

# Simultaneous Implant and Dermal Flap Technique for Breast Reconstruction After Skin-Sparing Total Mastectomy for Breast Carcinoma

Özgür Agdoğan<sup>1</sup>, Sibel Gürdal Özkan<sup>2</sup>

<sup>1</sup>Department of Plastic, Reconstructive and Aesthetic Surgery, Tekirdag Namik Kemal University, Tekirdag, Turkey; <sup>2</sup>Department of General Surgery, Tekirdag Namik Kemal University, Tekirdag, Turkey

Correspondence: Özgür Agdoğan, Namik Kemal Kampus, Cad No: 1, 59030 Suleymanpasa, Tekirdag, Turkey, Tel +90 532 326 69 22, Email drozguragdogan@hotmail.com

**Objective:** This study aims to evaluate the simultaneous implant and dermal flap technique for breast reconstruction following skin-sparing total mastectomy in breast carcinoma patients, assessing both oncological and aesthetic outcomes.

**Methods:** A retrospective analysis was conducted on 28 patients who underwent skin-sparing total mastectomy with preservation of the nipple-areola complex, followed by immediate breast reconstruction using implants and dermal flaps. Data on patient demographics, surgical outcomes, complications, and patient satisfaction were collected and analyzed.

**Results:** The study included 28 patients with an average age of 54.3 years. The implant sizes used ranged from 200 to 325 cc. Among these patients, 7 were chronic smokers and 8 had chronic diseases. A total of 22 patients underwent bilateral mastectomies, while 6 had unilateral mastectomies. Axillary lymph node dissection was performed in all cases. Preoperative radiotherapy was administered to 3 patients, and postoperative radiotherapy was given to 5 patients. Two patients experienced unilateral complete necrosis of the NAC and skin, while one patient had partial NAC necrosis. No evidence of capsular contracture, tumor recurrence, or metastasis was observed during the follow-up period. Patient satisfaction was high, with 24 out of 28 patients expressing positive outcomes.

**Conclusion:** Simultaneous implant and dermal flap breast reconstruction after skin-sparing total mastectomy offers a viable single-session approach with optimal cosmetic results, minimal morbidity, and high patient satisfaction. This technique is particularly beneficial for patients seeking immediate reconstruction with preserved nipple-areola complex.

**Keywords:** breast carcinoma, skin-sparing mastectomy, nipple preservation, single-stage reconstruction, dermal flap

## Introduction

Breast cancer (BC) is the primary cause of cancer-related death among women globally, and this trend is reflected in studies conducted between 2018 and 2023.<sup>1-5</sup> Despite the growing incidence of this disease, the mortality rate has declined in developed countries, primarily due to the widespread implementation of screening programs and advanced treatment techniques. It is widely accepted that early detection is critical for improving patient outcomes, and this has led to a renewed focus on oncoplastic surgery. In recent years, reconstruction methods such as implant or autologous reconstruction have gained increased attention, particularly in light of advances in these techniques. Skin-sparing total mastectomy, a reconstructive procedure that preserves all skin tissues, including the nipple-areolar complex, is a noteworthy development in this field.<sup>2</sup>

As the survival rates for breast cancer continue to improve, so too does the demand for satisfactory reconstruction options.<sup>3</sup> Techniques such as subpectoral implant placement, tissue augmentation with implants, reconstruction with autogenous tissues, and combinations thereof<sup>4</sup> are currently being used in two stages simultaneously or delayed after mastectomy. Recent research has also indicated that skin-sparing mastectomy is a viable treatment option with similar prognosis to simple mastectomy.<sup>5,6</sup> The aim of this approach is to repair the deficiencies caused by surgical treatment performed in accordance with the principles of oncologic surgery and to achieve an ideal, acceptable cosmetic result. This approach has led to the inclusion of autologous or implant-based breast reconstructions, which can be performed

simultaneously or late in breast cancer surgery, as part of the breast cancer treatment process. The popularity of simultaneous breast reconstruction after skin-sparing mastectomy is on the rise as both a prophylactic and therapeutic treatment for early breast cancer.<sup>1,7–9</sup> The advancements in breast-conserving techniques and facilities have resulted in a decline in the number of patients seeking autologous reconstruction in the USA.<sup>10</sup>

According to the American Society of Plastic Surgeons, two-stage implant breast reconstruction comprises 72.6% of all breast reconstructions, while the one-stage approach is increasingly accepted due to advancements in techniques and the use of cellular dermal matrix.<sup>1,11–13</sup> Advocates of the one-stage technique emphasize its low revision rate, fewer operations, reduced total costs, less pain, fewer psychological problems, and excellent patient outcomes. Proponents of the two-stage technique stress the ability to select an ideal implant for the second stage, reduced capsular contracture in the postmastectomy radiation field, lower revision rate, and excellent patient outcomes.<sup>2,12,14–16</sup> However, both implant-based techniques have basic disadvantages, such as complications like impingement folding, infection, and capsular contracture, which can result in poor aesthetic appearance.<sup>17</sup>

Patients who meet specific criteria are ideal candidates for simultaneous breast reconstruction after mastectomy. These criteria include having stage 0, 1, or 2 disease, a DCIS or invasive tumor less than 2 cm in size, no significant axillary lymph node involvement, and no skin involvement. It has been reported that this group of patients achieves an ideal result, particularly those with medium-sized breasts.<sup>7,18,19</sup> When considering simultaneous reconstruction, the oncological status of the contralateral breast should also be taken into account. However, patients who have received radiotherapy for breast carcinoma are currently deemed poor candidates for implant-based breast reconstruction due to skin and subcutaneous tissue damage.<sup>3</sup>

Medical oncological therapy should ideally be initiated as promptly as possible following mastectomy. It is essential to take into account the fact that chemotherapy impairs the healing process of wounds, making it difficult to treat infections. Complications that arise after surgery can delay the administration of chemotherapy. Although there is evidence to suggest that implants can withstand radiation therapy in breast reconstruction with implants following skin-sparing mastectomy, the outcomes may not always be optimal; the success rate is also reduced. Capsular contraction, implant exposure, infection, and wound healing problems are frequently observed in breast tissue that has been exposed to radiation.

