The free TRAM versus extended latissimus dorsi flap in postmastectomy reconstruction: A comparative study

Mahfouz Shehata Ibrahim, *MD, MRCS****; Ahmed Mohamad Aly,*** *MD*

Plastic Surgery Unit, General Surgery Department, Zagazig University, Egypt.

In currently available literature the optimal flap choice for reconstructing post mastectomy breast has not yet defined. The free TRAM and extended latissimus dorsi flaps have been described for breast reconstruction. However comparison between them has not yet been described in our community. The current study was carried out to evaluate the two modalities in our society.

Patients and methods: *30 consecutive patients who underwent immediate unilateral breast reconstruction were included in the study. 15 patients had undergone extended latissimus dorsi flap (group A) and the other 15 had undergone free TRAM (group B). All patients were evaluated operatively, clinically for complications, aesthetic results and patient's satisfaction during the mean follow up time 10.7(4-19) months for group A and 11.9(6-19) months for group B.*

Results: *The mean operative time, blood transfusion requirements, hospital stay and time to start post operative adjuvant therapy (3.67 hours, 666.6cc, 11.6days and 26.6days respectively) in group A patients were significantly less than for group B (8.8days,1666.6cc,17days and 39.2days respectively) with p value < 0.01.*

The rate of complications in group B (one anastomosis revision, 2partial flap necrosis, one hernia and one fat necrosis/33.33%) was higher than group A (one partial flap necrosis, one back scar disfigurement and 2seromas/26.67%).

Higher patient's satisfaction was achieved in group A (93.3% satisfied to very satisfied) than in group B (79.9% satisfied to very satisfied) while aesthetic scoring was nearly similar in both groups.

Conclusion: *The extended latissimus dorsi flap could be as good as free TRAM regarding aesthetic outcomes, technically feasible flap with fewer complications. So we advocated offering the extended latissimus dorsi flap as the 1st choice for immediate post mastectomy reconstructions to selected patients.*

Key words: *Mastectomy, free TRAM, extended LD.*

Introduction:

Immediate post mastectomy breast reconstruction yields a better cosmetic result than delayed one because the breast landmarks are preserved and used.[1] Today most of plastic surgeons prefer to do free flaps for breast reconstruction. Since it was first described by Holstorm, 1979 the free TRAM flap has become considered by many to be the gold standard.[2-4]

These microvascular procedures are complex and have inherent risks that include; total flap loss, partial flap loss, fat necrosis, and abdominal bulge or hernia.[5] Because of this many surgeons consider that free flaps offer little advantage over that they currently do with more technically demanding, greater risk and longer patient recovery.[6,7]

Latissimus dorsi myocutaneous flap was one of the initial methods of breast reconstruction but due to the increased popularity of free TRAM it was gradually driven to back seat.[8] However after evolvement of extended latissimus dorsi myocutaneous (ELD) method by Hokin et al, 1983 and its further modification of adding more fatty

tissues from scapular and parascapular areas it regained its popularity.[9-11]

Our unit commonly perform both methods so in this study we decided to compare these two types of breast reconstruction to determine whether there are any benefit to the patients.

Patients and methods:

Between Jan 2011 and July 2013 a total of 30 female patients underwent post mastectomy immediate breast reconstruction (IBR) for unilateral breast cancer after obtaining informed consents and approval of IBR. A thorough preoperative evaluation was done for all patients with special attention to breast size, previous scares, infraumbilical fat, body mass index (BMI) and pinch test for the back skin. The study inclusion criteria were patients with T1 or T2 lesions and who were not candidate for conserving surgery because of small breast tumor ratio, centrally located or multicentre tumor, moderate size breast, back tissue thickness more than 2 cm, absent scares and adequate infraumbilical tissue. Patients were randomized into two groups according to their sequence; group A included 15 patients with odd number who were subjected to reconstruction by ELD flap, and group B which included the other 15 patients with even numbers in whom free TRAM flap was the selected procedure. Patient's characteristics were recorded in **Table (1)**.

