

The Safety of Large-Amount Liposuction: A Retrospective Analysis of 28 Cases

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Abstract

Aim: Our study aims to assess the safety of large amounts of liposuction in a new light. **Materials and Methods:** This is a retrospective review of patients who underwent large-volume liposuction from August 2020 to April 2021. Patient demographics, liposuction areas, the amount of infiltrate and aspirate, the surface area of liposuction areas, anesthesia duration, pain score after surgery, preoperative and 4-h postoperative hemoglobin, and basic metabolic panel (sodium, potassium, creatinine, urea) were measured. **Results:** Out of the 28 patients, 26 (92.85%) were females. The mean age was 37.1 years old. The mean preoperative hemoglobin was 13.73 g/dL. The average anesthesia time was 220.39 min. The average amount of liposuction infiltrated was 7.55 L, and the average amount of liposuction aspirate was 6.83 L. The mean hemoglobin 4h postoperatively was 13.7 g/dL. **Conclusions:** With proper patient selection and a comprehensive physical exam with preoperative blood workup performed in an accredited facility with a highly experienced plastic surgeon and anesthesiologist, mega liposuction can be safely performed as a day surgery procedure.

Keywords: Body contouring, esthetic surgery, large-volume liposuction, lipoplasty, liposuction

Key Messages: Large-volume liposuction is safe with proper patient selection, and strict attention to the standard guidelines can ensure a satisfactory outcome and reduce the risk of morbidity and mortality.

INTRODUCTION

Liposuction, also referred to as lipoplasty, is a surgical procedure that removes excess fat in specific body areas.^[1] Liposuction is considered the most common procedure performed in esthetic surgery.^[2] The safety of liposuction has evolved with time. Proper patient selection, perioperative monitoring, fluid management, and deep vein thrombosis prophylaxis have made the procedure safe, with less than 1.5% of complications.^[2,3] As with many other surgical procedures, liposuction generally has minor complications, but some are life-threatening, representing 0.02% of total complications.^[2] One of the most common minor complications includes seroma, hemoglobin drop, and contour irregularities, whereas the most significant complications are deep vein thrombosis and pulmonary embolism. The development of new anesthesia techniques, like the tumescent formula, made

a breakthrough in esthetic surgery, enabling surgeons to safely aspirate considerable amounts of fat with decreased postoperative complications.^[1]

According to the *American Society of Plastic Surgery* (ASPS), large-volume liposuction is defined as an aspirate volume greater than 5 L; according to the ASPS recommendations, there is no cutoff point in the liposuction amount. However, the 5-L aspirate amount was made as a clear point, which, if exceeded, leads to an increasing percentage of complications.^[3] According to the literature, many surgeons have exceeded the 5-L cutoff point with no

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significant complications. It could be beneficial because of fat's metabolic effect on the body.^[4-6] With adequately selected candidates and an accredited facility with highly experienced anesthesiologists and plastic surgeons, large-volume liposuction can be safe and effective.^[7-9] To the best of the author's knowledge, this is the first research conducted in Saudi Arabia aimed at assessing the safety of large amounts of liposuction and postoperative outcomes.

MATERIALS AND METHODS

This retrospective chart review study was conducted after approval by the institutional review board. Inclusion criteria were all patients who underwent liposuction greater than 5L from August 2020 to April 2021, with a body mass index (BMI) of less than or equal to 30 (kg/m²) without comorbidities such as cardiac, respiratory, or metabolic disease to avoid the confounding effect of these diseases. Our exclusion criteria were patients with comorbidities, those who had undergone less than 5L of liposuction procedures, and those with a BMI of more than 30 (kg/m²).

Patients' charts were reviewed for preoperative clinical history and postoperative outcomes. The data obtained include age, gender, BMI, area of liposuction, amount of liposuction infiltrate and aspirate, preoperative and postoperative hemoglobin, type of anesthesia, anesthesia time, postoperative pain score from 0 to 10, postoperative complications, and body surface area liposuction done.

