods: At our institution, IMRT-APBI is favored, and we utilize 30 Gy in 5 fractions. Surgeons suture a fiducial marker into the lumpectomy cavity, and we treat a 2cm margin of tissue around it. Typically, the PTV is cropped 3mm from skin. However, we saw 5 patients with very shallow tumor cavities and opted to use electrons to spare integral dose to other tissues/organs, on the assumption that the skin-sparing effects of IMRT would be lost anyway. However, when these patients returned for 1-month post-treatment follow-up, they had significant acute skin toxicity, in excess of what we would typically expect with an IMRT-APBI plan, even when not attempting to spare the skin. We therefore discontinued use of electrons for APBI. Here, we analyze differences in dosimetry among various APBI plans for the 5 patients we planned with electron APBI. We created alternative plans for all of them (tangential fields, IMRT, and VMAT).

Results: Of the patients treated with electrons, all had grade 2-3 radiation dermatitis at 1-month follow-up. This was not present on the last day of radiation, peaked at 2-3 weeks post-treatment, and was significantly improved (though not at all completely) at 2-month follow-up. This is in stark contrast to our IMRT-APBI patients, who typically have no dermatitis, or occasionally grade 1. Despite the small sample size, our findings seemed to be unrelated to whether the PTV was cropped from skin. (Two of the PTVs were cropped 3 mm from skin and still had toxicity.) See the following table for key dosimetric parameters likely to be predictive of dermatitis after APBI.

Conclusions: Despite some theoretical advantages (lower integral and exit doses) spurring our novel use of electron beam for APBI in a handful of seemingly well-selected patients, we advise against utilizing electron beam for APBI, even for superficial tumors that wouldn't seem to benefit from the skin-sparing effect typical of IMRT-APBI. These patients experienced significant skin toxicity, which is counter to the spirit of treatment de-escalation.

Table: Skin dose parameters for various radiation techniques

	PTV Dmax (cGy)	PTV Dmean	Skin max dose
Electron	3549	3207	3312
Tangents	3273	3038	3152
IMRT	3260	3075	3188
VMAT	3272	3081	3201

771738 – Five-day Accelerated Partial Breast Irradiation (APBI) Using Stereotactic Body Radiation Therapy (SBRT) in Stage 0-II Breast Cancer: A Report of 112 Patients with up to 2 year Follow-up

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Background/Objective: Randomized trials in selected early-stage breast cancer patients with up to 10-year follow-up have proven that accelerated partial breast irradiation (APBI) given via high dose rate (HDR) implant bid in 5 days is equivalent to whole breast external radiation therapy (XRT) given qd in 5-6 weeks in regard to breast tumor local recurrence (LR). However, complications with APBI implant in a Medicare database review have been significant, with 3.95% of women requiring mastectomy, 16.2% developing infections, and another 16.3% experiencing non-infection complications including rib fractures, fat necrosis, and breast pain. Recently APBI using non-invasive intensity modulated radiation therapy (IMRT) or stereotactic body radiation therapy (SBRT) given qd in 5 fractions has been shown in another randomized trial with 5 year follow-up to be equivalent to qd XRT in 6 weeks, with respect to LR. IMRT/SBRT was superior in regard to acute effects, late effects, and cosmesis. Objectives: In the randomized clinical trial of APBI IMRT/SBRT, the clinical target volume (CTV) was defined by the injection of individual fiducial markers bordering the surgical cavity. At our institution, we have used the Biozorb fiducial system to localize the CTV for SBRT. We sought to confirm the APBI SBRT/IMRT results with a simpler fiducial system.

Methods: Between 2017 and 2019, 112 patients have undergone SBRT targeted to a Biozorb defined CTV with the walls of the surgical cavity sewn to the Biozorb device. Eligible patients were older than age 40, had tumor sizes <3cm, negative surgical margins, and negative sentinel node dissections. SBRT dose was 30 Gy given in 5 fractions. Dose constraints were as follows: V-30 Gy < 105%, ipsilateral breast V-15 Gy < 50%, ipsilateral lung V-10 Gy < 20%, contralateral lung V-5 Gy < 10%, heart V-3 Gy < 20%, contralateral breast Dmax < 2 Gy and skin Dmax < 27 Gy. The planning target volume (PTV) ranged from 27 to 355 cc with a median of 80 cc. PTV = CTV + 1-2cm.

Results: Follow-up ranged from 1-24 months with a median of 12 months. LR has been 0% (0/112). There have been no biozorb related infections, reactions, or rejections. There have been no cases of radiation induced seromas, skin reactions, or soft tissue necrosis. Three patients developed pain around the Biozorb site. All cases were resolved within 2 days on a short course of steroids. Cosmetic results as rated by the surgeon, radiation oncologist, and nurse were rated excellent in 98.2% (110/112) of cases.

Conclusions: Non-invasive APBI with SBRT given qd over 5 days targeted to Biozorb has resulted in LR, complications, and cosmetic results that compare favorably to invasive APBI given bid with HDR implant. At last follow-up, there have been no LR, biozorb-related complications, or cases of radiation induced seromas, skin reactions, soft tissue necrosis, or other complications. Cosmesis has been excellent in 98.2% of patients.

