Obesity Should Not Prevent from TRAM Flap Breast Reconstruction in Developing Countries

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Abstract Transverse rectus abdominis musculocutaneous (TRAM) flap is the most common procedure performed for breast reconstruction after mastectomy for breast cancer. Obesity is a relative contraindication, and complex modifications have been proposed in the pedicled technique for obese patients. We studied ischemic complications in our patients to investigate the effect of body weight on the outcome of TRAM flap breast reconstruction. Pertinent data from medical records of patients receiving a TRAM flap surgery from 1986 to 2011 were extracted. Patients were divided into three groups based on the body mass index (BMI): normal ($<25 \text{ kg/m}^2$), overweight ($25\text{--}29.9 \text{ kg/m}^2$), and obese ($>30 \text{ kg/m}^2$). Flap necrosis is defined as any visible nonviable tissue in the reconstructed breast. It was observed that 117 patients had received TRAM flap reconstruction. Fifty-eight patients were excluded. Of the remaining 59 cases, 24 had normal BMI, 21 were overweight, and 14 were obese. No patient was found to develop flap necrosis. Outcome of TRAM flap breast reconstruction in obese patients is similar to nonobese patients. No major necrosis in need of reoperation was identified in the studied obese patients. It was concluded that categorizing obesity as a relative contraindication to TRAM flap breast reconstruction should be revisited based on larger cohort studies.

Keywords Breast neoplasm · Breast cancer · Breast reconstruction · TRAM flap · Obesity

Introduction

Mastectomy is the most prevalent surgical treatment for breast cancer despite relatively similar survival figures for patient undergoing mastectomy versus conservative surgery and postoperative radiotherapy especially in the early stages of cancer [1]. Breast reconstruction tries to compensate for the loss of breast. Although free techniques have improved, the pedicled transverse rectus abdominis musculocutaneous (TRAM) flap is still the most common method of autologous breast reconstruction after mastectomy [2–4].

Obesity is associated with an increased rate of postoperative complications and has therefore been often considered a relative contraindication to autologous breast reconstruction [5–8], yet the large abdominal volume produces excellent esthetic results in terms of symmetry and natural-looking ptosis [5]. Several techniques have been proposed to overcome ischemic complications of TRAM flap procedures in obese women, but many studies have questioned the need to replace the technique with any other procedure [9–11].

In Iran, breast cancer comprises nearly one fourth of all malignancies in women [12–15] and is seen at a younger age [12, 13]. Mastectomy is the most prevalent surgical treatment for breast cancer in our country [1, 13, 16], and the prevalence of abdominal obesity is high [17].

Younger age of Iranian patients, relatively high rate of mastectomy, high median body mass index (BMI) in Iran, and lack of access to specially equipped surgical facilities for microsurgical techniques lead us to study the outcome of pedicled TRAM flaps in our patients based on the ischemic complications and necrosis after the procedure.

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Table 1 BMI and other variables in relation to flap necrosis

Patient or tumor factor (variable)	Number in study (%)	Number of flap necrosis in group (%)
BMI	59	13 (22)
Low	24 (40)	5 (38)
Overweight	21 (35)	6 (46)
Obese ^a	14 (24)	2 (15)
Stage ^b	70	13 (10)
I	12 (17)	3 (23)
IIA	18 (26)	7 (54)
IIB	19 (27)	
IIIA	11 (16)	1 (7)
IIIB	1 (1)	
IV ^c	9 (13)	2 (15)
ER status	41	8 (20)
ER+	23 (56)	7 (87)
ER–	18 (44)	1 (12.5)
PR status	41	8 (20)
PR+	24 (59)	6 (75)
ER–	17 (41)	2 (25)
ER, PR status	41	8 (20)
ER+, PR+	21 (51)	6 (75)
ER–, PR–	15 (36)	1 (12.5)
HER2 status	31	5 (48)
HER2+	13 (42)	3 (60)
HER2–	18 (58)	2 (40)
P53 status	29	5 (17)
P53+	12 (41)	2 (40)
P53–	17 (59)	3 (60)
Smoking	106	17 (16)
+	8 (8)	0 (0)
–	98 (92)	17 (100)
Diabetes ^d	108	17 (16)
+	10 (9)	1 (6)
–	98 (91)	16 (94)
Radiotherapy(RT)	94	14 (15)
+	79 (84)	12 (86)
–	15 (16)	2 (14)
RT + in known BMI	41	10 (24)
Normal BMI	15 (37)	3 (30)
Overweight	13 (32)	5 (50)
Obese	13 (32)	2 (20)

^a Two morbid obese (BMIs 35.49 and 35.7 kg/m²)

^b According to the TNM staging classification of the American Joint Committee on Cancer (AJCC)

^c Controlled bony metastases in all cases

^d Blood sugar level controlled in all at time of reconstruction

Methods

After the approval of Cancer Research Center of the Tehran University of Medical Sciences, records of patients receiving an autologous breast reconstruction by a TRAM flap procedure after mastectomy due to breast cancer were studied from 1986 to 2011. Demographic data, anthropometric characteristics of the patients, medical histories, habits, stage and hormone receptor status of the previous tumor, and the history of postmastectomy radiation as well as the information about the ischemic complications of the reconstructed breast were extracted from the records. Patients with incomplete data were excluded from this study.

BMI was calculated by dividing the weight of the patients (in kilogram) by the square of their heights (in meter). Patients were divided into three categories based on their BMI: BMI under 25 kg/m² was defined as normal in this study, BMI 25–29.9 kg/m² was considered overweight, and BMI above 30 kg/m² was labeled obese.

