The Role of Mega-Liposuction as a Therapeutic Tool for Symptomatic Large Volume Localized Obesity

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ABSTRACT

Background: Sizable heavy fatty deposits in the lower trunkal and gluteal regions lead to body imbalance that force the patient to lean forwards to compensate for this. With time, this can lead to the development of annoying chronic low back pain. This also can lead to posterior displacement of sacroiliac joints, osteomalacia, osteoporosis and decreased bone density as reported by orthopedic and spinal surgeons. They also suffer difficulty in wearing clothes, difficulty in lying on their back, obvious embarrassing deformities that lead to considerable psychological impact.

Gilliland et. al. [1] defined large-volume liposuction as having a 5,000ml aspirate, mega-volume liposuction as having an 8,000ml aspirate, and giganto-volume liposuction as having an aspirate of 12,000ml or more in one sitting [1].

Patients and Methods: 20 cases of large sized localized obesity were operated upon in Minia governorate region, upper Egypt from January 2008 to March 2010. Most of those patients were referred to us by orthopedic and spine surgeons complaining of chronic low back pain as well as the unsightly bulges of accumulated fat. All patients went on dietary and exercise regimens but with minimum or no improvement. The motive behind doing the procedure was mainly therapeutic rather than aesthetic. 12 cases of them had mega-liposuction and 8 had giganto-liposuction. All cases were females. The age group was from 24-48 years. Additional multiple body contouring procedures were performed in 6 cases. The change in haemoglobin and the hematocrit ratio pre- and post-operatively was recorded. Any fluid and blood deficits were carefully replaced.

Results: Post-operative course went smooth apart from some relatively minor complications in the form of haematoma, seroma and focal skin necrosis noticed in 4 cases. 2 cases required transfusion of one unit of blood, one of them had autologous blood transfusion when donor is not available. The inpatient stay ranged from 6 to 24 hours for both liposuction and liposuction with a dermo-lipectomy. Average weight reduction observed was 6 to 11 kg (approximately 5 to 10% of pre-operative body weight). Follow-up showed marked improvement of low back pain without doing spinal surgery with marked reduction of the amount of pain killers used to be taken before. This encouraged spinal doctors to refer more patients to us. Patients were also happy about the cosmetic results they achieved.

Conclusion: With careful peri-operative monitoring of systemic functions and replacement of intra-operative deficits, we can ensure safety in tumescent mega and giganto-liposuction for patients with symptomatic large volume localized obesity. Good therapeutic and aesthetic results can be achieved in a single sitting.

INTRODUCTION

Liposuction is one of the most helpful modern techniques in plastic surgery. It added so much to the armamentarium of the plastic surgeon. It is used for body contouring in cases of localized obesity as a sculpturing tool and it should not be used as a tool for weight reduction in the morbidly obese. As a rule, safety issues must always be addressed before aesthetic issues in any plastic surgery procedure. Suction lipectomy was initially indicated for the treatment of localized collections of fat and for the removal of less than 1500ml of fat material and general anesthesia was the rule for dry liposuction. However, when over 1500ml of fat is to be removed, anaesthesia, fluid requirements, and replacement of blood loss become important if the procedure is to be performed safely.

Gilliland et. al. [1] defined large-volume liposuction as having a 5,000ml aspirate, mega-volume liposuction as having 8,000ml aspirate, and giganto-volume liposuction as having an aspirate of 12,000ml or more in one sitting [1]. This is because the safety and aesthetics issues differ at each level of the above. While as in a big series of Dahmi, he stated that safety and aesthetic rules define mega-liposuction to be in volume in liters of more than 10% of body weight in Kg including the wetting solution [2].

Over the past 2 decades much developments happened in the techniques of liposuction with the introduction of the tumescent and super-wet techniques, ultrasonic assisted liposuction, power assisted liposuction, water jet liposuction and laser lipolysis. These advances have made possible the removal of larger amounts of fat with negligible blood loss and minor drawbacks.
Tumescent technique was 1st introduced in 1987 [3] and allowed safe contouring in a single session of large volume liposuction under regional or general anesthesia.

