Re-excision rates following breast conserving therapy: a single institution's experience over ten years

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Abstract

As breast conserving therapy has become the standard of care for patients with early stage breast cancer, an area of debate within the surgical literature has been the rate of positive surgical margins requiring re-excision. National re-excision rates are highly variable and have been reported as high as 40%. Any cancer diagnosis and treatment is stressful for patients and having to return to the operating room for a second surgery can greatly affect both patient satisfaction and cosmetic outcomes. Within our institution we wanted to investigate over ten years our population undergoing breast conserving therapy to determine re-excision rates and compare to nationally reported rates. We also wanted to examine our re-excision rate following the January 2013 position statement from the American Society of Breast Surgeons that proposed a treatment algorithm for determining the need for re-excision of surgical margins. Our overall re-excision rates were found to be 17%, compared to the national reported rates of 20-40%. In addition our re-excision rates decreased after January 2013 from 23% to 9%.

Introduction

In 1990, the NIH released a consensus statement in support of breast conserving therapy as an appropriate and acceptable treatment for early stage breast cancer. Since that time breast conserving therapy has essentially become the standard of care for women with early stage breast cancer. A mainstay of breast conserving therapy surgery is the removal of as little breast tissue as possible to preserve cosmesis in addition to having a complete resection of malignant tissue. The surgical margin status of lumpectomy and partial mastectomy specimens is defined as the presence or absence of malignant cells on or close to the edge of the specimen. In surgical literature, the definition of a negative margin has been an area of debate. In the past, the opinion of negative surgical margins was surgeon dependent and varied from ink-negative margins to margins greater than one centimeter.[5,6] This has been considered a potential explanation for the vast variation of re-excision rates following lumpectomy and partial mastectomy surgeries. Re-excision rates across the US have been documented in the range of 0% to 70%; however, these were surgeon dependent.[2] Overall, the re-excision rate following breast conserving surgery is approximately 20 to 40%.[1,2] In January 2013 the American Society of Breast Surgeons released a position statement summarizing the current evidence regarding surgical margin status and recommended an algorithmic approach to assessing the surgical margins.

The National Surgical Adjuvant Breast and Bowel Project B-06 study from the 1970s defined a negative margin as no tumor cells on the inked edge of a surgical specimen.[3] The variation of opinion centers around what margin width is adequate and does not require re-excision. A meta-analysis of 21 studies conducted by Houssami et al showed borderline significance for improvement in locoregional recurrence rates for patients with negative margins greater than one millimeter. However, there was no significant difference in recurrence when adjusted for patients receiving adjuvant radiation boost or endocrine therapy.[4] The value for re-excision in patients with an ink-negative margin but with a margin edge less than one to two millimeters is unclear when the patient is receiving appropriate adjuvant radiation and systemic therapy.[4] Ultimately, as of January 2013, the consensus from the American Society of Breast Surgeons was that patient with ink-negative margins and margin width of greater than or equal to one millimeter did not require any further surgery, and in any margin width less than one millimeter, re-excision is not mandatory and should be evaluated on a case by case basis.

In our study we sought to determine the rate of re-excision following breast conserving therapy within our institution over a ten year time frame and determine if our institution's re-excision rates were on par with the national average. We also wanted to examine if our rate of re-excision changed after January of 2013 once there was a uniform determination of negative margins.

Methods

After IRB approval, a retrospective review was conducted of all the patients undergoing breast conserving therapy over a ten-year period at the Diagnostic Breast Center that is part of Edwards Comprehensive Cancer Center. Data was collected from the Cabell Huntington Hospital Cancer Registry. The study contained 529 patients that underwent lumpectomy or partial mastectomy from January 1st, 2005 through December 2015. Over this time period there were three breast surgeons performing breast conserving therapy.

The 529 patients were divided into two separate groups: the first group consisted of those patients undergoing treatment prior to January 2013 and the second group consisted of those patients receiving treatment after January 2013. There were 293 patients in the first group and 236 patients in the second group. Both groups were reviewed for re-excision of positive margins. Re-excision is defined as a separate procedure following initial lumpectomy or partial mastectomy. Exclusion criteria included those patients that underwent immediate margin re-excision at the time of their initial operation and those patients whose pathology at the initial surgery was LCIS, which despite margin status does not require re-excision.

