

A Large-Volume Liposuction. Is it a Safe Procedure?

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ABSTRACT

Liposuction is a surgical technique to remove excess fat deposits from specific areas of the body. The purpose of this study is to determine how far large volume liposuction is safe and effective. From July 2003 to June 2005, 20 female patients had liposuction of different areas of the body as waist, hips, buttocks, thighs, and knees. Their ages ranged from 20 to 50 years (mean, 30.6 years). A standard liposuction technique was done by number 4 cannula using a tumescent infiltration formula. The average amount of infusate was 3000cc, with an average aspirate amount of 6000cc. No blood transfusions were required. Pre-operative anthropometric measurements as weight, height, body mass index, areas to be liposuctioned in addition to pre-operative hematological investigations as complete blood picture, blood sugar, liver function tests, blood urea, serum creatinine, and serum cholesterol were done. The results were evaluated with preoperative and postoperative photographs. Postoperative anthropometric measurements and hematological investigations were done at the 2nd day, 6th week, and 4th month after surgery. The rate of complications was low and relatively minor in nature. No major complications were presented. Minor complications have occurred as skin irregularities (20%), Seroma (15%), Garment pressure sore (10%), cutaneous hyper-pigmentation (5%).

INTRODUCTION

Liposuction is a surgical technique to remove excess fat deposits from specific areas of the body. It is not a substitute for weight reduction but a method of removing localized fat that does not respond to dieting and exercise [1].

There are different techniques of liposuction such as dry, wet, super wet and tumescent techniques. Tumescent technique is considered a significant improvement in liposuction surgery. It uses large volumes of a dilute solution of lidocaine, a local anesthetic, in combination with epinephrine. This technique dramatically reduces both the bleeding during surgery and the post-operative bruising and swelling [2].

The most common definitions of large volume liposuction refer to either total fat removal during the procedure (e.g. 4L of fat removal) or total

volume removed during the procedure (fat plus wetting solution, e.g. 5L of total volume removal) [3].

As a result of meticulous patient selection, intra and post-operative monitoring make the complications in large volume liposuction the same as with smaller volumes liposuction and other surgical procedures. These can be divided into minor and major complications and are medical or aesthetic in nature [4].

The aim of this work was to evaluate the degree of morphological improvement as well as hematological changes in patients undergoing large volume liposuction.

PATIENTS AND METHODS

The present study was conducted on 20 female patients admitted to Plastic Surgery Department in Assiut University Hospital from July 2003 to June 2005. Their ages ranged from 20 to 50 years with the mean age of 30.6 years old.

They presented by varying degrees of lipodystrophy in different body regions including (waist, hips, buttocks, thighs, and knees).

Exclusion criteria included the presence of significant medical diseases such as diabetes, cardiac, renal, hepatic, gastrointestinal, endocrinal diseases or body dysmorphic disorders.

Each patient was subjected to full history, systematic examination.

Pre-operative anthropometric measurements were taken for every patient including weight, height, and body mass index, circumference of the areas to be liposuctioned as waist, hips buttocks, thighs, and knees.

Pre-operative hematological investigations in the form of complete blood count, blood sugar

level, blood urea and serum creatinine, liver function tests (total protein, albumin, uric acid), and serum cholesterol.

Intra-operative local examination of the suctioned part was done by the use of the following tests:

- A- Static pinching test.
- B- Dynamic pinching test.
- C- The speed of retraction test.

Pre-operative photography using digital camera was done in standard positions.

Operative details:

Spinal anesthesia was the rule in all cases.

Intra-operative monitoring of the patients for oxygen and carbon dioxide tension, blood gases, electrocardiography, and urine output through insertion of urinary catheter.

Tumescent formula (Modified Klein's solution) was used which consists of:

- 20ml of 2% lidocaine.
- 1ml adrenaline (1:1000).
- 5ml of sodium bicarbonate solution (8.4%).
- Mixed in 500ml of lactated Ringer's solution.

The injection was continued until the skin became firm and turgid.

Standard big five for better results:

- Marking, positioning, and small stab incision.
- Pre-tunneling.
- Cross tunneling.
- Complete suction indicated when:
 - Pinch test less than 1 inch.
 - Change of feeling from soft to gritty sensation.
 - Aspirate mixed with blood.
- Pressure garment applied for 6 weeks [5].

