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A Study of Breast Fat Content in Egyptians and the Applicability of Liposuction as an Adjunctive Procedure in Breast Reductive Surgery

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ABSTRACT

The ideal result of any breast reductive surgery is to produce a long lasting conically shaped breast with preservation of nipple and areola viability and sensation. Liposuction is a relatively new adjunct procedure for breast reduction. It offers significant benefits when used in combination of reduction techniques and contributes to a better breast contouring. The amount of fat in breast tissue and its impact on the applicability of liposuction in the breast has not been studied till recently. In this study all patients with breast hypertrophy were managed by superior pedicle vertical mammaplasty with liposuction. The amount of fat suctioned was calculated as well as the amount of fat content in the surgical specimen. Results denote that the amount of fat content of the breast in Egyptians, even in young patients with large breasts is more than previously estimated, liposuction is feasible in all old patients and about 86.9% of young patients with large breasts. Although fat content increases with age and with body weight with great individual variation. Neither clinical examination nor mammography can predict best candidates for breast liposuction and the best policy is to routinely try liposuction at the beginning of breast reductive surgery.

INTRODUCTION

The ideal result of any breast reductive surgery is to produce a long lasting conically shaped breast with preservation of nipple and areola viability and sensation [1]. Liposuction is a relatively new adjunctive procedure for breast reduction [2,3]. As large amounts of fat can be found in hypertrophic breasts [4,5]. The addition of liposuction to breast reductive surgery offers many advantages [6,7].

1- Since more fat is removed than other tissue components, the resulting breast is formed of a greater proportion of glandular and connective tissues which are more important for the vascularity, sensation and lactation potential [8]. More importantly they are less prone to absorption if the patients loses weight after surgery avoiding recurrent ptosis and contributing to a more stable aesthetic result. This is particularly important in overweight patients who are not motivated to lose weight until their breasts are reduced [9].

2- Liposuction prior to surgery makes the breast more supple and pliable which facilitating infolding of a long superior nipple-areola pedicle on itself towards the future nipple site. This is particularly important with large fatty breasts which have a less reliable blood supply [10].

3- Liposuction limits the need for lateral dissection of the breast up to the anterior axillary line thus minimizing the incidence of haematoma formation. It also facilitates removal of axillary tail giving a better rounded shape [11].

4- Liposuction cab be used at the end of the operation to correct any breast asymmetry. The cannula can be introduced between the sutures and additional fat aspirated from the larger breast. This maneuver is much easier and faster than undoing the sutures and reshaping the breast [3].

Although liposuction alone is one way of reducing the volume of the fatty breasts, application of this approach is limited to correction of moderate cases of asymmetry or hypertrophy with good skin elasticity [12-14]. It is also indicated in elderly patients who require a simple yet effective procedure to get rid of the handicapping overweight breasts [12]. However, skin retraction after liposuction is usually insufficient to produce a satisfactory breast shape [11] and subcutaneous aspiration must be extensive to obtain the desired skin retraction which can be

complicated by localized areas of skin necrosis [15].

Some surgeons object to breast liposuction because it induces microcalcifications [16], however resulting microcalcifications are usually more rounded and more scattered than malignant ones [17]. Other newer studies state that no significant increase in the rate of microcalcification can be attributed to liposuction [6]. Another source of opposition stems from the fear of extracting cancer cells from breast tissue without detecting them [18]. In fact, liposuction performed with a blunt cannula does not aspirate parenchyma [19].

The use of ultrasonic assisted Liposuction (UAL) has been advocated in the breast and has been proven by many studies to have no ill effect on the remaining breast tissue [9,19-22].

The fatty component of the breast has not been subject to study till recently [4,23,24]. Significant fat content in the breasts is to be expected in obese patients, however, patients with normal body mass index [BMI = Weight in kgm / (Height in m)^2] also can demonstrate fatty breasts [24]. Although the amount of breast fat increases with age, especially after menopause, fat in varying proportions can be also found in young patients [24,25]. Studies show that there is great variability in the respective proportions of fat and glandular tissue, not significantly correlated to age and body mass index [24,26].