787352 - Considering Intention-to-treat Bias: A More Accurate Assessment of 1277 IORT Patients

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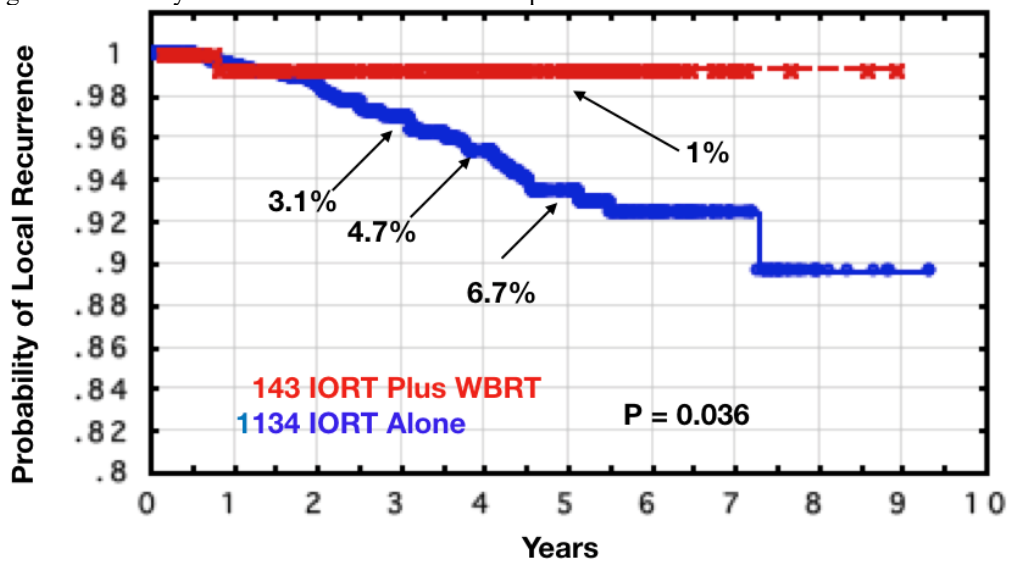
Background/Objective: Two trials of X-ray intraoperative radiation therapy (IORT), TARGIT-A and TARGIT-R, have shown IORT to be a safe alternative to whole breast radiation therapy (WBRT) with a low local recurrence rate (LRR). In both trials, patients with adverse findings on histopathology received WBRT in addition to IORT (15% for TARGIT-A and 27% for TARGIT-R). Since data from these trials were reported by intention-to-treat, patients who received IORT alone or in combination with WBRT were combined into a single cohort. The probability of local recurrence (LR) was reported for the entire cohort. Since patients who receive WBRT with IORT as a boost recur at a lower rate than patients who receive IORT alone, combining these groups resulted in an artificially improved recurrence curve. To more accurately assess the LRR with IORT alone, we analyzed data from a prospective, non-randomized IORT trial by treatment delivered, separating those who received IORT alone from those who received IORT plus WBRT.

Methods: A total of 1277 patients received X-ray IORT as part of a prospective study from May 2010 to September 2019. All patients had tumor spans ≤30mm in greatest extent as determined by mammography, ultrasonography, and MRI. All tumors were treated with breast-conserving surgery and IORT. To be eligible for IORT as the sole adjuvant radiation therapy (XRT), final pathology had to confirm tumor extent ≤30mm, tumor margins ≥2mm, no extensive lymphovascular invasion, and negative lymph nodes (N0(i+) acceptable). Patients who did not meet all criteria were advised to receive supplemental WBRT. Kaplan-Meier analysis was used to estimate LR probability for each group. Groups were compared with the log-rank test. All local events, regardless of which quadrant they occurred, or whether they were invasive or DCIS, were included in the analysis.

Results: A total of 1134 patients were treated with IORT as their sole form of XRT. There were 143 patients who received IORT plus WBRT. There have been 43 IBTEs, 25 at or near the IORT treatment site, and 18 in different quadrants. One LR occurred in a patient that received IORT plus WBRT. Forty-two LRs occurred in patients who received IORT alone. There have been 5 regional recurrences, 2 distant recurrences, and no breast cancer-related deaths. All 50 events occurred among 46 patients. With a median follow-up of 40 months, Kaplan-Meier analysis predicted that 4.7% of patients treated with IORT alone and 1% of patients treated with IORT plus WBRT will recur locally at 4 years. This difference is statistically significant (p=0.036).

Conclusions: The LRR for 1134 patients treated with IORT alone was 4.7% at 4 years compared to 1% in the 143 patients with adverse pathologic findings who received both IORT and WBRT (p=0.036). When the 2 treatment groups were combined into 1 cohort, the LRR dropped from 4.7 % to 4.2%, a statistically insignificant difference 0.5%. Combining patients that received IORT alone with those treated with IORT plus WBRT resulted in a decreased probability of LR. The greater the percentage of patients treated with additional WBRT, the more the probability of LR decreases. Thus, in studies with a high percentage of patients treated with WBRT, the difference is likely to be greater and IORT will appear to be more effective. Combining the 2 groups into a single curve gives an overall picture of what an IORT program can accomplish, but it is equally as important to understand what IORT can accomplish when used as the only adjuvant XRT, without the contamination effects of additional WBRT.

Figure: Probability of local recurrence with IORT plus WBRT vs IORT alone



Reconstruction

787624 - Is It Worthwhile to Perform Breast Reconstruction in the Setting of Stage IV Breast Cancer?

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Background/Objective: Traditionally, metastatic breast cancer has been treated with systemic therapy while surgery was reserved for palliative indications. However, advances in modern systemic therapies have allowed increasing life expectancy for patients with metastatic breast cancer, challenging the traditionally limited role for surgical intervention. The goal of this study is to report our outcomes of patients undergoing mastectomy with and without reconstruction in the setting of de novo Stage IV breast cancer.