Surgical technique which was started immediately after the mastectomy procedure. For free TRAM flap Baldwin, 2000 method was used but with the use of internal mammary as a recipient vessel in all cases.[12]

Surgical technique of ELD flap described by Hokin and Silfverskiold[11] was used. Superficial dissection of flaps were done to include fat over parascapular and lumber areas to maximize the flap volume. After identification of the flap pedicle the overlying tissue was dissected bluntly from the serratus anterior muscle. Finally the flap was rotated anteriorly and molded inside the breast skin without division of humeral attachment to protect from torsion and tension as described by Chang and his collogues.[13]

All cases of group B were kept in intensive care unit (ICU) during 1st 48 hours for close flap monitoring and for detection of any ischemia or thrombosis that necessitate immediate anastomosis revision.

Patients were carefully followed up and all their data were reported including flap or donor site complications, operative time, the length of hospital stay, blood transfusion requirement, the time to start adjuvant therapy and postoperative recurrences.

Patient's satisfaction was estimated through questionnaire adopted from Michigan Breast Reconstruction Outcome Study which was modified to meet the need of our study.[14] Item response was scored using five point scale (strong agree = 4, agree = 3, not sure = 2, not agree = 1, strong not agree = 0). The summation of the points dichotomized the results into three groups, a score 5 or 4 was classified as very satisfied, a score of 3 was assorted as satisfied and any response else was not satisfied.

The aesthetic scoring was obtained by reporting the opinion of 5 plastic surgeons regarding symmetry, shape, texture, mobility and color matching. Points were given excellent = 4-5, good = 3, fair = 2, poor = 1 and very poor = 0, so the aesthetic score of each case was the product of summation of their opinions. Data analysis was done by student's t test with p value < 0.05 considered significant.

Secondary procedures: Two patients of group A accepted to do nipple and areola reconstruction. The nipple reconstruction was done by modified star flap.[15] For the new areola reconstruction a full thickness skin graft was harvested from the labial skin.

Results:

Thirty consecutive breast reconstructions were performed over 18 months. Mean age for group A was 36.67 years (range from 27 to 42 years) and 40.2 years for group B (range from 32 to 45 years). Mean follow up since surgery was 10.67 months in group A (range 4 -19 months) and 11.9 months (range 6 -19 months) in group B. There was obvious

Figure (1): Elevated extended LD.

Figure (2): Postoperative LD.

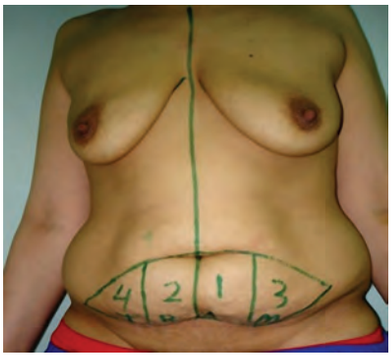

Figure (3): Preoperative free TRAM.

Figure (4): Postoperative free TRAM.

Table (1) Patients characteristics.

Item	Number	Age Mean/SD (years)	Follow up Mean/SD (months)	Marital state		Parity (offspring's)	
				married	unmarried	≤3	≥4
Group A	15	36.67±5.3	10.67±4.96	13	2	7	6
Group B	15	40.2±4.14	11.9±4.58	15	0	0	15

Table (2) results of ELD and free TRAM regarding operative time, blood transfusion, hospital stay, time to start radiotherapy therapy.

