

Immediate Placement of Implant After Nipple Sparing Mastectomy Provides Acceptable Cosmetic Results While Preserving Oncologic Outcome: A Single Hospital Experience

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Summary

Recent studies and reviews of surgical outcomes have supported the Nipple Sparing Mastectomy (NSM) as a safe and cosmetically beneficial option for patients seeking cancer risk reduction and in select patients with early stage breast cancer. Reconstructive options involve immediate (one step) and delayed (two step) reconstruction, primarily based on surgical evaluation of tissue integrity, the health of the tissue flap, future need for radiation therapy, in addition to patient preference. This study reports one breast surgeon's short- and mid- term postoperative outcomes after nipple sparing mastectomy. Ninety-one patients underwent 166 nipple sparing mastectomies at our institution from October 2008 to December 2013. The median patient age was 49 years. One hundred and sixty-five reconstructions were performed with either immediate placement of an implant (74) or placement of a tissue expander followed by placement of the implant (91); autologous reconstruction was performed in one patient. Median follow up was 15.2 months and no local or systemic recurrences were found. The nipple areolar complex was preserved in 160 mastectomies. Six breasts required reoperation for nipple loss. Thirty patients (34%) required implant revision due to cosmesis or wound issues. Cosmetic outcome was noted as satisfactory or better in 84% of patients. Those who underwent immediate placement of implant had greater cosmetic satisfaction. Short-term analysis shows that immediate reconstruction after nipple-sparing mastectomy provides acceptable cosmesis and patient satisfaction in comparison to a more delayed reconstructive process, while preserving oncologic outcome.

Keywords: Implant; Nipple areolar complex; Nipple sparing mastectomy; Reconstruction

Introduction

The surgical management of breast cancer has evolved dramatically over the past several decades. Conservation of the Nipple Areolar Complex (NAC) has been repeatedly investigated for oncologic feasibility and preservation of cosmesis. There are well-established inclusion criteria for breast conservation therapy; however, some women must undergo complete mastectomy in order to obtain local control of invasive breast cancer, such as those with large tumor to breast size ratio, wide-spread and multi-focal ductal carcinoma in situ and those who have contraindications to chest wall radiation therapy in these patients, the 20 year the average incidence of local recurrence is about 2.3% [1].

Freeman introduced the concept of the skin sparing mastectomy (without preservation of the NAC) in the 1960's as a treatment option for fibrocystic disease, mastodynia and breast cancer risk reduction [2]. The nipple sparing mastectomy involves removal of the breast tissue but spares a small 3-4 mm sub-areolar flap including preservation of the nipple areolar complex. This technique has been proven oncologically safe for small, peripheral tumors and in prophylactic mastectomies; however, there is less conclusive data available for larger, multi-centric and invasive tumors. In patients with invasive breast cancer, it has been accepted that the nipple sparing mastectomy can be performed for tumors less than 2-3 cm with at least 2-4 cm distance from the nipple [3]. Not only are size and distance important factors, but the breast size and shape, flap thickness and type of incision also play important roles in the overall outcome of the NSM. With oncological preservation being equal, the less disfiguring nipple sparing mastectomy has

been shown to provide greater preservation of the natural breast contour resulting in higher patient satisfaction. Overall, cancer recurrence at the areola is quite low in small tumors (less than two centimeters) at 0.9% [4]. However, occult involvement of the nipple areolar complex has been found to vary drastically, from 0.9 to 58%. According to the most recent Cochrane review, preliminary local recurrence rates after the nipple sparing mastectomy with short term follow up in non-randomized studies ranges from 1.6 to 28% without radiation therapy and 1.4 to 8.5% after radiation of the nipple areolar complex post operatively [1].

