



Modified Radical Mastectomy With Extended Latissimus Dorsi Flap Versus Skin Sparing Mastectomy With Sub Pectoral Silicone Implant; A Prospective Evaluation

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Abstract: Background: Several types of mastectomy procedures are now available to the breast surgeon. The most commonly performed is total mastectomy, with the removal of the nipple-areola complex (NAC) and the whole breast tissue in addition to the nipple-areola complex skin ellipse. A skin sparing total mastectomy resects all the breast tissue through a circumareolar incision including the resection of the nipple but preserving the skin envelope, thus facilitating immediate reconstruction. **Aim of the work:** the aim of our work was to compare modified radical mastectomy with extended latissimus dorsi flap with skin sparing mastectomy with sub pectoral silicone implants as regard surgical outcome, patient satisfaction and oncological safety. **Patients and methods:** This prospective randomized comparative study included 30 patients with invasive breast cancer. 15 of them were treated by modified radical mastectomy with extended latissimusdorsi flap (**group A**) and the other 15 patients were treated by skin sparing mastectomy with sub pectoral silicone implants (**group B**). The patients were followed up every 3 months for post-operative early and late complications and cosmetic outcome. **Result:** The mean age for our study was 45.60 ± 5.81 . The mean operation time in **group A** was 3.81 ± 0.76 while in **group B** was 1.55 ± 0.44 with **P value 0.0001 (HS)**. Postoperative complications occurred in only 10 cases in the form of 4 cases (13.3%) of wound infection and 6 cases (20%) of haematoma. 5 patients from the 6 patients who had haematoma were in **group A**. The mean of cosmetic outcome score in **group A** was 1.60 ± 0.74 which fall between poor and good and in **group B** 4.00 ± 0.93 which fall between good and excellent with **P value .001(HS)**. **Conclusion:** Skin sparing mastectomy with immediate reconstruction is an excellent choice for cases not suitable for conservative wide local excision provided that there is a good patients' selection.

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Key words: Latissimus dorsi flap, silicone implant, skin sparing mastectomy.

1. Introduction:

The most common cancer among women in Egypt is breast cancer representing about 18.9% of all cancer patient. There are many types of mastectomy procedures available for the breast surgeon. **(11)** Total mastectomy is the most commonly procedure used in which the whole breast tissue, the covering skin and nipple-areola complex are removed. Skin sparing total mastectomy is commonly used also now in which the whole breast tissue is removed through circumareolar incision with the removal of nipple-areola complex but preserving the skin envelope and so facilitating immediate reconstruction. **(1)**

Reconstruction by Implants and tissue expanders are the most commonly used in United States. This technique requires healthy mastectomy skin flaps to prevent implant expulsion. It has the following benefits over autologous reconstruction: lower primarily cost, easier operative technique, shorter

operative time and no further scar or donor site morbidity. **(4,7)**

The latissimus dorsi musculocutaneous flap as an autologous breast reconstruction has been used since the 1970s. it is an excellent option for almost any reconstruction situation either immediate or delayed. When it is used in immediate reconstruction following total mastectomy it is often used with prosthetic device while in delayed reconstruction after radiation, prosthetic device often not used. **(5,10)**

Latissimus dorsi flap has many advantages such as: it can be used in combination with tissue expander or implant in medium and large sized breast and so providing additional soft tissue coverage, pedicle is dependable and large in diameter, skin paddle design is adjustable and can be hidden by undergarments and the term donor site morbidity is lesser. The main disadvantages of this technique are the high incidence rate of seroma formation which may reach up to 79% of patients it is reduced significantly by progressive

tension sutures and that tissue expander and implant are mostly needed to increase breast projection and volume. (12)

Aim of the work

The aim of our work was to evaluate modified radical mastectomy with extended latissimusdorsi flap versus skin sparing mastectomy with sub pectoral silicone implant as regard postoperative complication oncological safety and cosmetic outcome.

2. Patients and methods:

This prospective comparative study was held at General Surgery Department in Ain Shams University Hospitals in the period from 1/7/2017 to 1/3/2019. The number of Participants was 30 Patients diagnosed to have breast cancer. The patients were divided into two equal groups:

Group A: had modified radical mastectomy with extended latissimus dorsi flap.

Group B: had skin sparing mastectomy with sub-pectoral silicone implant.

The approval of the Ethical Committee and written informed consent was obtained from all participants.