Many plastic surgeons regard big breasts in young patients as indicative of a condition called glandular virginal hypertrophy and disregard the role that fatty components play in breast size regardless of age [27]. Prechtel, demonstrated that parenchymal components increases with age till the 4th decade and then decreases progressively till the age of 60 [28]. Newer studies show that the amount of breast fat is variable as well as its distribution [24]. For this reason, not all patients with large breasts are candidates for liposuction as sometimes fat is mixed with glandular tissue and is impossible to remove by the blunt suction cannula [29]. Nevertheless, liposuction is feasible and beneficial in 60-70% of patients with large breasts [24]. Preoperative selection of these patients is not yet successful as clinical examination usually do not indicate which breasts contain fat that can be suctioned [30]. Mammography and ultrasound give some information but no precise evaluation of the amount and pattern of breast fat [24,31] and the best way is to try liposuction at the beginning of the operation [29].

PATIENTS AND METHODS

30 patients of breast hypertrophy were managed in Kasr El-Aini University Hospital by superior pedicle mammaplasty associated with breast liposuction.

Patient exclusion criteria:

- Heavy smoking.
- Previous breast surgery.
- Palpable breast lumps.
- Ongoing anticoagulant medication.
- Major medical illness.
- Mammographically detected breast masses.

Preoperative evaluation:

1- Age.

2- Weight represented by body mass index (BMI) [weight in kg / (height in meters)^2].

3- Breast examination.

4- Mammography to screen for any non-palpable breast lumps.

Technique:

All cases were operated upon using the vertical superior pedicle technique. Breast liposuction was done after de-epithelialization of the nipple pedicle as de-epithelization is technically easier with a fuller more tense breast.

Infiltration:

After anesthesia the lower half of the breast was infiltrated with 20-40 cc of 0.5% xylocaine with 1:100000 epinephrine. This combination reduced the amount of bleeding and no patient had to be transfused during or after surgery.

Liposuction:

- A small incision was made just above the lower marking of skin incision and a 6-mm three-hole blunt cannula was inserted into the breast. The retroareolar area was no suctioned as it is mainly formed of glandular tissue and for fear of jeopardizing the nipple-areola complex future pedicle.
- Fat was suctioned from all other parts of the breasts including upper breast and the lateral

and medial portions that will serve as pillars of the remodeled breast.

- Liposuction was stopped when the volume of fat suctioned decreased and the aspirate became tinged with blood. When the cannula did not penetrate the gland easily it was immediately withdrawn and suction abandoned.
- After completion of the procedure and closure of suture lines, liposuction was used to adjust breast symmetry and to remove any excess tissues especially laterally without the need to reopen the suture line.

Pathological examination:

Biopsies were taken from 4 quadrants of the surgical specimen to exclude malignancy.

Fat content evaluation (Tables 1 & 2):

Fat content was estimated by method adopted by Lejour **[24]** and Cruz-Korchin et al., **[4]**.

1- Fat suctioned was collected in glass tubes.

2- The surgical specimens (after biopsies were taken) were weighed, placed in a closed glass container and then put into a microwave oven at full power (850 W) for 20 minutes to induce melting of fat. Melted fat leaked out from the tissues which became grayish, firm and light with irregular surface.

3- Melted fat was poured out of the container, separating it from the breast residue and both were weighed.

4- The difference between the original specimen weight and the combined weights of melting fat and the tissue residue represented the amount of water evaporized during boiling.

5- The amount of fat suctioned was measured in cubic centimeters and represented as a percentage of the total weight of fat suction and surgical specimen.

6- The amount of tissues excised in grams was divided into three groups after boiling (fat, residue and evaporized water).

RESULTS

No cases of malignancy were discovered by pathological examination of biopsies from surgical specimens.

Liposuction was feasible in 30 cases (90.9%), where the amount of fat aspirate by suction ranged from 200-1650 cc with a mean of 536.33 cc.

Liposuction was feasible in all cases with body mass index greater than 22.5.

Liposuction was feasible in 20 patients between 16-40 years of age (86.9%) and 10 patients over 40 years (100%). This suggests that all patients above 40 years of age and most of the patients below the age of 40 with large breasts are candidates for liposuction. The amount of aspirate varied greatly among patients of the same age.

In cases where suction was feasible, the percentage of fat removed by liposuction to total amount removed by suction and surgical excision ranged from 7.58-78.21% with mean of 42.55%.

The percentage of fat content in the surgical specimen ranged from 3.7-77.59% with a mean of 48.11%.