RESULTS

Participants

Out of the 28 patients, 26 (92.85%) were females and two (7.15%) were males. Their ages ranged from 22 to 49 years old (the mean was 37.1 years old). Most of the included patients were under 40 years old (57.14%). The two male patients were 26 and 41 years old. Participants' BMI ranged from 24 to 30 kg/m² (mean = 28.90 kg/m²). The participants' body surface area of liposuction ranged from 18% to 54% (with a mean of 39.8%). All the included patients had no chronic medical conditions. All patients had their hemoglobin checked preoperatively, and it was in the range of 11.8–16.2 g/dL (mean = 13.73 g/dL). All the included patient-related data are presented in Table 1.

Intraoperative measures

All the patients were administered general anesthesia (100%) in our series, and the average anesthesia time was 221.17 min. Regarding the liposuction site, most of the patients had liposuction of the abdomen, back, and flanks (67.85%), followed by the abdomen, back, flanks, and arms (17.85%). This corresponded to the participants' body surface area of liposuction ranging from 18% to 54% (mean = 39.8%). The amount of tumescent fluid infused ranged from 4.25 to 12.5 L (a mean of 7.55 L). On the other hand, the average liposuction aspirate was 6.83 L (ranging from 5.1 to 9.5 L) [Figure 1].

The average anesthesia time was 220.39 min (ranging from 120 to 390 min).

Postoperative measures

Postoperatively, all patients' hemoglobin was checked 4h after surgery, ranging from 11.8 to 16.2 g/dL (mean = 13.7 g/dL) [Figure 2].

All patients were assessed for pain. The pain score 4h postsurgery ranged from 0 to 4 out of 10 (mean = 1.96). Regarding electrolyte measurements, all values were normal preoperatively and postoperatively. None of the included patients had any postoperative complications.

DISCUSSION

Liposuction, introduced as a surgical intervention for contouring distinct body parts, has grown in popularity as a total body sculpting intervention.^[1] It has become popular among the general population and surgeons as a safe, noninvasive, and simple procedure for body contouring or sculpting procedure.^[10] A study conducted in Egypt by Saleh *et al.* determined how far large-volume liposuction is considered effective and safe. They included 60 female patients. The mean amount of infiltrate was 3 L, with an average aspirate amount of 6 L.^[1] A systematic review and meta-analysis included 3583 patients with an average aspirate amount of 7.7 L, with the highest reported aspirate amount of 25 L.^[11]

Consequently, in our article, we have conducted a chart review of patients who underwent large-volume liposuction, removing up to 9.5 L of fat, with an average amount of 7.55 L infiltrated and an average aspirated amount of 6.83 L. Our results and those of several other published articles have pointed to the same average amount of infiltration and aspiration.^[7,12-14] Liposuction can be done using a local, regional, or general anesthetic. There has not been any evidence that one anesthetic approach is better than another. The type of anesthetic used is determined by the location and extent of liposuction and the patient's preferences.^[15] The anesthetic approach depends on the areas being operated on, such as the arms, thighs, abdomen, or buttocks, and the amount of liposuction accomplished. Because liposuction is done under general anesthesia as a daycare procedure, it is critical that patients' psychomotor and cognitive functions recover quickly, allowing them to be discharged sooner.^[16] When dealing with a large amount of liposuction or if the patient desires, the most recommended type of anesthesia is general anesthesia.^[17] A recent study conducted by Cuenca-Pardo reported a patient who underwent a large amount of liposuction and was complicated by sudden death due to fat embolism with an anesthesia time of 198 min.^[18] In our series, all the patients who underwent surgery were under general anesthesia (100%) with an average anesthesia time of 221.17 min. None of the included patients had any postoperative complications.

In a study conducted by Kaoutzanis *et al.*, the recommended guideline for large-volume liposuction fluid resuscitation is to use maintenance fluid, subcutaneous wetting solution, and 0.25 cc of intravenous crystalloid per cc of aspirate removed after 5L.^[19] However, these recommendations do not take the place of competent clinical judgment. Good communication between the surgeon and the anesthesiologist is essential in providing the patient with the best possible care and safety. All of our patients recovered well and were discharged home on the same day as day cases with no significant anesthesia-related complications.

