Reliability of skin-sparing mastectomy as a treatment option for female patients with early-stage breast cancer

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Purpo
se This is a retrospective study conducted to assess cosmetic outcomes, patients' satisfaction, and oncological safety after skin-sparing mastectomy (SSM) with immediate breast reconstruction (IBR) for patients with early-stage breast cancer.

Patients and methods
A total of 60 female patients with early-stage breast cancer (stages I and II according to TNM classification), subjected to SSM and IBR between 2015 and 2017 were assessed. The aesthetic evaluation was done by the surgical team and through a patient's questionnaire, and also postoperative morbidity and incidence of recurrence were analyzed.

Results
A total of 39 (65%) patients went through an un-incidental postoperative course without major postoperative morbidity, 12 (20%) patients experienced mild postoperative seroma at the donor site, three (5%) patients experienced superficial skin gangrene over transverse rectus abdominis myocutaneous flap, and the remaining six (10%) patients reported substantial postoperative morbidity in the form of native skin-edge necrosis and part of skin flaps. A total of 21 (35%) patients showed an excellent aesthetic result and were extremely satisfied, 24 (40%) patients were satisfied showing a good aesthetic outcome, three (5%) patients had a fair aesthetic outcome and were less satisfied, and only 12 (20%) patients showed a poor aesthetic result and were dissatisfied. Only three (5%) patients of the studied group showed signs of local recurrence. It was not associated with any signs of systemic recurrence.

Conclusion
SSM and IBR for early breast cancer is oncologically safe with a low incidence of postoperative morbidity and an acceptable cosmetic outcome.

Keywords:
breast cancer, breast reconstruction, mastectomy

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Introduction

In the past two decades, there is a paradigm shift in the surgical management of breast cancer away from radicality to more conservative techniques or tailored procedures owing to improvements in our understanding of breast cancer's natural history and tumor biology, along with the emergence of evidence-based local and systemic adjuvant therapies [1,2]. Skin-sparing mastectomy (SSM) reported by Toth *et al.* [3] with immediate breast reconstruction (IBR) is widely recognized as the procedure that can achieve a radical cure and solve cosmetic problems. It is anticipated that IBR will spare women the sense of mutilation and disfigurement that accompanies mastectomy [4]. Women undergoing IBR not only have high levels of satisfaction with the surgical results but also have significantly less psychosocial morbidity than those undergoing mastectomy alone [5]. They are less depressed and experience less impairment of their sense of femininity, self-esteem, and sexual attractiveness than their peers who delayed or did not seek reconstruction; they also tend to accept the new breast as an integral part of their body [6]. SSM can be considered part of the rational progression away from a conventional mastectomy.

This work aims to assess the aesthetic results, oncological safety, and complications in patients with early-stage breast cancer undergoing SSM and IBR.

Patients and methods

Patients

A total of 60 female patients with early-stage breast cancer who fulfilled the following inclusion criteria: T1 and T2 breast carcinoma with evidence of multicentricity, extensive in situ component, residual

after breast conservative surgery, and well-motivated patients with average BMI willing to have IBR following SSM.

The study was approved by Alexandria University Ethical Committee. Consent was obtained from each patient to be included in this study, stating that the study is a research, and the details of the procedure and the potential benefits and complications were announced.