Methods: Using an institutional prospectively maintained breast surgery database, we identified all patients who presented with de novo Stage IV breast cancer from January 2008 to December 2018. De novo Stage IV disease was defined as distant metastasis diagnosed within 4 months of breast cancer diagnosis according to the AJCC guidelines. Patients were included if they underwent mastectomy with or without reconstruction. Patients who underwent mastectomy for palliative indications were excluded. Patients were grouped into reconstruction (R), and no reconstruction (NR) groups. Demographics, cancer characteristics, reconstructive techniques, complications, and survival were abstracted and analyzed.

Results: A total of 29 patients were identified, among whom 8 (28%) underwent reconstruction (R), and 21 (72%) who did not (NR). Reconstructed patients tended to be younger (median age 45 in R vs. 56 in NR), had smaller pathologic tumor size (median 0.1 cm in R, 3.6 cm in NR), and fewer positive lymph nodes (median 0 in R, 2 in NR). Compared to patients in the NR group, patients in R group had higher percentage of complete clinical response to induction systemic therapy for both the primary (50% in R, 5% in NR) and distant disease (63% in R, 35% in NR). All patients in the NR group underwent simple mastectomy. In the R group, reconstruction was immediate in 5 (62%), 4 with skin-sparing mastectomy and 1 nipple-sparing mastectomy. The 3 patients with delayed reconstruction (38%) had simple mastectomy. Reconstructive techniques included tissue expanders (TE) followed by implant placement (n=5), autologous reconstruction (n=1), Goldilocks procedure (n=1), and fat injection (n=1). Median time from diagnosis to mastectomy was similar between the 2 groups (9 months in R, 8 months in NR). Similarly, no difference in complication rates was identified between the 2 groups (n=1, 13% in R; n=7, 33% in NR, p=0.38). Median survival from diagnosis in the whole group was 117 months. Overall survival from surgery was longer in the R group (100% at 2 and 5 years) compared to NR (85% [95% CI: 68-100%] at 2 years; 50% [95% CI: 27-91%] at 5 years), p=0.046.

Conclusions: Mastectomy and reconstruction may be reasonable to consider in appropriately selected patients with Stage IV breast cancer who have excellent response to systemic therapy and anticipated durable survival. Future studies should assess the impact of reconstruction on quality of life in patients with Stage IV breast cancer.

788097 - Clinical Analysis of Autologous Fat Grafting in DIEP and Implant-based Breast Reconstruction

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Background/Objective: In this study, we discuss the fundamentals of autologous fat grafting (AFG), the influence of patient characteristics (e.g., patient age and BMI) as parameters on satisfaction, and the safety and efficacy of fat grafting.

Methods: A total of 601 patients were examined in a retrospective case series of a single reconstructive surgeon between 2011-2016. Out of the 601 patients, 320 patients received fat grafting, in which 76 were DIEP and 244 were implant-based reconstructive procedures. Data analysis was performed with SPSS v22 statistical analysis software.

Results: There was a statistically significant difference in age (mean difference 1.86, 95% CI 0.13 to 3.6; p=0.035) between the group receiving fat grafting (FG; mean age=54.8; SD= ±10.9) compared with the group not receiving fat grafting (mean age=52.9; SD= ±11.1). There was no statistically significant difference in BMI (mean difference 1.99; 95% CI -1.4 to 5.4; p=0.25) between the group receiving fat grafting (mean BMI=29.9; SD=±24.2) compared with the group not receiving fat grafting (mean BMI=27.9; SD=±4.8). There was no statistically significant difference in satisfaction (mean difference = -.045; 95% CI -8.11 to 8.02; p=0.99) with breasts between the group receiving fat grafting (mean score=65.8; SD=±22.8) compared with the group not receiving fat grafting (mean score=65.9; SD=±25.1).

Conclusions: Fat grafting is a useful adjunct to breast reconstruction and is used very frequently. Satisfaction between FG versus non-FG groups was not significantly different. AFG should be taken into consideration for any patient undergoing breast reconstruction as an adjunct to the procedure.

787882 - Implications of Instituting an ERAS Pathway in Patients Receiving Chemotherapy in Microsurgical Breast Reconstruction

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Background/Objective: Neuropathy is a common side effect of chemotherapeutic agents. Manifestations of chemotherapy-induced peripheral neuropathy (CIPN) can present in a myriad of fashions, ranging from numbness, tingling, and pain to motor weakness and autonomic dysfunction. Given the nature of breast reconstruction, a significant portion of the patients have a history chemotherapy exposure; its effect on postoperative pain management has not been previously explored.

Methods: The study is a retrospective review of patients who underwent DIEP flap breast reconstruction by the 2 senior authors from January 2016 to September 2019. The patients were separated into 2 groups, pre-ERAS (enhanced recovery after surgery), and ERAS. The primary

outcome observed was postoperative opioid consumption, measured as oral morphine equivalents (OME). P-values were obtained through the student's t-test.

Results: In total, 256 patients were analyzed, out of which 113 had chemotherapy exposure. The difference between opioid consumption in patients in the pre-ERAS group without and with chemotherapy exposure was statistically significant (211.5mg vs 278.5mg p=0.0279). There was no difference between opioid consumption with concern to chemotherapy history in the ERAS group (137.4mg vs 133.0mg, p=0.7251).