Patient selection was done through inclusion and exclusion criteria.

Inclusion criteria:

- Female patients with age ranging from 27-60 years.
- Ability to Provide Written Consent.
- T3 not responding to neo-adjuvant chemotherapy.
- T2 in small size breast patients.

- Diffuse malignant micro-calcifications.
- Multicentric ipsilateral lesions.
- Patients received neo-adjuvant chemotherapy.

Exclusion Criteria:

- Patients with age <27 or >60 years.
- Inability to provide written consent.
- Pregnancy.
- Critically ill patients.
- Patients unavailable for follow up.
- Patients with recurrent breast Cancer: several studies reported that local recurrence after conventional surgery is associated with a worse prognosis than local recurrence after breast conservative therapy.
 - Breast cancer patients suitable for conservative treatment.
 - Autoimmune Disease: increase rate of flap necrosis, infection, high incidence of recurrence.
 - Drug abuse or Alcohol abuse.
 - Patient refuses surgery.
 - Tumour involving the skin envelope.
 - Metastasis M1.

Patients were subjected to Clinical assessment (history, full breast and axillary examination), investigation (routine preoperative laboratory investigations, bilateral sono-mammography, histopathological examination (true cut biopsy from suspicious mass) and metastatic work up (pelvi-abdominal u/s, CT chest and bone scan).

Operative technique:

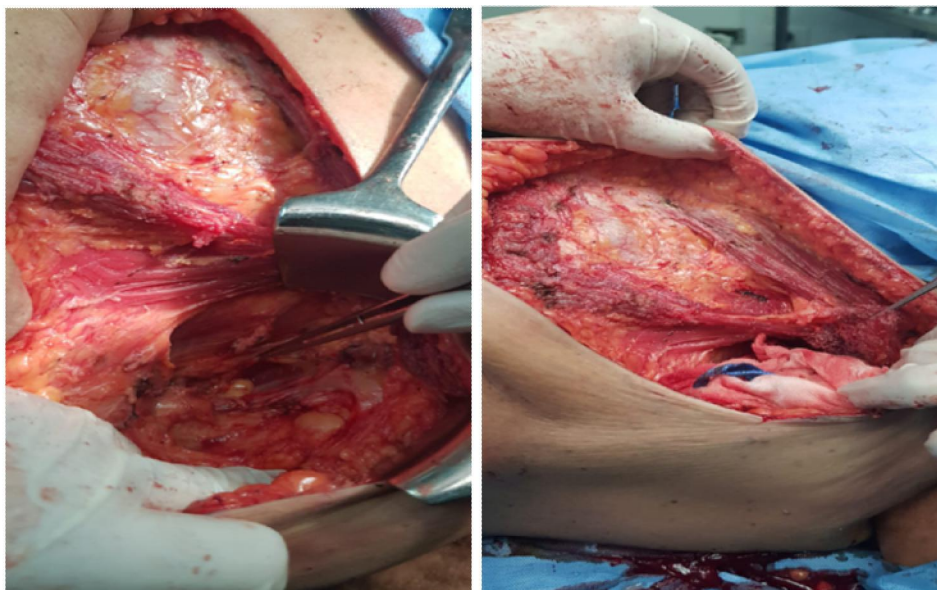


Figure (1): Modified radical mastectomy.

Group A: patients in this group were underwent modified radical mastectomy with extended latissimus dorsi flap.

Modified radical mastectomy: it involves removal of the entire breast, nipple-areola complex and skin overlying the breast with preservation of the pectoralis minor and major muscles, with in continuity dissection of level I and II axillary lymph nodes, while preserving level III axillary nodes.

The incision was marked as an ellipse to include the nipple-areola complex, any excess breast skin and any previous biopsy site. Care must be taken to avoid extension of the incision medial to the sternum or lateral to the breast mound because this will produce dog-ears.

Skin edges have to be elevated with skin hooks while skin flaps were dissected with electro cautery. En bloc axillary lymph node dissection was performed as part of modified radical mastectomy, the wound irrigated, and haemostasis was carefully done (**Figure 1**).

Extended latissimus dorsi flap:

Skin Paddle Design:

With the patient in the standing position, the skin paddle was designed by grasping the lumbar and lumbothoracic fat compartments simultaneously in a “double-bubble” pinch test.

