

# Nipple-sparing Mastectomy and Ptosis: Using a Free Nipple Graft with Tissue Expander Reconstruction

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**Background:** Nipple-sparing mastectomies are increasingly offered to women with breast cancer given the evidence for oncologic safety and improved cosmetic outcomes. Women with significant ptosis are often excluded due to potential nipple malposition and increased risk of nipple ischemia. The use of a harvested free nipple graft may allow women with ptosis to conserve their nipple-areolar complex.

**Methods:** This is an IRB approved retrospective study of breast cancer patients at an academic center with ptosis who underwent free-nipple graft mastectomies with a single plastic surgeon and 5 dedicated breast surgeons from 2014-2017. The primary outcomes were free nipple graft viability and the need for revision. Secondary outcomes included post-operative complications.

**Results:** Fourteen women with ptosis underwent skin and nipple-sparing mastectomy with breast reconstruction involving use of harvested free-nipple graft. More than half of the women were diagnosed with early-stage invasive breast cancer (42% stage 1, 14% stage 2). Four women underwent mastectomy for prophylaxis or other benign reasons. All of the women had significant ptosis during the pre-operative evaluation (57% grade 2 ptosis, 36% grade 3 ptosis, and 7% uncategorized), with an average BMI of 30. None were active smokers. In the postoperative period, one had partial nipple necrosis in combination with skin flap necrosis and positive margin (7%). Other complications included infection (14%) and hypopigmentation (14%). All nipples lost sensation and full projection.

**Conclusions:** This is a novel approach using a free nipple graft with a skin envelope reducing mastectomy and immediate expander-based reconstruction. This successful approach allows women with ptosis to undergo nipple-sparing mastectomy with preservation of the nipple-areolar complex. (*Plast Reconstr Surg Glob Open* 2020;8:e2623; doi: [10.1097/GOX.0000000000002623](https://doi.org/10.1097/GOX.0000000000002623); Published online 24 February 2020.)

## INTRODUCTION

This article addresses nipple preservation in women with cancer and significant ptosis. Nipple-sparing

mastectomies are increasingly offered to women with breast cancer given the evidence for oncologic safety and improved cosmetic outcomes.<sup>1-9</sup> Women with significant ptosis are often excluded due to potential nipple malposition and increased risk of nipple ischemia.<sup>10-12</sup> The use of a harvested free nipple graft may allow women with ptosis to conserve their nipple-areolar complex. This approach sites a free nipple graft on a Wise pattern tailored mastectomy skin flap that overlies either pectoralis muscle or more commonly an acellular dermal matrix-secured tissue expander. Graft take was highly successful (>90%). This technique will allow women undergoing implant-based reconstruction nipple preservation.

## METHOD

### Patient Selection

An institutional review board-approved retrospective study was performed at a single academic breast center. All procedures were performed by a single plastic surgeon

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**Fig. 1.** Postoperative photographs of a patient who underwent bilateral free nipple graft mastectomies with the use of the novel free nipple graft technique with immediate implant reconstruction.

and 5 dedicated breast surgeons between 2014 and 2017. Included patients were women with ptosis undergoing planned mastectomy. Women who were active smokers were not considered for the procedure, but diabetes and obesity were not exclusion criteria. The primary outcome was free nipple graft viability. Secondary outcomes included postoperative complications such as unplanned reoperation, infection, bleeding, scar hypertrophy, and hypopigmentation.

### OPERATIVE PROCEDURE

In the preoperative holding area, the patient is marked by the plastic surgeon using a standard Wise pattern plan. After standard safety procedures, anesthesia, skin preparation, and draping, the incision plan for the breast surgeon is reinscribed into a vertically oriented fusiform incision plan around the nipple-areolar complex (NAC) and within the confines of the Wise pattern marking. Standard thickness mastectomy skin flaps are dissected to appropriate anatomic borders. The breast specimen is removed, oriented, and passed to the sterile back table. The nipple-areolar complex is then harvested from the specimen. The nipple graft is defatted and dermis trimmed to allow grafting. It is wrapped and labeled for laterality. The trimmed tissue is sent for pathologic review as a retro-areolar specimen. Axillary surgery is performed as required. The tissue expander reconstruction is completed pre- or retropectorally with acellular dermal matrix in the standard approach. The skin envelope is tailored for a Wise pattern closure. SPY indocyanine green perfusion scan is performed to evaluate the mastectomy skin flaps. SPY intraoperative laser angiography is a vascular imaging methodology that can be used to visually assess superficial blood flow. Mastectomy flap areas with perfusion below-described thresholds are revised. The free nipple graft is applied to the de-epithelialized recipient site and secured with a bolster. Standard postoperative management is followed.

