OPEN

PRS GLOBAL OPEN

ORIGINAL ARTICLE
Breast

Optimizing Nipple Position following Nipple-Sparing Mastectomy

Amy S. Colwell, MD*
Erin Taylor, MD*
Michelle Specht, MD*
Jay S. Orringer, MD†‡

Background: The best treatment for nipple malposition following nipple-sparing mastectomy is prevention. This article reviews basic elements for success in nipple-sparing mastectomy and offers an option to patients with grade 2–3 breast ptosis who strongly desire to preserve the nipple.
Methods: Retrospective review identified patients undergoing nipple-sparing mastectomy and immediate reconstruction.
Results: Patient selection centered on realistic goals for postoperative breast size, nipple position, and when not to save the nipple. The choice of device considered projection and nipple centralization as equal components and led to wider, lower profile devices selectively for the first stage of reconstruction. In severe grade 2–3 nipple ptosis, an inferior vertical incision or wedge excision was used to enhance nipple position postoperatively. Eighteen consecutive patients underwent 32 implant-based breast reconstructions following nipple-sparing mastectomy with the vertical incision. The average age was 45 years old, and the average body mass index was 26.7. Direct-to-implant reconstruction was performed in 25%, whereas 75% had tissue expander-implant reconstruction. Overall complications included infection (3%) and nipple necrosis (3%) leading to explant in 1 reconstruction.
Conclusions: The final nipple position following nipple-sparing mastectomy can be optimized with preoperative planning. The vertical incision, combined with proper patient selection and choice of device, may increase eligibility for nipple-sparing procedures in patients with grade 2–3 ptosis who desire nipple preservation.
(Plast Reconstr Surg Glob Open 2017;5:e1490; doi: 10.1097/GOX.0000000000001490; Published online 13 September 2017.)

INTRODUCTION

Nipple-sparing mastectomy techniques are increasingly popular in mastectomy performed for cancer or risk reduction.[1–5] Preservation of the native nipple is desired by many women to enhance the overall cosmetic result. For patients with small-sized breasts and grade 1 ptosis, the inferolateral inframammary fold incision offers excellent access and cosmesis.[1,6] In patients with increasing breast size and severity of ptosis, it can become challenging to center the nipple on the implant or flap. Few studies educate the plastic surgeon on patient selection and technical pearls to achieve the best reconstruction. This article discusses the nuances of reconstruction following nipple-sparing mastectomy and offers practical advice to achieve the best results in breasts of all sizes.

*From the *Division of Plastic Surgery, Massachusetts General Hospital, Harvard Medical School, Boston, Mass.; †The John Wayne Cancer Institute, Santa Monica, Calif.; and ‡Renaissance Medical Center for Aesthetic Surgery, Los Angeles, Calif.*

Received for publication June 6, 2017; accepted July 19, 2017.

DOI: 10.1097/GOX.0000000000001490

METHODS

Institutional review board approval was obtained for patient chart review. The senior authors reviewed their experience in nipple-sparing mastectomy reconstructions. Demographics, complications, and outcomes were reviewed retrospectively in 18 consecutive patients who had the inferior vertical incision.

RESULTS

Patient and Device Selection

The best candidates for nipple-sparing mastectomy are those with grade 1 nipple ptosis (Fig. 1). An inferolateral inframammary fold incision is chosen to hide the incision

Disclosure: *Dr. Colwell is a consultant for Lifecell and Allergan. The Article Processing Charge was paid for by the authors.*