In the context of nipple-sparing mastectomy, the preservation of the nipple-areola complex (NAC) is contingent upon the absence of invasion of the NAC and the absence of tumor evidence. In the event that intervention in the axillary region is necessary, the surgery can be carried out through the mastectomy incision in the axillary region. Additionally, the implants can be placed by creating a pocket beneath the pectoral muscle via the same incision.

In patients with breast cancer, optimal outcomes entail the complete removal of the malignancy, the prevention of postoperative recurrence, and the achievement of aesthetically pleasing results, which includes the restoration of a natural breast appearance. This study presents the case of a patient who underwent a skin-sparing mastectomy for breast carcinoma, with the preservation of the nipple-areola complex, and simultaneous breast reconstruction using implants and dermal flaps.

## Patients and Methods

This study was authorized by the Tekirdađ Namık Kemal University Non-Interventional Clinical Research Ethics Committee with protocol number 2019.122.07.18 on July 30, 2019. Our study was conducted in accordance with the Declaration of Helsinki. Patients who received prophylactic mastectomy due to BRCA gene positivity were not included in this study. Cases of inflammatory breast cancer and cases with nipple-areola complex involvement (including nipple retraction and/or bloody nipple discharge) were also excluded from the study. The number of patients, age range and average, implant size range and average, smoking history, presence of existing chronic disease, type of malignancy, unilateral/bilateral mastectomy, chemotherapy/radiotherapy history, NAC necrosis, skin flap necrosis, capsular contracture, malignancy recurrence, patient satisfaction, and patient follow-up period are presented in [Table 1](#).

A retrospective analysis of hospital and patient records was conducted. All patients' demographic information was summarized, and medical records, medical histories, tumor metastasis, recurrence, complications, and information on additional reconstruction were reviewed. The examination records were analyzed to obtain patient follow-up data. Additionally, we present our surgical technique and case examples of patients who underwent breast reconstruction using simultaneous implant and dermal flap methods after undergoing skin-sparing total mastectomy for breast carcinoma.

**Table 1** Patient Numbers, Age Ranges and Averages, Implant Size Ranges and Averages, Smoking History, Presence of Chronic Disease, Type of Malignancy, Unilateral/Bilateral Mastectomy, Chemotherapy/Radiotherapy History, NAC Necrosis, Skin Flap Necrosis, Capsular Contracture, Malignancy Recurrence, Patient Satisfaction, and Follow-Up Period

Parameter	Details
Number of Patients	28
Age	26-67 (average 54.3)
Implant Size (cc)	200-325 (average 250)
Smoking History	7
Chronic Disease	8
Malignancy	Stage 1 and Stage 2 invasive ductal carcinoma
Unilateral/Bilateral Mastectomy	22 bilateral, 6 unilateral
Chemotherapy/Radiotherapy	3 patients received preoperative radiotherapy, 5 patients received postoperative radiotherapy
NAC Necrosis	2 patients with complete necrosis, 1 patient with partial necrosis
Skin Flap Necrosis	2 patients
Capsular Contracture	None during follow-up
Malignancy Recurrence	None during follow-up
Satisfaction	24 patients satisfied, excluding 4 patients (including 2 with total NAC necrosis)
Follow-Up Period	12 months - 30 months

In our capacity as a breast surgeon, radiation oncologist, medical oncologist, and plastic reconstructive surgery team, we collaborated closely with the patient and her family in the development and implementation of treatment and follow-up plans for simultaneous breast reconstruction. Our approach was guided by a thorough evaluation of the patient's psychological state, motivation, and oncological circumstances.

## Surgical Technique

Preoperatively, an outpatient procedure was carried out. The incision site was planned with a crescent-shaped oblique drawing that extended laterally at the lower level of the NAC. Based on the breast size and degree of ptosis, various incisions were planned. The location of the inframammary fold was also determined, and care was taken to ensure the thickness of the skin flaps, the viability of the NAC, and the absence of residual breast tissue. Following mastectomy, a biopsy was conducted to confirm the presence of any residual malignancy in the NAC. The patient was then transferred for reconstruction. After transfer, the breast pouch was washed with isotonic rifampicin, and the pectoralis major muscle was released inferomedially. The pouch was elevated and created, and careful control of bleeding was performed. De-epithelialization was performed to prepare the dermal flaps from the inferior skin. The prepared dermal flaps were planned to be at least 5 cm in height and 10 cm in width, as needed. Hemovac drains were placed in the submuscular and axillary pouches. The submuscular pouch was then washed with isotonic rifampicin. In our cases, we used round, smooth, high-profile gel implants. The preferred implant size was one below the ideal size to ensure easy insertion into the created submuscular pouch, reduce the risk of exposure, and minimize tension. An appropriately sized implant was placed under the muscle, and the implant was exposed inferomedially. The inferior skin flap was secured to the chest wall at three separate points along the planned fold line. Additionally, the inferior skin flap was fastened beneath the skin at three locations, located caudal to the pectoralis major muscle, with the appropriate amount of tension. This helps prevent contraction and regression. The planned dermal flap tip was attached to the superior skin flap at three points. The NAC was applied to the remaining portion of the prepared dermal flap, and the inferior skin was sutured to the wound lip. While the patient was standing, a crescent-shaped and lateral skin incision was made with a dermal flap beneath it, the pectoralis muscle

