

Immediate Reconstruction of the Nipple-areola Complex Using Inferior Pedicle Skin for Central Tumors of the Breast

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Summary: The nipple-areola complex (NAC) must be considered as an integral part of the breast with regard to morale and self-assurance. Achieving good aesthetic outcome is a challenge after excision of the NAC in retroareolar tumors. This article looks into immediate reconstruction of the NAC using inferior pedicle skin in patients after central excision of retroareolar tumors. Sixteen patients had breast conservation surgery for retroareolar tumors by a single surgeon between September 2016 and November 2021, and six of them had nipple-areola reconstruction with inferior pedicle skin. None of the patients having NAC reconstruction had any recorded complications and none needed reexcision of the margins. Five out of six patients undergoing NAC reconstruction had good to excellent aesthetic outcome as recorded in the patient questionnaire. There was no locoregional recurrence or distant metastasis in the whole group after a median follow-up of 17 months (2–62). (*Plast Reconstr Surg Glob Open* 2022;10:e4452; doi: [10.1097/GOX.0000000000004452](https://doi.org/10.1097/GOX.0000000000004452); Published online 22 July 2022.)

INTRODUCTION

Retroareolar tumors are those that are located within 2 cm from the nipple-areola complex (NAC).¹ They represent around 8% of all breast cancers.² Management of these tumors is a challenge to the oncoplastic breast surgeon who has to achieve satisfactory cosmetic outcome after getting adequate clearance of cancer. Central excision with mobilization of the surrounding tissue (level 1 procedure) is the simplest option for these tumors, which are suitable for breast conservation surgery. This involves elliptical incision with primary closure; however, these procedures are often associated with unsatisfactory cosmetic outcome with contour defects and flattening of the breast.³

Excision of more than 20% of the breast volume may result in significant deformity with level 1 procedure (wide local excision)⁴; however, advances in oncoplastic surgery through volume displacement techniques, such as therapeutic mammoplasty (TM; oncoplastic application of breast reduction and mastopexy techniques in the management of breast tumors), allow patients with high tumor to breast volume ratio to undergo breast conservation surgery and, at the same time, achieve satisfactory cosmetic outcome. In

addition, the aesthetic outcome with this technique could be improved with reconstruction of the NAC at the time of cancer surgery. The technique presented in this article involves inferior pedicle advancement with reconstructed NAC utilizing the overlying skin.

METHODS

The author reviewed prospectively collected data by a single surgeon between September 2016 and November 2021 for tumors involving the nipple or within 2 cm of the nipple undergoing breast conservation surgery. The data collected included presentation, smoking history, body mass index, bra size, pathology, reexcision rate, local recurrence, and distant metastasis. Patients undergoing NAC reconstruction were asked to grade the aesthetic outcome of the above procedure. Five choices were given: excellent, very good, good, average, and poor. Patients having breast conservation surgery were offered radiotherapy as per unit protocol [all invasive cancers and high-grade ductal carcinoma in situ (DCIS), and selected patients with intermediate grade DCIS].

Patient Selection and Surgical Technique in Patients Undergoing Oncoplastic Breast Conservation Surgery with Nipple-areola Reconstruction

All patients were discussed at the multidisciplinary meeting. Those patients who did not have adequate

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anticipated residual breast volume after central excision to reshape the breast were given the option of mastectomy and reconstruction, as shown in SDC 1. (See figure, Supplemental Digital Content 1, flow chart showing how decisions are made with regard to operation, <http://links.lww.com/PRSGO/C120>.) Patients with large tumors but who had enough anticipated residual breast tissue to reshape the breast after excision of cancer were given the option of TM. Patients suitable for breast conservation surgery with adequate distance between the nipple and inframammary fold to create NAC based on the inferior pedicle were also given the additional option of TM and NAC reconstruction. C-V flap technique was used for patients undergoing nipple reconstruction.⁵ The steps of the procedure and the technique have been discussed and shown in the video. (See Video [online], which displays presentation of a patient with central tumor of the breast, steps of the procedure and intraoperative technique. Right central wide local excision vertical scar therapeutic mammoplasty with sentinel lymph node biopsy and immediate reconstruction of nipple areolar complex with inferior pedicle skin.) The first step was to reconstruct the new NAC using the skin overlying the inferior pedicle, followed by deepithelization of the rest of the inferior pedicle before proceeding to central wide local excision and axillary surgery. Finally, the inferior pedicle with the reconstructed NAC was advanced into the defect created following central excision and sutured into position. Figure 1A shows the intraoperative picture of a patient with new NAC developed using skin of the inferior pedicle ready to be sutured into position following central excision of NAC. Figure 1B shows the 2-week postoperative picture. Figure 2A shows the 2-month postoperative picture (preradiotherapy) and Figure 2B shows the 2-year postoperative picture (postradiotherapy) of a patient who had right NAC reconstruction.

RESULTS

Sixteen patients had central excision during this period, as shown in SDC 2. (See table, Supplemental Digital Content 2, which shows patient characteristics, <http://links.lww.com/PRSGO/C121>.) One patient who had level 1 central excision developed infection, which settled with

Takeaways

Question: Achieving good aesthetic outcome is a challenge after central excision of the nipple-areola complex in breast tumors.

