Commentary on: Nipple-Sparing Mastectomy Through an Inframammary Fold Incision with Implant-Based Reconstruction in Patients with Prior Cosmetic Breast Surgery

Kenneth C. Shestak, MD; and Edward H. Davidson, MA (Cantab), MBBS

Nipple-sparing mastectomy (NSM), as the latest evolution of mastectomy technique, has proven to result in improved reconstructive and aesthetic outcomes in breast cancer care. Moreover, the oncologic safety of this approach in selected patients is now well-established. The procedure may be performed through a radial, transverse areolar, lateral, inferolateral, double concentric periareolar, vertical infraareolar, or inframammary incision. This procedure affords the possibility for immediate autologous reconstruction, reconstruction with a tissue expander and subsequent expander implant exchange, or the direct-to-implant method.

Patient and technical risk factors that increase risk of complications, namely skin and nipple-areola complex ischemia and necrosis, have been described. Smoking, body mass index, breast size, and preoperative radiation are predictors of complications. An increased rate of nipple necrosis is associated with the periareolar/circumareolar and trans-areolar incision patterns compared with radial or inframammary approaches. A higher incidence of nipple necrosis is seen when the selected implant with its larger volume is placed at the time of mastectomy as opposed to the more conservative two-stage tissue expander-based reconstruction strategies. Reconstruction with autologous tissue rather than implant-based strategies may also confer protection from ischemic complications in terms of reconstruction failure.

Prior breast surgery, with resultant scarring and disruption of native blood supply, has a clear potential to affect the complication profile of nipple-sparing mastectomy procedures and increase the risk of skin and nipple area complex ischemia and necrosis. Nipple-sparing results in a nipple-areola complex and skin envelope that is largely dependent on the sub-dermal plexus for vascularity, given that intercostal and internal mammary perforators are often likely to be disrupted. Augmentation mammoplasty, mastopexy, augmentation-mastopexy and reduction mammoplasty all further violate this network of vessels to some degree. Successful nipple-sparing mastectomy in these patients, therefore, relies on a vulnerable blood supply that has been previously compromised.

The current article retrospectively reviews the authors’ experience with nipple-sparing mastectomy and implant-based breast reconstruction through an inframammary fold incision in patients that had undergone prior cosmetic breast surgery, augmentation mammoplasty, mastopexy, augmentation-mastopexy or reduction mammoplasty. Significantly higher rates of mastectomy skin flap necrosis were noted with those patients that had undergone prior breast surgery, especially when single-stage reconstruction was attempted. The temporal relation from prior surgery to nipple-sparing mastectomy and the complication rate was no different in this study whether the time elapsed was greater than or less than a year. This suggests again (as many plastic surgeons believe) that blood vessel growth across established scars does not increase with time. The authors also found a higher hematoma rate in those with...
prior cosmetic breast surgery (attributed to increased difficulty of dissection through scar tissue). The authors do not explicitly distinguish nipple-areola complex necrosis from “mastectomy skin flap necrosis,” and, aside from a description of full or partial thickness, the extent of the ischemia is not described. Nonetheless the ischemia rate was 31% for those patients with a history of cosmetic breast surgery. The prosthesis explantation rate of 7.5% was, however, not significantly different from those without prior surgery.

Other surgical groups have similarly catalogued their experience. Alperovich et al\textsuperscript{14} compared reconstructive complications after nipple-sparing mastectomy between patients with previously augmented breasts and a larger cohort that had not undergone prior augmentation and found no statistically significant differences in complications including rates of mastectomy flap necrosis, partial nipple-areola complex necrosis and complete nipple-areola complex necrosis. Of note, in this cohort, patients undergoing implant-based reconstruction all received initial placement of tissue expanders with subsequent expander-implant exchange rather than direct-to-implant reconstructions. The authors also stress that mastectomies were performed sharply with the minimal need of electrocautery to protect the sub-dermal plexus.\textsuperscript{14} These authors have also presented their experience with nipple-sparing mastectomy in patients with a history of reduction mammaplasty or mastopexy. In all cases, prior reduction mammaplasty/mastopexy incisions were done for nipple-sparing mastectomy. Notably, intraoperative perfusion assessment of the mastectomy flaps following completion of mastectomy, using indocyanine green and the SPY Elite System (Life-Cell Corp., Branchburg, N.J.) was performed to guide surgical decision-making. Again, no direct-to-implant procedures were performed. There were no cases of nipple necrosis, partial or complete.\textsuperscript{15} Sbitany et al also demonstrated no increased morbidity related to vascular compromise of the nipple-areola complex and mastectomy skin flaps following breast augmentation. Again, direct to implant reconstruction was avoided in favor of staged expander-based reconstruction. This group advocated using an inframammary fold incision in those patients with prior implant placement through an inframammary incision or a small intraareolar/periareolar incision in the past. However, in patients with significant descent of breast parenchyma over the implant or history of augmentation mastopexy, a small peri-areolar incision for nipple-sparing mastectomy was preferred to minimize risk of nipple areola and skin flap necrosis.\textsuperscript{16}