Historically, there have been two types of reconstruction after mastectomy: Immediate (one-step) and delayed (two-step) reconstruction. Immediate reconstruction is performed at the same time as mastectomy whereas delayed reconstruction is performed up to several months after mastectomy. The purpose of breast reconstruction after mastectomy is to improve quality of life with the aim of regaining a sense of body image. Several surgical options exist, including autologous reconstruction (using the patient's native tissue to reconstruct the breast), tissue expanders and implants [5]. There has been shown a correlation between the patient satisfaction and psychological outcome based on the timing of the reconstruction performed, favoring immediate breast reconstruction [6,7]. Studies have shown that early reconstruction after mastectomy results in greater patient satisfaction and outcomes especially so in its ability to improve self-esteem and quality of life [5]. We have found in specific to the nipple sparing mastectomy, immediate reconstruction also results in greater patient satisfaction. The goal of this study is to assess the oncologic safety and cosmetic satisfaction of the nipple sparing mastectomy for invasive cancer after either immediate or delayed reconstruction.

Materials and Methods

A single center retrospective chart review of prospectively collected data was performed over a five-year period. One hundred and sixty-six nipple sparing mastectomies were performed in ninety-one women at our institution from October 2008 to December 2013. A single fellowship trained breast surgeon and nine fellowship trained plastic surgeons at Beaumont Hospital in Royal Oak, Michigan performed all surgeries. Extracted information included indication for surgery (invasive cancer, 46%, BRCA+, 27%; contralateral prophylactic mastectomy, 23%; DCIS/atypia, 4%) patient age, tumor characteristics, anatomic breast characteristics, type of reconstruction and cosmetic result assessed by both the patient and the surgeon. In patients that had undergone bilateral mastectomy, each breast was considered as an independent event during the data collection process.

Each patient was evaluated pre-operatively by both the breast surgeon and the plastic surgeon. Selection criteria included unicentric tumors less than three centimeters in size, location at least two centimeters from the nipple areolar complex, clinically negative axillary lymph node status and health of the contralateral breast. In addition, the plastic surgeon ensured that certain cosmetic criteria were met, including small to moderate

sized breast (less than 14 centimeters in width), less than grade two ptosis, nipple areolar width less than 50 millimeters and no previous disruption of the dermal blood supply. Exclusion criteria included those patients who had a history of smoking, diabetes, microvascular disease, prior radiation therapy of affected breast or chest wall, and obese patients due to the risk of wound healing complications. Mammography, ultrasound or MRI were used to evaluate nipple-areolar involvement pre-operatively and routine pathologic evaluation was used post operatively. Three types of incisions were used to perform the nipple sparing mastectomy: Radial (56%), Inframammary (33%), and Periareolar (11%).

One hundred and sixty-six reconstructions were performed with either immediately placement of implant (74) or placement of tissue expander followed by staged placement of either a silicone or saline implant at a second operation (91), and one autologous reconstruction was performed (deep inferior epigastric flap). Skin flap viability, tissue integrity, venous congestion and tension of the muscular envelope were all evaluated intra-operatively in order to determine the type of reconstruction. If there was any question in the integrity of the tissue, a tissue expander was used. Acellular collagenous matrix was used in the majority of reconstructions. Data collection and follow-up was performed by both the breast surgeon and plastic surgeon and information was compiled into a single database for review.

Results

Ninety-one women underwent 166 nipple sparing mastectomies at our institution from October 2008 to December 2013. Nipple sparing mastectomy was offered based on oncologic safety, anatomic eligibility as well as patient preference and surgeon discretion. Indications for surgery included: invasive cancer, 46%, BRCA+, 27%; contralateral prophylactic mastectomy, 23%; and DCIS/atypia, 4%. The majority of prophylactic mastectomies were performed on patients with invasive cancer. Median patient age was 49 years. The average tumor size was 1.7cm. Breast cancer stages ranged from IA to IIB.

Fifty-six percent of mastectomies were performed through a radial incision while 33% of mastectomies were performed through an inframammary incision. The type of incision used was determined by breast size; an inframammary incision was used for small breasts and in women with moderate sized breast, a radial incision was used. One hundred and fifty-six immediate reconstructions were performed with placement of implant with biologic or tissue expander, eight reconstructions were performed with tissue expander only, and one deep inferior epigastric flap was performed.

