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IDEAS AND INNOVATIONS

Breast

Free Nipple Grafting and Nipple Sharing in Autologous Breast Reconstruction after Mastectomy

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Summary: Nipple sparing mastectomy is gaining popularity in recent years, as it provides superior aesthetic results and has a positive impact on the psychological well-being of patients. However, patients with macromastia and high grade ptosis are not good candidates for nipple sparing mastectomy due to a high risk for nipple necrosis; for these patients, the free nipple grafting (FNG) is an excellent option following autologous reconstruction. We herein present our experience with FNG for women with large and ptotic breasts undergoing mastectomy and autologous reconstruction. We also present the option of splitting a single nipple-areolar complex to provide 2 grafts for bilateral nipple reconstruction. This retrospective study is based on data collected between 2014 and 2019 at a single institution. We report on 7 patients (13 grafts): 5 patients underwent FNG (4 bilateral, 1 unilateral) and 2 patients had a single nipple split into 2 parts to create 2 nipple-areolar complexes. Of the 13 grafts, 9 had complete take, 3 had almost complete take, and only 1 graft was lost. Overall patient satisfaction from the procedure was high. The use of FNG is an excellent reconstructive option, as it preserves the patient's own nipple in terms of color, shape, and texture. The procedure can be executed as part of a direct single-staged reconstruction for patients who are at a high risk for nipple necrosis. *(Plast Reconstr Surg Glob Open 2020;8:e3138; doi: 10.1097/GOX.0000000000003138; Published online 28 September 2020.)*

INTRODUCTION

Nipple sparing mastectomy (NSM) followed by immediate reconstruction is nowadays commonly performed.[1] The preservation of the skin envelope and specifically the nipple-areolar complex (NAC) has been shown to have a positive impact on the aesthetic outcome and the psychological well-being of patients.[2] Unfortunately, NSM is rarely offered for patients with large or ptotic breasts due to a high risk for nipple necrosis.[3] We present our experience with immediate nipple reconstruction using free nipple grafting (FNG) for patients with macromastia and high grade ptosis undergoing mastectomy with immediate autologous flap. In patients who had a previous unilateral skin sparing mastectomy, and therefore only had a single NAC, we split the remaining NAC into 2 neo-NACs and grafted each on the reconstructed breasts.

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PATIENTS AND METHODS

We retrospectively reviewed all patients who underwent immediate nipple reconstruction with FNG implanted directly on a free deep inferior epigastric perforator (DIEP) flap between July 2014 and July 2019, at the Kaplan Medical Center, Rehovot, Israel. All mastectomies were performed by a single breast surgeon (T.M.A.) via a circumareolar incision. All reconstructions were performed by the senior author (D.E.). The NAC was excised with the breast specimen, then removed ex vivo with a standard 40-mm diameter "cookie cutter" and harvested as a full thickness free graft. When mastectomy was performed for malignancy, frozen section from the nipple base was performed to rule out nipple malignancy. The grafts were defatted and preserved in a gauze soaked with normal saline until the DIEP flap anastomosis and in-setting were completed. A circular area of 40 mm in diameter was de-epithelized on the flap, where the free graft was implanted and secured with bolsters; the bolsters were removed on the 7th postoperative day. For patients who previously had a unilateral mastectomy, and underwent a contralateral mastectomy and bilateral reconstruction with DIEP, after harvesting, a midline incision in the NAC was made, splitting it into two identical parts, each was folded into a round shape and sutured to form a neo-NAC (Fig. 1). A satisfaction survey was conducted for all

