

Accurate Nipple Areolar Positioning in Nipple-sparing Mastectomy Reconstruction

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Summary: Nipple-sparing mastectomy continues to grow in popularity as oncologic indications for preserving the nipple areolar complex have become less stringent and more patients with genetic predispositions to breast cancer seek aesthetically superior prophylactic mastectomy reconstructions. Nonetheless, nipple malposition remains a common and disturbing complication. This article proposes several anatomic variations that predispose to nipple malposition and a strategy to avoid it through a reliable, easily reproducible method of preoperative marking and intraoperative stabilization. (*Plast Reconstr Surg Glob Open* 2019;7:e2064; doi: 10.1097/GOX.0000000000002064; Published online 14 January 2019.)

In the continuing evolution of breast cancer treatment and aesthetic reconstruction, nipple-sparing mastectomy (NSM) represents an increasing proportion of mastectomies.¹ NSM allows for improved cosmesis and has demonstrated psychological benefits for patients with overall greater satisfaction as compared with nipple reconstruction.^{2,3} Nonetheless, nipple malposition with implant-based reconstruction occurs with a frequency between 13.8% and 69.2%.⁴⁻⁶ To anticipate and avoid this problem, we describe specific anatomic situations which predispose to vertical and horizontal nipple malposition. We will present a method to properly locate the nipple areolar complex (NAC) through preoperative markings and suggest techniques to maintain this position postoperatively in both subpectoral and prepectoral reconstructions.

Vertical NAC malposition is relatively easy to predict and to prevent. The ideal height of the NAC should be two-thirds of the distance of the base diameter projected up from the IMF according to Tebbets.⁷ In a patient with pseudoptosis, the skin envelope, which curves around the lower pole of the breast, if kept in its entirety, will place the NAC too high on the breast reconstruction mound. In

these patents, a portion of the lower pole skin, just above the mastectomy IMF incision, can be trimmed to the appropriate dimensions at the time of reconstruction. Likewise if the distance is too short, abdominal skin can be thinned and advanced onto the breast mound (**see figure, Supplemental Digital Content 1**, which displays the patient had prior subglandular breast augmentation and subsequent bilateral NSM with prepectoral reconstruction. Vertical nipple asymmetry was addressed by trimming the mastectomy flap on the right and advancing abdominal wall skin into the breast reconstruction on the left, <http://links.lww.com/PRSGO/A945>).

There are 4 preoperative anatomic variations that predispose to lateral nipple malposition. Patients with an NAC that is already lateral are obviously prone to persistent or exacerbated malposition with reconstruction. A second group of patients who are at risk are those with a normal-appearing NAC placement preoperatively but who have a significant amount of breast mound projecting laterally beyond the footprint of the breast. When the lateral contour of the breast is diminished postreconstruction, the NAC will appear to have lateralized. Similarly, lateral NAC malposition can occur in patients with wide preoperative cleavage. Implant reconstruction can narrow breast cleavage, especially in prepectoral reconstructions. Medializing the breast footprint visually displaces the NAC laterally. Finally, patients with significant preoperative ptosis can similarly experience postoperative lateralization of the NAC. These patients may have appropriately positioned NAC's preoperatively in terms

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of laterality, but when the distance from the sternum to the NAC is projected horizontally instead of obliquely, the NAC will be malpositioned laterally.

A method for accurate nipple placement in breast reconstruction was designed using fixed landmarks (see video, Supplemental Digital Content 2, which displays preoperative markings for accurate nipple areolar positioning in implant-based reconstruction. Markings based on bony landmarks. This video is available in the “Related Videos” section of the Full-Text article at PRSGlobalOpen.com or at <http://links.lww.com/PRSGO/A948>). The patient is positioned standing. The base diameter (B.D.) of the breast is measured, as is the ideal B.D., which may be wider than the actual footprint. A vertical “plumb line” is dropped at the midline of the sternum. A second vertical is dropped from the clavicle at a distance, which is approximately half, or slightly longer, of the width of the chosen implant diameter. This is measured beginning just lateral to the sternum (where the new footprint of the breast will be located). The ideal vector from the sternal notch as described by Fabie,⁸ an oblique line at approximately 38 degrees, is drawn. Lifting the breast if necessary, a horizontal line from the sternum to the ideal NAC position is now marked. Since the ideal placement of the NAC should be at or below the equator of the breast, this point should be at half the distance of the B.D., or slightly less, measured upward from the inframammary fold. The placement of the new NAC will be at the intersection of these 3 vectors (see figure, Supplemental Digital Content 3, which displays preoperative trajectory from sternum to NAC, a. Projected trajectory without quilting sutures a’, <http://links.lww.com/PRSGO/A949>). Because these markings have bony origins they will remain reliable when the patient is repositioned supine in the operating room.