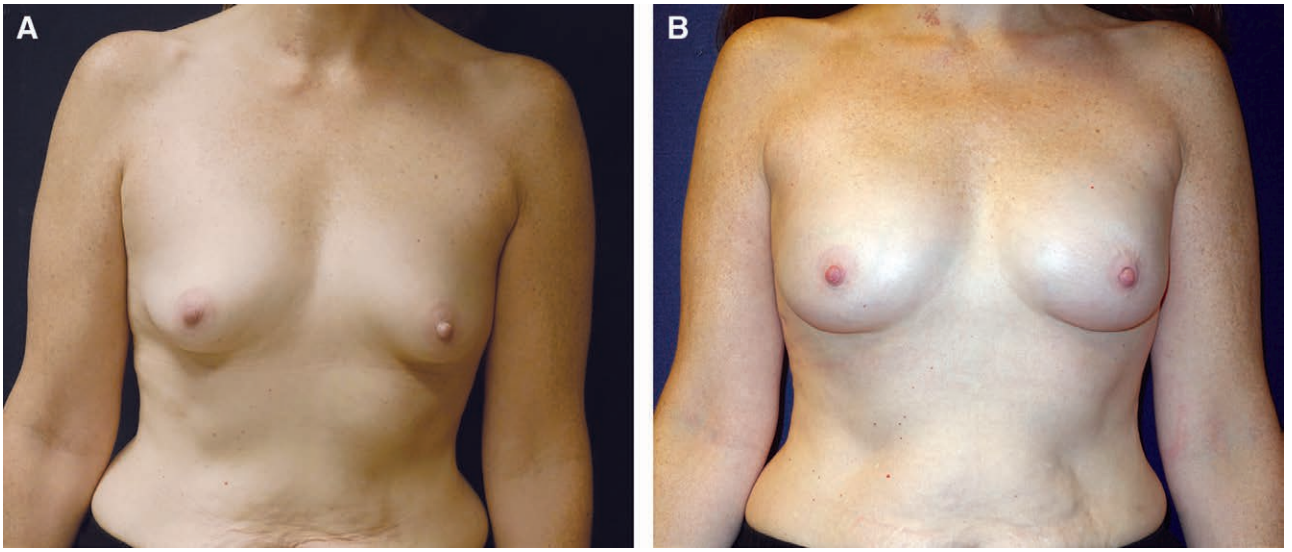

Fig. 1. This patient had bilateral nipple-sparing mastectomy and direct-to-implant reconstruction using an inferolateral inframammary fold incision. A, Preoperative photograph. B, Postoperative photograph.

under the breast and offers excellent access and exposure. The incision starts at the 6 o'clock position on the breast and extends to the 9 o'clock position. This lateral extension offers better access for the breast oncology surgeon to reach the superior breast without undue stress to the mastectomy skin flap. For larger breasts, the length of the incision is naturally increased, thus allowing excellent access.

As the size of the breast increases and the degree of nipple ptosis increases, the plastic surgeon selectively guides the patient into either a nipple-sparing or skin-sparing approach. For patients with a modest degree of ptosis, an inframammary fold incision with nipple preservation may offer a very acceptable result and one preferable to a skin-sparing approach or one with visible scars on the breast. In this subgroup, complete filling or overfilling of the skin envelope can help avoid nipple lateralization. As the degree of ptosis increases, the patient's options include skin-sparing mastectomy, mastopexy before mastectomy, or a vertical incision/excision. Inframammary fold incisions in this group should be largely avoided.

For the first-stage reconstruction with either an implant or an expander, a device is chosen to centralize the nipple on the device. The base width may be wider than is typical for skin-sparing reconstructions to avoid lateralization of the nipple. In small-to-moderate sized breasts and direct-to-implant reconstruction, lower profile (wider base width for given volume) implants may be necessary for optimal nipple position.

VERTICAL INCISION

As the degree of ptosis progressed to severe grade 2 or 3 nipple ptosis, the patient was counseled for skin-sparing mastectomy if they desired significant uplift or size reduction. A mastopexy before mastectomy was offered for patients without cancer who were undergoing mastectomy for risk reduction. In patients with severe grade 2 or 3 nipple ptosis with breast cancer, or in those who did not desire to delay surgery, a vertical incision, with or without elliptical wedge excision was performed (Figs. 2, 3). The vertical incision spanned from just below the base of the areola to approximately 1–2 cm above the inframammary fold. If the incision was too short in relation to the breast, the incision was extended approximately 25% around the edge of the areola laterally (Fig. 4). Extension more than 25% was not performed. In most cases, the vertical incision edges were deepithelialized approximately 3–5 mm on each side for a 3 layer closure. In a few patients with excessive skin, an ellipse of skin was deepithelialized to remove redundancy. Direct-to-implant was performed if the skin envelope was healthy at the time of surgery and the patient desired to stay approximately the same size. Tissue expander-implant reconstruction was chosen if the skin was unhealthy at the time of surgery or as a planned procedure to allow fat grafting, mastopexy, or size adjustment. Eighteen consecutive patients underwent 32 unilateral (9%) or bilateral (91%) nipple-sparing mastectomy procedures using the vertical incision. The average age was 45 years old, body mass index 26.7, and there were no smokers. Fifty-six percentage were prophylactic, and 44% were therapeutic. One had preoperative radiotherapy, and 3 had postmastectomy radiotherapy. Direct-to-implant reconstruction was performed in 25% and tissue expander-implant reconstruction in 75%.