Post-operative care:

- Broad spectrum antibiotics.
- Non-steroidal anti-inflammatory analgesics twice daily for 2 days.
- Multi-vitamins and iron supplements were routinely given to every patient for one month post-operatively.
- Early ambulation from second day after surgery.
- Pressure garment was applied for 6 weeks.
- Postoperative massage and ultrasonic wave therapy starting from third weeks postoperatively.

- All preoperative anthropometric measurements and laboratory investigations were repeated at the sixth weeks and fourth month postoperatively, except hemoglobin and hematocrite were repeated also at the second day postoperatively plus the usual measures.

RESULTS

There is a significant decrease in different body measurements at both 6 weeks and 4 months after surgery (Table 1).

As regards the laboratory investigations, we have found that:

- Hemoglobin concentration decreased on the 2nd day after surgery but returned to pre-operative levels at 6 weeks after surgery.
- Hematocrit value also decreased on the 2nd day after surgery but returned to pre-operative levels at 6 weeks after surgery.

We have found that the more the amount of aspiration, the more the decrease in hemoglobin level on the 2nd day after surgery. A marked decrease in hemoglobin level was noticed if more than 5 liters were aspirated. There is a strong negative correlation between the amount of aspiration and hemoglobin level on 2nd day after surgery (Fig. 1).

Analysis of fasting blood chemistry revealed the followings:

Blood glucose level did not decrease significantly 6 weeks after surgery but it started to decrease significantly at 4-months post-operative period (Fig. 2).

Blood urea level decreased non-significantly both 6 weeks and 4 months post-operatively. There is a non-significant change in serum creatinine. There are non-significant weak correlation between the amount of aspiration and the decrease of both blood urea and serum creatinine on both 6 weeks and 4 months post-operative.

There is a significant decrease in the total protein level 6 weeks after surgery but gradually returned to near the pre-operative levels 4 months post-operatively. There is a non-significant weak correlation between the amount of aspiration and both the serum total protein and serum albumin levels on 6 weeks and 4 months post-operative.

There is a significant decrease in the serum uric acid 6 weeks, and 4 months post-operatively (Fig. 3).

There is a non-significant weak correlation between the amount of aspiration and serum uric acid level both on 6 weeks and 4 months after surgery.

Total cholesterol level decreased significantly 6 weeks after surgery, but returned gradually to near the pre-operative levels at 4-months post-operative period. There is a non-significant weak correlation between the amount of aspiration and serum cholesterol level on both the 6th week and 4th month after surgery.

As regard the complications:

- No Major complications were presented.
- Minor complications have occurred as the following:
 - Skin irregularities: Four patients (20%).
 - Seroma: Three patients (15%).
 - Garment pressure sore: Two patients (10%).
 - Cutaneous hyper-pigmentation: One patient (5%).

Table (1): The mean values of different body measurements over 4-months post-operative period and their significance.

Body measurements (cm)	Pre-operative	6 weeks post-operative		4 months post-operative	
	Mean ± S.D.	Mean ± S.D.	<i>p</i> value	Mean ± S.D.	<i>p</i> value
Waist measurements	102.6±23.5	94.8±20.1	0.001	87±17.2	0.005
Hip measurements	115.8±12.1	107.5±10.9	<0.001	101.9±10.5	<0.001
Buttocks' measurements	111±11.5	106.8±11.5	<0.001	104.3±11.1	0.001
Thigh measurements	75.7±10.7	69.4±8.7	<0.001	64.6±8.1	<0.001
Knee measurements	58.3±6.4	52.5±4.7	0.01	48.3±4.3	0.03

Table (2): The mean values of hemoglobin level and hematocrit value over 4-months post-operative period and their significance.

	Pre-operative	2 nd day post-operative		6 weeks post-operative		4 months post-operative	
	Mean ± S.D.	Mean ± S.D.	<i>p</i> value	Mean ± S.D.	<i>p</i> value	Mean ± S.D.	<i>p</i> value
Hemoglobin level	12.1±1.3	10.6±1.3	<0.001	12.1±1.2	>0.05	12.2±1.1	>0.05
Hematocrit value	36.5±3	31.8±4.1	<0.001	36.7±2.7	>0.05	36.4±3.1	>0.05

Table (3): The mean values of laboratory investigations over 4-months post-operative period and their significance.