Findings: The study describes six patients undergoing immediate inferior pedicle nipple-areola complex reconstruction out of 16 patients having central excision under a single surgeon over 5 years. Most patients described their aesthetic outcome as good to excellent. With this technique, we can potentially improve the aesthetic outcome in selected patients with central tumors of the breast.

Meaning: The technique of nipple-areola complex reconstruction using inferior pedicle skin is a valuable addition in the management of central tumors of the breast.

antibiotics. Three patients had further surgery for margin involvement (two reexcisions of margins and one mastectomy). All patients who had TM and NAC reconstruction had radiation treatment. Two patients who had central wide excision did not receive radiotherapy; one had mastectomy for multiple margin involvement and a second patient with high-grade DCIS declined radiotherapy. None of the six patients who had TM and NAC reconstruction developed any complication and none needed reexcision of margins. All six patients who had NAC reconstruction responded to the patient satisfaction questionnaire (excellent, 2; very good, 2; good, 1; average, 1; poor, 0). Overall, there was no locoregional recurrence or distant metastasis after a median follow-up of 17 months (2–62).

DISCUSSION

This technique of reconstruction of the NAC using inferior pedicle skin in patients undergoing central excision of NAC is an excellent option in selected patients undergoing surgery for retroareolar tumors. Meta-analysis has shown that TM (level 2 breast conservation surgery procedure) is associated with significantly lower reexcision rate and significantly better patient satisfaction when compared with wide local excision alone (level 1 procedure).⁶ Level 1 breast conservation surgery only allows limited dissection and mobilization of surrounding tissue often only

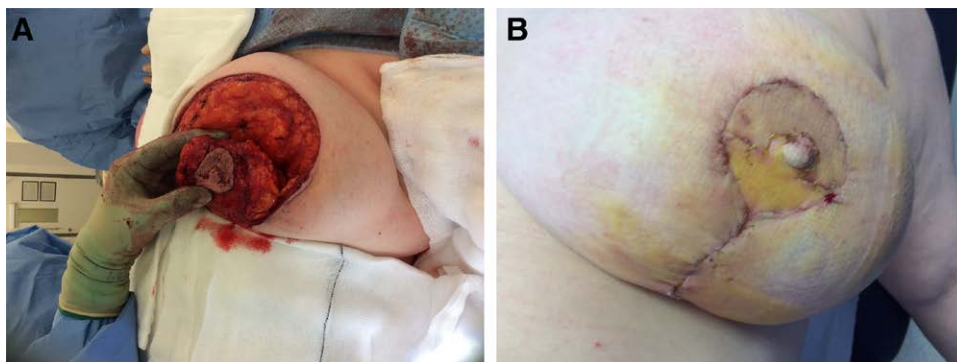


Fig. 1. Intraoperative and 2-week postoperative photographs of a patient who had left immediate reconstruction of nipple-areola complex following central excision. A, Intraoperative picture of a patient having left vertical scar TM with inferior pedicle NAC reconstruction. B, Two-week postoperative photograph.

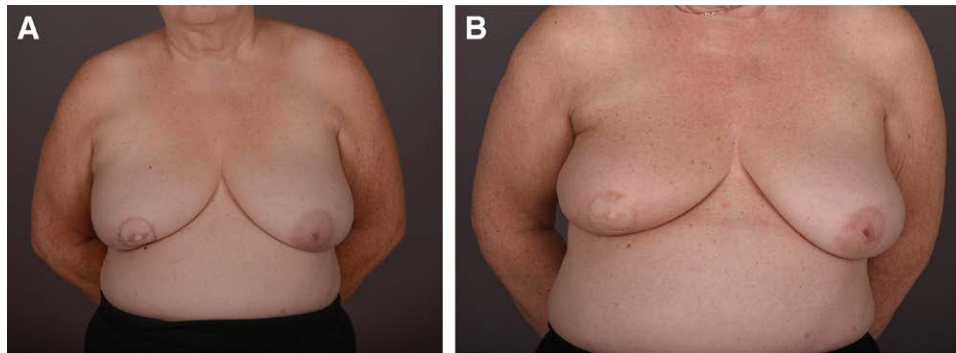


Fig. 2. Pre-radiotherapy and post-radiotherapy photographs of a patient who had right immediate reconstruction of nipple-areola complex following central excision. A, Two-month postoperative picture of a patient with right vertical scar TM with inferior pedicle NAC reconstruction. B, Two-year postoperative photograph.

in one plane, either in subdermal or subglandular to fill the defect following wide local excision. Wider mobilization especially both in subdermal and subglandular planes can result in loss of blood supply to the mobilized tissue leading to tissue necrosis. In contrast, level 2 procedures, such as TM, allow well-vascularized mobile pedicles with perforators to fill the defect following wide local excision. The deepithelized flap in TM allows the subdermal plexus to be preserved, thus complementing the blood supply to the flap.