Conclusions: Patients with chemotherapy exposure required more opioids to be comfortable. It is unknown if this difference is secondary to increased pain or less effectiveness of opioids. With the ERAS protocol being a multivariate intervention, it becomes difficult to assess which components of combination thereof are responsible for the observed decrease in opioid consumption. More research is necessary to assess if there are better ways to address pain postoperatively in patients with chemotherapy exposure.

781645 - Utilization of Installation Wound Vacuum Device for Breast Implant Salvage: Long-term Results and Success

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Background/Objective: When an infected implant necessitates removal, a new device is typically not immediately inserted. This delay can be devastating for the patient and can result in soft tissue contracture that complicates reconstruction. We have previously reported on our technique for managing breast implants necessitating removal with the placement of an irrigating vac at time of explant followed by insertion of a new prosthetic within a week. The goal of this paper is to report on our long-term outcomes and success.

Methods: A retrospective chart review was conducted for all patients with breast prosthetic infection who were treated with an irrigating wound vac. When cellulitis of the breast prompted surgical exploration, the implant was removed, and Alloderm was excised if not incorporated. An installation wound vac was placed with saline or dakins. Antibiotics were utilized as directed by culture. The patient returned within a week for wound vac removal, irrigation of the capsule and replacement of tissue expander or implant.

Results: Twelve patients and 14 breasts were treated with this approach. The vac was utilized for an average of 5.2 days. Eight patients had intra-operative cultures return as positive. Ten of the fourteen implants were successfully replaced, 3 implants in 2 patients were unable to be salvaged, and 1 patient whose implants were originally placed for augmentation opted not to pursue replantation. Patients with implants who were unable to be salvaged ultimately underwent autologous reconstruction, and 1 patient who successfully underwent replantation chose to pursue autologous reconstruction. For patients who successfully underwent replantation and did not pursue autologous reconstruction, the mean follow-up was 322 days.

Conclusions: Our approach allows for continuous washout of the capsule to encourage a further reduction in bacterial load after explant. We have utilized this approach successfully on 10 out of 14 breasts without any complications. We now report on long-term outcomes with a high degree of success and without an additional infection in any patient. This approach is a powerful tool to allow for implant salvage after infection to prevent the psychological detriments and soft tissue contracture associated with implant loss.

787914 - National Trends and Survival Outcomes of Performing Immediate Breast Reconstruction for Male Breast Cancer Patients: Propensity Scoring Analysis

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Background/Objective: There is a lack of data on the trends of performing immediate breast reconstruction (IBR) in male breast cancer (MBC) patients following a mastectomy. The purpose of this study is to examine the national trends and outcomes of performing IBR in MBC patients following a mastectomy.

Methods: The National Cancer Database (NCDB) registry from 2004 to 2014 was used to identify non-metastatic MBC patients who had a mastectomy with or without an IBR. Patients' demographics, readmission, and long-term overall mortality (OM) were compared between IBR and no-IBR patients. Univariate, multivariate, and propensity score weighted analyses were used to compare study groups and outcomes.

Results: A total of 370 (3.35%) IBR and 10,677 (96.65%) no-IBR patients were identified. Median follow-up was 59.63 months. Compared to no-IBR patients, IBR patients were more likely to be younger (Mean: 52, SD: 11.7 vs. Mean: 65.8, SD: 12.8), be Hispanic, live in a metropolitan county, and have private insurance, less comorbidities and higher income ($p<0.05$). Rates of IBR increased significantly from 1.56% in 2004 to 4.15% in 2014 ($p<0.05$). IBR types were 130 (35%) tissue-based, 96 (26%) implant-based, 42 (11%) combined tissue/implant, and 102 (28%) were non-specified. IBR was not associated with 30-day readmission or 90-day mortality. In the adjusted propensity score weighted analysis, IBR was not associated with OM for Stage I (HR:0.45, $p=0.23$), Stage II (HR:0.95, $p=0.92$), or Stage III (HR:1.48, p=34)

Conclusions: Our data suggest that IBR in MBC patients has been increasing over the years, with the tissue-based IBR as the most common type. There was no association between IBR and 30-day readmission rates or OM when compared to MBC patients who did not receive an IBR.

SLN

783581 - Repeat Sentinel Lymph Node in Locally Recurrent Breast Cancer: A 9-year Experience

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Background/Objective: Breast cancer accounts for the highest rate of new cancers in the US. Most women are diagnosed in the early stages opting for breast-conserving therapy and sentinel lymph node biopsy. For a small percentage of patients who have local recurrence, being able to perform a repeat sentinel lymph node biopsy vs. axillary dissection would be favorable. The aim of this study was to examine our experience with repeat sentinel lymph node biopsy of patients with locally recurrent breast cancer.

Methods: We reviewed our tumor registry database for the time period of January 1, 2010 to September 4, 2019 for all locally recurrent breast cancer patients who underwent preoperative lymphoscintigraphy with technetium-99, methylene blue, or both and whose primary tumor was managed by breast-conserving therapy, sentinel lymph node biopsy, and/or axillary dissection with adjuvant radiation.

Results: Repeat lymphoscintigraphy was successful in 65% (15/23) of the cases. Of these successful cases, the median age of diagnosis was 59, all mapped to an axillary lymph node, and had 5 or less years between first diagnosis and local recurrence. Unsuccessful repeat lymphoscintigraphy occurred in 34% (8/23) of the cases. Most of the cases 87% (7/8) had whole breast radiation prior to attempting reoperative sentinel lymph node and were hormone receptor-negative 62% (5/8). Radioisotope or a combination of methylene blue and radioisotope was used for sentinel lymph node mapping.