Localized fat accumulation patterns vary by race and age. A decrease in the subcutaneous fatty layer and an increase in intra-abdominal fat contents are seen with advancing age. Also women have a relatively higher percentage of body fat than men and have a gynaecoid pattern of fat deposition where fat deposits increase over the lateral thigh, buttock, hips, and truncal region, while men show an android pattern that centres on the truncal and abdominal regions. Sizable heavy fatty bulges in the lower truncal and gluteal regions lead to body imbalance that force the patient to lean forwards to compensate for this leading to the development of severe low back pain. Thus the motive behind this study was therapeutic more than cosmetic. Recent studies showed that there is a strong correlation between over weight and obesity and chronic low back pain [4,5].

Dahmi [2] reported 870 cases of liposuction. In (65%) cases, the total volume of aspirate was greater than 5 liters. (Range: 5 to 25 liters). In 24% cases, the large volume liposuction was combined with a limited or a total block lipectomy. He reported no major complications and only one patient required blood transfusion.

The operation is technically demanding and requires an experienced physically fit surgeon and an experienced anaesthetist. A lot of effort is done to suck such a large amount of fat and the operation can replace the morning exercise for the surgeon.

Study design:

The present study is a retrospective clinical study.

MATERIAL AND METHODS

This study is an evaluation of the ongoing work on tumescent liposuction over a period of 26 months in Minia governorate region, Egypt. The plan was to study the cons and pros of such a growing technique, namely mega-liposuction in the treatment of symptomatic large sized localised obesity patients.

All patients suffering considerable symptomatic localized obesity operated on by the author between January 2009 to May 2012 are included in this study. The study was carried out on 20 patients.

We counselled all patients and showed them photos of the expected results and scars. Some patients preferred to think and come back in another visit.

All patients signed an informed consent.

All patients were available for follow-up. Some of them denied to give late post-operative photos. The mean follow-up period was 8 months ranging from 6 to 12 months.

Results were assessed by clinical examination, pre and postoperative photographs by the same surgeon. In addition, we recorded patient satisfaction by directly questioning them.

Surgical technique:

Preoperative markings: Precise and accurate pre operative marking of the areas to be sculptured is essential for a good result. All were done while the patient is in standing position.

Position: Supine or prone position according to the area worked upon.

Anesthesia: Spinal with sedation for all cases except cases who had adjuvant techniques above the level of spinal anesthesia. Those has been given general anesthesia near the end of the operation. The anesthetist added certain amounts of epinephrine and or fentanyl to bupivacaine as they have a sparing effect on spinal anesthesia that prolongs it's duration.

Assistant: Two assistants, one of them is a registrar or senior house officer and the other is an experienced nurse as well as a circulating nurse.

Prepping: As usual using 5% povidine iodine.

Tumescent fluid formula: The fluid injected in all cases is composed of 500cc lactated ringer’s solution+0.75ml epinephrin 1/1000+10ml lignocain 0.5%. The amount injected varied from 8,000 to 14,000ml depending on the size, site, and area (until turgid).

Access incisions: 1.5cm incisions are made at the periphery of operated area in hidden areas. They are used separately for each area because using a single port to remove all fat can lead to a depression around it.

Liposuction cannulae: 6mm Mercedes cannulae in all cases.

Suction unit: Two suction units working in the same time.

Suction technique: Starting 20 minutes following fluid infiltration.
The cannulae move parallel to the fat plane in a to and fro motion along the same path. We change the site when the aspirate is blood tinged.

The end of aspiration is determined when the volume of aspirate and the appearance and feel of the treated area are bilaterally symmetrical.

Closure of access incisions is done by interrupted loose sutures to allow easy drainage of fluid, decrease swelling and seroma.

**Drains:** In giganto-liposuction cases only and all are removed on the 3rd day.

**Intra-operative clinical monitoring:** By clinical monitoring of the pulse rate, blood pressure, oxygen saturation as well as color and amount of urine collected by a Foley’s catheter.