The percentage of water content in the surgical specimen ranged from 4.5-79.01% with a mean of 30.31%.

The percentage of residue ranged from 3.8-61.29 with a mean of 21.59%.

Fat content in the surgical specimen increased with age and the percentage of glandular and connective tissues represented by the residue decreased with age.

Fat content in the surgical specimen increased with increase in body weight (BMI).

In cases where suction was feasible, the percentage of fat removed by liposuction to total amount removed by suction and surgical excision increased steadily with age from 25% of amount resected in adolescents to 40 percentile in women 30-40 years of age and then rose to about 50% in postmenopausal women.

In cases where suction was feasible, the percentage of fat removed by liposuction to total amount removed by suction and surgical excision was more related to the patterns of fat and gland in the breast rather than to the body weight.

The amount of fat removed by liposuction was not consistently related to the amount of fat extracted from the surgical specimen, since some fatty breasts with small lobules of fat included in the glandular tissue are difficult to aspirate.

The pure glandular breast was not common (2 patients with breast residue > 60%).

Liposuction was effective in 90% of patients. Patients with BMI > 22.5 could benefit from liposuction as an adjunct to their breast reduction surgery.

Although the fat content of surgical specimen increased with age and body weight and the percentage of fat suctioned increased with age, factors as age, appearance, body weight and clinical examination could not predict which patients will have high proportions of breast fat. That is due to the fact that there is marked individual variation.

The pattern of breast density on mammography did not correlate with neither the amount of fat produced by suction nor the fat content of the surgical specimen.

Table (1)

No.	Age	Weight (kgm)	Height (m)	BMI	Liposuction		Surgical excision						Total in gms
							Fat		Evaporation		Residue		
					cm^3	%	gms	%	gms	%	gms	%	
1	16	87	1.71	29.75	500	44.25	340	53.97	140	22.22	150	23.81	630
2	16	75	1.68	26.57	650	42.76	380	43.68	250	28.74	240	27.59	870
3	17	79	1.53	33.75	700	20.59	700	25.93	600	22.22	1400	51.85	2700
4	19	66	1.6	25.78	300	27.27	480	60.00	280	35.00	40	5.00	800
5	19	65	1.6	25.39	200	7.58	1000	40.98	840	34.43	600	24.59	2440
6	21	98	1.61	37.81	300	18.18	900	66.67	150	11.11	300	22.22	1350
7	22	84	1.59	33.23	300	41.10	240	55.81	110	25.58	80	18.60	430
8	22	67	1.54	28.25	320	27.59	120	14.29	220	26.19	500	59.52	840
9	23	70	1.68	24.80	220	57.89	90	56.25	45	28.13	25	15.63	160
10	23	56	1.69	19.61	0	0.00	200	12.05	960	57.83	500	30.12	1660
11	25	75	1.6	29.30	500	20.00	900	45.00	400	20.00	700	35.00	2000
12	25	52	1.55	21.64	0	0.00	150	46.88	120	37.50	50	15.63	320
13	29	77	1.71	26.33	300	53.57	120	46.15	115	44.23	25	9.62	260
14	29	90	1.65	33.06	400	22.22	350	25.00	650	46.43	400	28.57	1400
15	29	80	1.69	28.01	610	78.21	100	58.82	35	20.59	35	20.59	170
16	30	69	1.55	28.72	650	51.18	150	24.19	90	14.52	380	61.29	620
17	32	84	1.66	30.48	400	22.47	700	50.72	600	43.48	80	5.80	1380
18	34	69	1.59	27.29	500	53.76	320	74.42	70	16.28	40	9.30	430
19	34	78	1.63	29.36	580	24.37	490	27.22	750	41.67	560	31.11	1800
20	35	57	1.59	22.55	0	0.00	140	66.67	10	4.76	60	28.57	210
21	37	74	1.57	30.02	640	65.31	160	47.06	130	38.24	50	14.71	340
22	37	83	1.6	32.42	750	77.32	150	68.18	10	4.55	60	27.27	220
23	39	75	1.59	29.67	200	33.33	200	50.00	120	30.00	80	20.00	400
24	41	69	1.6	26.95	300	61.48	18	9.57	145	77.13	25	13.30	188
25	42	85	1.55	35.38	800	74.07	160	57.14	60	21.43	60	21.43	280
26	44	84	1.6	32.81	700	41.18	610	61.00	240	24.00	150	15.00	1000
27	44	120	1.66	43.55	1650	41.56	1800	77.59	280	12.07	240	10.34	2320
28	44	101	1.7	34.95	1020	71.58	15	3.70	320	79.01	70	17.28	405
29	45	65	1.55	27.06	600	60.00	300	75.00	50	12.50	50	12.50	400
30	45	78	1.64	29.00	400	27.59	600	57.14	310	29.52	140	13.33	1050
31	45	77	1.69	26.96	400	21.05	850	56.67	530	35.33	120	8.00	1500
32	54	69	1.54	29.09	500	31.85	360	33.64	490	45.79	220	20.56	1070
33	55	66	1.59	26.11	700	72.54	205	77.36	50	18.87	10	3.77	265