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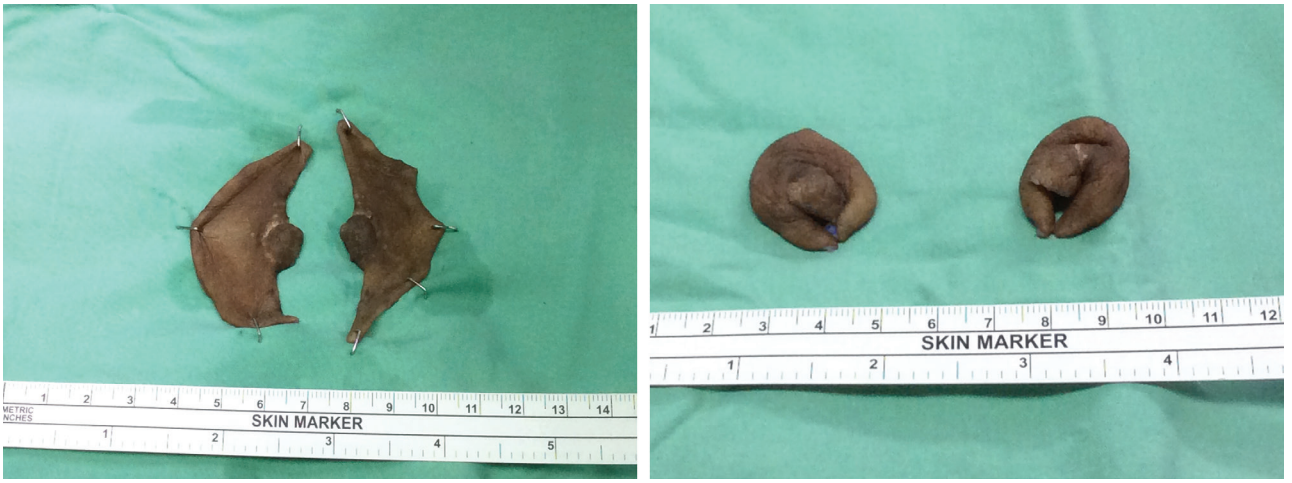

Fig. 1. Harvesting and splitting of the NAC. A, The free nipple graft after harvest, defatting, and midline splitting. B, Each half is shaped to form a neo-NAC.

surviving patients during the follow-up visit, which is a modification of Nahabedian et al[4] survey: patients were asked to address 4 questions and grade their satisfaction from 1 (least satisfied) to 5 (most satisfied) regarding overall outcome, willingness to undergo the procedure again, recommendation to other breast cancer patients, and nipple symmetry.

RESULTS

We performed 13 FNG in 7 patients (n = 7) who were appropriate candidates for a NSM by oncological standards, but were at high risk for nipple necrosis. Average patient age was 39.7 (range 20–52). All patients were overweight with average BMI of 30.1 kg/m^2 (range 28.7–34); all had large (cup D and above) and ptotic (grade II–III by the Regnault classification) breasts. Average mastectomy specimen weight was 953 g (range 768–1,160 g). The mean postoperative follow-up time for all the patients was 23.5 months (range 2–43 mo); 1 patient died during the first postoperative year from metastatic disease. Three patients were BRCA1 positive, and one had a p53 missense mutation. None of the patients had any comorbidities (besides obesity); only one patient was a tobacco smoker, who ceased smoking 4 weeks before surgery. Patient characteristics and indications for mastectomy are presented in Table 1.

All reconstructive procedures were with a DIEP flap. FNG with the whole NAC was performed in 5 patients (4 bilateral; 1 unilateral); 2 patients had a single NAC split into 2 neo-NACs, as described above.

Of the 13 nipple grafts, 9 exhibited complete take, 3 had almost complete take (over 70%), and 1 FNG was lost. Ten nipple grafts (76%) retained nipple pigmentation similar to the original nipple with only minor hypopigmentation; loss of nipple projection was seen in all patients; no flap-related complications occurred. Preoperative and postoperative images of one patient are presented in Figure 2A and B. A satisfaction survey was presented to all surviving patients at an average of 23.5 months postoperatively (range 2–43 mo). The survey questions and average scores are presented in Table 2.