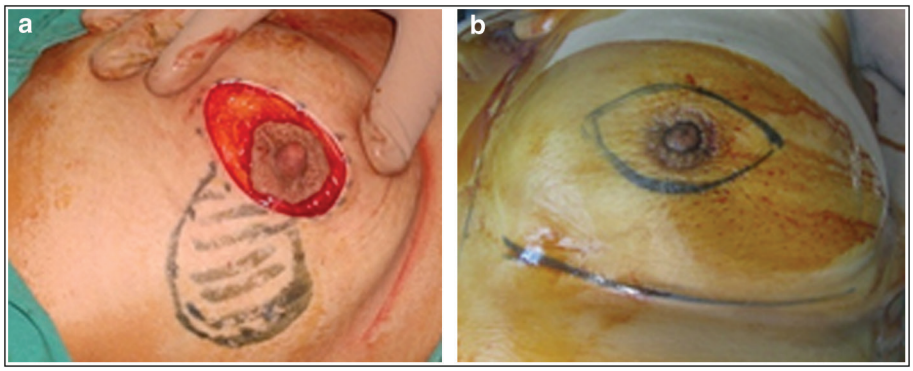
Methods

All patients included in this study were subjected to a thorough clinical examination of both breasts and axillae regarding breast lump, skin affection or changes, nipple discharge, and axillary lymph nodal enlargement. Digital photographs of the patient's breasts were taken preoperatively and postoperatively.

For surgery, the following steps were accomplished: the incision was primarily designed as a 5-mm margin of skin around the border of the nipple–areola complex (NAC) with or without medial and lateral linear extensions that did not incorporate the additional cutaneous surface area. In the case of superficial tumors or the presence of a previous biopsy scar, an elliptical incision was made including the NAC, the superficial scar, or the skin overlying the superficial tumor. For peripheral lesions (>2 cm from NAC), an elliptical skin incision directly over the tumor including the biopsy scar, saving NAC, was made. This was accomplished by frozen section biopsies taken from the subareolar region to ensure safety margin [7,8]. If implant/expander reconstruction is planned, the circular incision was converted to an 'elliptical incision.' In implant-based reconstruction, the skin was closed to facilitate breast shape, but in autologous reconstruction, the flap skin was used to fill the defect. After applying a suitable skin incision, the entire breast parenchyma was removed considering that the lower skin flap should not be dissected past the infra-mammary fold (Figs 1–5).

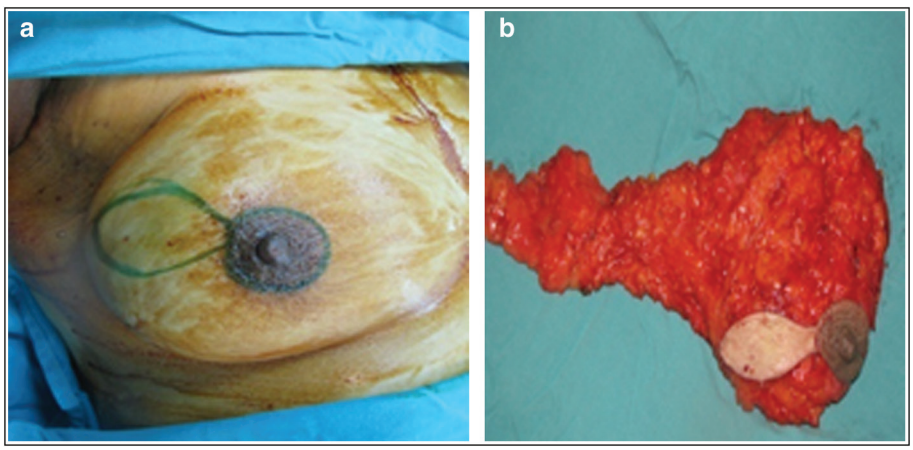
Axillary dissection or sentinel lymph node biopsy was done either through the periareolar incision itself, the lateral extension of the periareolar incision, or from a separate axillary incision.

