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**Original Research Article**

# Study of options and procedures in reconstruction of post mastectomy breast defects in a regional cancer centre

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## ABSTRACT

**Background:** Post mastectomy autologous breast reconstruction is challenging and involves restoring the patients lost structure and prepping the patient for adjuvant therapy and also psychosocial benefits that comes with early breast reconstruction. We analysed latissimus dorsi flap, transverse rectus abdomenis flap, deep inferior epigastric perforator flap and thoracoabdominal flap. Aim was to reconstruct post mastectomy defect using various methods, to enable the patient to receive early adjuvant therapy. Objectives were to study the various procedures used for post mastectomy defect autologous breast reconstruction. To evaluate the reliability of various flaps used. To evaluate the complications of flaps and their management. To assess the advantages and disadvantages of each flap.
**Methods:** 42 post mastectomy defect patients reconstructed with 4 flaps over 24 months, included in the study and results analysed.
**Results:** In 42 cases, latissimus dorsi flap was done in 11 cases, transverse rectus abdominis flap was done in 6 cases, deep inferior epigastric perforator flap was done in 3 cases and thoracoabdominal flap was done in 22 cases. Total flap loss in 1 case and partial flap loss in 6 cases was seen.
**Conclusions:** Immediate autologous breast reconstruction is helpful in making the patient ready for upcoming adjuvant therapy along with psychosocial benefits. We have analysed 4 different types of flaps and compared their advantages and disadvantages. We found that thoracoabdominal flap is a good option of immediate coverage in low socioeconomic class patients and ones with terminal disease.

**Keywords:** Breast cancer, Flaps, Mastectomy, Reconstruction, Thoracoabdominal

## INTRODUCTION

As there have been improvements in the early detection and treatment of breast cancer, there have also been improvements in the techniques used for breast reconstruction after mastectomy. There are many reconstructive methods available, using either autologous tissue or implants.[1] Breast reconstruction after mastectomy is oncologically safe and is associated with high satisfaction and improved psychosocial outcomes.[2,3] Although the rates of major complications after immediate reconstruction (at the same time as mastectomy) are greater than after mastectomy alone, clinically significant delays in the receipt of adjuvant therapy after immediate reconstruction have not been found.[4,5] Breast reconstruction after mastectomy has evolved over the last century to be an integral component in the therapy for patients with breast cancer. Breast reconstruction originally was designed to reduce post mastectomy complications and to correct chest wall deformity, but its value has been recognized to extend past this limited view of use. The goals for patients undergoing reconstruction are to correct the anatomic defect and to restore form and breast symmetry. The surgical options for breast reconstruction involve the use of endo-prostheses (implants), autogenous tissue

transfers, or a combination of both.[6] In post mastectomy patients, replacement of the breast restores the self-image that may be lost as a consequence of mastectomy. Reconstruction of the breast mound has consistently improved with multiple techniques that are selected on the basis of the extent of the defect and the patient's and surgeon's preferences.[7] The optimal timing of breast reconstruction is controversial. Immediate breast reconstruction, which has been demonstrated to be oncologically safe, spares the patient from the psychological trauma of waking from the mastectomy operation without a breast mound and allows fewer hospital admissions and anaesthetics.[8] Furthermore, the cosmetic outcome of immediate reconstruction may be superior to delayed reconstruction.[9]

Although all of these methods are individually sufficient for reconstruction, surgical preference is based on patient's condition, stage of the disease, option of the surgeon and the patient option.[9,10]

### *Aim of the study*

The aim of the study was to reconstruct post mastectomy defect using various methods so as to enable the patient to receive chemo radiation as a form of multimodal therapy.

### *Objectives of the study*

To study the various procedures used for post mastectomy defect breast reconstruction. To evaluate the reliability of various flaps in post mastectomy breast reconstruction. To evaluate the complications associated with the procedure if any and the management of the same. To assess the advantages and disadvantages of each reconstructive procedure used in the study.

## METHODS

The prospective clinical study was conducted in the department of plastic surgery, MNJ Hospital and RCC, Osmania Medical College, Hyderabad during a period of 24 months from April 2021 to March 2023.

