

## Evaluation of Simultaneous Trunk Liposuction with TRAM Flap Breast Reconstruction

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### ABSTRACT

Breast reconstruction methods are very versatile. Transverse Rectus Abdominis Myocutaneous (TRAM) flap still the commonest autogenous method for breast reconstruction. Modifications of TRAM flap aim to minimize the flap morbidities and to enhance the aesthetic outcome obtained. In our study, we introduce simultaneous trunk liposuction with TRAM flap breast reconstruction. Safe breast reconstruction is achieved with comparable complications rates. In addition, this technique enhances the trunk aesthetic outcome.

**Key Words:** *Liposuction – TRAM Flap – Breast reconstruction.*

### INTRODUCTION

Dnever first introduced Vertical rectus abdominis myocutaneous (VRAM) flap for breast reconstruction in 1981 [1]. The Transverse rectus abdominis myocutaneous (TRAM) flap was introduced in 1982 by Hartrampf and his coworkers. TRAM flap breast reconstruction offers the mastectomized patients breast reconstruction and abdominal contouring as well [2].

The pedicled TRAM Flap is a common surgical technique used for autogenous breast reconstruction after mastectomy [3-8]. At the beginning, the ipsilateral TRAM flap was the standard technique. Later on, for fear of vascular related complications, surgeons resorted to contralateral TRAM flap. This concern was arrayed to possible internal mammary pedicle attenuation after ipsilateral internal mammary lymph node dissection, chest wall irradiation, or due to the pedicle kink itself [9].

After that, studies showed that the ipsilateral pedicled TRAM flap was as safe as the contralateral technique during breast reconstruction. The ipsilateral technique showed comparable incidence of major and minor complications. Given the increased pedicle length and preservation of both the medial inframammary fold and xiphoid subunit, some authors believe that the ipsilateral technique is preferred over the contralateral one [4,5,10,11].

As regards the aesthetic outcome, a well-defined IMF, axillary tail reconstruction, and inferior pole fullness are the major determinants for final breast aesthetics. Certainly, symmetry with contralateral breast is a superior goal that gains patients' satisfaction. Symmetry can be achieved through manipulating the TRAM flap orientation, lipo-filling of depressed areas, nipple areola complex reconstruction, and or contralateral breast contouring [3].

The increasing popularity of the TRAM flap breast reconstruction increased attempts for further refinements in the appearance of both the reconstructed breast and the abdominal donor site. This second stage lipo-contouring was one of the proposed attempts for aesthetic refinements [12].

Addition of liposuction to the traditional abdominoplasty enhances trunk contouring. Liposuction in such situations removes lipodystrophy of flanks and epigastrium, exaggerates the hip-waist ratio, decreases length of the resultant scar, and facilitates tension free closure without excessive undermining [13,14].

In our study, trunk liposuction is done simultaneously with TRAM flap breast reconstruction. We believe that it is a safe procedure without any significant increase in incidence of complications. Furthermore, this technique enhances the trunk aesthetic outcome which in turn increases patients' satisfaction.

### PATIENTS AND METHODS

This study was conducted during the period between July 2013 and December 2015. Twenty-eight female patients had had breast reconstruction by contralateral pedicled TRAM flap. This was done simultaneously with abdominal liposuction of flanks and upper abdominal zone. All patients sought delayed breast reconstruction after they

completed their cancer ablation protocol. The mean age of the patients was 42 (28-57) years. All the patients signed formal consent for photography, and they were fully informed about the advantages, disadvantages, risks, and complications of TRAM flap in comparison with other reconstruction modalities.

After physical examination and laboratory work-up all the patients were evaluated for existence of any contraindication or risk factor. Patients with high risk factors as ischemic heart disease, BMI above 40, and history of collagen disease were excluded from the study. On the other hand, patients with other risk factors were prepared preoperatively. Two patients were smokers. Smoking was prohibited at the first visit for at least one month preoperative. Four patients were diabetic; tight blood sugar control was advised peri-operatively. Hypertensive patients were 2 (controlled). The Body Mass Index (BMI) of patients ranged from 29.7 to 36.5 (mean 33.8). For patients with high class II obesity; we advised weight reduction before surgery. Seven patients had positive history of chest irradiation therapy (Table 1).