Figure 1



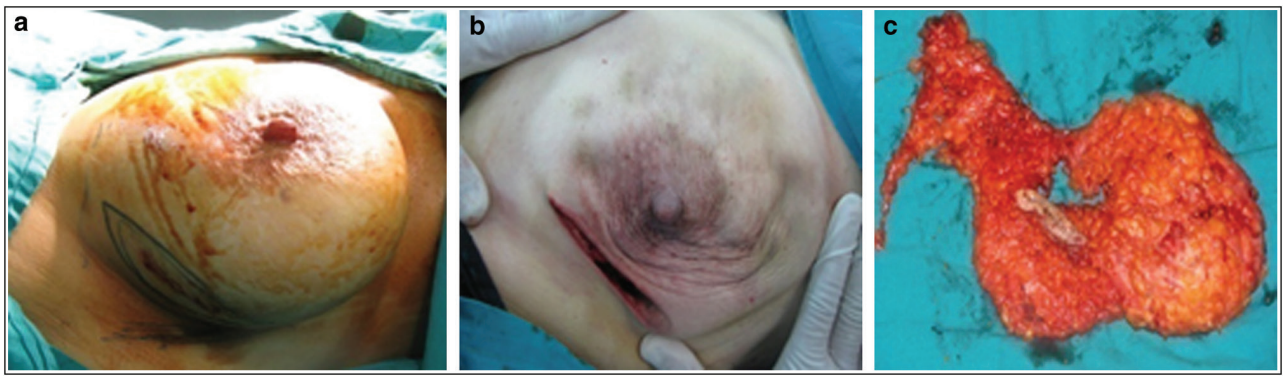
(a) Type I skin incision with a circumareolar incision. (b) Elliptical incision with markings of the tumor site.

Figure 2



(a) Type II skin incision with a lateral extension. (b) Mastectomy specimen after type II incision with a lateral extension.

Figure 3

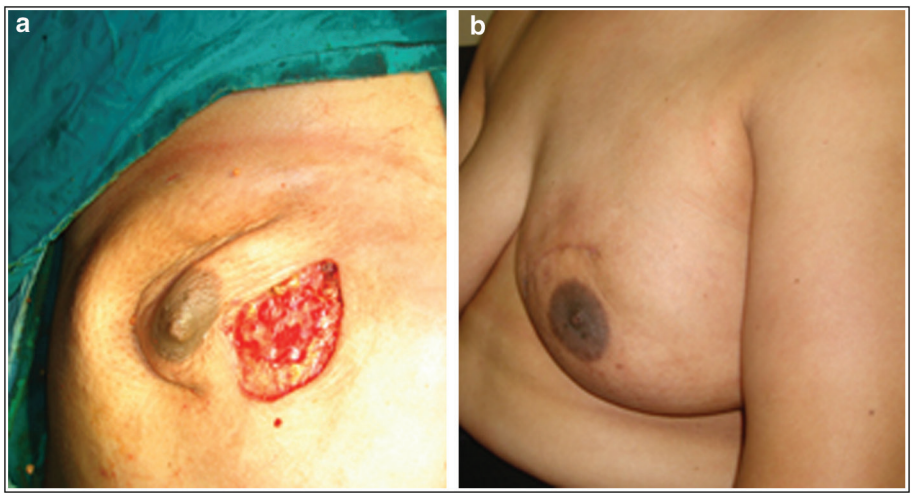


(a) Type III incision for a peripheral lesion. (b) Type III incision after mastectomy. (c) Mastectomy specimen.

Figure 4

(a) Planning for type IV skin incision. (b) Lines of skin incision with inverted T incision for reduction mammoplasty. (c) Type IV incision final result.

Figure 5



NAC-sparing mastectomy. NAC, nipple–areola complex.

The reconstruction method was determined by the MDT according to anticipated adjuvant postoperative radiotherapy, body habitus, size of the reconstructed breast, contralateral match, availability of flap donor sites, any coexisting comorbidities, previous abdominal surgeries, patient's preference, and acceptance for the reconstructive procedure. A variety of methods were used: subpectoral prostheses, tissue expanders, latissimus dorsi (LD) flap, or transverse rectus abdominis myocutaneous (TRAM) flap.

Assessment of the aesthetic results and, hence, psychological satisfaction according to the scoring system of Tzaffeta *et al.* [9], were done through the surgical team and a patient's questionnaire involving some subjective evaluations of the reconstructed breast. This evaluation addressed the shape of the reconstructed breast both with and without a brassiere, contralateral match, formation of the infra-mammary fold, and mobility of the reconstructed breast. Finally, the overall aesthetic result and the patient satisfaction were evaluated on a four-point ordinal scale (rated as excellent and extremely satisfied, good and satisfied, fair and less satisfied, and finally poor and dissatisfied).