### *Ethical approval*

This study was approved by IECC (ECR/300/Inst/AP/ 2013/RR-20).

All cases of post mastectomy breast reconstruction which met the inclusion criteria in the study period were included in the study. The proforma for the collection of data was made. All the relevant details of the patient during preoperative, surgical, and postoperative and follow up periods were collected and analyzed. All patients in addition to routine investigation were submitted to Doppler examination of the vascular pedicle near the flap donor site.

### *Inclusion criteria*

Post-tumour excision defects in patients with breast malignancies and malignant/borderline cytosarcoma phylloides. Patients with locally advanced disease, axillary disease or infected wound. Patients with early breast disease.

### *Exclusion criteria*

Patients not willing to participate in the study. Patients who are unfit for anesthesia or surgery. Unwilling for follow up. Benign breast tumours.

Data sheet included type of surgery, type of flap, duration, post operative complications. All clinical investigations taken into account where recorded. Postoperatively with the pathological report, patient was sent for chemotherapy or chemoradiation.

### *Procedure*

All cases fitting the inclusion criteria were assessed for MRM and flap cover, MRM done with axillary clearance done and hemostasis secured. Resultant defect measured. Flaps planned according to the size of the defect, age and general condition of the patient. Thoracoabdominal (TA)/ Latissimus dorsi (LD)/ Transverse rectus abdominis (TRAM)/ Deep inferior epigastric artery perforator (DIEP) flap done and in set given. Suction drain kept and dressing done.

All patients were retained in plastic surgery ward in the initial 1 week. Patients with good general condition were then discharged and reviewed twice a week- if the patient lived nearby to the hospital- or once weekly- if the patients were from a longer distance. Follow up period varied with individual complaints.

### *Statistical analysis*

Statistical analysis of collected data according to age and sex distribution, clinical features, investigations, surgical management, complications, follow up data and comparison with existing data and in the current literature.

### *Methodology*

All patients were assessed with a thorough history, clinical examination, and co-morbid illnesses. Written consent was obtained from the patients before surgery after they had been informed about the advantages and possible adverse effects of the operation. Resultant defect was measured. Flaps were planned according to the size of the defect, age and general condition of the patient. The choice of the operative procedure was determined according to the size of defect as well as the state and availability of the surrounding skin, comorbidities, stage of disease, age and general condition of the patient and

also considering patients choice. Suction drain was kept followed by dressing.

## RESULTS

Comprehensive data from prospective studies are vital for promoting informed decision making in breast reconstruction. This prospective analysis revealed considerably less complications and patient related morbidity. Also, procedure failure rates were low across various procedure types. Women electing to undergo reconstruction after mastectomy should demonstrate a firm understanding of the risks and benefits during the counselling as well as pre and post operative period. Finally, studies with longer follow-up are needed to adequately assess the breast reconstruction. Postoperative chemo/RT can be given as early as possible after reconstruction to prevent tumor spread.

Awareness of early breast reconstruction along with its multiple advantages should be stressed to the patients.

To conclude the various flaps integrated in the study:

***TA***

*Advantage:* Easier to execute, for small to moderate defects, can provide moderated bulk, hidden scar, reliable blood supply.

*Disadvantage:* Aesthetically unfavourable procedure, extensive mobilization of abdominal wall violates territories of TRAM and DIEP flap for future use, donor site morbidity, visible scar.

***DIEP***

*Advantage:* Gold standard currently, provides best match of tissue, bulk, shape, etc., hidden scar, added abdominoplasty to patient.

*Disadvantage:* Steep learning curve and microvascular expertise required, extensive dissection and time consuming, cannot be used if operative field violated by previous procedure, reliance on radiological and doppler studies for pre op markings.

***TRAM***

*Advantage:* Relatively hidden scar, can provide small to moderate bulk, moderate learning curve, better aesthetic outcome.

*Disadvantage:* Meticulous dissection, donor site morbidity (hernia), needs mesh repair, requires prosthesis for larger defects, able to achieve natural consistency, cannot be used in previously operated abdomen, more risk of flap failure and fat necrosis, more post operative morbidity.