Flap / Difference	ELD(group A) Mean/SD/range	Free TRAM(Group B) Mean/SD/range	P -value
Operative time	3.67±0.81(3-5)hours	8.8±0.86(8-10) hours	0.000*
Blood transfusion	666.6±243.9(500-1000) cc	1666.6±243.9(1000-1500) cc	0.000*
Hospital stay	11.06±5.59(7-21) days	17.06±6.49(12-28) days	0.01*
Time to start adjuvant therapy	26.66±5.35(21-35) days	39.266±7.19(30-50) days	0.000*

difference in the mean operative time between two groups; in group A it was 3.6 hours while it was 8.8 hours in group B ($p < 0.05$). Also there was a notable difference regarding the need for blood transfusion which was a mean of 666 cc in group A while it was a mean of 1666 cc in group B ($p < 0.05$). The mean hospital stay in group A was 11 days which was significantly longer in group B (17 days/ $p < 0.05$). The time to start post operative

Table (3) Complications.

Complication	ELD N=15(%)	Free TRAM N=15(%)
Revision of anastomoses	------	1(6.7)
Partial flap necrosis	1(6.7)	2(13.3)
Seroma	2(13.3)	------
Unsatisfactory donor scar	1(6.7)	------
Abdominal hernia	------	1(6.7)
Fat necrosis	------	1(6.7)
Total number/%	4(26.6%)	5(33.3%)

Table (4) Patient's satisfaction& aesthetic score:

Flap	Num	Patient's satisfaction			Aesthetic scoring			
		Very Satisfied	Satisfied	Unsatisfied	Excellent	Good	Fair	Poor
ELD	15	8(53.3%)	6(40%)	1(6.7%)	8(35.3%)	5(33.3%)	1(6.7%)	1(6.7%)
TRAM	15	5(33.3%)	7(46.67%)	3(20%)	7(46.6%)	5(33.3%)	1(6.7%)	2(13.3%)
P Value		>0.05(not significant)			>0.05(not significant)			

adjuvant radiotherapy was significantly less in group A (mean, 26.6 days) than in group B (mean, 39.2 days / $p < 0.05$) **Table(2).** The early complications were revision of one anastomosis in group B but the late were developed in both groups. In group A there were one partial flap necrosis that was treated by debridement and repeated dressing followed by secondary sutures, two donor site seromas treated with repeated aspiration and compression bandages and one ugly back donor scar treated by scar revision. While in group B two partial flap necrosis were treated same way as before, one fat necrosis which was found as firm mass about 1.5 cm three months after reconstruction confirmed by fine needle and treated by surgical excision under local anesthesia and one abdominal hernia and this patient was sent to general surgeon who did mesh repair. There were no local recurrences in both groups during the follow up period **Table (3).**

Patient's satisfaction revealed that 8(53.3%) and 6(40%) patients of group A were either very satisfied or satisfied respectively while 5(33.3%) and 7(46.67%) patients in group B were very satisfied and satisfied respectively. one patient (6.67%) from group A and 3(20%) patient from group B were not satisfied from their constructions. Regarding the aesthetic scoring an excellent result was obtained in 8(53.3%) of group A and 7(46.67%) of group B while good aesthetic result was obtained in 5(33.3%) of group A and 6(40%) of group B. The results were fair only in one patient (6.67%) of group B while poor aesthetic results were obtained in one patient (6.67%) from each group **Table (4).**

Discussion:

Breast reconstruction is considered an important part of breast cancer treatment for the time being,[16] but currently available literature regarding optimal flap choice is not broadly generalizable, and often reports conflicting results.[17]

In this study a direct comparison was done between ELD flap and the free TRAM to determine use and outcomes. These outcome data could be used to guide future clinical decision-making and research efforts in the field of breast reconstruction.

Since it was first described by Holmstorm, 1979[2] and again 1989 when Grotting and coworkers[3] introduced its routine use, the free TRAM flap has become one of the most popular and reliable methods of microsurgical

breast reconstructions.

Despite this many units still reluctant to offer the free TRAM because of possible fear from postoperative complications and long patient's recovery. Also the complex performance of microvascular procedures may not be possible.[13,18]

Latissimus dorsi musculocutaneous flap was one of the first methods of breast reconstruction but it does not give sufficient volume[19]. Extended latissimus dorsi flap was first described by Hokin et al, 1983[9] which was included the lumber fat. Multiple trials were then done to increase its volume by addition of scapular and parascapular fat.[10,11]

In current study there were significant decrease in operative time, blood transfusion requirements, hospital stay and time to start postoperative adjuvant therapy in extended LD than free TRAM group.