### RESULTS

Fourteen women with ptosis underwent skin-envelope reducing nipple-sparing mastectomy with breast reconstruction involving use of harvested free nipple graft. Although most women were diagnosed with invasive breast cancer, 4 women underwent mastectomy for

prophylaxis. All of the women were noted to have significant ptosis during the preoperative evaluation (57% grade II ptosis, 36% grade 3 ptosis, and 7% uncategorized). The median body mass index was 31 with a range from 23 to 37. The most common comorbidities were hypertension (36%) and diabetes mellitus (14%). None of the women were active smokers. Prepectoral implant placement was used in 64% of patients. All women underwent exchange of tissue expander to permanent implant. No nipple grafts were lost due to failed graft take. One free nipple graft was removed due to positive retro-areolar margin. All other subareolar specimens from the free nipple grafts were pathologically negative. Postoperative complications included infection (14%), eschar (14%), and the positive margin noted above (7%). Both infections responded to explantation, irrigation, and implant placement. The nipple graft removed for the positive margin was also associated with mastectomy skin flap necrosis. General revisional surgery was common (71%). In our cohort of 14 patients, no nipple grafts were lost due to graft failure. All grafts had loss of sensation and full projection. Hypopigmentation occurred in 14%. Equal success was obtained with both pre- and retropectoral implant approaches. No woman in our study has sustained a local recurrence at a mean surveillance of 28 months (Fig. 1).

### DISCUSSION

The success of a novel approach of using a free nipple graft with a skin-envelope reducing mastectomy and immediate expander-based reconstruction is reported, showing >90% nipple graft viability. The use of the free nipple graft allows women with ptosis to undergo nipple-sparing mastectomy with a tissue expander approach with preservation of their nipple-areolar complex. This approach may allow more women to save their native nipple-areolar complex and decrease the number of procedures to complete reconstruction. In our study, the recipient free nipple graft bed was the skin flap supported initially by a retropectoral reconstruction. The vascularity of the pectoral muscle initially fueled confidence for this approach. With the uptake of prepectoral reconstruction, given our initial success, we continued with the free nipple graft technique cautiously. Sixty-four percent of patients included in this analysis underwent prepectoral reconstruction. In the current approach,

the mastectomy skin flap is separated from the pectoralis muscle and instead rests on acellular dermal matrix, but this did not result in a compromise in our outcomes. Disclosing the risk for hypopigmentation and projection loss common to this technique is critical to informed consent. We have found tattooing useful tool for pigment replacement. The alternative approach of primary breast reduction with planned delayed nipple-sparing mastectomy is associated with greater preservation of these elements and useful when complete extirpation of the cancer, axillary staging, and adjuvant therapy are not required. However, in the setting of cancer, our approach allows complete removal of the breast, axillary staging, and first-stage reconstruction with preservation of the nipple–areolar complex in a single setting. As mastectomy flap techniques improve, direct to implant-based single-stage reconstruction may be possible.

### CONCLUSIONS

Our findings suggest that nipple-sparing mastectomy using the novel free nipple graft technique with implant reconstruction is not only oncologically safe but also has low rate of nipple graft loss. Despite using a skin flap backed by acellular dermal matrix as the recipient bed, comparable if not decreased risk of postoperative complications were encountered. The results of this study support utilization of the free nipple graft technique for women with breast cancer undergoing mastectomy.

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### REFERENCES

1. Nedomansky J, Nickl S, Maier B, et al. Management of the nipple-areola complex in selected patients undergoing primary breast reconstruction: a comparison of immediate replantation and delayed reconstruction. *Ann Plast Surg.* 2017;78:379–385.
2. Kummerow KL, Du L, Penson DF, et al. Nationwide trends in mastectomy for early-stage breast cancer. *JAMA Surg.* 2015;150:9–16.
3. Howard MA, Sisco M, Yao K, et al. Patient satisfaction with nipple-sparing mastectomy: a prospective study of patient reported outcomes using the BREAST-Q. *J Surg Oncol.* 2016;114:416–422.
4. DellaCroce FJ, Blum CA, Sullivan SK, et al. Nipple-sparing mastectomy and ptosis: perforator flap breast reconstruction allows full secondary mastopexy with complete nipple areolar repositioning. *Plast Reconstr Surg.* 2015;136:1e–9e.
5. Spear SL, Hannan CM, Willey SC, et al. Nipple-sparing mastectomy. *Plast Reconstr Surg.* 2009;123:1665–1673.
6. Spear SL, Willey SC, Feldman ED, et al. Nipple-sparing mastectomy for prophylactic and therapeutic indications. *Plast Reconstr Surg.* 2011;128:1005–1014.
7. Chidester JR, Ray AO, Lum SS, et al. Revisiting the free nipple graft: an opportunity for nipple sparing mastectomy in women with breast ptosis. *Ann Surg Oncol.* 2013;20:3350.
8. Doren EL, Van Eldik Kuykendall L, Lopez JJ, et al. Free nipple grafting: an alternative for patients ineligible for nipple-sparing mastectomy? *Ann Plast Surg.* 2014;72:S112–S115.
9. King IC, Harvey JR, Bhaskar P. One-stage breast reconstruction using the inferior dermal flap, implant, and free nipple graft. *Aesthetic Plast Surg.* 2014;38:358–364.
10. Rintaia AE. Modified subtotal mastectomy and free nipple graft in the treatment of severe mammary hypertrophy and ptosis. *Ann Chir Gynaecol.* 1983;72:9–12.
11. Gerber B, Krause A, Reimer T, et al. Skin-sparing mastectomy with conservation of the nipple-areola complex and autologous reconstruction is an oncologically safe procedure. *Ann Surg.* 2003;238:120–127.
12. Mitchell SD, Willey SC, Beitsch P, et al. Evidence based outcomes of the American Society of Breast Surgeons Nipple Sparing Mastectomy Registry. *Gland Surg.* 2018;7:247–257.