***LD***

*Advantage:* Easier to execute, for small to moderate defects, can provide moderated bulk, hidden scar, reliable blood supply,

*Disadvantage:* Donor site morbidity, loss of functioning muscle, requires prosthesis for larger defects, lacks volume, not able to achieve natural consistency.

**Table 1: Distribution according to age group.**

| Age group (years) | Number | Percent |
|---|---|---|
| **31 to 40** | 12 | 28.6 |
| **41 to 50** | 18 | 42.9 |
| **51 to 60** | 8 | 19 |
| **More than 60** | 4 | 9.5 |

The mean age of the patients was 46.17 years with major age group of 41 to 50 years and 9.5% cases were more than 60 years (Table 1). Most of the cases were from low socioeconomic strata of income range less than 5000 (61.9%), 30.9% were of income range 5000 to 10000 and 11.9% were of income rage more than 10000 (Table 2).

**Table 2: Distribution according to income.**

| Income | Number | Percent |
|---|---|---|
| **<5000** | 26 | 61.9 |
| **5000 to 10000** | 13 | 30.9 |
| **>10000** | 5 | 11.9 |

The most common etiology seen in our study was carcinoma breast followed by cytosarcoma phyllodes. In carcinoma, maximum were operated in stage 4 and 80% of phyllodes were of malignant type.

**Table 3: Distribution according to surgical procedure**

| Surgical procedure | Number | Percent |
|---|---|---|
| **DIEAP** | 3 | 7.00 |
| **LD** | 11 | 26.20 |
| **TRAM** | 6 | 14.3 |
| **TA** | 22 | 52.4 |

MRM was the most common reconstructive procedure which was done in 78.6% cases, while wide local excision was done in the remainder of cases.

The flaps done in our study were LD (latissimus dorsi)- 26.19%, TRAM (transverse rectus abdominis)- 14.3%, DIEP (deep inferior epigastric artery perforator)- 7% and TA (thoracoabdominal flap)- 52.4% (Table 3).

Average duration of the reconstructive procedure was 2.67 hours. DIEP flap took the longest duration (6 hours) while TA flap was done in the shortest duration (1.36 hours).

**Tale 4: Association of complications with respect to surgical procedures.**

| Complications | Reconstruction procedure | | | |
|---|---|---|---|---|
| | DIEAP N (%) | LD N (%) | TA N (%) | TRAM N (%) |
| **Partial flap necrosis** | 0 (0.00) | 1 (9.1) | 4 (18.2) | 1 (16.7) |
| **Total flap loss** | 1 (33.3) | 0 (0.00) | 0 (0.00) | 0 (0.00) |
| **No** | 2 (66.7) | 10 (90.9) | 18 (81.8) | 5 (83.3) |

Complications were encountered in 16.6% of the cases, which included partial flap loss in 6 cases and total flap loss in 1 case. Of the 6 partial flap loss cases, 1 was LD flap and 5 were TA flaps. And DIEP flap showed total flap loss in 1 case. The partial flap loss was tackled by debridement and primary closure and total flap loss of DIEP flap was salvaged by LD flap. Complication rate according to the flap was DIEP- 33% followed by TA- 18.2% and LD- 9.1% of each flap done (Table 4).

**Figure 1: Latissimus dorsi flap clinical pictures.**

**Figure 2: Clinical cases of tram flap.**

**Figure 3: Deep inferior epigastric artery perforator flap clinical cases.**

**Figure 4: Thoracoabdominal flap markings with defect at right breast.**

**Figure 5: Thoracoabdominal flap after inset.**

The TA flap serves the purpose of adequate coverage of the defect, early patient recovery and allows to mobilize the patient quicker for adjuvant therapy specially in patients with terminal disease or multiple comorbidities. Even though it is not a very aesthetically appealing flap, the results of our experience showed that TA flap is a simple, reliable, and cost-effective procedure for managing large post- mastectomy soft tissue. It has huge potential in developing countries dealing with a large number of patients because of simplicity and short learning curve. We receive patients of mostly low socio-economic strata in our setup. The TA flap helps in early return of the patient to her daily activities carries less donor site morbidity, requires no steep learning curve along or increased operative time and less more dependence on investigations and high-end hardware, and is therefore preferred over other flaps. So, it can be

considered as a workhorse flap for post mastectomy breast reconstruction with high turnover regional cancer centre like ours where more patient in advanced stage or with locoregional spread are operated.