Blood transfusion requirements for both groups were similar to what reported in the liteatures.[20,21] The mean operative time for extended LD was 3.67 hours and 8.8 hours for free TRAM group which was higher than other series that reported 2.9 hours for extended LD[20] and 7- 8 hours for free TRAM.[1,22] The slight longer time operative time in the current study could be due to the learning curve that started long then improved afterwards.

Regarding hospital stay in this study (mean 11days for extended LD and 17 days for free TRAM group) it was also higher than other series which reported 7days for extended LD[23,24] and 11-11.6 days for free TRAM.[21,22] The long hospital stay could be due to management of early developed complications on an inpatient basis.

The time to start post operative adjuvant therapy in this study (a mean of 6.26 weeks for extended LD and 9.22 weeks in free TRAM group) was same like others for extended LD[25] and for free TRAM.[26,27] A delay of up to 12 weeks postoperatively will not affect delivery of post operative adjuvant therapy.[28]

In this study the free TRAM group developed more complications than the extended LD one. The free TRAM group complications were revision of anastomoses (6.7%), partial flap necrosis (13.3%), abdominal hernia (6.7%) and fat necrosis (6.7%), these results are within the acceptable range reported in other series (6.5% required revision exploration, 4.5% complicated with hernia and 15.9% developed fat necrosis).[1]

The extended LD group complications were partial flap necrosis (6.7%), and back scar (6.7%) which were similar to a study done by misra et al.,[23] were partial necrosis in one out of 32 and back scar in 2 out of 32 patients.

Seroma formation is a well known donor site complication after LD harvesting,[29] two patients in our study (13.3%) had seroma which were less than that mentioned in other studies; 64%, 62%,[30,31] the lower incidence of seroma in this study may explained by using sharp dissection, post operative tight crepe bandage and the kept suction 2-3 weeks postoperatively. In summery the cases with ELD showed low incidence of complication when it compared with cases with free TRAM, finding is supported by a multicenter study that four cohort of patient submitted to autologous breast reconstruction.[10]

Regarding patient's satisfaction patients with extended LD group were more satisfied than free TRAM group but this was not significantly different. In this study 90.3% of extended LD and 79.9% of free TRAM cases were ranged from very satisfied to satisfied and 20% of free TRAM and 6.7% of extended LD were unsatisfied.

The results of this study regarding free TRAM group were same like other series 89.5-91.7% very satisfied to satisfied,[32,33] while for extended LD group there were slight differences between literatures 80-92.8% very satisfied to satisfied[1,27] and this different incidences might be due differences in number of studied patients.

We found the extended LD sufficient tissue to build small and medium size breast and acceptable size matching of two breasts, this finding is supported by the work of Chang an co-worker who found that extended LD provide tissue that can make breast with B and C cup size.[13]

Regarding the aesthetic scoring of

reconstructed breasts there were no significant differences between both groups instead of that excellent to good was higher in extended LD group (86.7%) than with free TRAM one (80%) these results also came comparable to other studies on extended LD.[24,25] Also for free TRAM other series reported 77% from excellent to good.[21,22]

Conclusion:

Breast reconstruction with extended LD has significantly less operative time, blood transfusion requirements, hospital stay, and time to start post operative adjuvant therapy than reconstruction with free TRM flap. More complications occurred in free TRAM than in extended LD but there is no significant difference regarding aesthetic grading and patient's satisfaction. Extended LD flap can offer sufficient volume, technically feasible and reliable method with fewer complications. Extended LD could be as good as free TRAM for patients with medium sized breasts. So we advocate offering extended LD flap to be the 1st choice for immediate post-mastectomy breast reconstruction to selected patients.

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