Table (2)

	Age	BMI	Liposuction		Surgical specimen						Total in gms	Total removed gms
					Fat		Evaporation		Residue			
			CC	%	Gms	%	Gms	%	Gms	%		
Liposuction not feasible (3 cases)												
Average	27.67	21.3			163.3	41.86	363.3	33.36	203.3	24.77	730	730
Max	35	22.5			200	66.67	960	57.83	500	30.12	1660	1660
Min	23	19.6			140	12.05	10	4.762	50	15.63	210	210
Liposuction done (30 cases)												
Average	32.97	30.1	536.3	42.55	426.9	47.91	269.3	29.14	227.7	21.39	929.3	1466
Max	55	43.5	1650	78.21	1800	77.59	840	80	1400	61.29	2700	3970
Min	16	24.8	200	7.576	15	3.75	10	4.545	10	3.704	160	380
All cases (33 cases)												
Average	35.73	30.8	536.3	43.06	443.3	48.11	305.7	30.31	248	21.59	923.9	1460
Max	55	43.5	1650	78.21	1800	77.59	840	79.01	1400	61.29	2700	3970
Min	16	24.8	200	7.576	15	3.704	10	4.545	10	3.774	160	380

Fig. (1): Liposuction is started immediately after de-epithelialization.

Fig. (2): Surgical specimen put in a glass container.

Fig. (3): Microwave oven used.

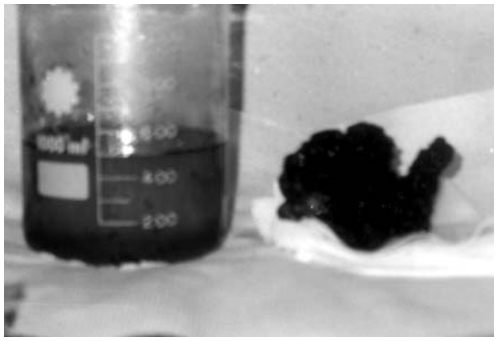

Fig. (4): Fat separated by boiling and tissue residue appears firm and grayish.

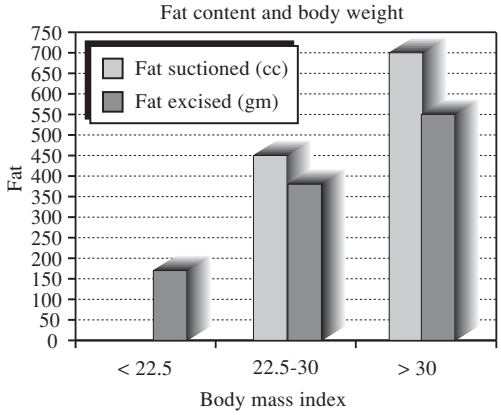

Fig. (5): Fat content increases with body weight (all cases).

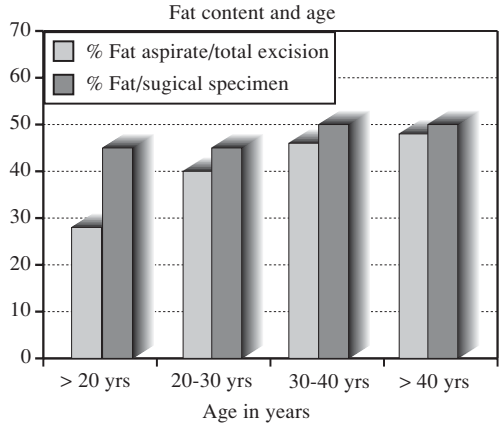

Fig. (6): Fat content increases with age (in cases where liposuction was feasible).