Conclusions: Repeat sentinel lymph node biopsy is successful in majority of locally recurrent breast cancer cases. Based on our data, a likely reason for failure to repeat sentinel lymph node biopsy is prior radiation. These findings should be validated in a larger cohort.

786704 - A Retrospective Comparison of Frozen Section versus Touch Prep Intraoperative Evaluation of Sentinel Lymph Nodes in Breast Cancer

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Background/Objective: The intraoperative evaluation of SLNs can spare patients a second operation to stage the axilla and is commonly achieved by frozen section. Intraoperative imprint cytology, or touch prep, preserves more nodal tissue for permanent fixation and is a quicker, less expensive alternative to frozen section with comparable accuracy.

Methods: We performed an IRB-approved retrospective review of 527 breast cancer patients who had intraoperative evaluation of a SLN with touch prep or frozen section during a 4-year

period. Patients were identified by the cancer registry. The accuracy of frozen section (FS) and touch prep (TP) were determined by comparing intraoperative results to final pathology.
Results: A total of 315 (59.7%) patients had a SLN evaluated by TP and 212 (40.3%) by FS. Nineteen TP patients had at least 1 false-negative result (6%) compared to 4 FS patients (1.8%). Nine (47.3%) TP patients with a false-negative result were due to micrometastasis. The negative predictive value of TP was 93.54% and 97.66% for FS. The accuracy of TP was 93.97% and 98.11% for FS.

Conclusions: This study adequately assessed the intraoperative results of touch prep and frozen section examination of sentinel lymph nodes. In comparison to frozen section, touch prep has a comparable negative predictive value and accuracy. The accuracy of touch prep was not impacted by histologic type as noted in prior studies. This data supports the utilization touch prep for accurate intraoperative assessment of SLNs in breast cancer patients.

784981 - Is Clinical Axillary Staging Alone Accurate in Older Woman with Early Breast Cancer?

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Background/Objective: The aim of this study is to determine the sentinel lymph node biopsy (SLNB) positivity rate for a subset of women age 70 and older with early breast cancer (T1) and favorable tumor markers: estrogen receptor (ER)-positive, progesterone receptor (PR)-positive, HER2-negative. The incidence of breast cancer is rising in the population with specific increase in the patients age 70 and older. Nearly 30% of all breast cancers occur in this age group. There is limited survival advantage to women with negative SLNB in this subset. There is morbidity associated with SLNB. Women in this age group with early favorable breast cancers may have a low incidence of positive SLNB and may benefit from clinical axillary staging alone without SLNB.

Methods: A 5-year retrospective review from the tumor registry at a community hospital of breast cancer patients from 2012 to 2017 for women age 70 and older with early breast cancer (T1) and favorable tumor markers; ER/PR+, HER2-negative, was performed. The population was reviewed with respect to: age, size of tumor, tumor markers, lymph nodes obtained, and SLNB positivity rate.

Results: A total of 212 cases were reviewed for inclusion based on the criteria of: age 70 and older with T1 tumors, ER/PR+, HER2-negative. Forty-six cases were excluded because of no nodes examined or no surgery performed. The analysis yielded 166 cases for study. The positive sentinel node biopsy rate was 6 (3.6%). Only 1 lymph node was positive per patient in all 6 patients.

Conclusions: This study demonstrates women age 70 and older with early breast cancer T1, and favorable tumor markers: ER/PR+, HER2-neg have a very low incidence of pathologically positive sentinel lymph node biopsies (3.6%). This is an important finding and may change clinical practice for women in this subset. This finding is consistent with the current literature.

With the known morbidity of seroma formation, infection, and paraesthesias associated with SLNB and the lack of clear benefit to local control or overall survival with SLNB in this subset, older women with early, favorable breast cancer may have clinical axillary staging alone and avoid SLNB. Future studies will need to evaluate women with clinical staging alone, quality of life in this age group, and the rate of local or distant cancer recurrences.

Table: Sentinel lymph node biopsy analysis

Charts reviewed:	212
Patients excluded:	46
Patients included:	166
SLNB Negative:	160
SLNB Positive:	6
Avg. Age:	74.5
Avg.# Nodes Pos.:	1
Avg. # nodes obtained:	3
Avg. Tumor Size:	10.3mm

785800 - Sentinel Lymph Node Biopsy – A Community Hospital Review of Lidocaine Use with Radio-Colloid Administration

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Background/Objective: Sentinel lymph node biopsy is the standard of care for axillary staging in patients with invasive breast cancer and a clinically negative axillary exam. We sought to evaluate the patient experience surrounding radio-colloid administration and the quality of data derived from the sentinel lymph node biopsy at a single community breast care center for quality improvement purposes.

Methods: A retrospective review was performed on 143 consecutive patients with complete data available from 2/2016 to 9/2017 who underwent pre-operative radio-colloid administration with (73%) or without (27%) lidocaine followed by lumpectomy or mastectomy and sentinel lymph node biopsy. A bivariate and multivariate analysis of clinical data relative to discomfort score was carried out. Effect of lidocaine on clinical findings was also evaluated.

Results: Lidocaine administered with radio-colloid injection was associated with significantly better discomfort scores than without, 1.7 +/- 1.5 compared to 4.2 +/- 3.8 ($p<0.001$). A benefit is realized regardless of clinical stage or breast surgery performed. Lidocaine did not impact nodal blue dye uptake.