Because the local anesthetic provides pre-emptive analgesia in tumescent liposuction, the need for analgesics during the procedure and afterward is limited.^[16] Our results can explain this as the mean pain score postoperatively was 1.96 out of 10 (ranged from 0 to 4). In addition, the length of analgesia obtained from tumescent lidocaine can be

increased by many hours by adding epinephrine to it. Nonsteroidal anti-inflammatory drugs were administered for postoperative pain treatment among our patients.

According to the published literature, the possibility of complications postliposuction ranges from 0% to 10%, with variations in the reported data between different disciplines, making a clear assessment of the risk profile of cosmetic surgery liposuction difficult.^[17] The use of tumescent liposuction has become the standard gold technique of liposuction. In 2016, a survey of 127,961 participants who had liposuction in the United States revealed a 0.9% rate of complications.^[12,20] No death has occurred because of tumescent liposuction in ambulatory centers.^[21] Among our data, we had no complications or adverse effects from large-volume liposuction. However, according to a recently conducted systematic review and meta-analysis by Kanapathy *et al.*, significant complications in

Table 1: Related information of the included patients

Case	Age	Sex	BMI (kg/m ²)	Site of liposuction	AT (min)	Liposuction infiltrate (L)	Liposuction aspirate (L)	Preoperative hemoglobin (g/dL)	Postoperative hemoglobin (g/dL)	Body surface area (%)
1	40	F	29.4	Abdomen/back/flank/arms	180	8	6.3	12	10.3	54
2	35	F	30	Abdomen/back/flank	120	7	6	12.8	10.6	36
3	31	F	29.3	Liposuction thigh	120	8	7.4	13.3	11.2	18
4	38	F	28.5	Abdomen/back/flank	300	4.25	5.1	13.6	9.5	36
5	30	F	28.4	Abdomen/back/flank	180	7	6.4	14	11.4	36
6	49	F	25.56	Abdomen/back/flank	180	7	5.4	14.7	11.6	36
7	46	F	29	Abdomen/chest/flank	180	6	7.5	15	13.7	36
8	26	M	30	Abdomen/chest/back/flank	180	8	8.4	16.2	14.3	36
9	40	F	29.5	Abdomen/back/flank/arms	260	8	6.3	11.8	10.3	54
10	41	F	26	Abdomen/back/flank	210	7	6.6	12.5	10.9	36
11	36	F	27.1	Abdomen/back/flank/arms	240	8	6.5	12.5	10.2	54
12	44	F	30	Abdomen/back/flank	310	7	5.7	13.8	10.8	36
13	22	F	25.53	Abdomen/back/flank	202	7	6.7	14	11.2	36
14	35	F	30	Abdomen/back/flank	270	7	6.7	14	11.3	36
15	49	F	30	Abdomen/back/flank/arms	240	8	6	15	13.5	54
16	41	M	30	Abdomen/back	160	7	9.5	16	13.3	36
17	36	F	26.7	Abdomen/back/flank	190	7	5.6	12.6	11.4	36
18	40	F	30	Abdomen/back/flank	201	8	8.3	13.2	11.5	36
19	34	F	30	Abdomen/back/flank	210	6	6	13.3	10.4	36
20	34	F	24	Abdomen/back/flank	241	8.5	6.35	13.3	8.4	36
21	34	F	28.9	Abdomen/back/flank	286	8	8.1	13.7	10.6	36
22	40	F	29.9	Abdomen/back/flank	207	8.3	7.5	13.9	12.2	36
23	43	F	29	Abdomen/back/flank	206	12.5	8.3	14.6	10.7	36
24	37	F	29	Abdomen/back/arms/flank	203	8	6.5	14.8	10.7	54
25	34	F	25	Abdomen/back/flank/arms	240	7	6	15.1	11.4	54
26	32	F	27.5	Abdomen/back/arms	195	7	6.9	12.4	11	54
27	32	F	26.4	Abdomen/back	390	9	7.3	13	10	36
28	40	F	30	Abdomen/back/flank	270	8	8.1	13.5	12	36