Table (1): The incidence of risk factors among patients.

Patient description	N=Number	% Percentage
Smokers	4	14.2
Diabetics	9	32.1
Hypertensive	5	17.8
Irradiation history	22	78.5
Obesity class I (30≤BMI≤34.9)	24	85.7
Abdominal scars	13 (10 with CS* scar, 3 with appendectomy scar)	46.4

CS = Cesarean section\*.

#### *Surgical technique:*

In erect position, marking of the contralateral TRAM flap territory and areas of liposuction were done (Fig. 1).

In supine position with arms abducted 90 degrees, two teams worked simultaneously to decrease the procedure timing. Where the first team prepared the mastectomy site. Mastectomy chest wall scar was excised then the mastectomy site was dissected to create the chest pocket.

The second team did the abdominal liposuction 20mins after infiltration of tumescent fluid (Lidocaine 5ml 2%/500ml normal saline, 1mg adrenaline/500ml saline) in areas of upper abdomen and flanks. Infiltration of the tumescent fluid to

the TRAM flap territory was avoided. The liposuction cannula used for the upper abdomen area was 3mm in diameter, while 4mm diameter cannula was used for the flanks.

Mapping of periumbilical perforators was done using hand held Doppler (8 MHz) (Fig. 2). Harvesting the contralateral TRAM flap starts with the upper skin incision. The incision run in outwards slanting manner from superficial to deep till landing on the rectus sheath. The umbilicus was dissected from the upper portion of the flap. Above the level of the umbilicus, dissection of the abdominal flap was carried to expose both recti muscles till the sterno-costal margin.

The patient was flexed to assess the adequacy of skin that provide tightless closure to the lower incision. Raising the TRAM flap started from lateral end of zone 4 followed by zone 2 towards the midline. The deep inferior epigastric artery perforators' sites were marked, measured from midline, and then ligated. These markings were used to predict and double check the preoperative perforators mapping done by the hand held Doppler. The TRAM flap zone 3 which is just lateral to zone 1 on the same side of the abdomen is raised from lateral to medial till the lateral edge of the rectus sheath.

After identification and ligation of deep inferior epigastric vessels, TRAM flap harvesting is done. Zone 4 was discarded in all patients. TRAM flap was delivered through adequate tunnel to the chest pocket, preserving the xiphi-sternal area as much as we can (Fig. 3).

The marginal skin of the TRAM flap was de-epithelized. Deferential burying of the de-epithelized areas under the chest skin flaps was done, aiming for higher projection and smoother natural contour of the breast mound. The flap was sutured to the chest skin flaps.

Reconstruction of the fascial defect was done using polypropylene mesh 30cm X 30cm (Prolene<sup>R</sup>, Ethicon). The umbilical stump was delivered through the mesh. Finally, closure of the abdominal incision was done in layers with umbilical transposition. Two suction drains were inserted; one under the TRAM flap at the chest pocket and the other under the abdominal flap. Proper pressure garment was applied to the trunk without compressing the TRAM pedicle. Recovery was done in semi-setting position. The follow up period ranged from 3 to 20 months (mean follow-up period = 6.2 months).

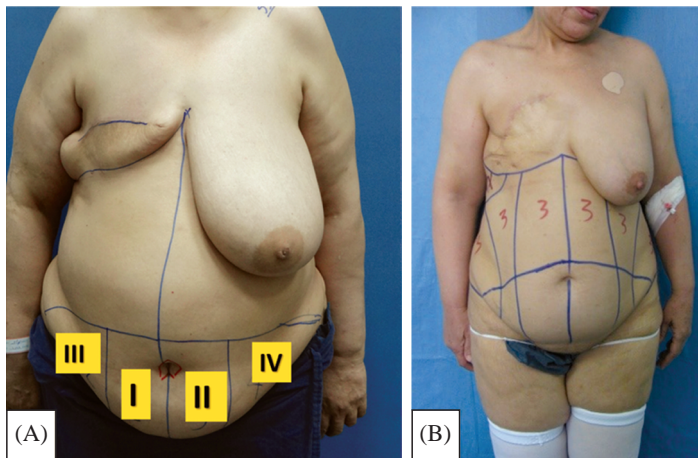


Fig. (1): (A) The TRAM flap conventional vascular zones. (B) The upper abdominal zone is labeled with number 3 (3mm is the diameter of the liposuction cannula used).