Conclusions: Lidocaine injection about radio-colloid administration should be considered in all patients who will undergo sentinel lymph node biopsy as there is significant improvement in patient discomfort without sacrificing nodal detection. These findings are concurrent with those demonstrated on literature review. There may be benefit to a standardized protocol of lidocaine use with radio-colloid administration at performing institutions.

Tables: Sentinel lymph node biopsy – A community hospital review of lidocaine use with radio-colloid administration

Results

Lidocaine used	n	X ± SD	P value
Yes	105	1.7 ± 1.5	< 0.001
No	38	4.2 ± 3.8	

- Patient Discomfort Overall 2.38 ± 2.25

Regression Model of Patient Satisfaction/Pain VAS

	B	β	t	p
Constant	3.351		6.201	<0.001
Stage	0.559	0.160	2.144	0.034
Mastectomy/Lumpectomy	0.214	0.045	0.579	0.564
Lidocaine	-2.347	-0.461	-5.830	<0.001

- After statistical control for clinical staging and mastectomy, lidocaine use remained associated with patient satisfaction

Was highest radioactivity LN also stained blue?

Lidocaine	No	Yes	n	No	Yes
Y	25	82	107	23.4%	76.6%
N	10	27	37	27.0%	73.0%

$\chi^2 = 0.200$
$P = 0.654$

- Whether or not the highest radioactivity was observed in the SLN stained blue was not associated with lidocaine use, 77 vs 73 percent

SLN/NAC

788240 - Oncologic Outcomes in Patients with Clinical T1-4N1-2M0 Breast Cancer Undergoing Targeted Sentinel Lymph Node Biopsy Post-Neoadjuvant Chemotherapy

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Background/Objective: Axillary nodal status is one of the most important prognostic factors in breast cancer outcomes. In patients with clinically negative axillary nodes, a sentinel lymph node biopsy is performed to determine nodal involvement and the need for further axillary surgery. Patients diagnosed with clinically positive nodes are not candidates for up-front sentinel lymph node biopsy and directly undergo an axillary dissection. However, more often neoadjuvant systemic therapy is used to downstage both in-breast and axillary tumor burden improving candidacy for less extensive in-breast and axillary surgery. Large prospective studies demonstrate the use of sentinel lymph node biopsy rather than full axillary node dissection in women who undergo neoadjuvant therapy and become clinically node-negative (ycN0) following treatment. In our study, we investigate the oncologic outcomes in our patients who present with cT1-4N1-2M0 who become clinically and pathologically node-negative (yc/pN0) following neoadjuvant therapy and undergo sentinel lymph node biopsy alone. We compare these outcomes to women with cT1-4N0M0 who undergo neoadjuvant therapy followed by sentinel lymph node biopsy alone (ypN0).

Methods: Breast cancer patients with cT1-4N0-2M0 disease who have undergone neoadjuvant chemotherapy for breast cancer treatment followed by sentinel lymph node biopsy alone for pathologic complete response were identified from our hospital cancer registry between February 2015 and February 2019. Demographic, radiographic, pathologic, and oncologic data were collected. Local, regional, and distant recurrence, as well as overall, disease-free, and distant disease-free survival were evaluated.

Results: Sixty-one patients underwent neoadjuvant chemotherapy followed by sentinel lymph node biopsy alone for cT1-4N0-2M0 invasive breast cancer between February 2015 and February 2019. Three-year overall survival and disease-free survival in the clinically node positive group was 85.2% and 88.9%, compared to 91.8% and 93.4% in the clinically node-negative group. Local and regional recurrence was not statistically significant between the 2 groups.

Conclusions: Outcomes in patients with cT1-4N1-2M0 invasive breast cancer who undergo neoadjuvant chemotherapy with complete clinical and pathologic nodal response (yc/pN0) followed by sentinel lymph node biopsy alone demonstrate comparable locoregional recurrence rates to patients undergoing neoadjuvant chemotherapy with c/pN0 disease. Although not statistically significant, there is a trend towards decreased overall, disease-free survival, and distant recurrence-free survival in the clinically node-positive cohort. Statistical power is limited by overall study size.

Table: Patient characteristics and outcomes data. Continuous variables are presented as mean (SD); median [IQR] (range); categorical variables are presented as N (%)

