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Can 'sample proportion' predict upstage of ductal carcinoma in-situ lesions of the breast to guide selective use of sentinel lymph node biopsy?

**Sonam Kapadia, MD; Albert Lee, MD; Amy H. Kaji, MD, PhD; Amy Polverini, MD;
Junko Ozao-Choy, MD; Christine Dauphine, MD**

Poster ID# 787434

Email: skapadia@dhs.lacounty.gov

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BACKGROUND

- Upstage rate from ductal carcinoma in-situ (DCIS) on core needle biopsy to invasive carcinoma at definitive excision ranges 11-50%^{1,2}
- Difficulty in predicting upstage per conventional clinicopathologic factors results in discordant sentinel lymph node biopsy (SLNB) utilization
- 'Proportion of lesion sampled' as a direct measure of sampling error has not been directly studied in predicting upstage in DCIS

OBJECTIVE

- **To evaluate whether estimation of the proportion of lesion biopsied, or 'sample proportion,' on post-biopsy mammogram was predictive of DCIS upstage, so as to identify cohorts at very low or very high likelihood of upstage to improve SLNB allocation**

METHODS

- Retrospective review of pure DCIS cases from 2008 to 2018 at a single institution
- Clinical, radiographic & tumor factors, including breast radiologists' measurement of 'proportion of lesion biopsied,' were analyzed to determine predictability of DCIS upstage

RESULTS

- **11-year study period – 231 female patients diagnosed with DCIS on core needle biopsy**
 - 57 (24.7%) patients upstaged to invasive disease at final surgical excision
 - 167 (72.3%) patients underwent SLNB at the index operation of whom:
 - 49 (29.3%) upstaged to invasive cancer
 - 15 (9%) found to have positive SLNB

RESULTS

Median lesion size (range)	20 mm (2.5-120mm)
Biopsy modality	
Stereo-guided core biopsy	177 (76.6%)
Ultrasound guided biopsy	49 (21.2%)
Nuclear grade	
Low	41 (17.7%)
Intermediate	67 (29.0%)
High	122 (52.8%)
Mass lesion	61 (26.4%)
Suspicion for invasion	47 (20.3%)
Casting calcification morphology	58 (25.1%)
Clip migration	21 (9.1%)
Post-biopsy hematoma	29 (12.6%)
Needle gauge	
7	82 (35.5%)
8	16 (6.9%)
9	23 (10.0%)
10	25 (10.8%)
11	20 (8.7%)
12	9 (3.9%)
13	1 (0.4%)
14	32 (13.9%)
18	1 (0.4%)
Sentinel lymph node biopsy	
Positive SLNB	15 (9.0%)
Surgical procedure	
Mastectomy	109 (47.2%)
Lumpectomy	122 (52.8%)
Percent lesion removed on biopsy	
10% or less	62 (26.8%) → 31 (50%) upstaged
11-50%	41 (17.7%)
51-89%	41 (17.7%)
90% or greater	70 (30.3%) → 4 (5.7%) upstaged
Unable to assess post-biopsy	17 (7.4%)

RESULTS

	Univariate Odds Ratio (95% CI)	p-value	Multivariate Odds Ratio (95% CI)	p-value
10% or less removed (n=62)	OR=7.9, 3.9-16.1	p<0.0001	-	-
90% or more removed (n=70)	OR=0.1, 0.05-0.4	p<0.0001	OR=0.2, 0.1-0.6	p=0.005
Mass lesion (n=61)	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)	OR=3.7, 1.9-7.4	p<0.0001	OR=2.8, 1.3-6.3	p=0.01
PR positive (n=147)	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
Combined variable analysis:				
≤10% lesion removal on biopsy + mass lesion + suspicion for invasion			OR=14.0, 2.9-68.3	p=0.001
≥90% lesion removal on biopsy + NO mass lesion + NO suspicion for invasion			OR = 0.04, 0.006-0.31	p=0.002

DISCUSSION

- With an overall upstage rate of 25%, the likelihood of upstage in patients with 90% or greater sample proportion was significantly lower (OR 0.2, p=0.005)
- Adding 'sample proportion' ≤10% or ≥90% biopsied to the post-procedure report may be useful in conjunction with other clinicopathologic factors in identifying a subset of patients at very low or very high risk of upstage
- Nearly a third of the patients in our cohort could have avoided SLNB altogether had these factors been considered

CONCLUSIONS

- 'Sample proportion' of the core biopsy is an independent predictor of DCIS upstage to invasive breast cancer
- In this cohort, biopsy removal of ≥90% of mammographically visible lesions significantly decreased the likelihood of upstage, suggesting diminished benefit to SLNB at the index operation

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