Fig. (2): Mapping of periumbilical perforators was done using hand held Doppler (8 MHz).

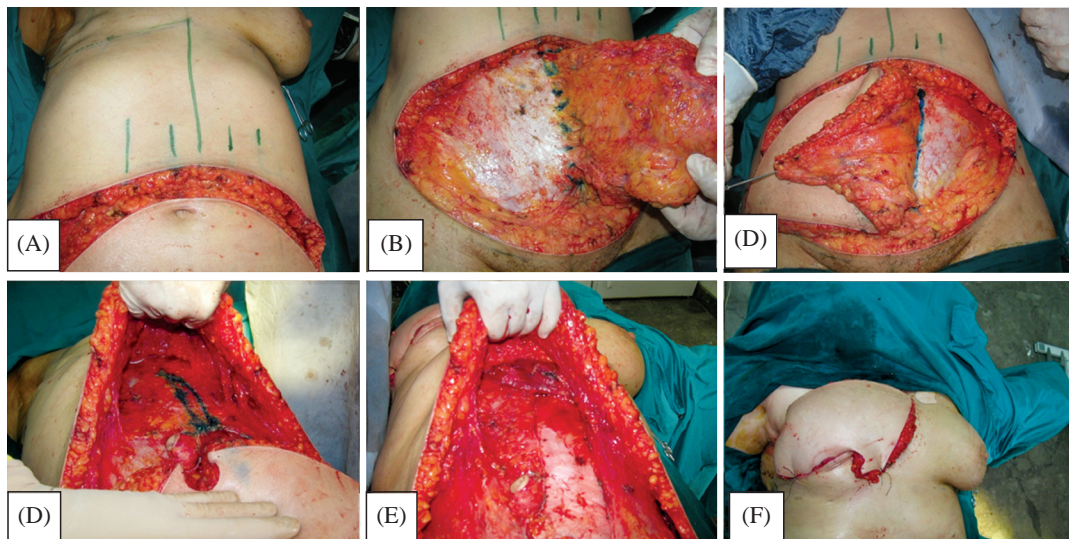


Fig. (3): (A, B, and C) Dissection of TRAM flap zones II, III, and IV with preservation of zone I attached to the lower abdominal ellipse. (note that the green marks represent the peri-umbilical perforators mapping) (D) The umbilicus is dissected out of the TRAM flap skin ellipse. (E and F) The TRAM flap is delivered to the chest pocket through adequate tunnel after discarding of zone IV.

## RESULTS

No total flap loss was present in our series. Nevertheless, a partial flap loss was recorded in 2 patients, zone 2 (area on the non-used rectus muscle) was the area affected in both cases. Conservative management was successful in one case, while the other one needed debridement and secondary sutures.

Abdominal wall laxity was recorded in 3 patients, an incisional hernia developed only one of them, hernioplasty was done 6 months post-operative. The most common complication was minor fat necrosis in 5 patients, which did not cause any deformity, but only caused localized

areas of firmness. Other minor complications as mastectomy flap necrosis, abdominal flap necrosis, and seromas; were managed conservatively. Complications were recorded in 9 patients ( $\approx 32.1\%$  of patients). To be mentioned, patients with multiple risk factors as diabetes, smoking, and BMI above 35; suffered from multiple minor complications (Table 2).

The patients' satisfaction was used to evaluate the aesthetic outcome. Andrade et al., evaluated patients' satisfaction after breast reconstruction surgeries through simple questionnaire; we used a modified form of this questionnaire in our study (Tables 3,4) [15].