**Intra-operative fluids in large volume liposuctions:** An experienced anesthetist is responsible for balancing the output and the intake of fluids during such major operative technique. This is done by giving the patient a sum of 1000ml crystalloids for an 8 hours starvation, the normal requirement under anesthesia of 8ml/kg/hr, and compensate blood loss if any, which can be more than anticipated or expected. The amount of tumescent fluid injected subcutaneously must be taken into consideration.

**Blood transfusion:** Only for patients with post-operative hemoglobin ≤9gm/dl and hematocrite value ≤33. We gave only one unit of packed RBCs (whole blood when autologous) + supplementary iron and vitamin B.

**Volume of aspirate:** In the present study, mega-liposuction is defined as a volume aspirate of 8 and giganto-liposuction as 12 liters or more. The total volume of aspirate included fat, blood and wetting solution (Fig. 1).

**Pressure garments:** Special liposuction pressure garments were applied to all patients at the end of operation. They were advised to keep them on all the time for 2 weeks and to take them off at bed time afterwards. Total period of wearing pressure garments is 3 months.

**Post-operative:**
- Early mobilization.
- Oral antibiotics.
- Oral analgesia.
- $\alpha$ chemotrypsin (IM) for ecchymoses.

**RESULTS**

Analysis of data showed that the age of the patients at the time of operation ranged from 24 to 48 years old (mean=38).

We classified patients into 2 groups namely, mega-liposuction and giganto-liposuction according to the amount of fat sucked as mentioned above. The mean age for the mega-liposuction patients was 39 years and it was 37 years for the giganto-liposuction cases.

All patients were females.

Pre-operative weight ranged from 85-126kg. The mean weight for the mega-liposuction cases was 95kg and it was 104kg for giganto-liposuction cases. The BMI ranged from 35 to 41. We made sure all patients had preoperative hemoglobin % of 12g/dl or more and hematocrite % of 39 or more (Table 1).

Liposuction from gluteal and trochanteric regions was done in all cases. Liposuction from medial, lateral and anterior thigh was added in individual cases when required.

**Operative time:** Ranged from 2 hours, 35 minutes to 3 hours, 45 minutes (Mean 3 hours, 15 minutes).

<table>
<thead>
<tr>
<th>Table (1): Patients’ criteria.</th>
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<tbody>
<tr>
<td>Criteria</td>
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<tr>
<td>Age, yrs</td>
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<tr>
<td>Gender</td>
</tr>
<tr>
<td>Pre-operative weight, kg</td>
</tr>
<tr>
<td>BMI</td>
</tr>
<tr>
<td>Hemoglobin %</td>
</tr>
<tr>
<td>Mean hematocrite %</td>
</tr>
<tr>
<td>Follow-up period (mts)</td>
</tr>
<tr>
<td>Previous contouring procedures</td>
</tr>
<tr>
<td>Previous dieting &amp; exercise</td>
</tr>
<tr>
<td>Previous bariatric surgery</td>
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<tr>
<td>Smoker or diabetic</td>
</tr>
</tbody>
</table>

**Blood transfusion:** Only 2 cases required transfusion of one unit of blood in either groups, one of them had autologous blood transfusion when donor was not available.

**Complications:** No major complications recorded. Only minor complications noticed (Table 2).
Table (2): Complications.

<table>
<thead>
<tr>
<th>Complication</th>
<th>Mega-liposuction No=12</th>
<th>Giganto-liposuction No=8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Haematoma</td>
<td>–</td>
<td>1</td>
</tr>
<tr>
<td>Seroma</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Focal skin necrosis</td>
<td>–</td>
<td>1</td>
</tr>
<tr>
<td>Prolonged induration with local rigidity</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Allergy to drug or sticking plaster</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Visible scars and discoloration of the skin</td>
<td>–</td>
<td>1</td>
</tr>
</tbody>
</table>

*Fig. (1): The used jar of liposuction apparatus with total aspirate inside. Note fat is floating on top and fluids with blood resting in the bottom of the jar.*

*Adjuvant procedures: As shown in (Table 3).*

Table (3): Adjuvant procedures.