beneath that, and the implant beneath the muscle. This construction ensures that even if the wound lip deteriorates or skin necrosis occurs, there is minimal chance of implant exposure.

## Results

28 individuals underwent a skin-sparing total mastectomy to treat breast carcinoma, preserving the NAC. The youngest patient was 26 years old, while the oldest was 67 years old, with an average age of 54.3 years. The implant sizes utilized varied between 200–325 cc, with an average of 250 cc. Among the 28 patients, 7 were chronic smokers, and 8 had chronic diseases. The patients' breast carcinomas ranged from stage 0 to 2, and 22 of them underwent bilateral mastectomies, while 6 received unilateral mastectomies. An axillary lymph node dissection was performed for all patients. Preoperative radiotherapy was administered to 3 patients, and postoperative radiotherapy was provided to 5 patients. Two patients experienced unilateral complete necrosis of the NAC and skin, with one undergoing high-dose radiotherapy postoperatively and being advised against breast reconstruction. The patient was instead treated with a vacuum wound dressing and reconstruction using a graft. The other patient had NAC necrosis, which was debrided and repaired without implant removal. One patient experienced unilateral partial NAC necrosis, which was partially debrided and primarily repaired. During the follow-up period, no evidence of capsular contracture, tumor recurrence, or metastasis was observed in any of the patients. 24 patients, excluding 4, reported satisfaction with their outcomes. The results are presented in [Figures 1A–L](#), [Figures 2A–K](#), [Figures 3A–G](#), [Figures 4A–D](#), and [Figures 5A–D](#), along with case examples. In [Figures 1 and 2](#), an inferior based dermal flap and subpectoral muscle pouch were created for the breast in which total mastectomy and reconstruction were planned with preservation of skin and NAC due to bilateral breast carcinoma. The pectoral muscle was adapted to the inferior skin flap. The exposed part of the implant was covered with the dermal flap and the dermal flap was adapted under the superior skin flap. The dermal flap was covered with NAC. In [Figure 3](#), unlike the first two cases, the dermal flap was



**Figure 1** (A) Preoperative drawing plan of both breasts, planned for total mastectomy and reconstruction with skin and NAC preservation due to bilateral breast carcinoma, viewed from the front. (B) Preoperative drawing plan from the left oblique angle. (C) Preoperative drawing plan from the right oblique angle. (D) Planning of inferior-based dermal flaps. (E) Preparation by de-epithelialization. (F) Creating the pocket by releasing the pectoral muscles from the inferior-medial. (G) Placement of implants and creation of the inframammary fold with the inferior skin flap and adaptation of the pectoral muscle to the inferior skin flap. (H) Coverage of the exposed part of the implant with the dermal flap and adaptation of the dermal flap under the superior skin flap. (I) Coverage of the dermal flap with the NAC. (J) Front view at 6 months postoperative. (K) Left oblique view at 6 months postoperative. (L) Right oblique view at 6 months postoperative.



**Figure 2** (A) Preoperative drawing plan of both breasts, planned for total mastectomy and reconstruction with skin and NAC preservation due to bilateral breast carcinoma, viewed from the front. (B) Preoperative drawing plan from the right oblique angle and design of the dermal flap to be de-epithelialized. (C) Preoperative drawing plan from the left oblique angle and design of the dermal flap to be de-epithelialized. (D) Placement of the implant and creation of the inframammary fold with the inferior skin flap by freeing the left pectoral muscle infero-medially and adaptation of the pectoral muscle to the inferior skin flap. (E) View of the left inferior-based dermal flap. (F) Coverage of the exposed part of the implant with the left inferior-based dermal flap and adaptation of the dermal flap under the superior skin flap. (G) Coverage of the left NAC with the dermal flap. (H) Placement of the implant and creation of the inframammary fold with the inferior skin flap by freeing the right pectoral muscle infero-medially and adaptation of the pectoral muscle to the inferior skin flap. (I) View of the right inferior-based dermal flap. (J) Coverage of the exposed part of the implant with the right inferior-based dermal flap and adaptation of the dermal flap under the superior skin flap. (K) Coverage of the right NAC with the dermal flap.



**Figure 3** (A) Preoperative view of right breast carcinoma, drawing periareolar and laterally. (B) Resection of the tumor with preservation of skin and NAC. (C) Preparation of superior based dermal flap. (D) Creating a pouch under the pectoral muscle, placing the implant and creating the inferior fold. (E) Covering the exposed part of the implant with superior based dermal flap and adapting and fixing the dermal flap under the inferior skin flap, covering the dermal flap with NAC. (F) 6th week postoperative view from the front. (G) 6th week postoperative view from the right oblique angle.