	Pre-operative	6 weeks post-operative		4 months post-operative	
	Mean ± S.D.	Mean ± S.D.	<i>p</i> value	Mean ± S.D.	<i>p</i> value
Blood glucose	5.3±0.8	5.2±1	>0.05	4.9±0.6	<0.005
Blood urea	4.7±1.4	3.9±1.7	<0.001	4.5±1.2	<0.001
Serum creatinine	70.6±15.3	58.5±11.9	<0.001	64.6±11.9	<0.001
Serum total protein	75.5±5.1	65.6±7	<0.001	74.4±4.4	>0.05
Serum albumin	41.8±3.6	35.9±3	<0.001	42.3±3.9	>0.05
Serum uric acid	5.1±1.5	4.6±1.4	<0.001	4.3±1.4	<0.001
Total cholesterol	170.5±35.8	162.4±32.5	<0.001	167.4±35.2	>0.05

Table (4): Overall complications rates during post-operative period.

Factor	Number of patients	% of total patients
Skin irregularities	4/20	20
Seroma	3/20	15
Garment pressure sore	2/20	10
Cutaneous hyper-pigmentation	1/20	5



Case (1-A): Pre-operative huge bilateral lipodystrophy of buttock.



Case (1-B): Post-operative after aspiration of 4 liters from both buttocks.



Case (2-A): Pre-operative Hip 2 thigh lipodystrophy.



Case (2-B): Post-operative after aspiration of 6 liters from both hip and thigh.



Case (3-A): Pre-operative inner thigh lipodystrophy.



Case (3-B): Post-operative with good inner thigh after liposuction.



Case (4-A): Pre-operative medial side of both knee and inner thigh lipodystrophy.



Case (4-B): Post-operative late with good suction over both inner thigh and knee region.



Case (5-A): Pre-operative bilateral flank lipodystrophy.



Case (5-B): Late post-operative with smooth flanks after suction.

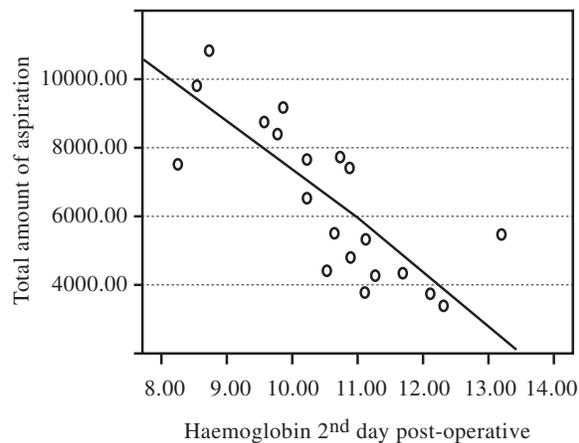


Fig. (1): The correlation between the amount of aspiration and hemoglobin level on 2nd day post-operative.

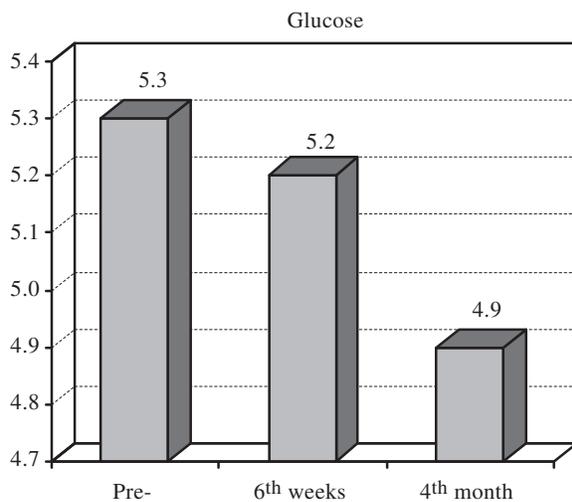


Fig. (2): Mean values of blood glucose level preoperative, 6th weeks, 4th month postoperative.