Table (2): The incidence of minor and major complications among patients.

Minor complications*	Number of patients (=n)	Percentage (%)
Mastectomy flap necrosis	1	3.5
Fat necrosis	4	14.28
Partial flap necrosis	1	3.5
Abdominal flap necrosis	1	3.5
Abdominal seroma	3	10.7
Abdominal laxity	2	7.1
Major complications **		
Abdominal wall laxity/ hernias	1	3.5
Partial flap necrosis	1	3.5
Massive Fat necrosis	0	0
DVT/pulmonary embolism	0	0

(\*) Minor complications were managed conservatively.

(\*\*) Major complications were managed by 2ry procedures or therapeutic anticoagulation protocols in case of DVT/pulmonary embolism.

Table (4): The patient dissatisfaction was used to evaluate the breast reconstruction outcome.

Question	No. of patients	Percentage (≈%)
Overall dissatisfaction	3	10.7
Dissatisfaction due to abdominal scar	0	0
Dissatisfaction due to abdominal bulge	2	7.1
Dissatisfaction due to partial flap necrosis	1	3.5
Dissatisfaction due to breast scar	1	3.5

Table (3): The patient satisfaction was used to evaluate the breast reconstruction outcome.

Question	No. of patient with positive response	Percentage (≈ %)
Positive result overall	25	89.3
Feel more normal	21	75
Feel more whole	25	89.3
Do not have to wear prosthesis	28	100
Decreased thoughts of cancer	28	100
Happy that own tissue was used for breast reconstruction	26	92.8
Positive psychological effect	27	96.4
Feel more balanced/symmetrical	28	100
Better than mastectomy alone	28	100
Can wear more styles of clothes	17	60.7
Satisfied with feel of reconstructed breast	25	89.2
Feel more feminine now	28	100
Satisfied with overall abdominal contour	26	92.8
Satisfied with waist contour	26	92.8
Satisfied with epigastric contour	26	92.8

Most of the patients (89.3%) showed positive result overall towards the method of breast reconstruction and its aesthetic outcome. Nevertheless 10.7% (n=3) of patients expressed dissatisfaction; two cases due to the abdominal bulges, and one case because the partial flap necrosis they suffered. 89.2% to 100% of patients expressed more whole feelings, more feminine feelings, positive psychological effect, and better condition than mastectomy alone. Also, they pointed out the enhanced aesthetic outcome of the epigastrium, waist, and the whole abdominal contour (Fig. 4).