The original flap described by Grisotti is an acceptable volume displacement technique for central tumors.⁷ Grisotti technique consists of central quadrantectomy with transposition of a flap from the lower part of the breast. This technique is used for patients with ptotic breasts where there is adequate distance between the nipple and inframammary fold to mobilize the inferior pedicle into the defect. The modified approach to this technique adopted here in this article involves additional reconstruction of the NAC. None of the patients in this study who had TM and reconstruction of the NAC had reexcision of margins, and there was no locoregional recurrence or distant metastasis during the follow-up period. An early report of this technique has been published in another small series by McCulley et al⁸ in 2006. The above article describes a series involving 11 patients who had central excision, six of whom had immediate nipple reconstruction with TM. In patients undergoing nipple reconstruction, the author describes the use of Wise pattern incision, and also vertical pattern incision, particularly in small breasts where the author describes various pedicles. In patients with vertical scars, the author's preference was a medial or a horizontal bipedicle. In contrast to the above series, in this article, all six patients who had immediate nipple reconstruction had the same operation (vertical scar TM with reconstruction of NAC with inferior pedicle), and in addition, these procedures were performed in patients with large breasts (D and above). Vertical scar TM described above utilizes smaller incisions and lower operating time when compared with Wise pattern. In addition, a vertical scar is potentially associated with fewer wound issues, especially T-junction problems seen with Wise pattern.

One of the issues with nipple reconstruction with most techniques including the C-V flap is loss of projection in the long term.⁹ Tension on the mobilized skin and underlying fat in nipple reconstruction may contribute to loss of projection. One of the advantages of using the mobile inferior pedicle with overlying skin used for NAC reconstruction described in the article as opposed to the superior-based dermoglandular pedicle is that it allows to mold itself naturally into the defect of the central excision of the NAC without undue tension, and there is potentially minimal shrinkage with radiation treatment. In a study by Schoeller and Huemer,¹⁰ a superior-based dermoglandular pedicle was used after central excision to reconstruct the nipple. The report included nine patients. Here, an additional local flap was created to fill the defect of the central excision, and a full-thickness skin graft was used to create the areola after nipple reconstruction. In one patient, there was delayed wound healing of the full-thickness skin graft for the areola, which healed by secondary intention.

Immediate reconstruction of the nipple in patients having mastectomy and reconstruction has also been previously reported.^{11,12} There are also other TM techniques described to improve the cosmetic outcome following excision of central tumors without the reconstruction of the NAC.^{3,13} Johnson et al³ describe a technical modification of the Grisotti flap in patients with short nipple to inferior mammary crease distance. Pasta et al¹³ describe the modified hemibatwing along with the removal of the NAC as a useful technique. Here, the author suggests that the technique is oncologically safe with good aesthetic results in patients with large breasts. Over a 30-month period, seven patients with central tumors were treated with a batwing or modified batwing technique. Only one patient who had the modified technique was assessed for aesthetic outcome and was rated as good. In the present study, five out of six patients reported their aesthetic outcome as good to excellent. Although this was not a standard validated questionnaire, similar five-point questionnaires have been used in patients undergoing TM to assess the aesthetic outcome.¹⁴ An objective assessment of nipple-areola reconstruction, including nipple projection, nipple contour, areola position, breast shape, etc., was not used in the article.

Not all patients suitable for breast conservation surgery are eligible for NAC reconstruction with inferior pedicle skin. The patients should have adequate distance between the nipple and the inframammary fold to create a mobile enough inferior pedicle with skin to be advanced into the defect following central excision. Another limitation is the asymmetry following TM and NAC reconstruction. Patients should be offered a symmetrization procedure on the contralateral side at the time of cancer surgery or on a later date depending on the unit protocol. Patients should also be warned that they may lose nipple projection over time, and this needs to be taken into account when performing symmetrization procedures. In addition, patients should be given the choice of nipple-areola tattooing to adjust to the color of the contralateral side. Although none of the patients in this series had necrosis of the reconstructed NAC, this is a protentional problem, and patients should be warned regarding the possible delay in adjuvant treatment and subsequent breast deformity. None of the patients who had TM and nipple reconstruction in the current study needed reexcision of margins; however, a small proportion undergoing this procedure may need reexcision and a smaller group with multiple margin involvement may need mastectomy. Despite these complexities in planning this operation in patients with central tumors, having a successful NAC reconstructed in the immediate setting at the time of cancer surgery may provide additional morale boost and self-assurance to the cancer patient.

In conclusion, the management of retroareolar breast tumors is a challenge for the oncoplastic breast surgeon because of the aesthetical circumstances needed to reconstruct the breast after the NAC is excised. Although vertical scar TM with immediate reconstruction of the NAC using the inferior pedicle skin remains one of the more complex procedures depicted in the algorithm of patients having breast conservation surgery for central tumors, it can safely be done with overall good patient satisfaction, as shown in this article. Patient selection is crucial in attaining good results, and the technique of inferior pedicle TM with NAC reconstruction remains a valuable addition in the management of central tumors of the breast.

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