This test demonstrates the incorporation of the lumbar and lumbothoracic both adipose folds within the skin paddle design. Both folds were pinched together. The size of the fat compartment can be estimated in the double-bubble pinch test, so we can decide the ability to close the donor-site primarily. (**Figure 2**).



Figure (2): Preoperative markings of skin paddle

Operative and surgical technique:

With the patient in the lateral position and the shoulder is abducted 90 degree the flap is raised. The incision of the skin island was done only down to the subdermal layer.

The plan of dissection is then continued along the subcutaneous plane until we obtain the maximal amount of the surrounding adipofascial tissue within the flap. The largest possible flap as regard volume should be harvested with tendency towards overcorrection. (**Figures 3, 4**).

The muscle was then divided as usual from its attachments into the iliac crest and the thoracolumbar fascia. Separation of the anterior border from the underlying Serratus anterior muscle was then done carefully. To keep the pedicle protected by some fibers of the muscle and at the same time minimize the axillary bulk, the insertion of the muscle into the intertubercle groove on the humerus was subtotally divided. This technique also allows for more reach of the muscle.



Figure (3): The skin flap dissection subfascially.



Figure (4): Obtaining large flap volume.

The muscle with the overlying fat was then separated from all its attachments except at the intertubercle groove insertion and now mobilized to the chest wall through a subcutaneous tunnel which is wide enough to introduce four fingers to reach to the site of reconstruction. Care was also taken not to disturb the inframammary fold. (Figure 5).



Figure (5): Elevation of the harvested flap.

The myoadipofascial flap was folded under the skin paddle in such a way to provide the best possible projection with fullness mainly formed inferiorly to match the other breast. The muscle was now anchored to the underlying muscle bed and with the addition of some sutures to the lateral chest wall, the lateral contour of the breast mound was defined. (Figure 6).



Figure (6): Insertion of the flap into the mastectomy defect.

The back was then closed in two layers over a large suction drain, which was usually left for one to two weeks postoperatively. Another suction drain was inserted under the transposed flap.

The wound of the chest wall was closed in layers and the flap was supported with some tapes laterally and superiorly.

Group B: the patients in this group underwent skin sparing mastectomy with subpectoral implant.

All breast tissue along with the NAC were removed through a surgical plane developed between subcutaneous fat and the breast tissue. the preservation of the inframammary fold and as much native skin envelop as possible is done to optimize the aesthetic outcome of the reconstruction. (Figure 7).

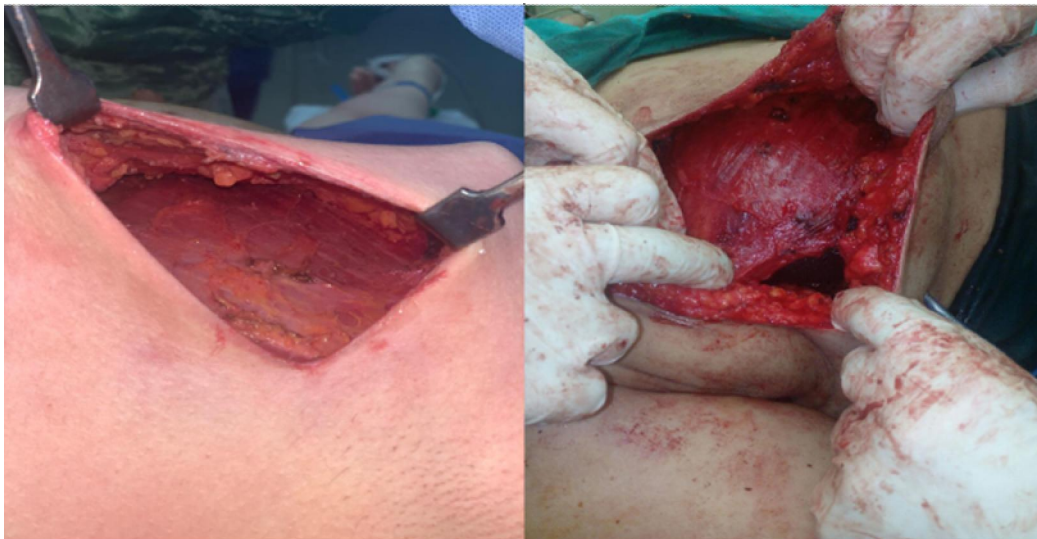


Figure (7): Skin sparing mastectomy.