Adjuvant systemic chemotherapy, radiotherapy, and hormonal therapy were planned and administered according to histopathological examination, lymph nodal status, and hormonal receptor status. Beginning 4–6 weeks after the procedure, all patients were followed up. The length of postoperative follow-up ranged from 36 to 60 months. All patients were subjected to clinical examination every 3 months, annual mammosonography for detection of loco-regional recurrence, and metastatic workup was done every 6 months for detection of distant metastasis.

Results

The study included 60 female patients. Their mean age was 41.80 ± 7.70 years, ranging from 28 to 54 years old. None of our patients were smokers, three patients were diabetics, and three patients had both diabetes mellitus and hypertension. The mean BMI was 27.6 kg/m^2, ranging from 23.4 to 35.8 kg/m^2.

Table 1 shows sites of the tumor.

The majority of patients were diagnosed as having infiltrating ductal carcinoma (Table 2).

According to the UICC TNM staging system and after excluding cases with recurrent or residual tumors after breast conserving therapy (BCT) [21 (35%) cases], the remaining patients were classified according to the TNM staging system into three groups (Table 3).

Tumor size ranged from 1 cm in multicentric tumors as the lowest dimension up to 3.5 cm as the largest dimension. Neoadjuvant chemotherapy was taken by 15 patients, accounting for 25% of cases.

Axillary management was done in the form of sentinel lymph node biopsy in 18 patients; 15 patients were free, and the remaining three patients were positive, and complete axillary clearance was done. However, the remaining 33 patients had complete axillary dissection, after the exclusion of nine patients who had recurrent disease.

Table 1 According to the sites of the tumor

Site of tumor	*n* (%)
Upper outer quadrant	27 (45)
Upper inner quadrant	12 (20)
Lower outer quadrant	3 (5)
Central	3 (5)
Multicentric	15 (25)

Table 2 Tumor histopathology

Tumor histopathology	*n* (%)
Infiltrating ductal carcinoma	42 (70)
Infiltrating lobular carcinoma	6 (10)
Mixed ductal and lobular carcinoma	3 (5)
Reconstruction infiltrating ductal carcinoma	9 (15)

Table 3 UICC TNM staging

UICC TNM staging	*n* (%)
Stage I	12 (20)
Stage IIA	12 (20)
Stage IIB	15 (25)
Total number	39 (65)

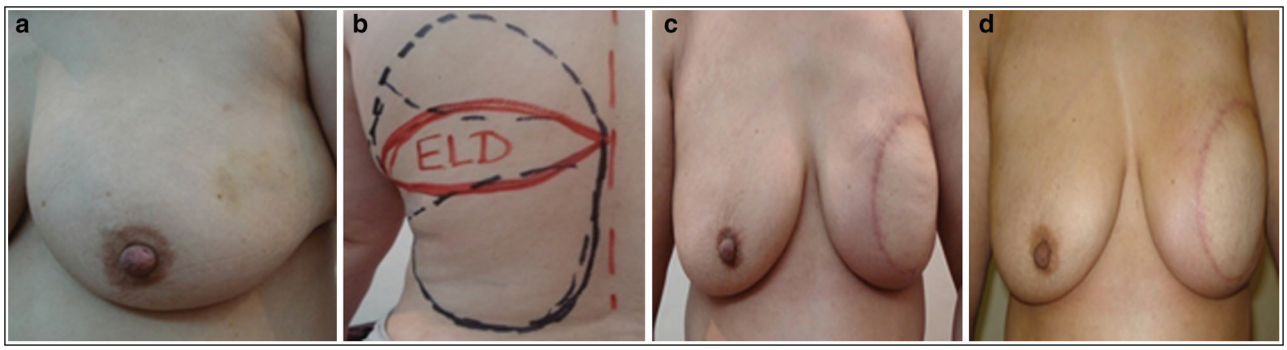
Reconstruction options are shown in Figs 6–8 and Table 4.