In addition to re-excision rates, demographics such as age, race and comorbid conditions of the patients from pre-2013 group and post-2013 group were compared. The comorbidities examined were hypertension, hyperlipidemia, COPD and heart disease. Another variable looked at was the stage of the patient's breast cancer; the patients were divided based on pathologically determined stage, stages 0-IV, as well as tissue pathology.

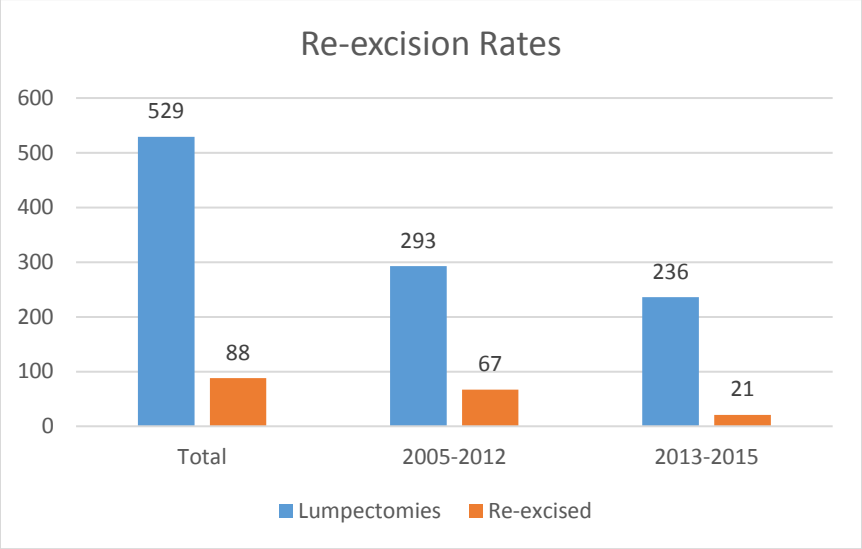
Image guidance in the forms of ultrasound-guided or wire-localization versus no image guidance at the time of the initial surgery was another variable taken into consideration for those patients requiring re-excision.

Statistical analysis was performed on the data using STATA (College Station, TX). Pearson Chi Squared analysis was performed on the following variables: re-excision rates, comorbid conditions, race and cancer stage. A t-test was used to analyze the median age of the two groups. Following analysis of the two groups, unadjusted and adjusted odds ratios were calculated to determine if differences in the two groups had any effect on re-excision rates.

Results

Over the ten-year period, a total of 88 patients required re-excision for positive margins. 67 of 293 (23%) patients required re-excision in the group prior to January 2013 versus 21 of 236 (9%) patients in the group after that date (See **Graph 1**). This was a statistically significant decrease in re-excision rate with a p value of <0.001. Overall re-excision rate as an institution for this ten-year study was 17%.

Graph 1. Re-excision Rates



The median age for the pre-2013 group was found to be 61.6 and the median age of the post-2013 group was 63.6. A t-test determined that there was a significant difference in the median age of the two groups, p value of 0.05. There was no significant difference in the race of the two groups, the pre-2013 group was 95.9% white and the post-2013 group was 96.2% white, p value of 0.45.

Table 1. Variable Analysis of Patient Groups

Characteristic	2005-2012	2013-2015	P value
Age	61.6 (11.6)	63.6 (11.0)	0.05
Race, %white	95.9 (282)	96.2 (226)	0.45
Hyperlipidemia (%)	15.6 (46)	37.0 (87)	<0.001
Hypertension (%)	47.3 (139)	53.2 (125)	0.18
COPD (%)	13.3 (39)	7.2 (17)	0.02
Heart Disease (%)	7.8 (23)	5.1 (12)	0.21
Stage (%) In situ I II III IV	 19.4 (57) 55.3 (162) 22.5 (66) 2.4 (7) 0.3 (1)	 10.2 (24) 49.4 (116) 37.9 (89) 1.7 (4) 0.8 (2)	0.001
Infiltrating Ductal Carcinoma (%)	67.4 (198)	76.2 (179)	0.03