AT = anesthesia time, BMI = body mass index

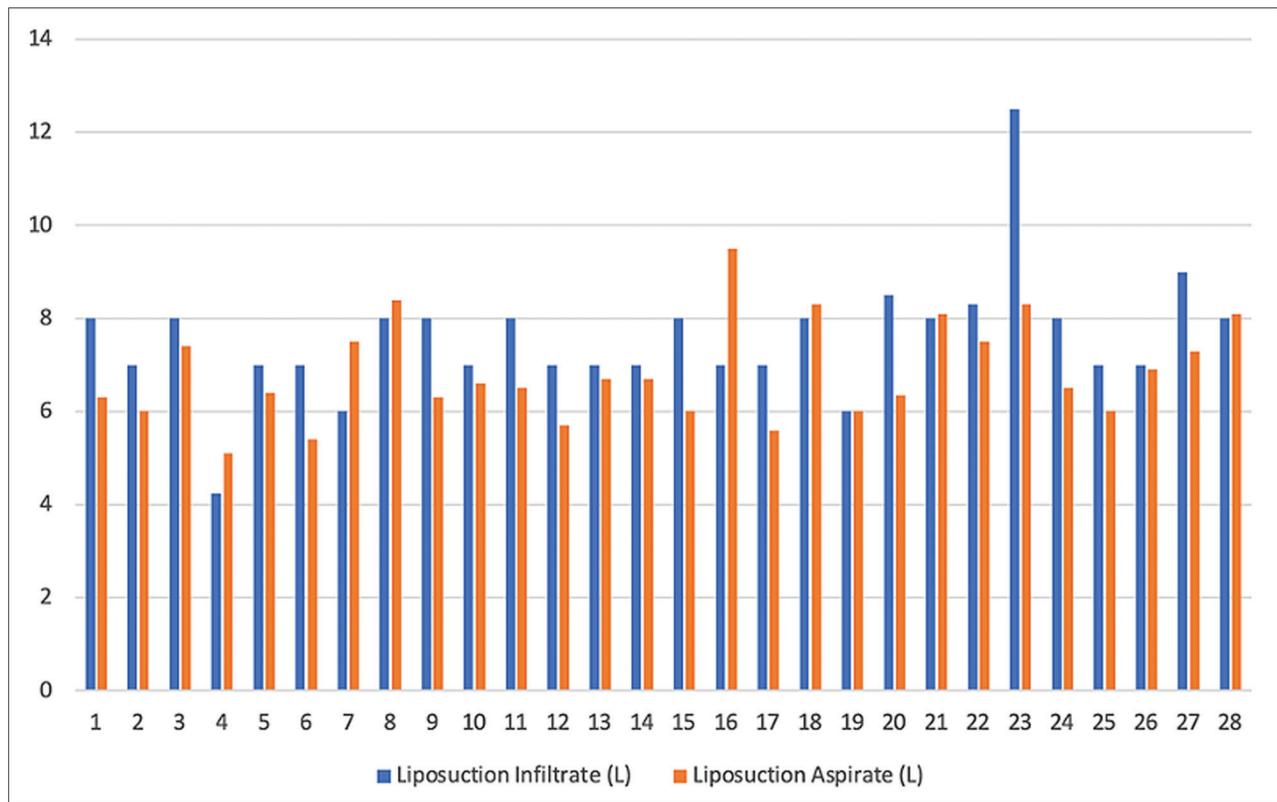


Figure 1: The liposuction infiltrate and aspirate in liters of each patient

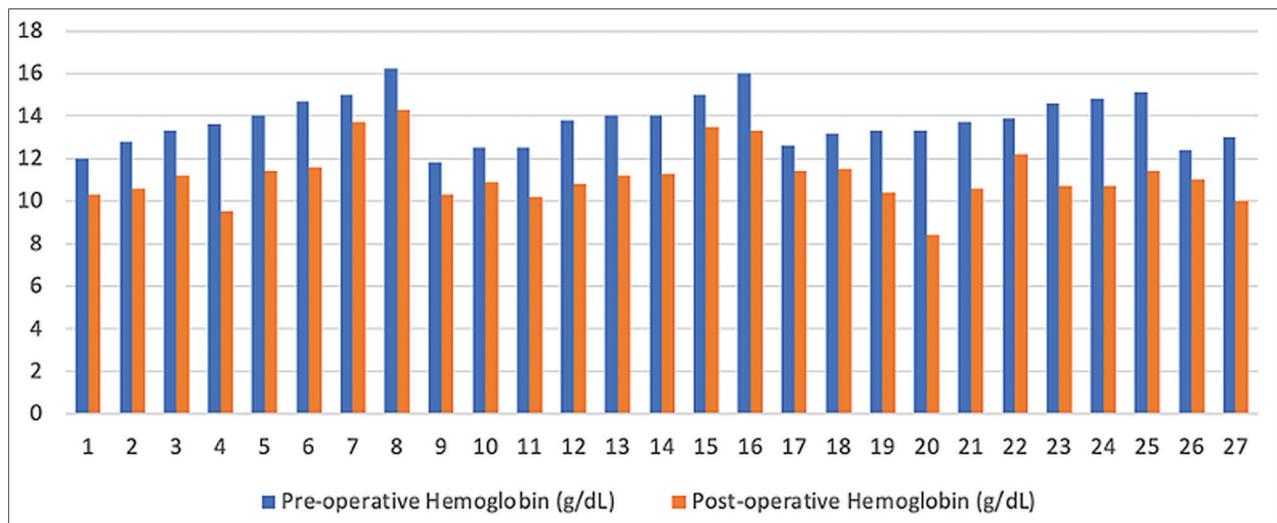


Figure 2: The preoperative and postoperative hemoglobin of the included patients

large-volume liposuction were 3.35%, of which blood loss requiring transfusion was the most common (2.89%). Of those patients that received a blood transfusion, 83.33% received an autologous blood transfusion.^[12] In another study conducted in Egypt, among 60 female patients who had large amounts of liposuction in different body areas, no blood transfusion was needed postoperatively for any of their cases.^[1] On 120 consecutive patients, Alegria Perén *et al.* completed a large amount of 8 L of liposuction and more for entire body contouring without the requirement

of a transfusion of blood.^[22] These two findings agree with ours, as in none of the included cases, a blood transfusion was required after surgery, with the minimum hemoglobin being 11.8 g/dL, with a mean of 13.7 g/dL. We believe that the minimized blood loss, which is established due to the time allowed for the tumescent solution prior to liposuction, along with increasing the amount of infiltrating, is a key to fewer complications regardless of the aspirate amount.

During the 4-month postsurgery period, a large amount of liposuction leads to considerable pulse rate and

blood pressure reductions.^[15,23,24] This is due to the drop in hemoglobin postoperatively, which causes metabolic changes and salutary physiological adjustments secondary to enhanced insulin sensitivity and loss of weight. The insulin level in the blood has formerly been implicated as a significant influence on blood pressure and can predict subsequent heart dysfunction.