Flap necrosis was defined as any visible nonviable tissue in the reconstructed breast. Necrosis was further subclassified according to the need for further treatment as described in the medical records. Minimal necrosis comprised those managed by conservative wound care at home, mild necrosis required rehospitalization for wound care, moderate cases were those in need of minor surgical repair, and severe cases were those in need of major repair.

Data were analyzed by STATA statistical software (Stata Station, Texas). The association was evaluated by χ^2 test followed by logistic regression after adjustment for age. *P* values <0.05 were considered significant.

Results

One hundred seventeen patients had undergone TRAM flap reconstruction from 1986 to 2011. The age range was 24–64 years (mean 41) with most patients (42 %) lying in the 30–40-year group. Fifty-eight patients were excluded from the BMI calculation because of lack of height measurement in the records.

No patient had developed complete severe flap necrosis. Twenty patients developed partial flap necrosis, including seven patients with mild and six patients with moderate necrosis. The corrective outpatient surgeries included only wound debridement and operative closure, which were performed under local anesthesia. None of the necrotic cases had resulted in cosmetic disfigurement requiring plastic reconstructive measures.

Table 1 shows the tumor characteristics in the studied population together with the smoking and diabetes history.

There was no statistically significant association between flap ischemia or necrosis and age (*P* value=0.86); the stage

Table 2 Correlation of flap failure, cosmetic result or patient satisfaction with obesity in different studies

	Number of patients	Type of operation	Criterion for Ob	Fl Com or Fl Nec increased	Cosmetic result in obese	Patient satisfaction
Ducic et al. [24]	224	P TRAM	WT	+		
Greco et al. [3]		AR ^a	BMI	+		
Moran et al. [9]	36	P TRAM	BMI	+		
Kroll et al. [25]	82	TRAM	WT/HT	+	Good	
Tuominen et al. [10]	12	P TRAM	BMI ^b WHCR	–		
Yin et al. [11]	115	P TRAM ^c	BMI	–		
Berrino et al. [5] ^d	34	TRAM		+ ^e	Very good	High
Atisha et al. [26]	262	TRAM	BMI			High

AR Autologous reconstruction, Com complication, Fl flap, HT height, Nec necrosis, Ob obesity, P pedicled, WHCR waist to hip circumference ratio, WT weight

^a All operations done in patients with BMI greater than 25.8 kg/m²

^b Marginal necrosis more common in women with lower body type fat distribution but BMI and abdominal muscle or fat thicknesses not associated with necrosis of the flaps

^c Compared with modifications of TRAM

^d They concluded that obesity uncomplicated by other risk factors is not an absolute contraindication to TRAM flap procedure

^e No severe complications but more than in a nonobese population

of the breast cancer at the time of mastectomy (P value=0.68); PR, HER2, and P53 status of the tumor (P values 0.292, 0.371, and 0.917, respectively); smoking history (P value=0.83); history of diabetes mellitus (P value=0.4); or previous radiotherapy (P value=0.24).

Discussion

The rate of mastectomy for breast cancer is still very high universally [1, 16, 18, 19]. This procedure disturbs the body, self-image, and sexuality of a woman, especially in younger patients [12, 16, 20, 21]. Breast reconstruction has a positive effect on the psychological health of these patients [18–22].

Two main techniques are used for breast reconstruction: autologous and prosthetic. Autologous reconstructions result in a more natural outcome; the pedicled TRAM flap reconstruction is the method of choice because it provides enough tissue of similar consistency to match the opposite breast. Flap failure is the most feared consequence in these operations. Complete necrosis of TRAM flaps is uncommon, but partial flap necrosis rates range from 5 to 44 % [2, 8, 11, 23]. Several factors have been speculated to increase the probability of ischemia. Obesity has been shown as a relative surgical contraindication to the reconstruction in many studies but has been criticized as such in others. Table 2 shows the summary of different studies.

Because of the relatively high frequency of obesity in Iranian women, obese patients are offered TRAM flap breast reconstruction in our institution. Records of the pedicled TRAM flap procedures done for breast reconstruction from

1996 to 2007 in our institution had been published in 2008 [2]. The median height of Iranian women is rather short which brings the median BMI above normal. Absence of severe flap necrosis shows that obese and overweight patients respond well to the procedure. Minor flap necrosis had a rate of 18.6 % in the study.

In the present study, approximately two thirds (59 %) of cases had weights above the normal range, and one fourth (24 % of total) were obese. Total flap necrosis did not occur including the obese or overweight patients. None of our obese patients had more than minimal necrosis and obesity had not lead to more frequent ischemic complications (14 vs 29 and 21 % in the obese, overweight, and normal weight groups, respectively). It is interesting that the two morbid obese patients did not have ischemic complications in their reconstructed breast.

No significant association was seen between any measured variable and tissue necrosis. Smoking, diabetes, and history of radiotherapy have received more attention in the literature. The rate of smoking is low in Iranian women and its effects on flap reconstructions cannot be investigated in small studies (eight low pack-year smokers in our study). Diabetic patients with uncontrolled disease are not allowed to receive breast reconstruction surgery in our institution and the ten cases with positive history had all well-controlled disease for years before admission. Patients with positive radiation history after mastectomy had a higher but not statistically significant frequency of flap necrosis (15 vs 13 % in patients who had not received radiation). No known explanation exists for the statistically significant association between the ER status of the tumor and flap

necrosis which occurred in 87 % of the ER positive cases (P value=0.046), but we should bear in mind that this figure is marginally significant and can change by larger studies.

Unfortunately, patient data in our outpatient and inpatient departments are not saved in databases or in a standard sequenced manner, which underlies high rate of patient exclusion from this study.

Conclusion

We believe that obesity should be revisited as a relative contraindication to TRAM flap breast reconstruction. This should be studied in larger cohort studies, and the results are of pivotal importance especially in developing areas.

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