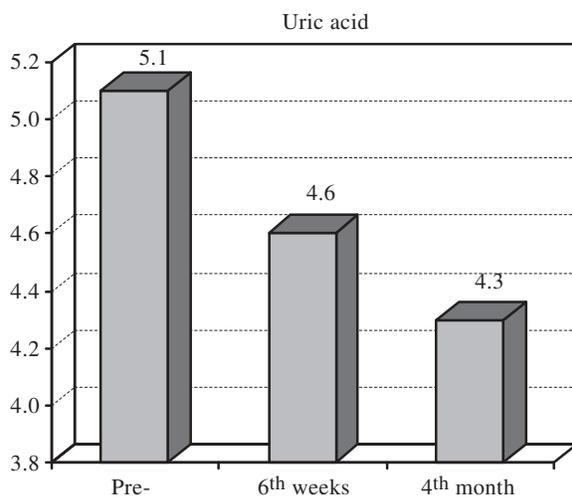


Fig. (3): Mean values of serum uric acid pre-operative, 6th week and 4th month postoperative.

DISCUSSION

Since liposuction was initially introduced to the surgical community, its applications have progressively broadened from its use in small regional operations to total body contouring [6].

Circumferential body treatment not only yields dramatic results for the patient in a single surgical session, but it also leads to a rapid change in body composition.

In our study, the average amount of infusate was 3000c.c., with an average aspirate amount of 6000c.c.

Our results, as well as those of several other investigators, have demonstrated the same findings [5,7,8].

With these large aspirated volumes, we found that the mean hemoglobin concentration decreased on the 2nd day after surgery but returned to near pre-operative levels after 6-weeks post-operatively and blood transfusion was not needed post-operatively.

As the amount of aspiration approaches 5500c.c. the changes in the hemoglobin level was somewhat steady but after that the changes undergo a marked sloping decrease in hemoglobin level but still above 8g/dl.

This was in accordance with others [9] performing total body contouring with mega-liposuction of 8 liters and more on 120 consecutive cases without the need for blood transfusion.

The same results occur with hematocrit value, which also decreased on the 2nd day post-operative but returned to pre-operative levels at 6-weeks in post-operative period [9].

These results were better than the results of Cardena-Camarena et al. [3] who reported that the reduction of hemoglobin concentration and hematocrit value was of 3.8g/dl and 12%, respectively, and in accordance with the results of other workers [10,11].

Our results were in accordance with the results of Gonzalez-Ortiz et al. [12] which showed that surgical removal of subcutaneous fat by large-volume liposuction lead to a decrease in blood glucose level over 4-weeks post-operatively and also consistent with the results of Robles-Cervantes et al. [13].

Gonzalez-Ortiz et al. [12] reported that subcutaneous abdominal fat, as a component of central adiposity, has as strong an association with insulin resistance as visceral fat, and is an important independent marker of insulin resistance in obesity.

Our results concerning blood urea and serum creatinine are in accordance with the results of others [12,14,15].

Concerning the serum total protein and albumin level are in accordance with the results of other workers [14,15] who reported that hypoalbuminemia and hypoproteinemia were observed throughout the study decreasing to 10 to 40% 24 hours post-operatively.

They attributed this to redistribution and hemodilution that occurs after aspiration of larger amounts of fat [13,16].

As regard the mean serum uric acid level revealed significant decrease on both the 6 weeks and 4 months after surgery with no correlation between the amount of aspiration and serum uric acid level [12]. Reported also the same findings.

As regard the serum lipid profile, there is a significant decrease of the serum total cholesterol level 6 weeks after surgery but returned gradually to near the pre-operative levels at 4-months post-operative period and these results are nearly the same as other investigators [12,13].

Overall complication rates were low and relatively minor in nature. There were no major complications even with suction of larger volumes of fat.

These rates were in accordance with nearly all authors especially among those who perform large-volume liposuction as [3,8,16,17].

Summary and conclusion:

Large-volume liposuction can be performed safely and effectively with the fulfillments of the following criteria:

- 1- Proper patient selection (good skin tone with moderated, localized fat deposits).
- 2- Well-trained surgeon in liposuction techniques.
- 3- Well trained anesthesiologist having a complete understanding of the physiology associated with infusion and removal of large volume of fluids.
- 4- Usage of the tumescent formula as it produces the greatest degree of homeostasis.
- 5- Meticulous observation of the patients during

the procedure and follow-up investigations to guard against any fluid and electrolyte disturbances.

- 6- Postoperative care including (pressure garment for 6 weeks, per and post-operative broad-spectrum antibiotics, post-operative analgesics, post-operative massage and ultrasound treatment, exercise and diet control).

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