After the mastectomy and haemostasis were completed, the sub-muscular pocket was readied. The pectoralis major muscle was raised from its lateral edge and the sub-muscular pocket dissected medially to the sternal edge. This submuscular dissection was reached superiorly to the level of the ideal position of the new breast cleavage in the relatively avascular space between pectoralis major and minor (**Figure 8**). This is mostly, but not always, at the level of the second rib. It is very important not to expand the pocket too far superiorly as this will result in a high riding implant.



Figure (8): Sub muscular pocket.

For placement of the implant medially, the pectoralis major muscle was raised from its insertion at the level of the fifth rib (**Figure 9**). It may be important also to raise part of the anteriorrectus fascia, in continuity, to make complete coverage. This has to be done with consideration that this layer is often thin and friable.



Figure (9): Elevation of pectoralis major muscle from its insertion.

The inferolateral portion of the implant was covered by raising the lower slips of serratus anterior. The sub-serratus and sub-pectoral pockets extended down to beneath the level of the inframammary fold.

The implant was then inserted into the sub-muscular pocket, and once the position is satisfactory (**Figure 10**), the lateral border of pectoralis major was sutured to serratus anterior and therefore the implant is completely covered with muscle which separates it from the mastectomy space (**Figure 11**).

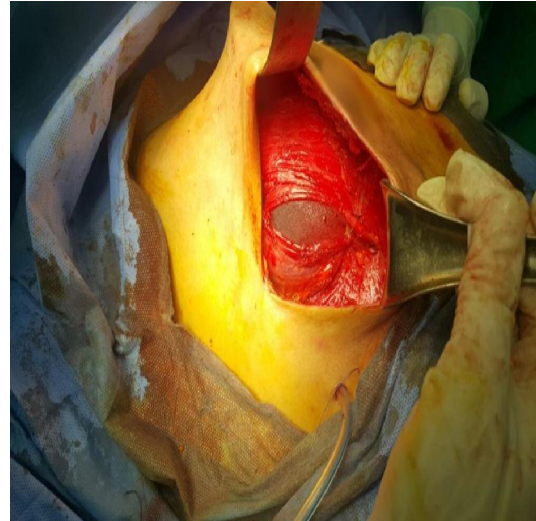


Figure (10): Sub muscular implant insertion.



Figure (11): Suturing the lateral border of pectoralis major to serratus anterior muscle.

Axillary clearance was done.

Patients were asked to follow up in the surgical department clinic after completion of the adjuvant therapy once every three months for 9 months.

Our patients were followed up for:

- § Bleeding and hematoma formation
- § Wound assessment
- § Cosmetic outcome
- § Patient satisfaction
- § Integrity of skin flaps
- § Local recurrence

Statistical analysis:

The results had been collected, evaluated, calculated, tabulated and statistically analyzed using a computer statistical package SPSS version 20.0. Qualitative data were analyzed using Chi-Square test. If an expected value for any cell was less than 5, Fisher Exact test was used. P value less than 0.05 was considered as significant (s), more than 0.05 was considered as Non-significant (NS) and less than 0.01 was considered as Highly significant (HS).

3. Result:

Our study conducted on 30 female patients with breast cancer. The patients subdivided into two groups:

Group A: included 15 patients who underwent modified radical mastectomy with immediate reconstruction by extended latissimus dorsi flap.

Group B: included 15 patients who underwent skin sparing mastectomy with immediate reconstruction with silicon implant.

Mean age in both groups were 36.47 ± 5.58 and 34.73 ± 6.10 respectively. There was no significant difference of mean age between the two groups (P value > 0.05). five patients have medical comorbidities, three patients had diabetes mellitus, one patient had hypertension and one patient had ischemic heart disease.

The tumor size was evaluated by ultrasound. The mean tumor size for group A was 1.48 ± 0.34 versus 3.31 ± 0.56 in group B with P value 0.0001 (HS). The largest tumor size in all the study was 45-55mm while the smallest was <20mm. the breast size was estimated. The mean breast cup size for the whole study was B. The minimum breast cup size was A, while the maximum was D. the mean breast size in both groups were 1.93 ± 0.70 (which stand for B) and 3.00 ± 0.93 (which stand for D) respectively with **P value 0.0001 (HS). (Table 1).**

Table (1) comparison between the two groups as regard tumor size and breast size

	Group Extended					
	latissimus dorsi flap		SSM+implant		P	Sig
	Mean	±SD	Mean	±SD		
Tumor size	1.48	.34	3.31	.56	0.0001*	HS
Breast size	1.93	.70	3.00	.93	0.0001*	HS

Our mean operation time in all the thirty patients was 2.68 ± 1.30 . The minimum operation time was 1 hour while the maximum was 5 hours. The mean

operation time in **group A** was 3.81 ± 0.76 while in **group B** was 1.55 ± 0.44 with **P value 0.0001 (HS). (Table 2).**

Table (2): Mean operative time for every surgical procedure.