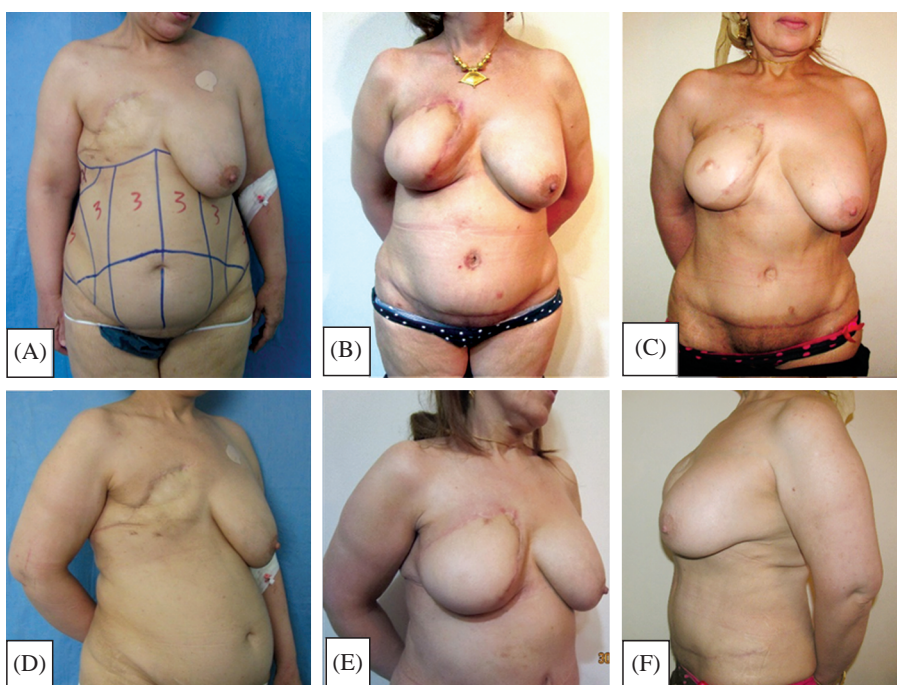


Fig. (4): (A and D) Preoperative frontal and oblique views for 55 years old female patient, she underwent right side mastectomy 6 years earlier. (B and E) Six months postoperative frontal and oblique views (contralateral pedicled TRAM flap breast reconstruction was done). (C and F) Thirteen months postoperative frontal and left lateral views showing enhanced trunk contouring that was achieved through addition of liposuction during breast reconstruction.



## DISCUSSION

Cancer breast patients feel loss of wholeness as a female. Breast reconstruction helps them to regain the sense of feminine wholeness and decrease the psychological burden. Although it is a reconstructive surgery; the aesthetic outcome is a major objective that is subjectively evaluated by the patients themselves.

Every effort should target better aesthetic outcome during breast reconstruction. The aesthetic enhancement of the reconstructed breast can be achieved through insitting the TRAM flap in different orientations. Where vertical and oblique orientation of the flap can mimic the narrow base breast with axillary tail and infraclavicular reconstruction. While putting the flap in transverse orientation can mimic wider base breast [3,16]. Also, the reconstructed breast can be contoured through lipo-filling of depressed areas, scar revision, and/or Nipple areola complex (NAC) reconstruction [12].

The effect of the tumescent fluid infiltration on the TRAM flap vascularity was discussed in literature, when Bried and his coworkers evaluated the effect of tumescent fluid infiltration at the edges of TRAM flap donor site. They concluded that infiltration of tumescent fluid didn't affect TRAM flap vascularity and significantly decreased the need for blood transfusion during TRAM Flap Breast Reconstruction [17].

There are local and systemic factors that limit the amount of liposuction during abdominoplasty. Liposuction is considered an integral step during abdominoplasty in most of cases. Liposuction with abdominoplasty proved to be a safe procedure. This combination has the same incidence of complications as abdominoplasty alone; except for the higher incidence of seroma formation [18,19,20].

Certainly, the addition of trunk liposuction will increase the psychological gain for breast reconstruction patients. Studies done for evaluation of the psychological aspect of breast reconstruction patients, showed positive psychological gain than non-reconstructed patients [19,21,22,23].

During abdominoplasty, aggressive liposuction of the upper abdomen is feasible; as long as the perforators of the deep superior epigastric artery (PDSEA) are preserved. Unlike abdominoplasty, the PDSEA are severed during TRAM flap raising. So, careful liposuction using small diameter cannulas is mandatory during TRAM flap breast reconstruction [24].

As regards the safety of simultaneous trunk liposuction with TRAM flap breast reconstruction; the incidence of complications was comparable with previous studies. There was no increase in the incidence of major nor minor complications. The total incidence of complications was 32.1% (n=9), most of them were minor complications and were managed conservatively leaving unnoticed effect on the final outcome. This incidence was comparable to previous studies that showed 28-43% as an incidence of complications. The most common complication was fat necrosis with incidence 14.28 %, this is falling in the range of incidence in previous studies (3.3% to 22.4%) [25-28]. The incidence of complications was mostly attributed to the presence of multiple risk factors; as obesity, smoking, diabetes, and history of radiation. So, the addition of liposuction did not increase the incidence of complications significantly [8,29].

## Conclusion:

Simultaneous trunk liposuction and TRAM flap breast reconstruction is a safe procedure. The enhancement of the trunk aesthetics increases the patients' satisfaction and psychological gain.

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