The overall complication rate was 6%. Individual complications included infection (3%) and nipple necrosis (3%). There were no hematomas or seromas. One patient had an explant secondary to the infection. Although the nipple was not completely centralized in every case, no patient requested nipple removal secondary to malposition.

DISCUSSION

Nipple malposition following nipple-sparing mastectomy is very difficult to correct. Therefore, the best treatment of nipple malposition is in prevention. Prevention of nip-

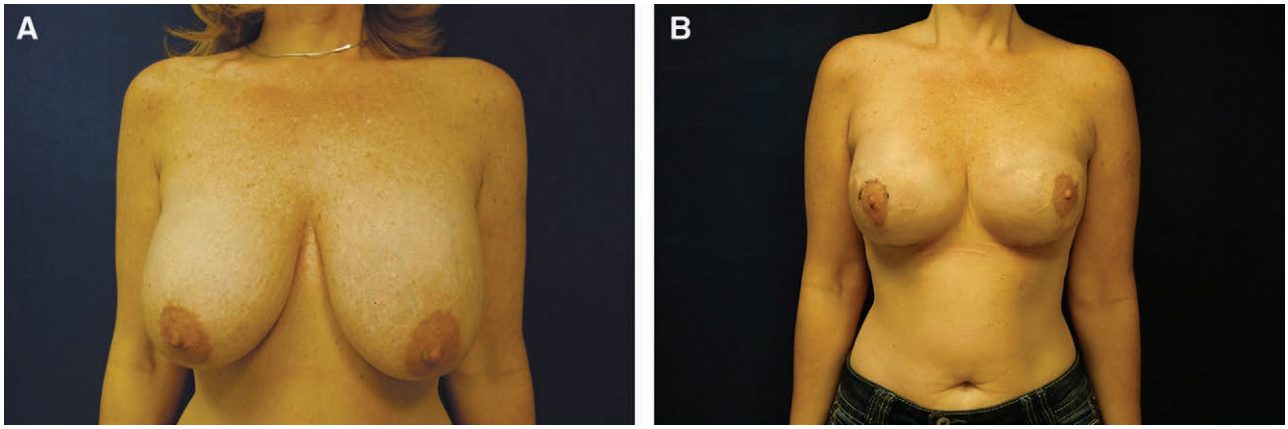

Fig. 2. A, This 43-year-old woman had invasive right breast cancer. She had a history of subglandular breast augmentation 10 years prior. This patient strongly desired nipple preservation but was turned down at 2 hospitals. We used a vertical incision for the nipple-sparing mastectomy and placed immediate tissue expanders with partial muscle coverage and acellular dermal matrix. At the time of closure, 3 mm of skin was deepithelialized on each side for a 3 layer closure. B, She was exchanged to 800 cc smooth round high profile silicone implants and a crescent mastopexy was performed on the right. No other skin adjustment was performed. The amount of nipple elevation from preoperative to postoperative measured 4.5 cm on the left and 4 cm on the right.