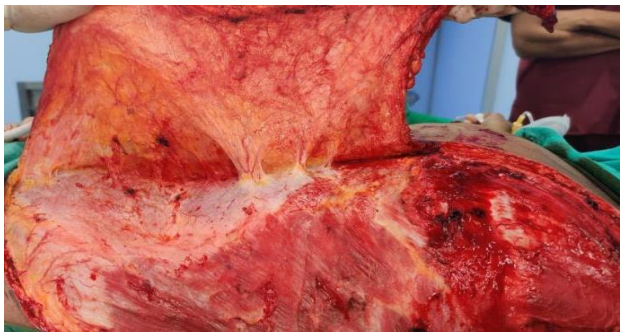

**Figure 6: Thoracoabdominal flap with paraumbellical perforators**

## DISCUSSION

In our set up the patients who attended government hospital, were mostly in an advanced stage of the disease. These people are not aware of the progression and prognosis of the disease and they also resort to native treatment and some rituals. Moreover, people who come with early breast cancer are not willing for immediate reconstruction procedures. They just want to get rid of the disease and are not worried much about cosmetic problem. Hence, they have to be convinced very much regarding immediate reconstruction which will be helpful for postoperative radiotherapy and chemotherapy.

### *Etiology*

Therapeutic reasons for mastectomy often include multicentric tumors, contraindications to radiation therapy, local recurrence following breast conserving surgery, inflammatory breast cancer, failure of down staging or tumor progression following neoadjuvant chemotherapy, and breast cancer during pregnancy if radiation therapy cannot be delayed until the postpartum period.[10] While in our study reason of mastectomy included carcinoma breast in 88.1% cases while cytosarcoma phyllodes in 11.9% cases.

### *Reconstruction*

In patients undergoing reconstructive breast surgery, an evaluation of psychological morbidity showed that patients recalled distress about mastectomy was lower among those who had reconstruction immediately (i.e., at the time of mastectomy) or early (i.e., within one year), whereas those who had delayed reconstruction (i.e., more than one year later) had significantly more recalled distress about mastectomy.[11]

### *Adjuvant therapy*

Beyond the first year after diagnosis, a woman's quality of life is more likely influenced by her age or exposure to Adjuvant therapy than by her breast surgery.[12,13] Metcalfe, et al reported data on 190 women, which showed that women undergoing delayed breast reconstruction (i.e., already had a mastectomy) had higher levels of body stigma (p=0.01), body concerns (p=0.002), and transparency (p=0.002) than women undergoing mastectomy alone or mastectomy with implant-based reconstruction. However, by 1-year follow-up, there were no significant differences in any of the psychosocial functioning scores between the groups.[14] It should be noted that there are inconsistencies in the methods used among studies, the types and definitions of complications reported among studies, and the populations who self-select to undergo each procedure due to aesthetic goals or age.[15] In our study all of the 42 patients (100%) underwent adjuvant therapy after reconstruction.

### *Complications*

A retrospective study among all patients undergoing IBR (n=186) at a single institution over a five-year period revealed a lower complication rate for patients with expander/implant reconstructions (21.7%), in comparison to those with latissimus-dorsi (LD) flap reconstructions (67.9%) or TRAM flap reconstructions (26.9%).[16]

In our study total flap loss in 1 case (2.3%) while 6 cases (14.2%) had partial flap loss and the remaining 35 cases (83.3%) were complication free. Partial flap loss was seen in 1 case of LD flap and 5 cases of TA flap. Partial flap loss was promptly dealt with by debridement and primary closure. Total flap loss was seen in 1 case of DIEP flap which was later corrected with LD flap. In patients with comorbidity out of 2 patients with diabetes, 1 landed up with total flap failure of DIEP flap and out of 8 cases of hypertension, 5 had partial flap loss, showing that there is significant correlation of co-morbidity and complication rate. This is in accordance with the study by Ekin, which says that advanced age, co-morbidities such as hypertension and chronic obstructive pulmonary disease are associated with complications and flap loss in free flap surgery.[17]Also study by Rosado et al, says that DM patients have 1.76 increased risk of complications. The incidence of DM in these patients with failed free flaps is 2.3 times higher than in the general population.[18]