^[24-26] None of the included patients had hemoglobin drop immediately postoperatively, and there was no change in electrolytes. All patients were followed up to 6 months postoperatively, and they were in stable condition; therefore, the hemoglobin level test was not repeated. According to our results, hemoglobin drop showed to be unrelated to the amount of aspirate. It was more crucial to choose suitable patients. However, this finding is explained because our patient population had no chronic medical conditions. Patients known to have comorbidities were well documented in the literature to have a higher risk of complications and morbidity.^[25]

Limitations

To the best of the author's knowledge, this is the first research of its kind conducted in Saudi Arabia. The main limitation faced is that this is a single-center retrospective chart review. Hence, we recommend prospective studies with a broader spectrum of a sample size to analyze all the variables in compliance with the estimate of liposuction. Inclusion criteria may include patients with comorbidities such as controlled diabetes and hypertension in the future. In addition, to determine the most appropriate pain protocol and management, we recommend conducting future studies to assess the pain score at different intervals, such as 12 and 24 h after surgery. Also, an accurate estimation of intravenous fluid used.

In conclusion, this single-center retrospective study of patients who underwent a large amount of liposuction showed that proper patient selection and strict attention to the standards and guidelines ensure a satisfactory outcome and reduce the risk of morbidity.

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Conflicts of interest

There are no conflicts of interest.

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