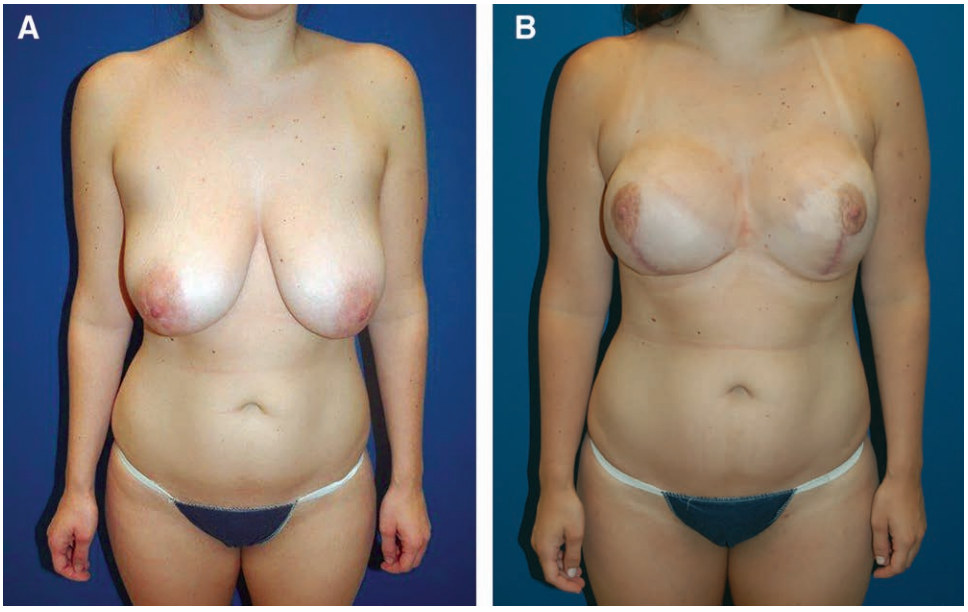

Fig. 3. A, This 26-year-old woman had the BRCA2 gene. She desired nipple preservation and an uplift of the breasts with her mastectomy. She underwent bilateral nipple-sparing mastectomy procedures with a vertical ellipse deepithelialized at the time of closure over tissue expanders. B, She then had exchange of expanders to permanent silicone implants and is shown at her postoperative follow-up. The amount of nipple elevation from preoperative to postoperative measured 5 cm.

ple malposition is optimized by patient selection, choice of device, and incision. Patient selection centers on patient education of realistic goals based on preoperative breast anatomy. The choice of device in the first stage of nipple-sparing mastectomy is based on breast base diameter and nipple centralization. This is in contrast to skin-sparing mastectomy where the most narrow, most projecting tissue expander or implant is chosen to try to create projection. Nipple preservation in nipple-sparing mastectomy has a less flattening effect compared with skin-sparing mastectomy. Therefore, nipple centralization is a primary goal.

In the patient with significant breast ptosis and/or large size, several options exist for treatment. If the patient is willing to delay their mastectomy, a breast mastopexy or reduction can be performed as the first step. If the patient is unwilling or cannot delay the mastectomy and they strongly desire nipple preservation, a vertical incision can be considered. In our series, the complication rates were similar to our experience with other incisions and to breast reconstruction outcomes in the literature. The contraction and elevation of the skin envelope and nipple is remarkably enhanced with a