The most reported comorbidities in descending order were hypertension, hyperlipidemia, COPD and heart disease. The pre-2013 group had 139 (47.3%) patients with hypertension, while the post-2103 group had 125 (53.2%) patients demonstrating no significant difference between the groups, p value 0.18. Hyperlipidemia did have a statistically significant difference between the

two groups, with the pre-2013 group having 46 (15.6%) patients and the post-2013 group having 87 (37.0%) patients, p value <0.001. The other comorbidity to have a significant difference between the two groups was COPD; the pre-2013 group had 39 (13.3%) patients, whereas the post-2013 group had 17 (7.2%) patients, p value 0.02. The final comorbidity examined, heart disease, demonstrated no difference in the populations, pre-2013 group having 23 (7.8%) patients and the post-2013 group having 12 (5.1%) patients, p value 0.21.

The remaining two variables examined were pathological stage and tissue pathology. The majority of patients' tissue pathology was infiltrating ductal carcinoma, with the pre-2013 group having 198 (67.4%) patients and the post-2013 group having 179 (76.2%) patients demonstrating a significant difference between the two groups, p value 0.03. There was a significant difference in the pathological stage breakdown between the two groups as demonstrated in Table 1.

Unadjusted and adjusted odds ratios were performed. Unadjusted odds ratio was 0.35 (0.21-0.59). Once adjusted for age and race, the odds ratio was 0.38 (0.22-0.63). Further adjustments included stage, comorbid conditions and tissue diagnosis and the odds ratio was then determined to be 0.39 (0.23-0.68). This is demonstrated in Table 2.

Table 2. Unadjusted and Adjusted Odds of Re-Excision for Breast Cancer by Group:

Model 1	Model 2	Model 3
0.35 (0.21 – 0.59)	0.38 (0.22 – 0.63)	0.39 (0.23 – 0.68)

*Model 1 = unadjusted; Model 2 = Model 1 + age and race; Model 3 = Model 2 + stage, hyperlipidemia, hypertension, COPD, heart disease, and infiltrating ductal carcinoma diagnosis

In 89% of the 88 patients that required re-excision, the surgeon used image guidance during initial lumpectomy or partial mastectomy. Fifty-nine patients (67%) had wire localization, while 19 (22%) had ultrasound guidance.

Discussion

A retrospective review was conducted of all the patients undergoing breast conserving surgery for early stage breast cancer over a ten-year time period and re-excision rates for positive surgical margins within our institution were evaluated. From 2005-2015 the overall re-excision rate was 17%, which was an acceptable rate compared to national standards. There was a statically significant reduction in re-excision rate following January 2013. Prior to this time the excision rate was at 22%, but subsequently decreased to 9%. Despite several significant differences between patient populations of the two groups, the adjusted odds ratio demonstrated that these differences had no effect on re-excision rates. To date, there had been little data addressing the effect that the new position statement of the American Society of Breast Surgeons had on re-excision rates. We found that among the patients having to undergo re-excision, most had image guidance at the initial surgery, demonstrating that re-excision rates were not influenced by the lack of image guidance. Individual surgeons and their respective re-excision rates were examined. Unfortunately, only one surgeon was practicing during the entirety of the study. That surgeon did have a reduction in re-excision rate from 14.1% pre-2013 to 7.5% post-2013.

Several questions have arisen as a result of the patient data. The patients from the re-excision group prior to January 2013 are currently being reviewed to see if based on the reported surgical margin at initial surgery, would re-excision still be required if the American Society of Breast Surgeon's treatment algorithm were applied? Pathology reports are being reviewed from the re-excision surgeries to determine if there was any residual tumor within the re-excised tissue. This especially concerns patients prior to January 2013 who may have had ink-negative margins but a margin width less than 2 cm, and thus re-excision was deemed necessary.

In conclusion, the present retrospective study of re-excision rates on stages was able to address initial questions and hypotheses. Moving forward, we plan to address the questions that have arisen as a result of the review, with the hope that we can continue to provide quality surgical care for patients with breast cancer undergoing breast conserving therapy.

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