**Figure 4** (A) Partial NAC necrosis of the right breast after bilateral breast carcinoma reconstruction with skin and NAC preservation. (B) Exposed pectoral muscle after debridement. (C) Viability of the NAC and right oblique view at 6 weeks postoperative. (D) Front view at 6 weeks postoperative.

planned with a superior basis. In [Figure 4](#), a left total mastectomy was seen 15 years ago due to left breast carcinoma in which NAC was also resected. A total mastectomy was performed with preservation of the right NAC due to right breast carcinoma. An inferior dermal flap based on NAC was prepared. Afterwards, superficial NAC circulatory disorder was observed; however, it was seen that NAC was alive. [Figure 5](#) shows right partial NAC necrosis after bilateral breast cancer reconstruction preserving skin and NAC. The pectoralis muscle is exposed after debridement and then primary repair of the defect is seen.

## Discussion

In recent times, the use of autologous tissue in breast cancer reconstruction has become increasingly popular. However, implant-based breast reconstructions have also gained prominence. In these procedures, an acellular dermal matrix or polypropylene mesh coated with titanium is commonly utilized. The advent of new materials like cellulose dermal matrix and titanium-coated polypropylene mesh has expanded the scope of applications for breast surgeons.

The challenges of placing implants in the subpectoral area have been addressed by means of wraparound materials that support the pectoral muscle from below, prevent the muscle from migrating upward, and secure the implant in the subpectoral region. The use of mesh in breast reconstruction with implants was initiated in 2008 and has been widely accepted. Dieterich et al<sup>7</sup> reported that the use of advanced materials, such as biological matrix and synthetic meshes, in conjunction with implants is safe and increasing in popularity.

Breast reconstruction with a single-stage permanent implant was first accomplished by Bostwick by creating an inferior-based dermal tissue pocket attached to the pectoralis major muscle.<sup>20,21</sup> This technique has several advantages over cellular dermal matrices, including the fact that inferior dermal flaps maintain their own blood supply, thus providing a fully vascularized implant pocket.<sup>20</sup>

In Ross's study on one-stage breast reconstruction with implant and dermal flap methods after prophylactic mastectomy, it was reported that no patient's nipple and areola were preserved.<sup>22</sup> It should be noted that in many studies,



**Figure 5** (A) Right partial NAC necrosis after skin and NAC-sparing, bilateral breast cancer reconstruction. (B) Exposed pectoralis muscle after debridement. (C) 6th week view from the right oblique angle where NAC experienced after primary repair. (D) 6th week frontal view.

the NAC was not preserved or adapted as a graft.<sup>1,10,20,23</sup> In their study, King et al attributed the main reason for using NAC as a graft to the risk of possible residual malignancy.<sup>20</sup> In all our cases, we preserved the NAC, and in only one patient, a patient with bilateral breast carcinoma, the NAC was resected due to unilateral tumor invasion of the NAC. We preserved the NAC and allowed feeding through a dermal flap by focusing on dissection and incision to preserve the nutrition of the NAC. It is safe to perform areola-sparing mastectomy when early-stage, invasive, or DCIS tumors are more than 2 cm away from the nipple, there is no areolar involvement on imaging, the nipple margin is clear, and there is no nipple discharge or Paget disease.

The option of one-stage reconstruction using implants and inferior dermal flaps after mastectomy can also be applied to breasts with severe ptosis.<sup>22</sup> This technique is typically recommended for patients with a high body mass index (BMI) who are either unsuitable or unwilling to undergo more complex reconstruction (Reference 22). However, it is important to note that this method may not be as effective in achieving ideal cosmetic results in macromastia patients. The thickness of planned dermal flap was adjusted to 5 mm,<sup>22</sup> but in our study, the thickness of the dermal flap was 3–4 mm. Nonetheless, we applied this technique to all patients with type 1, type 2, and type 3 ptotic and nonptotic fractures.

The benefit of dermal flaps lies in the fact that they provide a substantial amount of excess tissue, which is autologous in nature. Furthermore, they provide adequate coverage of the exposed implant and a third layer apart from the skin and subcutaneous tissue. It has been reported that the wound healing process of dermal flaps is better than that of artificial dermis.<sup>22</sup> Consequently, it has been determined that this reconstructive technique is both safe and a viable option. All patients who underwent the procedure reported high levels of satisfaction; however, further analysis is necessary to determine how the dermal flaps will change over time and whether any future correction for ptosis will be required.<sup>22</sup> Although the follow-up period for our cases varied between 12 months and 30 months, no patient developed ptosis, and no problems arose that required additional surgery. In our surgical technique, we prevented ptosis by fixing the inferior skin flap to the chest wall at three different points, which were located at the planned fold line.

Some researchers have employed an artificial dermis to address aesthetic concerns of the lower pole region, achieving satisfactory outcomes.<sup>22</sup> In a breast reconstruction investigation conducted by Derazon et al, who evaluated two-stage tissue expander and one-stage direct implant strategies, they reported that utilizing an artificial dermal matrix produced favorable results in establishing a proper pocket for the implant, minimizing tension on mastectomy skin flaps, and diminishing the likelihood of capsular contracture.<sup>5,24–26</sup> The incorporation of acellular dermal matrix (ADM) has become a crucial aspect of implant-based breast reconstruction. ADM is placed between the inframammary fold (IMF) and the lower margin of the pectoralis muscle as a sling or drape to provide structural support for the implant.<sup>27,28</sup> In our study, we did not utilize ADM. Instead, we relied on the planned dermal flap to provide adequate coverage and layering. By not employing a second foreign material, we have mitigated certain risks and spared our patients the significant financial burden associated with healthcare in our country.