The operative time ranged from 2 h and 30 min up to 7 h with a mean of 4.13 h. This variation in operative time was related to the reconstructive procedure rather than the mastectomy procedure itself. This was noticed more in cases reconstructed using the TRAM flap. This prolonged time had no additional intraoperative or immediate postoperative risk on the studied patients. On the contrary, the insertion of tissue expanders showed the lowest operative time among the reconstructive procedures. None of our patients needed an intraoperative or postoperative blood transfusion.

Postoperative morbidities (Table 5) were in the form of donor-site seroma found in 12 patients (20% of cases, all in the LD reconstruction group). Despite the use of closed suction drains, superficial skin gangrene over the TRAM flap was reported in three (5%) patients managed by debridement and daily dressings till spontaneous healing, with resultant delay in the initiation of adjuvant chemotherapy and radiotherapy for 2 months (Fig. 9).

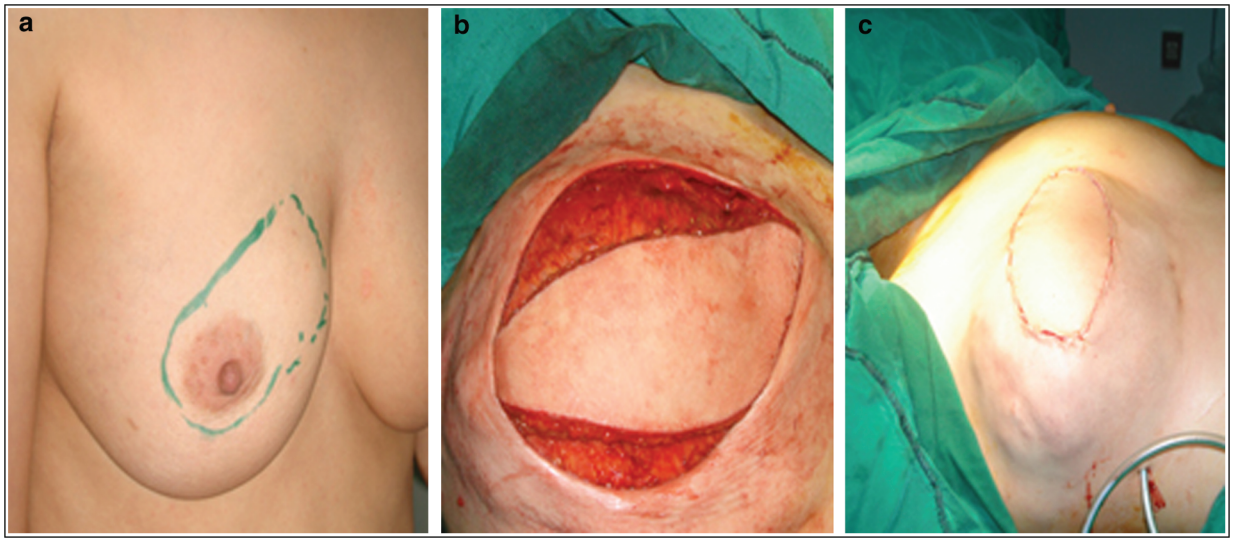
Finally, six (10%) cases had local necrosis and gangrene of edges of skin envelope necessitating removal of implants; this was responsible for a postoperative

Figure 6



(a) Preoperative (LD flap). (b) Plan of LD reconstruction. (c) Three months postoperative. (d) Four months postoperative. LD, latissimus dorsi.

Figure 7



LD with an implant (a–c). LD, latissimus dorsi.

delay in conduction of adjuvant treatment for about 3 months (Fig. 10).

Of 12 (20%) patients who showed donor-site seroma, 10 patients underwent LD flap with or without implant and two of them underwent TRAM flap reconstruction. On the contrary, regarding the three (5%) patients who showed superficial flap gangrene, two of them underwent TRAM and one of them underwent composite reconstruction (LD flap+implant).

Six (10%) patients in our study had major complications. Three of them underwent TRAM, which needed frequent daily dressing and vacuum-assisted dressing after two weeks and one of them needed intraoperative debridement after three weeks owing to flap gangrene. Two patients showed gangrene of skin flaps over tissue expander and required tissue expander removal. One patient of the composite group (LD flap+implant) required implant removal.