Once the ideal nipple position is determined, fixation of the mastectomy flap with multiple points of fixation is recommended since, without stabilization, areolar position will tend to migrate according to the skin envelope mechanics. In a small breast or one that is not predisposed

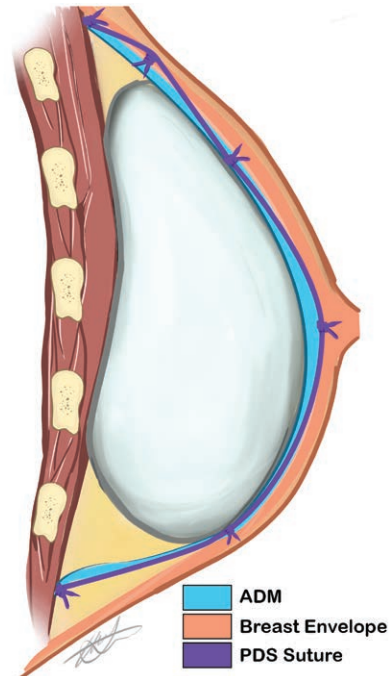


Fig. 1. Cable suspension sutures lateral view.

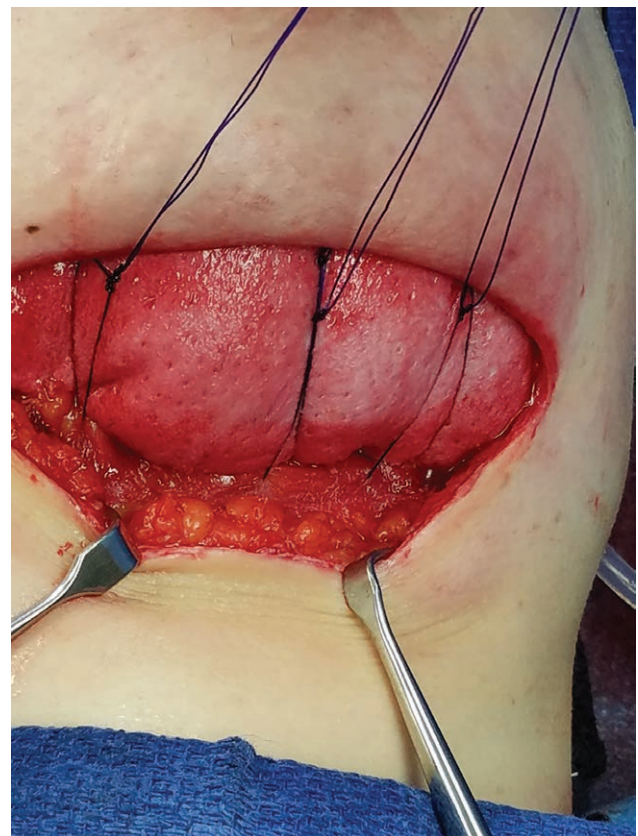
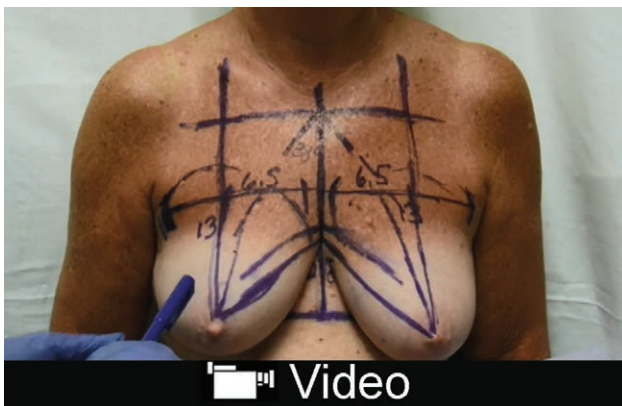


Fig. 2. Cable sutures as viewed from below.