The findings of a recent systematic review revealed that direct implant reconstruction and the two-stage approach had comparable complication rates of 35% and 34%, respectively, when proper patient selection was taken into account.<sup>1</sup> Our reconstruction procedure using simultaneous implants resulted in an even lower number of complications, which is lower than the rates reported in previous studies.

As per recent studies, there has been a decline in complication rates due to plastic surgeons becoming more proficient in the use of ADM, and its increasing utilization. Currently, more than 50% of breast reconstructions performed by members of the American Society of Plastic Surgeons involve the use of ADM.<sup>4,29–31</sup> Moreover, the overall complexity of ADM-facilitated reconstruction was not notably greater than that of non-ADM-facilitated reconstruction; however, the incidence of long-term capsular contracture was lower.<sup>4,29,32</sup> Notably, none of our patients reported significant discomfort, which negatively impacted their quality of life. In our dermal flap procedure, the reconstruction time following the oncological surgeon was less than approximately 90 minutes for bilateral breast reconstruction.

The potential presence of extraneous materials in implants can generally increase the risk of infection. However, there is no unanimity regarding whether the use of ADM escalates the risk of infection.<sup>27</sup> Chun et al discovered significantly higher infection rates in patients using ADM (8.9% vs 2.1%), whereas Vardanian et al reported no variation in postoperative infection rates between ADM use and non-use.<sup>27,33</sup> Although dermatitis was observed in one patient after radiotherapy, we did not observe any infection in our patients.

In a study conducted by Rancati et al on single-stage breast reconstruction with mesh-covered implants following skin-sparing mastectomy, the optimal location of the new inframammary fold for the reconstructed breast was deemed crucial for achieving the best aesthetic result. This location should be symmetrical with the contralateral breast if there is no ptosis, and if there is ptosis on the contralateral side, the new inframammary fold should be positioned 2 cm lower. We adhered to this guideline during preoperative planning.

Women who possess larger bust sizes are generally deemed unsuitable for conservative mastectomy because the vascularity of the nipple-areolar complex might be jeopardized, which could lead to necrosis.<sup>2</sup> Patients who are morbidly obese, have undergone previous radiation therapy, or actively smoke tobacco products typically make poor candidates for prosthetic reconstruction.<sup>2</sup> Before performing the procedure, we thoroughly assessed our patients' smoking history and informed them that they needed to quit smoking at least one month prior to the operation. We emphasized the heightened risk of necrosis of the nipple-areolar complex to patients who had a history of smoking.

One-stage implant breast reconstruction has the advantage of utilizing excess skin tissue immediately after mastectomy. However, surgeons do not commonly use this procedure due to unfamiliarity with the technique, reluctance to apply additional tension on mastectomy skin flaps, and the perceived difficulty of achieving a predictable result in a single stage. Similarly, while skin-sparing mastectomy has the potential for natural skin flap necrosis, the reported rates of necrosis have ranged from 0.0% to 21.6%.<sup>2</sup> Avoiding periareolar incisions is highly recommended, as they can increase the risk of complications related to the nipple-areolar complex. Despite the reasons for avoidance, we have modified and contributed to our experience with this method. The success of this work depends on subtle nuances and requires close patient follow-up. Although skin flap necrosis and loss of NAC are potential issues, they were not significant problems that we encountered. We did not avoid a periareolar incision, and this was not a concern for us. This approach contributed to our technique. Depending on the patient's condition and the breast's state, various incisions may be employed.

Lee et al<sup>34</sup> concluded that patients undergoing one-stage direct implant prosthesis-based reconstruction were at a relatively higher risk of postoperative complications and reconstruction failure compared to those undergoing two-stage reconstruction using tissue expanders. However, they did not observe any significant difference in outcomes between the two groups following skin-sparing mastectomy. The researchers also found that one-stage reconstruction provided a more aesthetically pleasing result and had clear advantages in terms of financial burden compared to two-stage reconstruction. Nevertheless, they recommended that more modern studies focusing on skin- and breast-sparing cases should be performed to obtain more valid results.

According to current beliefs, the probability of contracting breast cancer is decreased when a larger amount of tissue is excised during a skin-sparing mastectomy. Therefore, it is recommended that significant portions of breast parenchyma be removed, and thin skin flaps be preserved, while keeping the NAC as thin as practicable. While this approach may reduce the likelihood of recurrence, it may also increase the risk of skin and NAC viability.<sup>1,4,34</sup> In our patient cohort, we observed follow-up periods ranging from 12 to 30 months, and no instances of recurrence were reported.

Implant exposure is considered a critical complication in this procedure, with its occurrence falling between 0.25% and 8.3%.<sup>35,36</sup> The following complications should also be taken into account: ischemic skin, necrotic skin, poor skin cover, detached wound lips, chronic or partial fistula. In many cases, if left untreated, infection can occur, making implant removal a necessity. Most instances of implant exposure are caused by skin necrosis resulting from excessive tension in the suture line and excessive removal of subcutaneous adipose tissue or wound dehiscence.<sup>35</sup> In one of our patients, the implant became exposed due to high-dose radiotherapy treatment. Following re-suturing, the implant was exposed once again, resulting in skin necrosis. To address this issue, debridement was performed, followed by the application of a vacuum wound dressing for some time. Ultimately, the implant was successfully reconstructed using a graft and was treated. Among our patients, we observed one case of partial loss of the nasal ala cartilage (NAC) and another case of detached wound lips. Fortunately, in both instances, the wounds were repaired successfully and no implant loss was reported. One patient, who was obese and had undergone radiotherapy previously, developed a significant seroma.