Ten patients did require post-operative chest wall radiation after histopathological staging. The median follow-up was 15.2 months and there have been no local or systemic recurrences to date. Of the 166 nipple sparing mastectomies performed, 160 (96%) nipple areolar complexes were preserved. Six nipple areolar complexes were lost due to ischemia (4), close margins (1) and post-operative chest wall radiation (1). Cosmesis was noted

from the patient's self-assessment as good or excellent in 84% of patients.

Discussion

The indications for the NSM have expanded based on accepted criteria over the last several years. Initially, the NSM was only performed for fibrocystic disease and for risk reduction (prophylactic mastectomies). The majority of mastectomies in our study were performed for patients with invasive cancer or BRCA positive. As technique improved and selection criteria expanded to patients with small, peripheral tumors with distance far from the nipple areolar complex. Throughout a 15.2 month's median follow, our oncologic and cosmetic outcomes are comparable to similar, single-center studies [8].

Breast size, tumor location, and flap thickness pose significant challenges that are specific to the nipple sparing mastectomy. This technique involves preservation of the skin and nipple areolar complex while leaving at 2-3 millimeter sub-areolar flap consisting of minimal or no ductal tissue; therefore, there has been specific criteria described in order to select those patients most appropriate, including tumor stage between T0-T2, tumor size less than 4.5cm, distance from the areolar edge greater than 2.5cm, distance greater than 4cm between the tumor and the nipple center, and no involvement of the nipple areolar complex or the skin [3].

When preserving the nipple areolar complex, it is crucial to maintain the vascular supply which can be affected based on the type of incision used. The periareolar incision provides access to all four quadrants of the breast and is well hidden within the nipple areolar complex; however, this incision involves a higher risk of vascular disruption and may compromise the viability of the nipple. The radial incision provides central access to all four quadrants of the breast and causes less vascular disruption since it is lateral to the nipple areolar complex. Lastly, because the inframammary incision is furthest away from the nipple areolar complex and well hidden within the inframammary fold it is least likely to cause vascular compromise; however, it is more difficult to gain access to the upper quadrants of the breast [3].

In specific to the type of incision used, it was quickly noted that dissection through an inframammary incision was more difficult in women with moderate sized breasts in comparison to women with small breasts. In order to achieve an oncologically acceptable retro-areolar resection through an inframammary incision, a significant amount of retraction and manipulation of the skin envelope was required. In women with small breasts, manipulation was minimal; however, in those with larger breasts, manipulation was markedly more significant which poses risk to the viability of the resulting tissue flap and can affect outcome. Therefore, inframammary incisions were used solely for women with small breasts (size A) while the remainder of patients were approached with either a radial or periareolar incision.

We also found that within our patient population, there was greater cosmetic satisfaction in those who underwent immediate

implant placement, as 89% of these patients reported their cosmetic outcome as satisfactory or better. The majority of our patients underwent placement of a tissue expander first, followed by placement of an implant (either silicone or saline) at a second operation. These patients who underwent a two-step process reported satisfactory or better in 84% of time. Those patients who had later placement of implant did require more surgical revision than those who underwent immediate implant placement. The decision made to have initial placement of tissue expander was often due to the need for adjuvant chest wall radiation therapy, which is known to cause significant scarring, contraction and undesirable skin changes therefore leading to patient dissatisfaction and need for aesthetic surgical revision [9]. In addition, those patients who did undergo a one-step reconstructive process were carefully selected to ensure that they would be less likely to require adjuvant chest wall radiation therapy which would have the potential to compromise the aesthetic outcome. Of the six nipple areolar complexes lost, the events were evenly distributed between both the implant and tissue expander groups; the type of reconstruction performed did not seem to affect the overall outcome of nipple preservation. One factor that is known to negatively affect nipple viability is autologous reconstruction in addition to the usage of biologics.

Conclusion

To date, the conclusions regarding the overall oncologic safety and cosmetic outcome of the nipple sparing mastectomy have been promising. Choosing those patients most appropriate for one or two-step reconstruction can be complicated and is multifactorial; however, if appropriately selected, those patients who undergo a one-step reconstructive process are likely to have increased satisfaction in cosmetic outcome in addition to less need for surgical revision.

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