Table 1. Perioperative and Intraoperative Patient Details

	Age (y)	Indication	Procedure	Reconstruction	Genetic Mutation	BMI	Ptosis Grade	Excised Breast Tissue Weight	Nipple Grafting
1	37	Risk reducing	Bilateral mastectomy	Immediate, bilateral	BRCA1	30.8	III	Right 940 g Left 935 g	Bilateral free nipple-areolar graft
2	36	Right breast risk reducing (s/p left mastectomy for malignancy)	Unilateral mastectomy	Right: immediate Left: late	P53 Missense	28.7	II	Right 950 g	Bilateral free nipple-areolar graft following nipple sharing
3	20	Right breast risk reducing; left breast malignancy	Bilateral mastectomy	Immediate, bilateral	BRCA1	34	II	Right 1,030 g Left 1,160 g	Bilateral free nipple-areolar graft
4	50	Right breast risk reducing (s/p left mastectomy for malignancy)	Unilateral mastectomy	Right: immediate Left: late	Negative	28.9	III	Right 1,025 g	Bilateral free nipple-areolar graft following nipple sharing
5	36	Right breast risk reducing; left breast malignancy	Bilateral mastectomy	Immediate, bilateral	BRCA1	29.8	II	Right 969 g Left 1,007 g	Bilateral free nipple-areolar graft
6	53	Right breast malignancy	Unilateral mastectomy	Immediate, unilateral	Negative	29	III	775 g	Unilateral free nipple-areolar graft
7	47	Bilateral breast malignancy	Bilateral mastectomy	Immediate, bilateral	Negative	30.1	III	Right 927 g Left 768 g	Bilateral free nipple-areolar graft

s/p, status post.

Fig. 2. A fifty-year-old patient with a previous left therapeutic mastectomy. A, Preoperatively, she underwent a contralateral risk reducing skin sparing mastectomy with a bilateral DIEP reconstruction and an FNG of a split nipple. B, Postoperative photograph of the patient at 43 months.

Table 2. Modified Satisfaction Survey based on Nahabedian et al[4] Survey

	Average Score on a 5-tier Scale
How satisfied are you with the outcome of your surgery?	4.6
Would you undergo this procedure (nipple grafting) again?	4.8
Would you recommend this procedure to other breast cancer patients?	5.0
Rate your nipple symmetry: 1 (asymmetric) to 5 (symmetric)	4.2

DISCUSSION

The importance of NAC preservation during mastectomy has been previously emphasized.[2] Unfortunately, women with macromastia and ptosis are not good candidates for NSM due to a high risk for nipple necrosis.[3] Different strategies have been proposed to reduce the risk for necrosis.[5,6] Spear et al[5] proposed a reduction mammoplasty before the mastectomy to preserve the nipple. Multiple techniques exist for nipple reconstruction such as local flaps or 3D tattooing that can provide aesthetically pleasing results and high satisfaction rates[7]; however, these require a second procedure.

FNG was first introduced as a NAC preservation method during reduction mammoplasty.[8] Shown to be oncologically safe procedure,[2] it was than utilized for reconstruction after NSM with implant, tissue expander, and local flaps.[9] Doren et al[9] published a case series of 21 patients who underwent mastectomy with immediate breast reconstruction using FNG with satisfying results. Wexler et al[10] described a case report of areola splitting for bilateral NAC reconstruction. The advantages of this approach are good aesthetic results providing naturally appearing nipples in a single stage procedure performed during the reconstructive phase.

In our series, we used FNG in the setting of an immediate free autologous DIEP flap reconstruction. Moreover, we were able to reconstruct bilateral NACs by splitting a single complex to produce 2 neo-NACs. All grafts were successfully re-implanted on the free flap, and good pigmentation was preserved in the majority of patients. Loss of projection was seen in all patients. Regardless, our patients reported a high satisfaction, and all did not desire to undergo a second refinement procedure.

CONCLUSIONS

Women with large and ptotic breasts are often not considered candidates for NSM due to a high risk for nipple necrosis. FNG is a simple single-stage technique performed at the time of free flap reconstruction and is applicable for patients who remained with a single NAC. Good aesthetic outcomes and high satisfaction rates were achieved.

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