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Mega-liposuction No=12</th>
<th>Giganto-liposuction No=8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brachioplasty</td>
<td>–</td>
<td>1</td>
</tr>
<tr>
<td>Abdominoplasty</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Medial thigh lift</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

*Weight loss: Ranged from 6-11Kg. (approximately 5 to 10% of pre-operative body weight).*

*Patient satisfaction: All patients were happy with the final therapeutic & aesthetic results (Fig. 2-11).*

*Fig. (2): 48 years old ♀. Left, pre-operative posterior view showing marked gluteal and trochanteric localized obesity. Right, post-operative view showing marked contour correction and improvement (14,000ml total aspirate).*

*Fig. (3): The same above lady. Left, pre-operative right lateral. Right, post-operative right lateral view.*

*Fig. (4): The same above lady. Left, pre-operative left lateral. Right, post-operative left lateral view.*
Fig. (5): 24 years old ♀ showing marked gluteal, trochanteric and medial thigh localized obesity. Left, pre-operative posterior view. Right, pre-operative anterior view (13,000ml total aspirate).

Fig. (6): The same above girl. Left, pre-operative left lateral view. Right, pre-operative right lateral view.

Fig. (7): The same above girl with marked post-operative contour reduction. Note tight pressure garments on. Left, immediate post-operative oblique anterior view. Right, immediate post-operative anterior view (13,000ml total aspirate).

Fig. (8): 38 years old ♀ showing marked gluteal, trochanteric and anterior thigh localized obesity. Left, pre-operative anterior view. Right, pre-operative posterior view.
DISCUSSION

Liposuction can be considered as more of an art than a surgical procedure. It combines sound scientific knowledge with precision, manual dexterity, and skill gained by clinical experience. Both the patient undergoing the technique and the surgeon practicing it take the joy of performing this demanding task of delivering that final result.

Before the advent of tumescent liposuction, general anesthesia was the rule for dry liposuction. Over years the refinement in techniques allowed us to use regional anesthesia supplemented by local anesthesia for the whole length of operation.

There is much debate about the maximum safe dose of lignocaine and adrenalin used in the wetting solution. Ostad et al., proposed the maximum tumescent safe lignocaine dosage to be 55mg/kg of body weight [6]. However Klein, stated that a safe dosage for tumescent lignocaine was shown to be 35mg/kg to 50mg/kg by [7]. In the present study, lignocaine was the preferred local anesthetic. We did not exceed the dose of 30mg/kg as it was an adjuvant anesthetic to spinal anesthesia used in all cases. The recommended concentration of epinephrine in tumescent solutions is 0.25-1.5mg/l. I used a total dosage of epinephrine of 0.75mg/l.

Dahmi reported 780 case of mega and giganto-liposuction with total aspirate up to 25 liters with trivial minor complications. He used tumescent infiltration with Lactated ringer, adrenalin, triamcinolone and hyalase was made in all cases. This approach has clinically shown less tissue edema in the post operative period than when the conventional physiological saline was being used in place of ringer lactate [2].

Badran et. al. (1993) performed massive liposuction of up to 11 liters in one stage on 150 patients with high degree of patient satisfaction...
with no morbidity or mortality. In a trial to do blood conservation, they used a combination of pre-deposited autologous blood and acute intraoperative normovolemic hemodilution in the management of 150 patients requiring massive liposuction [8].

Initially surgeons used large pore and sharp tipped cannulae. These caused a lot damage to neurovascular bundles and occasionally led to uneven contours and seromas or hematomas. Illouz and Fournier [9-11], popularized liposuction using their newer generation of the blunt-tipped cannulae and the 'wet technique' (Table 4).

Table (4): Volume in wetting techniques.

