



## Do Cavity Shave Margins Help Breast Conserving Surgery Outcomes?

Emma Huebner, Thomas Duncan, Javier Romero, Graal Diaz, Ken Waxman and Shawn Steen\*

Institute for Head & Neck Surgery, Ventura County Medical Center, Ventura, CA, USA

### Abstract

Breast conservation surgery yields positive margin with tumor in up to two-thirds of cases, often leading to re-excision. The removal of cavity shave margins has been an attempt to decrease the rate of positive margin. In this case-controlled, age-matched study, 139 patients who underwent breast conservation therapy with or without resection of additional margins were retrospectively assigned to an Additional Margins (AM) group or No Additional Margins (NAM) group. The rates of primary specimen positive margin, tumor presence in the additional margins, and final positive margin were analyzed. Removal of shave margins in the AM group contained additional multifocal cancer in 23% cases in which the primary specimen had negative margins. Despite finding this additional disease, the rate of final positive margin in the AM group was still less than the NAM group (21% and 40%, respectively,  $p < 0.01$ ). Fellowship-trained breast surgeons performed 97% of the surgeries in the AM group, while general surgeons performed 57% of the surgeries in the NAM group. Thus the positive margin rates were likely biased by surgical technique. Our findings suggest that resection of additional margins may be more beneficial in identifying multifocal disease than in decreasing the rate of positive margin and re-excision.

### Introduction

Since the 1980's, breast conservation surgery has become acceptable as surgical treatment for most breast cancers. However, positive margin with tumor is a frequent finding occurring in 29% to 66% of surgeries [1]. The current ASCO/ASTRO/SSO guidelines for invasive cancer are to assure that there is no tumor on the inked resection margin and no abnormal cells within 2 mm of the resection margin for DCIS [2]. These recommendations lead to frequent repeated operations, in order to obtain pathologically clear margins.

To decrease the incidence of positive margins, the removal of additional shave margins from the walls of the surgical cavity has become routine practice for some surgeons. The value in this practice may be to decrease pathologically involved margins and decrease re-excision surgery. What many studies have found, though, is that, in addition to testing for complete removal of the primary tumor, the removal of additional shave margins also identifies multi-focal disease not previously suspected. One randomized, controlled trial of cavity shave margins in breast cancer found no difference in complications, and 12% of the cases which had initial negative margins found multifocal disease in the new shave margins [3]. Another study reported a 10% rate of positive cavity margins despite negative breast conservation therapy margins [4,5]. Thus, additional margin removal may not only affect the rate of pathologically involved margins in breast conserving surgery, but it may also discover multi-focal disease that would otherwise have been missed.

The purpose of this study was to evaluate how the use of routine shave margins during breast conservation surgery impacted surgical outcomes in our community safety-net hospital. As seen with many safety-net hospitals with an underserved population, in our hospital, patients tend to present with more advanced disease. In addition, in hospitals such as ours with limited financial support, resource utilization becomes of utmost importance.

We initially hypothesized that routine shave margins would decrease the positive margin rate and re-excision surgery. The finding of unsuspected multi-focal disease in the new margins had not been studied at our institution prior to this review.

### Materials and Methods

This was a retrospective, case-controlled, age-matched comparative study that investigated cases of invasive cancer or DCIS undergoing breast conservation therapy. Positive margins were defined

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#### \*Correspondence:

Shawn Steen, Institute for Head & Neck Surgery, Ventura County Medical Center, 3291 Loma Vista Rd, Bldg 340, Suite 401 Ventura, CA 93003, USA, Tel: 805.652.6201; Fax: 805.641.4416; E-mail: shawn.steen@ventura.org

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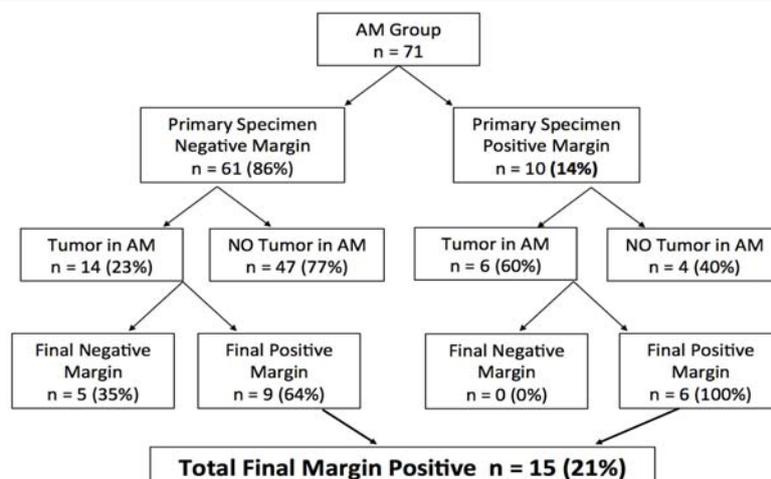


Figure 1: Margin results for the AM group.

as tumor on ink for both DCIS and IDC. The study compared patients without routine resection of cavity shave margins (No Additional Margins, or NAM group) with those who had routine shave of 3 or more additional margins (Additional Margins, or AM group). The use of shave margins at our facility coincided with the arrival of Society of Surgical Oncology fellowship trained breast surgeons on the surgical staff. Rates of tumor involved margins of the primary specimen, tumor presence in the additional margins, and final margin involvement with tumor were analyzed. Postoperative complications such as infection and seromas were tracked.

Analyzed outcomes also included the rate of primary specimen positive margin, rate of final positive margin, rate of re-excision surgery, size of specimen, and rate of wound complications. SPSS software was used for statistical analysis. The data distributions of the two groups were assumed to be normal and similar, so a two-tailed student's t-Test was done. Alpha was set at .05. SPSS Premium Grad Pack Version 23 was used.