Video Graphic 1 . See video, Supplemental Digital Content 4, which displays preoperative markings for accurate nipple areolar positioning in implant-based reconstruction. Markings based on bony landmarks. This video is available in the “Related Videos” section of the Full-Text article at PRSGlobalOpen.com or at <http://links.lww.com/PRSGO/A948>.

to malposition few if any sutures are necessary. Plication in a subpectoral reconstruction consists of multiple interrupted quilting sutures of 2-0 Vicryl placed between the

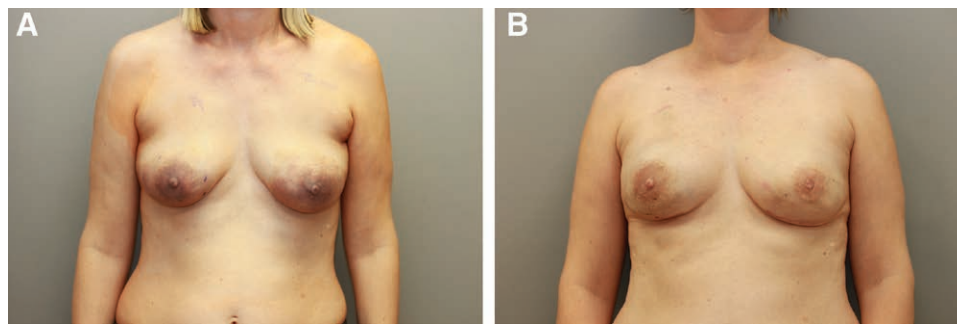


Fig. 3. Before (A) and after (B) prepectoral NSM reconstruction with cable suspension sutures for NAC elevation and stabilization. Five-month follow-up, before fat grafting.

mastectomy flaps and the subjacent pectoralis muscle in the upper pole, and the ADM in the lower pole, as previously described by the author.⁹ These sutures are facilitated by the fact that all NSM patients have had a surgical delay procedure 2 weeks earlier and so the mastectomy flaps are thicker and easier to sew and well vascularized.¹⁰ Suturing the flap can be fairly elusive in prepectoral reconstruction where the subjacent ADM is inherently soft and elastic. Therefore, in prepectoral reconstructions, the senior author uses 3-0 polydioxanone sutures as “suspension cables.” These begin at the subclavicular musculature and are affixed first to the ADM then back to the mastectomy flap and then back to the ADM (Figs. 1, 2). In direct-to-implant reconstruction, the polydioxanone cable ends at the IMF to stabilize the entire implant, with expanders, the cable ends just below the NAC, to stabilize the NAC without interfering with expansion. Long-term results with this plication technique will be submitted as a separate paper. Plication has been found to be more stable in the author’s hands than either suction dressings or occlusive dressings (Fig. 3).

DISCUSSION

Nipple malposition is a potentially devastating complication, and with the increasing popularity of prepectoral breast reconstruction, a problem that is more difficult to treat, as local flaps^{4,6,11–14} and re-undermining and redraping the mastectomy flap⁹ are no longer viable options unless the mastectomy flaps are quite thick. Therefore, prevention of this complication has become paramount.

The ideal NAC position has been described and debated by many authors.^{7,15–19} Penn’s arbitrary 21 cm distance from the sternal notch and Maliniac and Lassus’ measurements related to the humerus are often inaccurate because they do not take into account the significant variations of the footprint of the breast on the chest wall.^{16–18} Although Pitanguy’s point remains helpful for breast reduction, in an implant-based reconstruction where all of the reconstructed breast mound is above the IMF, it is irrelevant.¹⁰ Tebbetts’ system for ideal NAC positioning is helpful to determine ideal subareolar flap length intraoperatively but not preoperatively⁷ since the amount of skin below the NAC may be modified intraoperatively. We have used the straightforward metric of the anticipated prosthetic

base diameter to determine vertical and horizontal axes relative to the clavicle and the sternum. These are combined with Fabié’s angle of approximately 38 degrees from the sternal notch,⁸ to locate the ideal position using horizontal, vertical, and oblique vectors. These 3 data points are ideal because they are specific to the breast wherever the footprint may be on the chest wall. Quilting sutures have helped to stabilize NAC position postoperatively in subpectoral reconstructions and cable suspension sutures originating from the subclavicular pectoralis have been used in prepectoral reconstructions.

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