	Group					
	Latissimus dorsi flap		SSM+implant		P	sig
	Mean	± SD	Mean	± SD		
Operative time	3.81	.76	1.55	.44	0.0001*	HS

The post-operative stay period was recorded for all patients. Patients with extended latissimus dorsi flap had the longest post-operative stay (2-3 days), while patients with skin sparing mastectomy and implant had the shortest post-operative stay (1-2 days).

Postoperative complications occurred in only 10 cases in the form of 4 cases (13.3%) of wound infection and 6 cases (20%) of haematoma. It is worth noting that four patients who have had wound infection three of them were diabetics. The four

patients received antibiotic injection for 3 days then continued oral antibiotic and instructed to have the wound dressing twice daily until the infection was eradicated. One patient only required wound opening to allow drainage, which was later secondarily sutured. This didn't affect the final cosmetic outcome. Five of the six patients who had postoperative haematoma underwent latissimus dorsi flap and one patient underwent skin sparing mastectomy with subpectoral implant. **(Table 3).**

Table (3): Mean complications for every surgical procedure

		Group					
		Latissimus dorsi flap		SSM+implant		P	Sig
		Number	%	Number	%		
Hematoma	Positive	5	33.3%	1	6.7%	0.006**	HS
	Negative	10	66.7%	14	93.3%	0.0001*	HS
Infection	Positive	3	20.0%	1	6.7%	0.169**	NS
	Negative	12	80.0%	14	93.3%	0.598**	NS

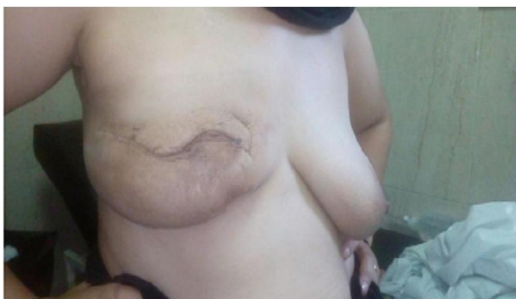
*Fisher exact test**Chi-Square Tests

All the fifteen patients who underwent sub pectoral silicone implant developed capsular contracture of different grades. This was the complication of the postoperative radiation as all the patient in this group was in demand for irradiation. This was treated by capsulotomy in grade 1 and 2 and capsulotomy and re-implant in grade 3 and 4 at time of nipple-areola complex reconstruction. This complication did not affect the main cosmetic outcome in this group. (**Table 4**).

Table (4): Number of cases with capsular contraction

Capsular contracture	Number	%
Grade 1	4	26.7
Grade 2	5	33.3
Grade 3	3	20
Grade 4	3	20

In our study 2 cases developed implant malposition (**figure 12,13**).

**Figure (12):** Superior malposition of implant**Figure (13):** Lateral malposition of implant

No cases of local recurrence recorded in follow up period (9 months).

Cosmetic outcome was estimated using a scoring system which was made up by surgeon, patient and MDT of the breast based on the level of satisfaction to give an overall score for cosmetic outcome.

The cosmetic outcome score was based on multiple items:

- 1- The overall shape of the breast
- 2- The symmetry of both breasts
- 3- The site and direction of the nipple
- 4- The volume if the breast
- 5- The skin incision shape

These items was discussed for every single case and analysed to give a scoring system graded from 1 to 5 as the following:

- 5 = Excellent
- 4 = very good
- 3 = Good
- 2 = Fair
- 1 = Poor
- 0 = Ugly

The overall mean score of our study was 2.80 ± 1.47 which fall between good and excellent.

The mean of cosmetic outcome score in **group A** was 1.60 ± 0.74 which fall between fair and good (**Figure 16**) and in **group B** 4.00 ± 0.93 which fall between very good and excellent (**Figures 14,15**) with **P value.001 (HS)**.