Considering the contrast in outcomes between these reports and the current manuscript, rather than “hoping for the best”, patients with prior breast surgery must be identified as potentially high risk for ischemic complications and management considerations and decisions should be made accordingly both preoperatively and intraoperatively. In addition to avoiding direct to implant reconstruction, identifying and maintaining the proper plane just above the anterior breast capsule is important in that it will preserve the sub-dermal plexus and any remaining medially located perforating vessels from the internal mammary vessels\textsuperscript{12} as well as minimizing thermal injury to this important circulatory plexus for the NSM flap. It is also important to note that using fluorescent imaging to assess vascularity intraoperatively have led to success in the above studies. In the current study, however, epinephrine infiltration during the mastectomy precluded this technology.

High-risk patients such as these may also benefit from exploring other strategies targeted to optimize nipple preservation. Swistel et al have described how preoperative Doppler ultrasound was done to identify the internal mammary artery perforators. Internal mammary artery perforators corresponding to the Doppler mapping were identified and spared.\textsuperscript{17} A pre mastectomy surgical delay procedure improves nipple survival in high-risk patients.\textsuperscript{18} The delay procedure is performed 7 to 21 days prior to mastectomy: the skin flap is elevated in the plane of a therapeutic mastectomy beneath the nipple-areola complex and surrounding mastectomy skin.\textsuperscript{19}

Given the lack of prospective data, it is difficult to definitively outline specific treatment algorithms for this patient population. However, for the evidence to date, the following recommendations are at least prudent in order to maximally shift the balance towards a favorable outcome. Patients with prior breast surgery undergoing nipple-sparing mastectomy should be counseled that autologous reconstructive options might harbor less risk of reconstructive failure due to ischemic complications. This is because, in the event of an ischemic complication, exposure of underlying autologous tissue is likely less of a reconstructive challenge than an exposed prosthesis. When employing an implant-based reconstruction plan, patients and practitioners should be aware that the direct-to-implant approach maximally stresses the NSM flap. This likely potentiates the risk of ischemia to a greater degree than a tissue expander whose volume can be decreased – all the way to zero – as necessary, perhaps altering the circulatory dynamics of the flap in an important and positive way for the patient. Premastectomy nipple-delay procedure should also be considered. Preoperative Doppler and intraoperative fluorescence imaging may aid in guiding surgical decisions. As mentioned, careful identification of the anatomic plane and a preference for sharp dissection over electrocautery may also help preserve blood supply.

Questions obviously remain regarding the relative importance of each of these recommendations. The role of elapsed time from initial breast surgery and decisions regarding choice of incision also remain unclear. The work published here and elsewhere on this topic serves as a benchmark for guiding management but highlights the
need for prospective data. What remains clear is that as elective breast surgery and nipple-sparing mastectomy increase in scope and popularity, this patient cohort will increase in size.

As the results obtained from NSM come closer and closer to those seen with breast augmentation, these patients likely will represent a more aesthetically discerning group with higher expectations and less tolerance for complications despite their risk profile. As surgeons, we too must also strive to be equally discerning in both patient selection and technique selection, which will result in more optimal outcomes from the standpoint of reducing complications. We congratulate the authors for bringing their experience and data to our attention.

Disclosures

Dr. Shestak is on the Advisory Board of Allergan Medical (Irvine, CA). Dr. Davidson has nothing to disclose.

REFERENCES