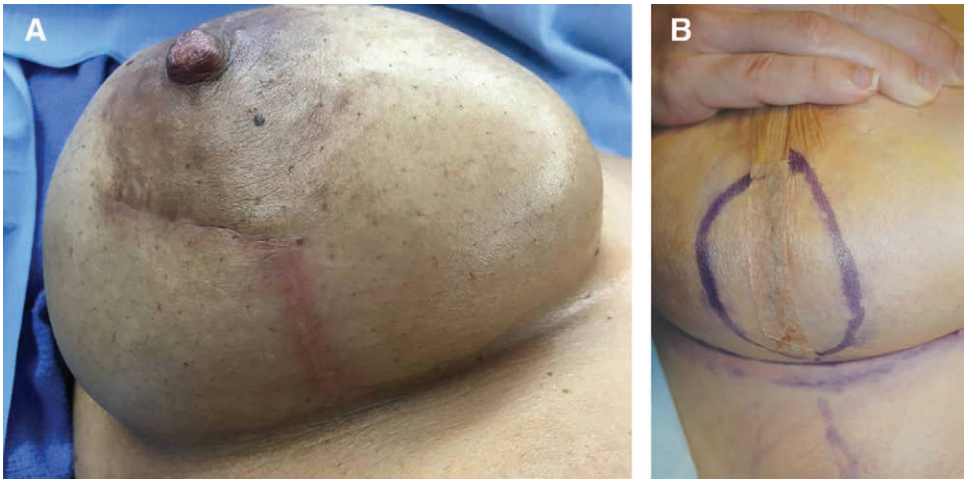

Fig. 4. A, A vertical incision spans from just below the base of the areola to approximately 1 cm above the inframammary fold. If this vertical distance is too short, the incision can extend laterally 25% around the nipple for additional exposure. B, A vertical ellipse of skin can be deepithelialized at the time of closure in the first stage reconstruction or at the time of the exchange to implants. The surgeon should be cautious not to resect an excessive amount of skin or it may lead to wound healing problems or a constricted lower pole.

vertical incision in comparison with the typical elevation seen with mastectomy and implant-based reconstruction using other incisions. Although the etiology of this phenomenon is not entirely known, it is likely related to contractile forces and scar orientation. Compared with mastectomy with a circumvertical mastopexy incision, there is less ischemic insult to the nipple. In cases of marked skin redundancy, a vertical excision with limited transverse dimension (2 cm or less) may help control the skin envelope to decrease the likelihood of seroma accumulation before skin closure. This judicious vertical ellipse may further facilitate elevation of the nipple in patients with grade 3 ptosis. The incision may be brought horizontally into a J or L configuration, but a true Wise pattern is typically avoided in the first stage. The amount of redundancy in the horizontal dimension is often less than originally anticipated and excessive resection can lead to a constricted lower pole. At the time of tissue expander exchange, any residual redundancy can be easily tailored with a mastopexy with or without a Wise pattern conversion.

In conclusion, optimizing results in reconstruction following nipple-sparing mastectomy involves proper patient selection, choice of device, and choice of incision. This article shows that the vertical incision can be used as an alternative to mastopexy before mastectomy and may save this additional step in select patients. Compared with a simultaneous circumvertical mastopexy at the time of mastectomy, the ischemic insult is less. Compared with traditional inframammary fold and lateral or oblique incisions, there is less nipple lateralization and more uplift. Therefore, the vertical incision may be the procedure of choice in select patients with grade 2–3 ptosis and/or large breast size desiring nipple preservation.

Amy S. Colwell, MD, FACS
Division of Plastic Surgery
Harvard Medical School
Massachusetts General Hospital
15 Parkman Street
WACC 435
Boston, MA 02114
E-mail: acolwell@mgh.harvard.edu

REFERENCES

1. Colwell AS, Tessler O, Lin AM, et al. Breast reconstruction following nipple-sparing mastectomy: predictors of complications, reconstruction outcomes, and 5-year trends. *Plast Reconstr Surg.* 2014;133:496–506.
2. Frederick MJ, Lin AM, Neuman R, et al. Nipple-sparing mastectomy in patients with previous breast surgery: comparative analysis of 775 immediate breast reconstructions. *Plast Reconstr Surg.* 2015;135:954e–962e.
3. Reish RG, Lin A, Phillips NA, et al. Breast reconstruction outcomes after nipple-sparing mastectomy and radiation therapy. *Plast Reconstr Surg.* 2015;135:959–966.
4. Alperovich M, Choi M, Frey JD, et al. Nipple-sparing mastectomy in patients with prior breast irradiation: are patients at higher risk for reconstructive complications? *Plast Reconstr Surg.* 2014;134:202e–206e.
5. Wang F, Peled AW, Garwood E, et al. Total skin-sparing mastectomy and immediate breast reconstruction: an evolution of technique and assessment of outcomes. *Ann Surg Oncol.* 2014;21:3223–3230.
6. Colwell AS, Gadd M, Smith BL, et al. An inferolateral approach to nipple-sparing mastectomy: optimizing mastectomy and reconstruction. *Ann Plast Surg.* 2010;65:140–143.