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# Does practice make perfect? Resident experience with breast surgery influences excision adequacy



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## Abstract

**BACKGROUND:** The adequacy of breast-conserving surgery (BCS) for invasive or in situ disease is largely determined by the final surgical margins. Although margin status is associated with various clinicopathologic features, the influence of resident involvement remains controversial.

**METHODS:** Patients who underwent BCS for malignancy from 2009 to 2012 were identified. The effects of various clinicopathologic characteristics and resident involvement were evaluated.

**RESULTS:** Of the 502 cases performed, a resident assisted with most surgeries (95%). The overall rate of positive margins was 30%, which was not associated with resident involvement. Interns assisting from July to September had significantly lower rates of positive margins. Margins were more likely to be positive following any given resident's first 3 cases on their breast rotation than throughout the remainder of their rotation.

**CONCLUSION:** Although resident level alone does not influence the adequacy of BCS, experience gained over time does appear to be associated with lower rates of positive margins.

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In the treatment of breast cancer, breast-conserving therapy includes breast-conserving surgery (BCS) followed by radiation therapy. BCS involves complete surgical excision of the lesion, as well as a margin of normal tissue.<sup>1</sup> It has been shown that there is no significant survival benefit among patients who have had a total mastectomy,

lumpectomy, or lumpectomy plus irradiation for the treatment of invasive breast cancer.<sup>2</sup> However, the incidence of positive margins in BCS proves to be a major risk factor for local recurrence and increased patient morbidity.<sup>3</sup>

Various studies have demonstrated that multiple clinicopathologic qualities of the breast tumor itself have been associated with a higher incidence of positive excisional margins.<sup>4</sup> As many BCSs are performed in academic centers with surgical residents, the influence of resident involvement on the incidence of positive margins remains controversial.<sup>5,6</sup> Research in other areas of general surgery with resident involvement have demonstrated acceptable patient outcomes for those undergoing appendectomies<sup>7</sup> and ventral hernia repairs.<sup>8</sup> The goal of our retrospective analysis was to assess the influence of resident involvement

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on breast surgical margins, based on the level of training, experience gained, and time of year.

## Methods

Patients who underwent BCS for breast carcinoma between 2009 and 2012 at a single academic institution were included in our study. Inclusion criteria consisted of patients who were greater than or equal to 18 years and of female gender. Patients with a history of previous breast cancer, those who received neoadjuvant chemotherapy, or those who were pregnant at the time of surgery were excluded from the study. A retrospective chart review was conducted and the presence/absence of positive margins was assessed. A margin was considered positive if invasive carcinoma or ductal carcinoma in situ (DCIS) was within 1 mm of the surgical margin, as described in the surgical pathology reports generated by staff pathologists. Variables examined in our analysis included whether a resident was involved in the surgery, the resident's level, the resident's experience, and the time of year the procedure was performed. These data were obtained by reviewing operating room logs and recording the participation of a resident in a given case. Other clinicopathologic variables examined in this study included the final pathologic diagnosis, multifocality, presence of comedonecrosis, use of needle localization, whether the lesion was palpable preoperatively, and performance of a core biopsy preoperatively. Statistical analyses were conducted using Stata 10.0 (StataCorp, College Station, TX). Categorical variables were analyzed using chi-square tests, and continuous variables were analyzed using Mann–Whitney *U* tests or Student *t* tests. Multivariate analyses using logistic regression and reporting odds ratios were also performed. Statistical significance was defined as a *P* value less than or equal

to .05 (2 sided). This study was approved by the Loyola University Health Systems' Institutional Review Board.

## Results

A total of 502 female patients with a median age of 62 years (range 25 to 98) were identified. Self-identified patient race/ethnicity included 355 white/Caucasian, 97 black, 29 Hispanic, 8 Asian, and 12 other/unknown. The median body mass index was 28.5 kg/m<sup>2</sup> (range 15.2 to 64.4 kg/m<sup>2</sup>). On initial evaluation, 30% of the breast lesions were palpable (*n* = 151). Preoperatively, most patients underwent core needle biopsy (*n* = 456, 91%). Of the lesions biopsied, 57% demonstrated invasive disease (*n* = 262), 45% in situ disease (*n* = 206), and 5% atypical ductal hyperplasia (*n* = 22). The BCSs were performed by 5 surgeons, and a resident assisted with 95% of the cases (*n* = 474). The resident levels included the following: 325 interns (69%), 37 post-graduate year (PGY) 2's (8%), 95 PGY3's (20%), and 17 PGY5's (3%). Needle localization was used in 79% of surgeries. Final pathology revealed invasive malignancy in 68% of specimens (*n* = 339) and in situ disease in 29% (*n* = 146). The median tumor size was 1.2 cm (range .08 to 9.6 cm). The Nottingham Histologic Scoring revealed 69 grade 1 tumors, 178 grade 2 tumors, and 108 grade 3 tumors. Tumor multifocality was present in 37% of specimens (*n* = 185), and comedonecrosis was identified in 27% (*n* = 136). The overall rate of positive margins was 30% (*n* = 152).

Overall, positive margins were associated with age, race/ethnicity, not using needle localization, not having a biopsy preoperatively, the presence of a multifocal tumor, and the presence of comedonecrosis. Although patient age and race were associated with margin status, body mass index and tumor palpability preoperatively were not (Table 1). Needle localization was negatively associated with the margin status

**Table 1** Univariate logistic regression analysis among clinicopathologic features, resident involvement, and the presence of positive surgical margins

Covariate	Odds ratio	95% CI	<i>P</i> value
Age	.98	.97–.995	<b>.01</b>
Race/ethnicity	1.68	1.12–2.52	<b>.01</b>
Body mass index (kg/m <sup>2</sup> )	.99	.96–1.02	.56
Palpability (preoperatively)	1.49	.99–2.23	.055
Biopsy (preoperatively)	.32	.17–.6	<b>&lt;.001</b>
Pathology on biopsy malignant	.61	.37–.99	<b>.047</b>
Needle localization	.58	.37–.92	<b>.02</b>
Tumor size (cm)	1.15	.93–1.42	.21
Tumor NH grade 3	1.23	.74–2.03	.42
Tumor multifocality	2.91	1.96–4.32	<b>&lt;.001</b>
Tumor comedonecrosis	2.05	1.36–3.1	<b>.001</b>
Surgery date between July 1 and September 30	.72	.46–1.12	.15
Any resident present during surgery	.52	.24–1.15	.11
Intern present during surgery	.79	.52–1.21	.28
Any resident's first 3 surgeries	1.57	1.04–2.38	<b>.03</b>

CI = confidence interval; NH = Nottingham Histologic Grade.  
Bold values signify statistical significance.

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