The opening of wound lips and necrosis of skin can lead to the exposure of an implant, which may result in implant loss and surgical failure if there is no living tissue or layer between the implant and the skin. To prevent this, our technique places a dermal flap and pectoral muscle beneath the incision scar. In other words, we avoid placing the incision line near the exposed implant. This approach serves as the foundation of our technique.

According to Tadiparthi et al's analysis study, while implant-based breast reconstruction appears to be a straightforward method for maintaining the form and symmetry of the breast, they reported that 28–50% of patients required revision surgery due to complications such as implant infections, impingement-folding, and capsular contracture.<sup>17,37</sup> The study's authors concluded that patients were dissatisfied with implant-based breast reconstruction and preferred autologous breast reconstruction.<sup>17</sup> Although autologous reconstructions have demonstrated long-term preservation of good aesthetic outcomes, the cosmetic results of implant-based reconstructions have reportedly declined.<sup>17,38,39</sup> However, simultaneous bilateral implant-based reconstructions may offer some improvement in this regard.<sup>17</sup> It is crucial that all patients considering implant-based reconstruction are fully informed about the potential complications associated with implants, the likelihood of requiring revision surgery in the future, and the possibility of converting to autologous reconstruction.<sup>17</sup> Our patients have not reported any dissatisfaction with their outcomes. We inform all patients about advanced complex reconstructive methods and have not observed any signs of capsular contracture during our follow-up processes.

In their analysis, Bertozzi et al found that breast reconstruction using alloplastic materials can yield aesthetically pleasing outcomes in patients undergoing minimally invasive surgery, allows for early hospital discharge in over half of breast cancer cases, promotes rapid healing and quick resumption of daily activities.<sup>4</sup> This method, which we have also employed, enabled our patients to remain in the hospital for two to three days and quickly return to their social and daily routines. Furthermore, the additional sessions have provided our patients with positive psychological motivation and increased self-confidence, along with a satisfactory aesthetic outcome.

In the study conducted by Bayram et al, they described a dermal barrier flap technique in medium-sized breasts after skin-sparing mastectomy, where the implant was placed over the muscle with a double-layer dermal barrier. The flap was bipedicled, and the thickness of the breast skin and NAC was preserved. Bayram et al refrained from placing the implant

under the muscle due to prolonged surgical time and the difficulty of placing large-volume implants.<sup>40</sup> Our technique shares similarities with this approach but has some differences. In our method, the dermal flap is single pedicled, and we had no issue with placing the implant under the muscle. The creation of a submuscular pouch took only 10–15 minutes. Our technique was applied to non-ptotic, type 1, type 2, type 3, and macromastia breasts without limitations based on ptosis or size. We protected the oncologically significant skin and NAC by leaving them thin to prevent residual tumoral tissue. The most notable aspect of our technique is that the incision line was covered by three layers: pectoral muscle, dermal flap, and breast skin.

## Conclusions

The benefits of one-stage breast reconstruction with implants comprise the simplicity of the surgical procedure, the employment of neighboring and preserved tissues, the preservation of the nipple, the absence of complications at the donor site, a brief operative and recuperation period. In cases where there is no uncertainty about the viability of skin flaps following mastectomy, simultaneous reconstruction is favored. Successful one-stage breast reconstruction with implants entails close collaboration with the breast surgeon, meticulous planning, attentiveness to the intricacies and critical points in the surgical approach, and diligent follow-up.

Following skin-sparing total mastectomy for breast carcinoma, simultaneous implant and dermal flap breast reconstruction with preservation of NAC is a highly desirable single-session method that achieves optimal cosmetic results, minimizes morbidity, presents a low probability of complications as opposed to the literature, and is cost-effective, resulting in increased patient satisfaction. In light of the potential for patient dissatisfaction, low psychological status, decreased sexual happiness, decreased sensitivity and sensitization, and poor appearance resulting from subsequent reconstruction of the NAC, it is our recommendation that NAC preservation be prioritized without exception.

## Consent Statement

We informed all our patients about the surgery. We received approval for surgical consent and information form from all our patients. We received patient consent form for medical photographs from all our patients. All our patients approved the use of the photos in education, medical books, journals, articles and electronic media.

## Disclosure

The authors report no conflicts of interest in this work.