**Figure (14):** First post operative dressing with minimal edema and excellent symmetry



Figure (15): Follow up after one month.



Figure (16): First post operative dressing showing good vascularity of flap with fair symmetry of both breasts.

4. Discussion:

Breast reconstruction after mastectomy becomes a subject of great interest to both the surgeon and the women who need the restoration of one of the most important feminine characteristics. Reconstruction can be performed either simultaneously with mastectomy or it can be delayed. Delayed reconstruction was for long time the method of choice, especially if radiotherapy post mastectomy was needed. Also it can be either autologous (locoregional flap, free flap), allogeneic (implant-based), or a mix of both. (2)

Since skin-sparing mastectomy has proven to be oncologically safe, there is an increasing in the number of patients with invasive breast cancer who underwent breast reconstruction. In fact, for women who underwent mastectomy, breast reconstruction gives psychosocial as well as aesthetic benefits. (3)

The mean age of this study was 45 years, 50% of the cases fall between 45 to 55 years which is

consistent with the demographic data published by **National Cancer Institute in 2013 by Zeeneldin et al** who claimed the peak incidence of breast cancer between 40 -59 years old. (13)

In our study the operation time was quite different between the two procedures. The mean operation time for extended latissimus dorsi flap was 3.81 hours and 1.55 hours for skin sparing mastectomy with subpectoral implant.

In the study made by **Masseti and Slgarello in 2012**, the Whole operative evaluation for skin sparing mastectomy with sub-pectoral implant proved that it is very simple and safe procedure with relatively average operation time from 1-2 hours in comparison to the extended latissimus dorsi flap, yet it has the least intra and post-operative blood loss and the least need for analgesia and the fastest recovery and discharge. (6)

In a retrospective study done by **Reshma et al. (2016)** evaluated a series of 14,894 women undergoing either autologous reconstruction or direct to implant immediate breast reconstruction with a mean follow-up of 2 years. Patients with autologous reconstruction versus direct to implant immediate breast reconstruction reported wound haematoma rates (9.5% versus 4.4%); in our study wound haematoma rates were higher (33.3% versus 6.7%), it occur in sex patients, five of them were in the group who underwent extended latissimusdorsi flap. (9)

Wound infection rates were (20.7% versus 20.5%) in the study by **Reshma et al. (2016)** on the other hand it was (20 % versus 6.7%) in our study. The four patients who have had wound infection, received oral antibiotics and instructed to do wound dressing twice daily until the infection was eradicated. One patient only required wound drainage, which was later secondarily sutured. This didn't compromise final cosmetic outcome. (9)

In our study none of complications resulted in delay of post-operative adjuvant therapy and all patients were sent to receive their appropriate therapy according to schedule.

In our study we were able to conduct an excellent cosmetic outcome with 63.4% of the cases (19 patients) falling in excellent and good score groups. Another 36.6% (11 cases) fall in fair and poor score groups. None of our cases have had an ugly scar. The skin sparing mastectomy with subpectoral implant had the highest mean cosmetic outcome score 4 ± 0.93 which approaches the excellent score. The wound being obscured around the nipple-areola complex played an essential role in improving patient satisfaction and cosmetic outcome. None of the cases have been given below good score. Extended latissimus dorsi flap comes with mean cosmetic outcome 1.6 which falls between poor and fair. 2 Out

Of 15 cases scored good, 5 out of 15 cases scored fair and 8 cases scored poor. None of cases scored ugly.

In contrast a retrospective analysis done by **Qinghong et al. (2018)** of 151 breast cancer patients underwent breast reconstruction after mastectomy between February 2009 to November 2015 with a median follow-up time of 44 months. Comparing cosmetic outcomes between the 2 groups found a better outcome (excellent or very good) in flap vs immediate implant (62.7% vs 46.3%); in our study it was (0% in extended latissimus dorsi flap with 73.3% in subpectoral implant). **(8)**

No cases developed local recurrence in our study. However further follow up of the patients is mandatory for possible late occurrence.

Conclusion:

The choice of the oncoplastic technique is mainly based upon the size, location of the tumor, size of the breast and distance of the tumor from the nipple areola complex, So all cases have to be adequately assessed in order to take the best decision for every single case.

The skin sparing mastectomy with sub-pectoral silicone implant is an excellent technique for patient with invasive breast cancer. It has better cosmetic outcome with more simplicity of the surgical procedure and less postoperative complications provided good choice of the patients.

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