<table>
<thead>
<tr>
<th>Technique</th>
<th>Infiltrate</th>
<th>Estimated blood loss %</th>
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<tbody>
<tr>
<td>Dry</td>
<td>No infiltrate</td>
<td>20-45</td>
</tr>
<tr>
<td>Wet</td>
<td>200-300 cc per area</td>
<td>4-30</td>
</tr>
<tr>
<td>Super wet</td>
<td>1 cc infiltrate per 1 cc aspirate</td>
<td>1</td>
</tr>
<tr>
<td>Tumescent</td>
<td>Infiltrate to skin turgor</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>2-3-cc infiltrate per 1 cc aspirate</td>
<td>1</td>
</tr>
</tbody>
</table>

Large volume tumescent liposuctions have gained acceptance in the west where the procedure is regularly practiced in large numbers nowadays. For safety issues, I believe that liposuction should not be used for weight reduction per se in morbid obesity patients but it should be restricted to cases of symptomatic localized obesity as mentioned above. Morbid obesity cases should go first for weight reduction either by dieting and exercise or by bariatric surgery till they reach a suitable BMI.

In a study by Shiri et al. (2010), they found that overweight and obesity increase the risk of low back pain. Overweight and obesity have the strongest association with seeking care for low back pain and chronic low back pain [4]. In a subsequent study, they found that both obesity and low level of physical activity are independent risk factors of radiating low back pain [8].

Most of patients in the present study are referred to us by orthopedic and spinal surgeons to correct large volume localized obesity causing agonizing low back pain. Most of them went on dietary regimens and exercise for 3-4 years without effect on the size of large localized fatty areas. This is because of the fact that these areas of localized obesity are composed of stable fat that is not liable for reduction by dieting. Doing mega-liposuction on those patients has led to marked improvement of low back pain without doing spinal surgery. This encouraged spinal surgeons to refer more patients to us and we are still getting them so far.

Also patients with considerable annoying localized obesity suffer difficult wearing clothes, difficult lying on their back, obvious embarrassing deformities that lead to considerable psychological impact. They definitely need help.

Wagner et al., stated that an increase in fat content can be either hypertrophic or hyperplastic. An increase in total fat cell numbers is hyperplastic obesity. It predominates as body fat levels exceed 40% and is more resistant to dieting and exercise regimens. In those cases where the actual number of fat cells remains stable, the cells increase (hypertrophic) or decrease in their volume with weight gain or loss [12]. That is why liposuction is a good treatment option for cases of large volume localized obesity as they will resist dieting and exercise.

Experienced anaesthesiologist is an integral member of the team and must have a complete understanding of the procedure and be well trained to handle preoperative, intra-operative, or post-operative problems of fluid shifts and drug toxicity. The patient’s core body temperature must be maintained using heating blanket systems on the table, minimizing body exposure and using warmed wetting solution.

It is to be appreciated and emphasized that the dreadful complications of pulmonary embolism, deep venous thrombosis, penetration injuries, bleeding, pulmonary oedema, hypovolemic shock, fat emboli, drug toxicity and mortality are absent in every large series of large volume liposuction. In all these cases, credit goes to a strict adherence to the 5 pillars of safety (safe surgeon, safe anaesthesiologist, safe facility, safe co-workers and a properly selected patient).

Compressive pressure garments are always worn in the immediate postoperative period to keep skin in close contact with underlying muscle and prevent any dead space. This helps to minimize postoperative bleeding, serous oozing, swelling and a third space shift of fluid.

The common definition of 'large volume liposuction' LVL refers to either total fat removed during the procedure or a total volume removed during the procedure (fat plus wetting solution). Because many of the complications associated with large volume liposuction are related to fluid shifts and fluid balance, classifying the procedure as large volume based on the total volume removed from the patient, including fat, wetting solution, and blood, is more acceptable.
In the present study, the main disadvantage of the technique is seroma formation requiring repeated aspiration sittings that can be distressing to the patient. This can be avoided to a large extent by wearing tight pressure garments. We had no major complications or deaths.

Conclusion:
From the above study, we can say that aspiration of large volumes of fat is a safe and useful technique for the management of symptomatic localized obesity for patients with mild increase of BMI. Availability of safe surgeon and alert anesthetist and careful peri-operative monitoring and immediate correction of any deficits are mandatory.

REFERENCES