## References

1. Azzi AJ, Zammit D, Lessard L. Single-stage breast reconstruction using an all-in-one adjustable expander/implant. *Plast Reconstr Surg Glob Open*. 2018;6:e1609.
2. Nahabedian MY. Implant-based breast reconstruction following conservative mastectomy: one-stage vs. two-stage approach. *Gland Surg*. 2016;5(1):47–54. doi:10.3978/j.issn.2227-684X.2015.06.08
3. Koch MB, Gunnarsson GL, Udesen A, et al. Direct delayed breast reconstruction with TAP flap, implant and acellular dermal matrix (TAPIA). *J Plast Reconstruct Aesthetic Surg*. 2015;68:815e821.
4. Bertozzi N, Pesce M, Santi P, Raposio E. One-stage immediate breast reconstruction: a concise review. *Hindawi BioMed Res Int*. 2017;2017:1–12. doi:10.1155/2017/6486859
5. Derazon SM, Shay T, Lewis S, Adler N. Immediate breast reconstruction: comparative outcome study of one-stage direct-to-implant and two-stage/tissue expander techniques. *Israel Med Assoc J*. 2018;VOL 20:340–4.
6. Cunnick GH, Mokbel K. Skin-sparing mastectomy. *Am J Surg*. 2004;188(1):78–84. doi:10.1016/j.amjsurg.2004.02.004
7. Rancati A, Soderini A, Dorr J, Gercovich G, Tessari L, Gonzalez E. One-step breast reconstruction with polyurethane-covered implants after skin-sparing mastectomy. *J Plast Reconstruct Aesthetic Surg*. 2013;66:1671e1675.
8. Baildam AD. Skin-sparing mastectomy. *Eur J Cancer*. 2011;47(Suppl. 3):S342e3. doi:10.1016/S0959-8049(11)70196-4
9. Romics JL, Chew BK, Weiler-Mithoff E, et al. Ten-year followup of skin-sparing mastectomy followed by immediate breast reconstruction. *Br J Surg*. 2012;99(6):799–806. doi:10.1002/bjs.8704
10. Colwell AS. Current strategies with 1-stage prosthetic breast reconstruction. *Gland Surgery*. 2015;4(2):111–115. doi:10.3978/j.issn.2227-684X.2015.02.05
11. Colwell AS, Damjanovic B, Zahedi B, et al. Retrospective review of 331 consecutive immediate single-stage implant reconstructions with acellular dermal matrix: indications, complications, trends and costs. *Plast Reconstr Surg*. 2011;128(6):1170–1178. doi:10.1097/PRS.0b013e318230e2f6
12. Kim YW, Kim YJ, Kong JS, Cheon YW. Use of the pectoralis major, serratus anterior, and external oblique fascial flap for immediate one-stage breast reconstruction with implant. *Aesth Plast Surg*. 2014;38:704–710. doi:10.1007/s00266-014-0351-1