## Results

A total of 139 patients were separated into two age-matched groups; there were a total of 71 patients in the AM group and 68 patients in the NAM group. There was no significant difference in age or tumor size between the groups. The AM group had a mean age of 57 (SD=10), and the NAM group had a mean age of 56 (SD=11) ( $p=0.67$ ). The mean tumor size in the AM group was 1.5 cm (SD=0.8) compared to 1.3 cm (SD=0.9) in the NAM group ( $p=0.69$ ).

The overall volume of breast tissue removed was higher in the AM group (226 cm<sup>3</sup>, SD=17) compared to an average of 161 cm<sup>3</sup> (SD=143) in the NAM group ( $p<0.01$ ). Although a larger volume was removed in the AM group, there was no significant difference in the rate of wound complications compared to the NAM group, 21% vs. 24% respectively ( $p=0.38$ ).

Before removal of any additional margins, the AM specimens had a significantly lower positive margin rate (10 of 71 patients, 14%) than the NAM primary specimen (26 of 68 patients, 39%) ( $p<0.01$ ) (Figure 1). After the AM primary specimen showed negative margins ( $n=61$ ), removal of shave margins contained additional cancer with intervening normal breast parenchyma defining this as multifocal disease in 23% (14 of 61) cases, many of these leading to a persistently

positive final margin. This increased the final positive margin rate from 14% after primary specimen alone to 21% after the additional margins taken in the AM group. The rate of final positive margin in the AM group was still less at 21% (15 of 71), however, compared to 40% (27 of 68) with final positive margins in the NAM group ( $p<0.01$ ).

Re-excision surgery was performed on 19 of 71 patients (27%) in the AM group, a significant decrease compared to 25 of 68 patients (37%) in the NAM group ( $p=0.04$ ).

## Discussion

In our study, the AM group showed a significant decrease in both final positive margins and re-excision surgery. This finding has been seen in other studies also. In a prior propensity score-matched study, while 74.4% of patients had clear margins after breast conservation therapy, 98.3% were clear after taking cavity shave margins, reducing the re-excision rate by 17% [6]. Another single institution retrospective review reported a nine-fold decrease in rate of re-excision when cavity shave margins were taken at the time of initial partial mastectomy [7].

On the other hand, multiple articles have also found no decrease in margin positive rate or re-excision surgery by taking additional cavity shave margins. A retrospective study by [8] of 773 cancers treated by breast conservation therapy found that cavity shave margin resection at the time of breast conservation therapy did not decrease re-excision rates [8,9] reported a decrease in false-positive margins with additional margin resection but no corresponding decrease in rate of re-excision [9]. Despite finding a decrease in the rates of positive margins and re-excision surgery in our study, the variation in the literature points to the difficulty in studying surgical outcomes when different surgeons are generating the data. Many confounding variables in how a surgery is performed from surgeon to surgeon can affect the final outcome, making causation difficult to determine. In our study, the primary specimens of the AM group had significantly less positive margins while also having smaller volumes than the primary specimens of the NAM group. This suggests a surgeon bias; 97% of the surgeries in the AM group were performed by fellowship-trained breast surgeons, while 57% of the surgeries in the NAM group were performed by general surgeons. Specialty trained breast surgeons seem to remove the tumor with more accuracy and with less tissue during the primary specimen excision, but then go on to

perform the additional margins which increases the final specimen volume to more than that of the NAM group. The final outcomes of this study were likely biased by surgical technique variation amongst the surgeons more than the actual technique of additional shave margins.

The value of removing additional shave margins during breast conservation therapy may lay more in the identification of unsuspected multi-focal disease than in the goal to decrease positive margin rates. When examining our AM group, removal of additional margin tissue actually increased the final margin positivity rate. While only 14% of the AM patients had positive margin on initial specimen, additional multifocal disease found in the additional margin tissue increased the final margin positive rate to 21% in this group. Some studies have found that taking cavity shave margins may detect more multifocal cancers while not necessarily decreasing positive margin rate in patients with DCIS [10,11]. Finding tumor in additional shave margins suggests more aggressive or multifocal disease. A positive cavity shave margin has been associated with higher tumor grade, extensive intra-ductal component, younger age and larger tumor diameter [12-14]. One longitudinal single institution study over a span of more than 20 years reported that cavity shave margins found multifocal disease in the cavity shave tissue in 11% of patients who had negative margins on the primary specimen. The patients with multifocal disease in the additional margins had a significantly worse overall survival. In our study, multifocal cancer was discovered in 23% [1] of cases in the AM group, although we cannot comment on the long-term local recurrence risk and survival as these were not analyzed due to our short follow-up of less than two years. Despite larger specimen size in the AM group, our study found no increase in wound complications, making any possible additional benefit in this technique likely to outweigh the downsides to slightly larger tissue volume removal.

The drawbacks to this study include that it was a retrospective, non-randomized review. Long-term follow-up and prospective data collection would be beneficial in determining any potential decrease in local recurrence that cavity shave margins may provide.

## Conclusion

At initial review, this study seems to support the removal of additional margins in breast conservation surgery to reduce the rate of final positive margin as well as the need for re-excision surgery. On deeper analysis, however, the rates of margin positivity are likely confounded by surgical technique. We also found that routine removal of additional margins actually increased the rate of final positive margins when compared to the primary specimen of those patients. The value of routine resection of additional margins during breast cancer surgery might be to identify and remove multifocal cancer, rather than to detect incomplete resection of the primary tumor. The long-term benefit in local recurrence and prognostic value of this technique will need to be further examined.

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