

Nipple-Sparing Mastectomy

Technique and Results of 54 Procedures

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Hypothesis: The rationale for removal of the nipple-areolar complex (NAC) during total mastectomy centers on long-standing concerns about possible neoplastic involvement of the NAC and its postoperative viability. Nipple-sparing mastectomy (NSM) combines a skin-sparing mastectomy with preservation of the NAC, intraoperative pathological assessment of the nipple tissue core, and immediate reconstruction, thereby permitting better cosmesis for patients undergoing total mastectomy. Neoplastic involvement of the NAC can be predicted before surgery and assessed during the operation, and sustained postoperative viability of the NAC is likely with appropriate surgical technique.

Results: Fifty-four NSMs with immediate reconstruction were attempted among 44 patients. Six NAC core specimens revealed neoplastic involvement on frozen section analysis, resulting in conversion to total mastectomies. Forty-five of the 48 completed NSMs maintained postoperative viability of the NAC; 3 NACs had partial loss.

Conclusion: Nipple-sparing mastectomy is a reasonable option for carefully screened patients.

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TOTAL MASTECTOMY, AS practiced today, discourages preservation of the nipple-areolar complex (NAC) because surgeons have had long-standing concerns about possible neoplastic involvement and postoperative viability of the NAC. Previously published studies¹⁻⁸ that considered neoplastic involvement of the NAC often involved retrospective pathological analysis of preserved mastectomy specimens. Reported rates of neoplastic involvement of the NAC varied from 0%⁷ to 58%.⁸ Furthermore, some studies adjusted for the likelihood of NAC involvement after correlation with additional possible predictive indicators, including node status,^{3,4,6,9-13} tumor size and location within the breast,^{1-5,7,9-17} nuclear grade,^{2-5,10,13,15,18} and multicentricity or multifocality.^{3,5,8,9,13,16} Although most of these studies agreed that neoplastic involvement of the NAC was more likely when tumors were centrally located or greater than 2 to 3 cm in diameter, relative findings were inconsistent and, therefore, prohibitive to a definitive consensus. However, with the success of skin-sparing mastectomy,¹⁸⁻²¹ it became possible to consider nipple-sparing mastectomy (NSM), skin-

sparing mastectomy combined with preservation of the NAC, and immediate reconstruction. The purpose of this study was to develop and describe an experience with NSM, with particular attention to neoplastic assessment of the NAC, surgical technique, and sustained postoperative NAC viability.

METHODS

Data were collected prospectively for 54 consecutive NSM procedures performed between September 5, 2001, and June 11, 2003. All NSM procedures were performed by surgical oncologists (J.P.C. and J.A.K.) and plastic surgeons (R.Y. and J.B.). Nipple-sparing mastectomy was converted to traditional mastectomy if frozen section analysis of the NAC core revealed infiltrating breast cancer or ductal carcinoma in situ (DCIS). Nipple-areolar complex viability was assessed by clinical examination throughout the postoperative course; the minimum postoperative follow-up was 6 weeks.

PATIENT SELECTION

Candidacy for NSM was assessed before and during surgery. Preoperative screening criteria for all patients, whether considering NSM for breast cancer treatment or prophylaxis, included clinical breast examination, thorough

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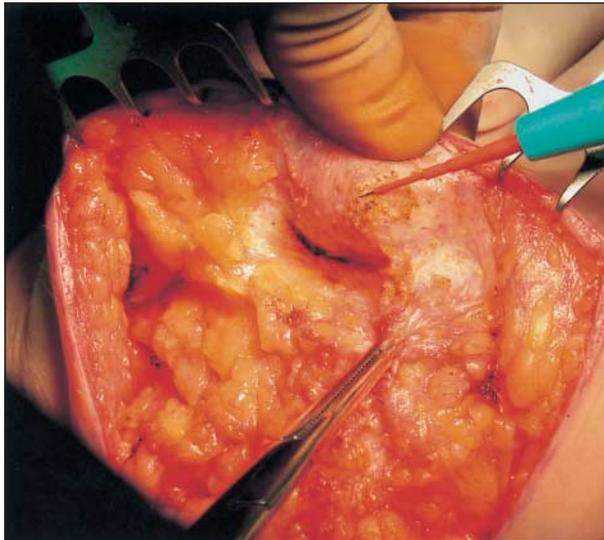


Figure 1. The core of tissue beneath the nipple is removed.

review of mammograms, and patient informed consent. For patients with breast cancer, additional preoperative assessment included tumor size and location; patients whose tumors measured greater than 3.5 cm or whose tumors were centrally located were not candidates for NSM. Furthermore, patients who had previously undergone neoadjuvant chemotherapy, had inflammatory breast cancer, or had Paget disease of the nipple were not candidates. Suitability for reconstruction was determined by the plastic surgeon. Intraoperative evaluation included frozen section analysis of the nipple core for 51 of 54 NSM candidates.