13. Salgarello M, Visconti G, Barone Adesi L. Nipple-sparing mastectomy with immediate implant reconstruction: cosmetic outcomes and technical refinements. *Plast Reconstr Surg.* 2010;126(5):1460–1471. doi:10.1097/PRS.0b013e3181ef8bce
14. Salzberg CA, Ashikari AY, Koch RM, et al. An 8-year experience of direct-to-implant immediate breast reconstruction using human acellular dermal matrix (AlloDerm). *Plast Reconstr Surg.* 2011;127(2):514–524. doi:10.1097/PRS.0b013e318200a961
15. Spear SL, Seruya M, Rao SS, et al. Two-stage prosthetic breast reconstruction using AlloDerm including outcomes of different timings of radiotherapy. *Plast Reconstr Surg.* 2012;130:1–9. doi:10.1097/PRS.0b013e3182547a45
16. Topol BM, Dalton EF, Ponn T, Campbell CJ. Immediate single-stage breast reconstruction using implants and human acellular dermal tissue matrix with adjustment of the lower pole of the breast to reduce unwanted lift. *Ann Plast Surg.* 2008;61(5):494–499. doi:10.1097/SAP.0b013e31816d82d9
17. Tadiparthi S, Staley H, Collis N, O'Donoghue JM. An analysis of the motivating and risk factors for conversion from implant-based to total autologous breast reconstruction. *Plast Reconstr Surg.* 2013;132:23. doi:10.1097/PRS.0b013e318290f83e
18. Kobraei EM, Nimtz J, Wong L, et al. Risk factors for adverse outcome following skin-sparing mastectomy and immediate prosthetic reconstruction. *Plast Reconstr Surg.* 2012;129:234e41e. doi:10.1097/PRS.0b013e31823aec7f
19. Salgarello M, Rochira D, Barone-Adesi L, Farallo E. Immediate breast reconstruction after skin- or nipple-sparing mastectomy for previously augmented patients: a personal technique. *Aesthet Plast Surg.* 2012;36:313e22. doi:10.1007/s00266-011-9809-6
20. King ICC, Harvey JR, Bhaskar P. One-stage breast reconstruction using the inferior dermal flap, implant, and free nipple graft. *Aesth Plast Surg.* 2014;38:358–364. doi:10.1007/s00266-014-0276-8
21. Bostwick J. Prophylactic (risk-reducing) mastectomy and reconstruction. In: Bostwick J, editor. *Plastic and Reconstructive Breast Surgery, VOL II*. St. Louis: Quality Medical Publishing; 1990:1369–1373.
22. Ross GL. One stage breast reconstruction following prophylactic mastectomy for ptotic breasts: the inferior dermal flap and implant. *J Plast Reconstr Aesthetic Surg.* 2012;65:1204e1208.
23. Kijima Y, Yoshinaka H, Hirata M, et al. Oncoplastic surgery combining partial mastectomy with breast reconstruction using a free nipple-areola graft for ductal carcinoma in situ in a ptotic breast: report of a case. *Surg Today.* 2011;41(3):390–395. doi:10.1007/s00595-010-4294-0
24. Spear SL, Sher SR, Al-Attar A. Focus on technique: supporting the soft-tissue envelope in breast reconstruction. *Plast Reconstr Surg.* 2012;130(5 Suppl 2):89S–94S. doi:10.1097/PRS.0b013e3182625852
25. Vardanian AJ, Clayton JL, Roostaieian J, et al. Comparison of implant-based immediate breast reconstruction with and without acellular dermal matrix. *Plast Reconstr Surg.* 2011;128(5):403e–410e. doi:10.1097/PRS.0b013e31822b6637
26. Zienowicz RJ, Karacaoglu E. Implant-based breast reconstruction with allograft. *Plast Reconstr Surg.* 2007;120(2):373–381. doi:10.1097/01.prs.0000267340.31742.1
27. Lee SH, Chun YS, Park HK, Kim YW, Cheon YW. Dual coverage of the inferior pole with conjoined fascial flap and acellular dermal matrix for immediate one-stage breast reconstruction with a prosthetic implant. *Int Soc Aesthet Plastic Surg.* 2018;42(5):1213–1219. doi:10.1007/s00266-018-1138-6
28. Sorkin M, Qi J, Kim HM, et al. Acellular dermal matrix in immediate expander/implant breast reconstruction: a multicenter assessment of risks and benefits. *Plast Reconstr Surg.* 2017;140(6):1091–1100. doi:10.1097/PRS.0000000000003842
29. Ibrahim AMS, Shuster M, Koolen PGL, et al. Analysis of the national surgical quality improvement program database in 19,100 patients undergoing implant-based breast reconstruction: complication rates with acellular dermal matrix. *Plast Reconstr Surg.* 2013;132(5):1057–1066. doi:10.1097/PRS.0b013e3182a3beec
30. Colwell AS, Tessler O, Lin AM, et al. Breast reconstruction following nipple-sparing mastectomy: predictors of complications, reconstruction outcomes, and 5-year trends. *Plast Reconstr Surg.* 2014;133(3):496–506. doi:10.1097/01.prs.0000438056.67375.75
31. Bernini M, Calabrese C, Cecconi L, et al. Subcutaneous direct-to-implant breast reconstruction: surgical, functional and aesthetic results after long-term follow-up. *Plast Reconstr Surg.* 2015;3(12):e574. doi:10.1097/GOX.0000000000000533
32. Bertozzi N, Pesce M, Santi P, Raposio E. Oncoplastic breast surgery: comprehensive review. *Eur RevMed Pharmacol Sci.* 2017;21:2572–2585.
33. Chun YS, Verma K, Rosen H, et al. Implant-based breast reconstruction using acellular dermal matrix and the risk of postoperative complications. *Plast Reconstr Surg.* 2010;125(2):429–436. doi:10.1097/PRS.0b013e3181c82d90
34. Lee KT, Mun GH. Comparison of one-stage vs two-stage prosthesis-based breast reconstruction: a systematic review and meta-analysis. *Am J Surg.* 2016;212:336–344. doi:10.1016/j.amjsurg.2015.07.015
35. Gallego EE, Bandre's GP, Arribas-Del A, Gil-Romea I, Domínguez RS, Sa'nchez AG. Treatment of implant exposure due to skin necrosis after skin sparing mastectomy: initial experiences using a not selective random Epigastric flap. *World J Surg.* 2017;41:2559–2565. doi:10.1007/s00268-017-4041-4
36. Spear SL, Seruya M. Management of the infected or exposed breast prosthesis: a single surgeon's 15-year experience with 69 patients. *Plast Reconstr Surg.* 2010;125(4):1074–1084. doi:10.1097/PRS.0b013e3181d17fff
37. Gabriel SE, Woods JE, O'Fallon WM, Beard CM, Kurland LT, Melton LJ. Complications leading to surgery after breast implantation. *N Engl J Med.* 1997;336:677–682. doi:10.1056/NEJM199703063361001
38. Clough KB, O'Donoghue JM, Fitoussi AD, Vlastos G, Falcou MC. Prospective evaluation of late cosmetic results following breast reconstruction: II. TRAM flap reconstruction. *Plast Reconstr Surg.* 2001;107:1710–1716. doi:10.1097/00006534-200106000-00011
39. Alderman AK, Wilkins EG, Lowery JC, Kim M, Davis JA. Determinants of patient satisfaction in postmastectomy breast reconstruction. *Plast Reconstr Surg.* 2000;106:769–776. doi:10.1097/00006534-200009020-00003
40. Bayram Y, Kulahci Y, Irgil C, Calikapan M, Noyan N. Skin-Reducing Subcutaneous Mastectomy Using a Dermal Barrier Flap and Immediate Breast Reconstruction with an Implant: a New Surgical Design for Reconstruction of Early-Stage Breast Cancer. *Aesth Plast Surg.* 2010;34:71–77. doi:10.1007/s00266-009-9452-7

**Breast Cancer: Targets and Therapy**

**Publish your work in this journal**

Breast Cancer - Targets and Therapy is an international, peer-reviewed open access journal focusing on breast cancer research, identification of therapeutic targets and the optimal use of preventative and integrated treatment interventions to achieve improved outcomes, enhanced survival and quality of life for the cancer patient. The manuscript management system is completely online and includes a very quick and fair peer-review system, which is all easy to use. Visit <http://www.dovepress.com/testimonials.php> to read real quotes from published authors.

Submit your manuscript here: <https://www.dovepress.com/breast-cancer—targets-and-therapy-journal>

**Dovepress**  
Taylor & Francis Group