Adjuvant postoperative radiotherapy

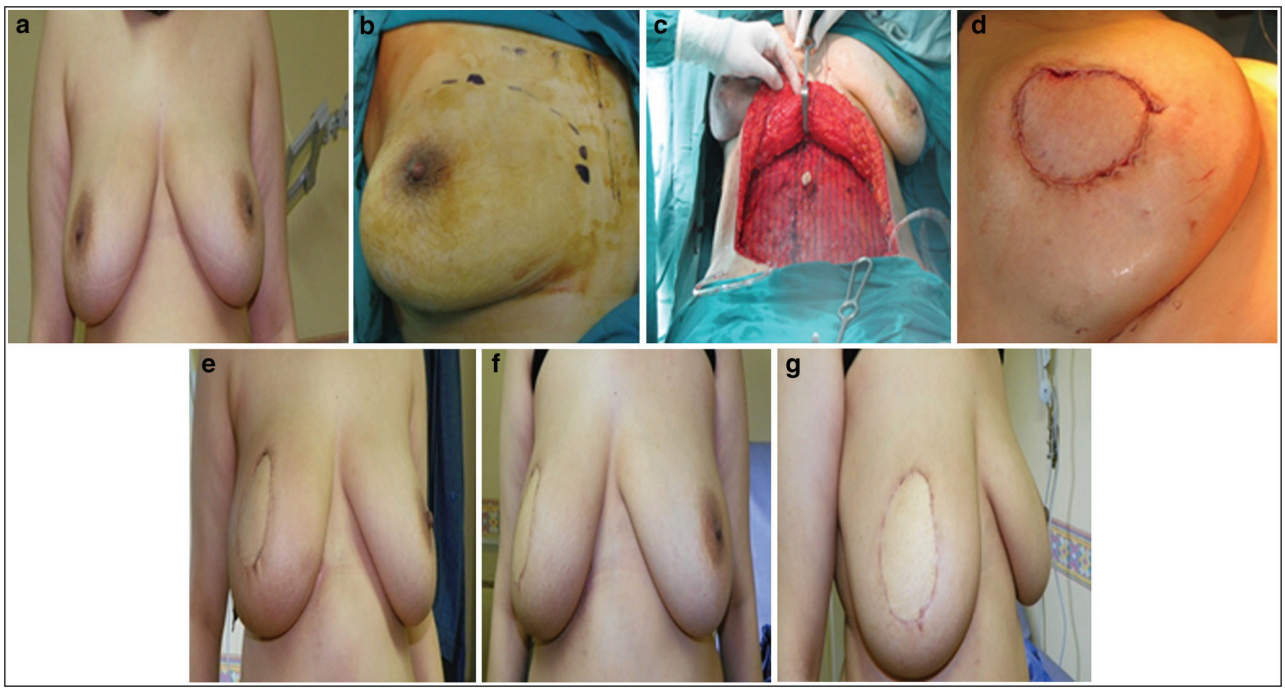
Of the 60 patients included in the study, 39 (65%) patients received adjuvant postoperative radiotherapy to the chest wall. The remaining 21 (35%) patients were excluded from postoperative adjuvant radiotherapy. Postoperative adjuvant radiotherapy was found to be directly related to the encountered aesthetic results; all 15 patients who showed either poor or fair aesthetic results were among the group of patients who received postoperative adjuvant radiotherapy.

Aesthetic results and psychological assessment

Overall good results were seen up to 75% of cases. Poor aesthetic results accounted for 25% of the studied patients (Table 6).

All 12 (20%) patients with poor satisfaction were associated with postoperative complications regarding skin necrosis, gangrene, or implant removal. Only three patients of the postoperative seroma group scored poor satisfaction.

Figure 8



(a) A 33-year-old female patient with right-sided multicentric breast cancer. (b) Plan of TRAM reconstruction. (c) Mesh insertion after TRAM flap. (d) At the end of surgery. (e) One month postoperatively. (f) Three months postoperatively. (g) Three months postoperatively. TRAM, transverse rectus abdominis myocutaneous.

