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Radiofrequency Identification Tag Localization is Comparable to Wire Localization for Non-Palpable Breast Lesions

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BACKGROUND

Radiofrequency identification (RFID) tag localization is a technique of localizing non-palpable breast lesions

RFID tags do not require radioactive handling regulations, can be placed prior to surgery, and have been approved for long-term placement

PURPOSE

To evaluate whether tag localization (TL) is comparable to wire localization (WL) in regard to specimen size, operative time, and re-excision rate

METHODS

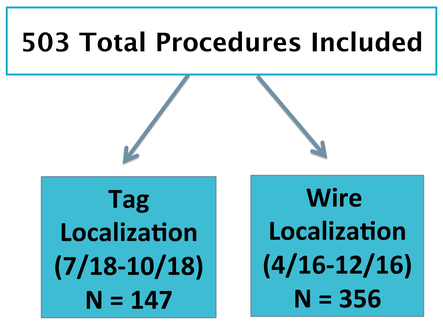
Retrospective analysis of TL and WL procedures

Tag localizations performed by dedicated breast radiologists under stereotactic or ultrasound guidance

Excisional biopsies and lumpectomies performed by 5 breast surgeons at 2 MGH institutions

Excluded bilateral or multicentric lesions and excision of TL-lymph node

Associations between localization method and specimen volume, operative time, and re-excision rate assessed by Wilcoxon rank sum, independent t-test, and chi-square tests, respectively



RESULTS

All intended targets were removed with tag or wire localization

Figure 1. Timing of tag placement

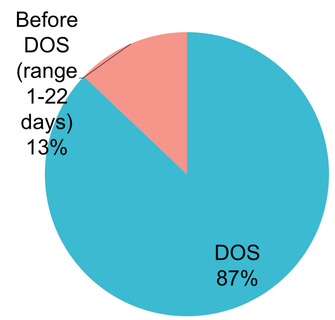


Figure 2. Specimen radiograph with tag and clip

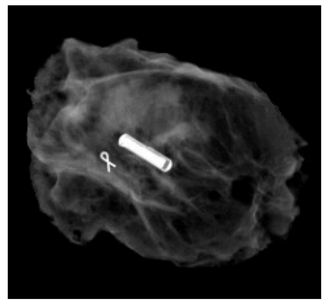


Table 1. Patient & Procedural Characteristics

	Tag Localization	Wire Localization
Age (Mean, SD[1])	59.5 (14.0)	60.3 (12.8)
Number of markers*		
One	140 (95.2%)	318 (89.3%)
Two or more	7 (4.8%)	38 (10.7%)
Surgical procedure		
Excisional biopsy	53 (36.1%)	124 (34.8%)
Lumpectomy	34 (23.1%)	90 (25.3%)
Lumpectomy + SLNB[2]	60 (40.8%)	142 (39.9%)
Surgical indication		
Atypia	23 (15.7%)	60 (16.8%)
Other (FEL[3], papilloma, imaging)	30 (20.4%)	64 (18.0%)
DCIS[4]	24 (16.3%)	59 (16.6%)
Invasive carcinoma	70 (47.6%)	173 (48.6%)
Final pathology		
Atypia	19 (12.9%)	65 (18.3%)
Other (FEL[3], papilloma, benign)	33 (22.5%)	59 (16.5%)
DCIS[4]	20 (13.6%)	69 (19.4%)
Invasive carcinoma	75 (51.0%)	163 (45.8%)
Lesion size (cm) (Mean, SD[1])*	1.0 (0.8)	1.3 (0.9)

[1]Standard deviation; [2]Sentinel lymph node biopsy; [3]Fibroepithelial lesion; [4]Ductal carcinoma in situ
*p<.05

Table 2. Outcome by Surgical Procedure

	Tag Localization	Wire Localization	p-value
Mean specimen volume (cm3) (IQR[1])			
Excisional biopsy	8.2 (12.3)	8.0 (14.5)	0.560
Lumpectomy +/- SLNB[2]	19.3 (21.8)	16.5 (16.8)	0.494
Mean operative time (minutes) (SD[3])			
Excisional biopsy	34 (11)	36 (12)	0.152
Lumpectomy	57 (19)	49 (16)	0.027
Lumpectomy + SLNB[2]	73 (24)	68 (25)	0.158
Re-excision rate			
Lumpectomy +/- SLNB[2]	18 (19.1%)	39 (16.8%)	0.615

[1]Interquartile range; [2]Sentinel lymph node biopsy; [3]Standard deviation

Table 3. Outcome by Surgical Indication

	Tag Localization	Wire Localization	p-value
Mean specimen volume (cm3) (IQR[1])			
Atypia	9.4 (10.2)	9.0 (15.0)	0.244
Other (FEL[2], papilloma, imaging)	6.4 (11.8)	6.9 (16.6)	0.695
DCIS[3]	24.4 (29.7)	15.7 (21.7)	0.026
Invasive Carcinoma	15.0 (14.0)	20.2 (21.2)	0.026
Mean operative time (minutes) (SD[4])			
Atypia	35 (12)	32 (10)	0.224
Other (FEL[2], papilloma, imaging)	37 (12)	36 (10)	0.474
DCIS[3]	64 (26)	50 (17)	0.020
Invasive Carcinoma	68 (23)	64 (25)	0.222
Re-excision rate			
DCIS[3]	7 (29.2%)	9 (15.2%)	0.145
Invasive Carcinoma	11 (15.7%)	30 (17.3%)	0.759

[1]Interquartile range; [2]Fibroepithelial lesion; [3]Ductal carcinoma in situ

CONCLUSIONS

TL and WL procedures had similar specimen volumes, re-excision rates, and operative times (other than a slightly longer operative time for TL lumpectomies for DCIS)

Given the comparable outcomes and added benefit of placement flexibility, TL should be considered for non-palpable breast lesions