SURGICAL TECHNIQUE

Incisions were planned before surgery by the surgical oncologist and plastic surgeon. For those patients undergoing NSM for prophylaxis, mastectomies were performed through an obliquely oriented incision in the upper outer quadrant. For those patients undergoing NSM for breast cancer treatment, diagnosis had been made previously by fine-needle aspiration, core needle biopsy, or surgical excisional biopsy. Nipple-sparing mastectomies in which the preoperative diagnosis had been made by core biopsy were also performed through an upper outer quadrant incision, if possible, thereby allowing axillary access; if the prior biopsy tract was identifiable, it was elliptically excised. Nipple-sparing mastectomy in which the preoperative diagnosis had been made by excisional biopsy incorporated the biopsy incision into the NSM incision.²² Of 48 completed NSMs, 45 were performed through a lateral incision. The remaining 3 cases were performed through a medial incision.

To ensure complete removal of the tissue beneath the NAC, the nipple was everted to facilitate dissection, and the tissue core within the nipple was removed (**Figure 1**) and sent for frozen section analysis. The NAC was resected if there was evidence of neoplastic involvement on frozen section analysis. Otherwise, viability of the NAC was monitored throughout the operation by visual inspection and capillary refill.

RESULTS

Fifty-four NSMs were attempted on 44 patients aged 29 to 72 years (mean age, 43 years). Thirty procedures (56%) were performed for infiltrating breast cancer involving tu-



Figure 2. Four months after nipple-sparing mastectomy with implant reconstruction.

mors measuring 0.1 to 3.5 cm (mean, 1.1 cm); 7 NSMs (13%) were for DCIS; and 17 NSMs (31%) were for prophylaxis. Intraoperative frozen section analysis of the NAC core was performed on 51 of 54 NSMs; cancer was identified in 6 (12%) of 51 specimens. Ductal carcinoma in situ was identified in 5 NAC core analyses, and these breast specimens showed 1 patient with multifocal DCIS, a second patient with multifocal DCIS and a separate 0.3-cm infiltrating ductal carcinoma, a third patient with multiple foci of infiltrating ductal carcinoma and DCIS, and a fourth and a fifth patient with DCIS with a less than 0.1-cm focus of infiltrating ductal carcinoma. A sixth patient had a 2.6-cm infiltrating ductal carcinoma with infiltrating breast cancer identified in the NAC core. None of the NSMs performed for prophylaxis revealed neoplastic involvement of the NAC. Of 37 NSMs performed for breast cancer, 6 (16%) had neoplastic involvement of the NAC, including 1 (14%) of 7 patients with DCIS and 5 (17%) of 30 patients with infiltrating breast cancer.

Although superficial tissue loss of the NAC was common during the first 7 to 21 postoperative days, the 45 completed NSMs performed through a lateral incision are completely intact and well healed, with good cosmesis (**Figure 2**).

Each of the 3 NSMs that resulted in partial loss of the NAC was performed early in our experience in patients with infiltrating breast cancer. One patient had been diagnosed as having DCIS after ultrasound-guided core biopsy. A subsequent partial mastectomy performed through a medial incision revealed multifocal infiltrating breast cancer with positive margins, resulting in an attempted NSM through the previous medial incision. A second patient had been diagnosed as having infiltrating ductal carcinoma after ultrasound-guided core biopsy for a tumor located medially near the inframammary fold. Infiltrating ductal carcinoma for a third patient had been diagnosed by fine-needle aspiration. The tumor was located close to the skin in the lower outer quadrant, requiring the NSM to be performed through a large wedge resection encompassing most of the skin of the lower outer quadrant and a portion of the lower inner quadrant from the areolar edge to the inframammary fold.

Of 48 completed NSMs, 16 (33%) had transverse rectus abdominis myocutaneous flap reconstructions and 32 (67%) had tissue expander implants placed.

COMMENT

Traditionally, total mastectomy has included removal of the NAC, but because breast cancer screening initiatives have resulted in the detection of smaller tumors, surgeons often need to remove less skin. From this realization evolved the development of the skin-sparing mastectomy combined with immediate reconstruction, thereby permitting enhanced cosmesis.^{19,20} As skin-sparing mastectomy techniques continue to improve, surgeons are questioning if routine removal of the NAC is necessary for all patients.

The idea of nipple preservation has been reported in the literature for at least 25 years.⁶ Recent studies have reported that neoplastic involvement of the NAC is rare in patients who have small peripherally located tumors^{11,14,19} and that long-term viability of the preserved NAC is possible.²³⁻²⁶ Nevertheless, little consideration has been given to the fundamental factors that may permit successful clinical application of NSM, including patient selection, neoplastic assessment of the NAC before and during surgery, and analysis of surgical technique to ensure postoperative viability of the NAC.

Our early experience suggests that NSM is an option for carefully screened patients. Those patients whose tumors are peripherally located and 3.5 cm or smaller may be candidates if the nipple is without clinical evidence of disease and the plastic surgeon determines that the breast mound can be adequately reconstructed. Intraoperative frozen section analysis of the nipple core tissue should be performed to assess neoplastic involvement, and, if cancer is identified, the NAC must be resected. Finally, lateral incisions may contribute to the likelihood of sustained NAC viability. Among our 48 completed NSM procedures, each of the 45 performed through a lateral incision has a fully intact and well-healed NAC. Each of the 3 performed through more medially located incisions had partial postoperative NAC loss, possibly suggesting that medial incisions may compromise blood flow. The success of NSM may be based on conscientious preoperative patient selection, multidisciplinary collaboration, pathological analysis of the NAC core, and attention to NSM incision placement.

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