Table 4 Distribution of the studied cases according to the type of reconstruction

Type of reconstruction	*n* (%)
Latissimus dorsi myocutaneous flap	27 (45.0)
Latissimus dorsi myocutaneous flap+implant	12 (20.0)
Transverse rectus abdominis myocutaneous flap	15 (25.0)
Tissue expander	6 (10.0)

Table 5 Postoperative morbidity

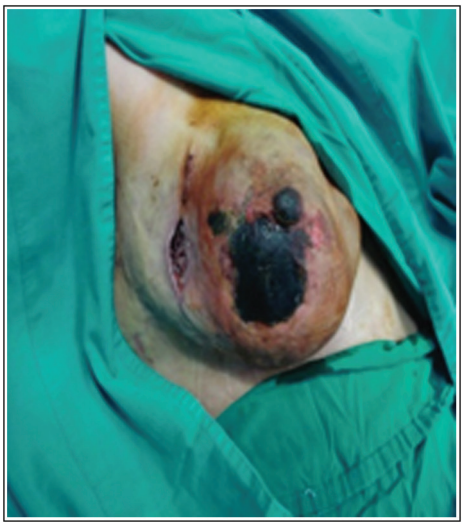
Postoperative morbidity	*n* (%)
Uneventful	39 (65.0)
Postoperative morbidities	21 (35.0)
Minor morbidity (donor site seroma)	12 (20.0)
Moderate morbidity (superficial skin flap gangrene)	3 (5.0)
Major morbidity (gangrene of skin flaps and implant removal)	6 (10.0)

Oncological follow-up

All patients included in the study were followed up closely to detect any signs of local recurrence. The length of postoperative follow-up ranged from 36 months postoperatively to 60 months, and all patients were subjected to both breast and axillae clinical examinations every 3 months, annual mammosonography for detection of loco-regional recurrence, and metastatic workup was done every 6 months for detection of distant metastasis.

Only three patients of the studied group showed signs of local recurrence that was not associated with any signs of regional or systemic recurrence. These patients were of the group of patients who had LD flap as their reconstructive procedure and had adjuvant radiotherapy after their mastectomy. The recurrence was managed by local excision and postoperative radiotherapy (Table 7).

Figure 9

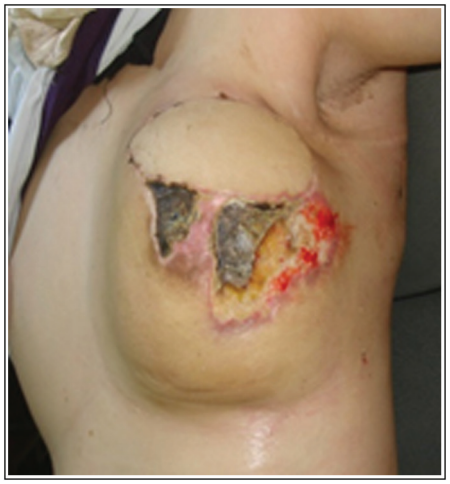


Skin gangrene.

Discussion

A total of 60 female patients with early-stage breast cancer matching the inclusion criteria for SSM and IBR were included in our study. Patients' age ranged from

Figure 10



Flap necrosis.

Table 6 Aesthetic results scoring and patient satisfaction

Aesthetic results scoring and patient satisfaction	*n* (%)
Poor, dissatisfied	12 (20.0)
Fair, less satisfied	3 (5.0)
Good, satisfied	24 (40.0)
Excellent, extremely satisfied	21 (35.0)

Table 7 Distribution of cases according to local recurrence

Local recurrence	*n* (%)
No local recurrence	57 (95)
Local recurrence	3 (5)

28 to 54 years, with a mean of 41.80 ± 7.70 years old. This may explain why those relatively young patients were well motivated to have IBR following SSM.

Hurley *et al.* [10] studied 29 patients with SSM and IBR, and the mean age for them was 48 ± 1.8 years.

Ryu *et al.* [11] studied 31 patients who were subjected to SSM and IBR, and their median age was 37 (range, 26–57) years.