	Overall (N=61)	**Node negative** (N=34, 56%)	**Node positive** (N=27, 44%)	**p**
Age	55.3 (10.9); 55 [48,63] (33,77)	56.6 (10.8); 57 [51,64] (36,74)	53.6 (11.1); 55 [46,61] (33,77)	.254
Tumor subtype				
IDC	58 (95.1)	34 (100)	24 (88.9)	
Mixed	1 (1.6)	0 (0)	1 (3.7)	
Undifferentiated	2 (3.3)	0 (0)	2 (7.4)	.081
Tumor Markers				
HR+Her2-	8 (13.1)	2 (5.9)	6 (22.2)	
HR+Her2+	18 (29.5)	12 (35.3)	6 (22.2)	
HR-Her2+	13 (21.3)	8 (23.5)	5 (18.5)	
HR-Her2-	22 (36.1)	12 (35.3)	10 (37.0)	.264
Grade				
1	2 (3.3)	1 (3.0)	1 (3.7)	
2	13 (21.7)	7 (21.2)	6 (22.2)	
3	45 (75.0)	25 (75.8)	20 (74.1)	1
Clinical stage				
IA	10 (16.4)	10 (29.4)	0 (0)	
IIA	27 (44.3)	21 (61.8)	6 (22.2)	
IIB	18 (29.5)	2 (5.9)	16 (59.3)	
IIIA	3 (4.9)	0 (0)	3 (11.1)	
IIIB	3 (4.9)	1 (2.9)	2 (7.4)	<.0001
Pathologic stage				
0	31 (50.8)	16 (47.1)	15 (55.6)	
IA	27 (44.3)	16 (47.1)	11 (40.7)	
IIA	2 (3.3)	1 (2.9)	1 (3.7)	
IIB	1 (1.6)	1 (2.9)	0 (0)	.889
Oncologic Outcomes				
Local recurrence	1 (1.6)	0 (0)	1 (3.7)	.443
Regional recurrence	2 (3.3)	1 (2.9)	1 (3.7)	1
Distant recurrence	4 (6.6)	1 (2.9)	3 (11.1)	.313
Distant recurrence follow-up time	35.4 (15.0); 35 [20,48] (12,61)	37.3 (15.2); 37 [25,52] (12,59)	33.2 (14.5); 30 [20,46] (12,61)	.288
Overall survival=yes	56 (91.8)	33 (97.1)	23 (85.2)	.161
Overall survival follow-up time (months)	34.8 (15.0); 34 [20,48] (12,60)	37.3 (15.4); 37 [24,52] (12,59)	31.7 (14.2); 29 [19,42] (12,60)	.163
Disease-free survival=yes	57 (93.4)	33 (97.1)	24 (88.9)	.313
Disease-free follow-up survival time	34.1 (15.2); 33 [20,46] (12,60)	36.8 (15.3); 36 [24,51] (12,59)	30.7 (14.6); 29 [17,42] (12,60)	.172

Time to Treatment

784081 - What Are the Modifiable Factors in Getting Patients to Chemotherapy Faster?
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Background/Objective: Current guidelines recommend that patients diagnosed with breast cancer start receiving chemotherapy within 120 days of diagnosis to increase overall survival. Newer research suggests that triple-negative breast cancer patients may do better starting chemotherapy within 30 days. A patient's decision as to whether to undergo breast-conserving surgery versus mastectomy is a very personal decision that often takes time to reach. Many mastectomy patients elect to undergo reconstruction, including implant versus autologous approaches. The goal of our study was to look at what barriers, if any, there were to having patients start chemotherapy within this timeframe.

Methods: Through a retrospective IRB approved study, we examined patients from our tumor registry during 2012-2017 who were diagnosed with breast cancer and subsequently treated with chemotherapy.

Results: Of the 931 patients, 871 (93.6%) received their chemotherapy within 120 days. Of the 60 patients who received chemotherapy after 120 days (6.4%), 26 had a lumpectomy (43.3%), and 34 had mastectomy (56.7%). Of the 34 patients who had mastectomy, 5 had no reconstruction (14.7%), 12 had implants or expanders (35.3%), and 17 underwent autologous free flap reconstruction (50%). One hundred seventy-two of the 931 patients (18.5%) had triple-negative breast cancer. Of these, only 3 (1.7%) received their chemotherapy within 30 days. The average time between diagnosis and initiation of chemotherapy in triple-negative breast cancer patients was 74 days with a range of 15 to 159 days.

Conclusions: Chemotherapy is an acknowledged important adjunct in breast cancer treatment, and the optimum time to begin chemotherapy is within 120 days of diagnosis. In our study, 93.6% of patients over a 6-year period received chemotherapy in this time interval. Of the 6.4% of patients whose chemotherapy was delayed, there was no single factor that could be identified. We could not support that multidisciplinary planning for breast reconstruction, type of breast reconstruction, obtaining second opinions, or wound complications resulted in a delay in chemotherapy. With this in mind, it is imperative that the surgeon recognizes the need for early referrals to chemotherapy, and to work in conjunction with other specialties, nurse navigators, and social workers to avoid delay and start chemotherapy promptly.

787912 - Early Mobilization Following Breast Cancer Surgery Is Effective and Safe

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Background/Objective: Breast cancer patients undergoing surgery with axillary lymph node dissection (ALND) or sentinel lymph node dissection (SLND) are at risk of developing decreased range of motion (ROM) post-operatively. Exercise post-surgery is imperative to allow patients to achieve full ROM and return to prior level of functioning within a timely manner. However, controversy remains on the timing of exercise programs and if early exercise increases complication rates. The purpose of this study is to demonstrate the effectiveness of early mobilization without increased risk of post-operative complications.

Methods: A retrospective review was performed on breast cancer patients who underwent ALND or SLND and were treated at an occupational therapy clinic from January to June 2019. Phase I ROM home exercise programs (HEP) without restrictions of active ROM were implemented as early as post-operative day one and phase II ROM HEP 2 to 4 weeks post-operatively. Patients who had surgery were compared to a small sample of patients who underwent surgery at outside facilities with no therapy post-surgery. The outcomes measured included implementation of early mobilization and time to regain full ROM, as well as potential post-operative complications such as seroma, axillary web syndrome (AWS), and lymphedema (LE).

