



Revisiting the modern toolkit to optimize breast conservation surgery

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Reoperation after lumpectomy

For patients with early breast cancer, breast conservation therapy results in higher patient satisfaction with equivalent or improved long-term survival compared to mastectomy (1,2). The risk of positive margins after lumpectomy, however, remains a problem. Reoperations after initial breast conservation surgery (BCS) often exceed 20%, compromising aesthetic results, driving up healthcare costs, and prolonging time to adjuvant therapy for tens of thousands of women each year.

In the current study of more than 520,000 women identified from the National Cancer Database (NCDB); Landercasper *et al.*, report an overall reoperation rate of 16.1 % after BCS (3). More than 1,200 facilities were included in their analysis, of which, only 1 in 4 facilities had a reoperation rate under 10%, the European quality benchmark (4). On multivariate analysis, Facility ID was the variable most significantly associated with reoperation. Notably, there was a four-fold variation in reoperation rates between facilities at the 10th and 90th percentile, a difference not explained by facility volume, lumpectomy rate or case mix (3).

With their elegant use of the NCDB, Landercasper *et al.*, have demonstrated the true scale of this problem for the first time. Their results confirm those from McCahill *et al.* in 2012, who showed significant variation in post-lumpectomy reoperation rates between 4 affiliated institutions (5). This earlier work found the hospital facility itself to be the most important determinant for reoperation,

regardless of margin status after initial BCS. Yet, in both studies, the root cause for interfacility variation could not be delineated from the available data, suggesting important variables were left unmeasured.

Retrospective studies using large aggregate datasets with standardized variable fields are not sufficiently detailed to answer disease-specific research questions, often limiting a study's conclusions. For example, breast density was recently shown to have a significant impact on reoperation rates after lumpectomy (6), but this variable was not included in the studies by Landercasper or McCahill. Likewise, individual differences in decision-making and operative technique among breast surgeons, can cause significant variability in reoperation rates within a given facility (7), yet these factors are not captured in the aforementioned datasets.

Educating individual breast surgeons for improvement is arguably the most effective way to decrease both the overall rate of reoperations after lumpectomy, and the wide interfacility variation. Importantly, there are several methods for a surgeon to improve on this benchmark (8). Here, we revisit some of the tools to help minimize rates of reoperation after BCS.

Margin guidelines

In 2014, the Society of Surgical Oncology (SSO) and American Society for Radiation Oncology (ASTRO) published a consensus guideline for “no ink on tumor” as the new margin standard after BCS for invasive disease (9).

Adoption of the SSO-ASTRO guideline has significantly reduced reoperation rates (10), yet over 25% of surgeons remain non-compliant with this recommendation (11,12). While it is possible that low-volume, or community breast surgeons have yet to adopt this guideline, the work by Landercasper *et al.*, may shed alternative insight. According to their analysis, women with aggressive tumor types (based on grade, receptor expression, and nodal status) were more likely to undergo a reoperation after lumpectomy (3). Interestingly, if tumor margins are the main indication for reoperation after lumpectomy, these factors should bear no influence on a surgeon's decision to return to the operating room. Ongoing efforts to educate all breast surgeons regarding this new guideline should help patients with "no ink on tumor" avoid unnecessary reoperation.

Intraoperative assessment of margins

In addition to stricter guideline adherence, a number of intra-operative tools exist to help breast surgeons reduce positive margins, which in turn, can reduce reoperations after BCS. Many of these techniques were discussed by Gray *et al.*, in a recent systematic review (13). In terms of tumor localization, intraoperative ultrasound can reduce the rate of positive margins and reoperations after BCS. Moreover, intra-operative margin assessment may provide a cost-effective reduction in reoperation rates (13), an approach we are actively investigating.

Oncoplastic surgery

Oncoplastic surgery refers to a range of breast conservation techniques, combining wide tumor resection with immediate breast re-shaping (14). Since its inception in Europe the early 1990's, oncoplastic techniques have helped hundreds of thousands of women avoid mastectomy, and have rapidly become an important part of the armamentarium for European breast surgeons, complete with integrated training, formalized accreditation, and advanced degrees (15,16). Oncoplastic techniques are especially useful for large invasive or *in-situ* lesions at high risk for significant deformity after lumpectomy (17,18). Importantly, when compared to traditional BCS; oncoplastic surgery has consistently proven to decrease the rates of positive margins, reoperations, and local recurrence, while improving the cosmetic results for wide resections (19).

Despite a growing body of supporting evidence over the last decade; rates of oncoplastic surgery in North America

lag behind those in Europe (20). A main reason is that many senior breast surgeons have no oncoplastic experience, and less than a third of the current breast surgery fellows will be exposed to oncoplastic techniques during their training (21). However, the tide is turning. In 2016, the American Society of Breast Surgeons (ASBrS) officially acknowledged the value of oncoplastic surgery by establishing an Oncoplastic Surgery Committee. In 2019, the ASBrS endorsed the European definition and classification by Clough *et al.* (14), while beginning to offer preliminary certification in oncoplastic techniques (22).

Final thoughts

The wide variation in reoperation rates after BCS highlights an urgent need for internal auditing and quality improvement initiatives. As the multimodal management of breast cancer is constantly evolving breast surgeons should continue to lead and innovate. Oncoplastic surgery, when used appropriately, represents an important addition to improve the quality of care for breast cancer patients. In holding themselves accountable for improvement, it is mandatory that breast surgeons incorporate all tools available to reduce the number of reoperations after lumpectomy.

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Footnote

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