We have found that the age of patients had no value in the final assessment of the aesthetic outcome of the procedure.

In the current study, the overall morbidity rate was 35%, ranging between minor, moderate, and major postoperative morbidities, which was in the form of donor-site seroma found in 12 patients (20% of cases, all in the LD reconstruction group), and all of them were managed conservatively. Superficial skin gangrene over the TRAM flap was reported in three (5%) patients managed by debridement and daily dressings till spontaneous healing with resultant delay in the initiation of adjuvant chemotherapy and radiotherapy for 2 months. Finally, six (10%) cases had local necrosis and gangrene of edges of skin envelope necessitating removal of implants. This was responsible for a postoperative delay in the conduction of adjuvant treatment for about 3 months. Patient-related factors including age, body habitus, and coexisting comorbidities were found to be insignificant in the occurrence of postoperative comorbidities, whereas neoadjuvant chemotherapy was found to be associated with minor comorbidities in six patients and with major comorbidities in three patients, accounting for 60% of cases who received neoadjuvant chemotherapy, which was found to be of significant value. A total of six patients had previous radiotherapy after a previous BCT, and three of them developed marginal lower flap skin ischemia and gangrene.

In a series of 127 women who had SSM and IBR, Reefy *et al.* [12] observed infection requiring implant removal in two patients and one patient developed marginal ischemia of skin envelope which was treated conservatively. All their patients who underwent LD flap reconstruction developed donor-site seroma, which was managed conservatively. Chemotherapy was delayed in only one patient for 2 weeks owing to infection, and six patients had previous radiotherapy after a previous BCT and suffered no wound complications.

The study by Ryu *et al.* [11] on 31 patients who underwent SSM and IBR observed flap complications in the form of partial flap necrosis occurring in one patient and one patient had sclerotherapy because of uncontrolled seroma.

Postoperative complications in our study were found to be irrelevant to pathological diagnosis, staging, or age of the patient but were found to be related to neoadjuvant chemotherapy, previous breast irradiation, thinning of skin flaps during dissection, and the aesthetic procedure that was adopted.

According to psychological satisfaction, 35% of our patients were extremely satisfied by the reconstructive procedure, 40% were just satisfied, 5% were less satisfied and finally, and 20% were dissatisfied with their reconstructive procedure. The overall rate of dissatisfaction was 25%.

In a retrospective study conducted by Du *et al.* [13], which included a total of 62 patients who underwent 63 breast reconstructions; 37 (58.7%) reconstructions were related excellent, 19 (30.2%) were good, five (7.9%) were fair, and two (3.2%) were poor.

The current study closely monitored all patients to detect any signs of local recurrence. The duration of postoperative follow-up ranged from 36 to 60 months. Only three (5%) patients showed signs of local recurrence without any signs of systemic recurrence. Regarding their histopathology, they were triple-negative, had positive lymphovascular invasion, and had positive axillary lymph nodes.These patients had completed their adjuvant chemotherapy and radiotherapy and were managed by local excision and radiotherapy. This low incidence of local recurrence may be attributed to the early stage of the disease at the time of surgical intervention, the mastectomy procedure itself, and the justified administration of neoadjuvant and adjuvant therapy to the studied patients.

Lee *et al*. [14] observed local recurrence in 12 (10.2%) of 118 patients who underwent SSM/NSM with IBR.

After an average follow-up of 51 months, Meretoja *et al*. [15] reported only four local recurrences within the native breast skin of 146 women with stage 0–II breast cancer (2.7% of cases) and three cases with isolated regional lymph nodal recurrence at a rate of 2.1%. The overall loco-regional recurrence was 4.8%.

Conclusion

SSM with IBR is a feasible clinical and oncological procedure, resulting in acceptable cosmetic results and high levels of patient satisfaction. Poor aesthetic results were related to neoadjuvant chemotherapy, previous breast irradiation, thinning of skin flaps during mastectomy, and the reconstructive procedure itself.

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Nil.

Conflicts of interest

There are no conflicts of interest.

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