Fig. (7-A)

Fig. (7-B)

Fig. (7): Case 1 preoperative (Lt.) and post operative view (Rt.).

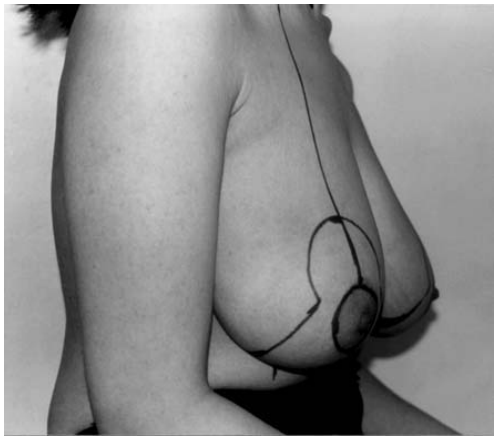

Fig. (8-A)

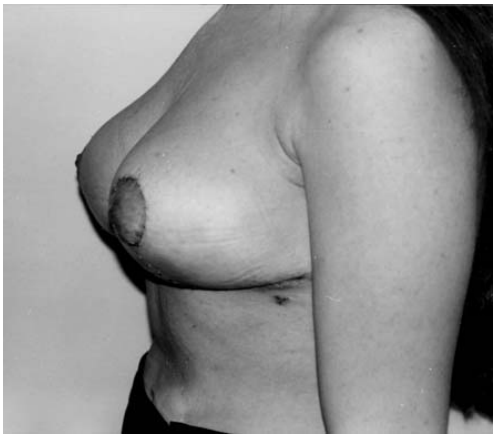

Fig. (8-B)

Fig. (8): Case 2 preoperative (Lt.) and post operative view (Rt.).

DISCUSSION

The addition of liposuction as an adjunctive procedure to breast reductive surgery has gained popularity over the past decade for its promised technical and aesthetic advantages. However, little study has been directed towards evaluating the amount and pattern of fat content in the breast and its impact on application of liposuction in breast reduction. This study was conducted to evaluate the breast fat content in Egyptians. 30 patients with breast hypertrophy were managed using the superior pedicle reduction technique with trial of liposuction at the beginning of the procedure. The resected specimen was boiled in a microwave oven to divide it into melting fat, glandular component and evaporized water. The feasibility of liposuction and the relative amounts of fat aspirate as well as the fat content, glandular component and water content of the surgical specimen were evaluated.

Results show that there is much fat in the Egyptian female breast than is commonly realized even in young patients. This comes in accordance with other studies in western countries **[4,5,23,24]**. Liposuction was feasible in 91% of cases which exceeds the results reported by Madeline Lejour **[24]** on European patients, taking in consideration that all cases were managed in Cairo University Hospital where cases tend to be of the advanced type with very large breast volumes. There was a significant increase of fat content as well as fat aspirate with increase in age. 86% of patients under 40 years of age and 100% of patients above the age of 40 were good candidates for liposuction. Fat extracted in adolescents was doubled in patients above 40 years of age. The relation of breast fat to obesity was obvious. Liposuction was feasible in all patients with body mass index above 22.5.

However, there were great individual variation in the amount of fat aspirate and fat content in the surgical specimen amongst patients within the same age group and patients with similar body mass indices. Moreover, neither preoperative clinical examination nor glandular pattern on mammography could predict the amount of fat to be expected in most of the cases.

Conclusion:

Liposuction of the breasts has proven to be a great addition to breast reductive surgery in Egyptian patients. The amount of breast fat in Egyptian is more than realized and most of patients under the age of 40 and all patients above this age can benefit from liposuction. The amount of breast fat increases with age and body weight with great individual variation. Fat content of the breast can not be predicted preoperatively by neither clinical examination nor mammography and the best policy is to routinely attempt liposuction at the beginning of each breast reduction surgery unless the breasts are nodular. Because de-epithelialization around the areola is easier when the breast is still firm, this part of the procedure is performed first. Liposuction markedly improves the shape and contouring of the breast, protects the important structures needed to maintain the viability and sensation of the nipple and areola, technically facilitates wrapping of the breast and lateral excision. It contributes to a more long lasting effect immune to future alterations in body weight.

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