**Table 5: Comparison of complication rate.**

| Complication | Katelyn et al[19] | Our study |
|---|---|---|
| **Any complication** | 771 (32.9%) | 7 (16.6%) |
| **Minor re operative complication** | 453 (19.3%) | 1 (14.2%) |
| **Reconstructive failure** | 126 (5.4%) | 1 (2.3%) |
| **Wound infection** | 230 (9.8%) | 0 (0%) |

Thus, choosing the right operation usually involves careful weighing of the potential benefits against the risks of the various procedure types. To make these choices, surgeons and patients need reliable, comprehensive complication data on implant-based and autologous reconstruction techniques.

In our study, reoperation was done for complications in 7 (16.6%) cases, while no complication was seen in the remainder of 35 cases (83.33%) cases.

The patient needs to be informed that adjuvant therapy can be associated with increased severity and rates of complications, including impaired aesthetic outcomes, all of which are highly related to the type of reconstruction 20,21. The best timing of adjuvant therapy in the setting of any method of reconstruction is controversial.[20-22]

Breast reconstruction following mastectomy can be performed using various techniques, including positioning a tissue expander that is replaced by a permanent implant in a second procedure before or after adjuvant therapy (2-stage procedure with expander and implant).[23]

Autologous-based reconstruction is reported to have lower rates of complications and better cosmetic outcomes in the setting of adjuvant therapy, compared to implant-based reconstruction.[24] Autologous breast reconstruction, however, demands specific expertise and is associated with additional donor site morbidity and may delayed oncologic treatment in case of severe complications.

An alternative technique to synthetic supportive material is the use of autologous de-epithelialized dermal grafts, mostly harvested from the ipsilateral side from the lower pole of the breast skin.[25,26]

***Outcome of surgery and reoperation***

A prospective cohort comparing implant-assisted LD with tissue-only autologous LD flap reconstruction (N=182) among primary early-stage breast cancer patients demonstrated equivalent short-term (0 to 3 months) and long-term (4 to 12 months) complication rates (respectively: 66% for implant versus 51% for autologous; p=.062 and 48% for implant versus 45% for autologous; p=.845).[27] However, role functioning and pain were significantly worse in the tissue-only autologous group (p=0.002 for both). In our study we encountered complications in only 7 cases (16.66%) which included 6 cases of partial flap loss (1 case of LD and 5 cases of TA flap) which were promptly dealt with by debridement and primary closure and only 1 case of total flap failure of DIEP flap which was followed by reoperation in form of LD flap.

Abdominal-based flaps were associated with significantly higher general and aesthetic satisfaction than latissimus flaps (p=0.011 and p=0.016, respectively). Patient satisfaction according to flap in our study was similar which showed higher satisfaction in abdominal flaps as compared to LD flap. More patients showed satisfaction with TA flap with over 72% patients undergoing TA flap giving excellent to satisfactory feedback.[28]

Rate of breast reconstruction following mastectomy was 7.9 percent to 7.7 percent in study by Baxer et al, while in study by Barnsley et al it was found to be 3.8%.

In study by Alderman et al 15 percent rate was found, while in study by Polednak et al it was 9.1% in 1998.

Joslyn found it to be 17%% and Rosson found it to be 27.95%. Tsang found rate as 20.2% while Kruper et al found it as 24.8%. In our center over the study period, reconstruction was performed in 42 (21.21%) of the 198 mastectomy cases.

The sample size of the study is small and number of cases done per flap can also be more and follow up of patients was difficult as most patients were not compliant with post op follow up.

## CONCLUSION

Immediate autologous breast reconstruction is helpful in making the patient ready for upcoming adjuvant therapy along with psychosocial benefits. We have analysed 4 different types of flaps and compared their advantages and disadvantages. We found that thoracoabdominal flap is a good option of immediate coverage in low socioeconomic class patients and ones with terminal disease.

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