Results: A total of 113 patients were included in this study. Fifty-two patients underwent a mastectomy, with 15 undergoing ALND and 37 SLND, while 61 patients underwent a lumpectomy, with 12 undergoing ALND and 49 SLND. Of the 113 patients, 7 patients had surgery at outside facilities. Every patient was educated on ROM home exercise programs and underwent manual therapies to address AWS and ROM deficits. On average, patients were able to regain their full ROM within 3-4 visits for those who underwent a mastectomy, and within 1-2 visits for those who underwent a lumpectomy. Patients who had surgery at outside facilities had little to no post-surgery therapy, demonstrated limited ROM and shoulder pain that affected their activities of daily living (ADL). These patients were able to regain their full ROM within 2-3 visits; however, they had decreased ROM for a year prior to treatment. In the mastectomy group, 11 of the 15 patients who underwent ALND and 9 of the 37 patients who underwent SLND developed AWS, which resolved in 53% and 89%, respectively, after treatment. For the lumpectomy patients, 9 of the 12 patients who underwent ALND and 23 of the 49 patients who underwent SLND developed AWS, which resolved in 89% and 74%, respectively, following treatment. Lastly, out of 113 patients, 2 developed seromas, and 5 developed lymphedema.

Conclusions: Early mobilization is effective in achieving full ROM, allowing patients to return to completing ADL tasks independently sooner. Patients also had reduced AWS with therapy, and only a few cases developed complications such as a seroma or LE, most of which were related to number of lymph nodes removed or other complications such as infection that are not able to be controlled by therapy. Thus, early mobilization is a safe method to potentially improve functional outcomes for breast cancer patients.

787812 - Factors Associated with a Delay in Post-mastectomy Radiation Therapy

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Background/Objective: While the optimal time interval between mastectomy and post-mastectomy radiation therapy (PMRT) has not been well-elucidated, a delay in PMRT has been associated with increased local recurrence. We sought to determine factors associated with a delay in PMRT beyond 12 weeks in patients not undergoing adjuvant chemotherapy.

Methods: Breast cancer patients who underwent mastectomy at our institution between January 2010 and April 2018 who subsequently received PMRT were retrospectively reviewed. As adjuvant chemotherapy can delay PMRT, patients receiving adjuvant chemotherapy were excluded. Factors associated with a delay in PMRT (defined as >12 weeks from the time of mastectomy) were analyzed.

Results: Among the 89 patients who met our inclusion criteria, the mean time from mastectomy to PMRT was 11.4 weeks. Twenty-four patients (27.0%) had PMRT >12 weeks after mastectomy. Factors associated with a delay in PMRT included race (p=0.031), younger age (p=0.047), higher BMI (p=0.015), contralateral prophylactic mastectomy (p=0.033), longer initial hospital length of stay (p=0.001), more complications (p=0.025), and having surgery between 2010-2014 (p=0.004). On multivariable analysis controlling for all of these factors, only initial hospital length of stay (OR 1.83; 95% CI: 1.12-3.01; p=0.017) and timeframe of surgery (2010-2014 vs. 2015-2017; OR 5.76; 95% CI: 1.53-21.72; p=0.010) were associated with a delay in PMRT.

Conclusions: More than a quarter of patients not undergoing adjuvant chemotherapy have a delay in PMRT beyond 12 weeks from the time of mastectomy, although this is declining in recent years. Length of initial hospital stay is the key driver in delaying PMRT; other factors such as insurance status or type of reconstruction do not affect this metric.

Table: Clinicopathologic characteristics in patients with and without delayed post-mastectomy radiation therapy

Factor	No delayed PMRT (n = 65)	Delayed PMRT (n = 24)	p-value
Age (yrs); median	52.00	46.50	**0.047**
Race: no. (%)			**0.031**
White: no. (%)	50 (76.9)	13 (54.2)	
Black: no. (%)	8 (12.3)	4 (16.7)	
Asian: no. (%)	4 (6.2)	1 (4.2)	
Other: no. (%)	3 (4.6)	6 (25.0)	
Insurance type: no. (%)			0.464
Medicaid	6 (9.2)	3 (12.5)	
Medicare	15 (23.1)	2 (8.3)	
Military	3 (4.6)	1 (4.2)	
Private	41 (63.1)	18 (75.0)	
Ever smoker: no. (%)	31 (47.7)	9 (37.5)	0.475
Hypertension: no. (%)	16 (24.6)	7 (29.2)	0.786
Diabetes Mellitus: no. (%)	8 (12.3)	4 (16.7)	0.727
BMI; median	28.34	31.95	**0.015**
Mastectomy number of sides: no. (%)			0.085
Unilateral	27 (41.5)	5 (20.8)	
Bilateral	38 (58.5)	19 (79.2)	
Contralateral Prophylactic Mastectomy: no. (%)	32 (49.2)	18 (75.0)	**0.033**
Type of Mastectomy: no. (%)			0.634
Conventional	17 (26.2)	4 (16.7)	
Nipple sparing	11 (16.9)	5 (20.8)	
Skin sparing	37 (56.9)	15 (62.5)	
Reconstruction type: no. (%)			0.128
Implants	20 (41.7)	5 (33.3)	
Autologous	16 (33.3)	9 (60.0)	
None	12 (25.0)	1 (6.7)	
Reconstruction: no. (%)	51 (78.5)	22 (91.7)	0.217
Complications: no. (%)	9 (13.8)	8 (33.3)	0.065
Number of complications; mean	0.14	0.50	0.025
Length of Stay (days); median	2.00	3.00	**0.001**
Reoperation within 90 days: no. (%)	5 (7.7)	5 (20.8)	0.125
Readmission: no. (%)	5 (7.7)	3 (3.4)	0.677
Year of Surgery: no. (%)			**0.004**
2010-2014	25 (38.5)	18 (75.0)	
2015-2017	40 (61.5)	6 (25.0)	