

Study of 543 patients subjected to tumescent liposuction

Estudo de 543 pacientes submetidos à lipoaspiração tumescente

ABSTRACT

Introduction: Liposuction is one of the most common aesthetic procedures, and always has its safety questioned.

Objective: To verify the safety and operative complications of tumescent liposuction by analyzing demographic, anthropometrical and technical parameters, as well as the aspirated fat.

Methods: We retrospectively analyzed 543 patients (98% women) who received liposuction using the tumescent technique at the outpatient clinic's surgical center at the ABC Medical School between 2000 and 2005. Demographic and anthropometrical data were collected and analyzed, as well as data regarding the procedure – the site aspirated, the amount of tumescent solution infused, the total aspirate and aspirated fat volumes, and complications.

Results: The average patient age was 33 ± 8 , with a body mass index of $22 \pm 2 \text{ kg/m}^2$. The abdomen was the site with the highest number of procedures, and the aspirated fat as a percentage of body weight ranged from 0.43 to 1.66%, with an average of $0.97 \pm 0.33\%$. Minor complications occurred in 1.2% of patients, and were promptly and appropriately treated.

Conclusions: The tumescent liposuction technique is a safe procedure when properly performed by dermatologists and plastic surgeons.

Keywords: lipectomy; ambulatory surgical procedures; postoperative complications; intraoperative complications.

RESUMO

Introdução: A lipoaspiração é um dos procedimentos estéticos mais realizados, e sua segurança é sempre questionada.

Objetivo: Verificar a segurança e complicações operatórias da lipoaspiração tumescente, bem como parâmetros demográficos, antropométricos e técnicos, como gordura aspirada.

Métodos: Foram analisados retrospectivamente 543 pacientes submetidos à lipoaspiração pela técnica tumescente no centro cirúrgico do ambulatório da Faculdade de Medicina do ABC entre 2000 e 2005. Dados demográficos e antropométricos foram coletados e analisados, bem como dados referentes ao procedimento, como local aspirado, quantidade de solução tumescente infundida, volumes total e de gordura sobrenadante aspirados, além das complicações existentes.

Resultados: As mulheres representaram 98% de todos os pacientes estudados, a média de idade foi de 33 ± 8 anos com índice de massa corpórea de $22 \pm 2 \text{ kg/m}^2$. O abdome foi o local mais abordado, e o percentual de gordura aspirado em relação ao peso corporal variou de 0,43 a 1,66, sendo em média $0,97 \pm 0,33\%$. Só 1,2% dos pacientes tiveram complicações consideradas leves e que foram tratadas rápida e adequadamente.

Conclusões: Pudemos confirmar que a lipoaspiração pela técnica tumescente é procedimento muito seguro quando realizado por dermatologistas e cirurgiões plásticos devidamente treinados.

Palavras-chave: lipectomia; procedimentos cirúrgicos ambulatoriais; complicações pós-operatórias; complicações intraoperatórias.

Original Article

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INTRODUCTION

The surgical removal of fat with the intention of remodeling the contour of the body was first performed in 1921 by Charles Dujarrier.¹ In 1976, Giorgio Fisher described the technique of aspirating fat with the use of cannulas, which is considered the model for modern procedures.² A number of other techniques and surgical instruments aimed at obtaining better aesthetic results and reducing complications have since become available.

Fournier used the "dry technique," in which fluids were not infused into the patient before liposuction.^{1,2} However, the amount of fat that could be extracted and the loss of blood during surgery imposed limits to the procedure.³ Illouz then described the "wet technique," which involved the infiltration of hypotonic saline solution and hyaluronidase in the adipose tissue before the fat aspiration. The solution facilitated fat removal and lessened surgical trauma by reducing blood loss during the procedure.^{1,2,3}

Newman employed the term liposuction to describe this surgical procedure only in 1984. Liposuction is currently defined as the surgical removal of subcutaneous fat, using cannulas subjected to negative pressure that are introduced into small incisions in the skin.^{4,5}

In 1986 Jeffrey Klein published the technique of liposuction under tumescent anesthesia, which consists of infiltrating a great volume of crystalloid solution containing low concentrations of lidocaine and adrenaline into the subcutaneous area, followed by the aspiration of fat using small diameter cannulas.¹⁻⁶ This technique allows liposuction to be performed under local anesthesia, increasing the safety and reducing the risk of inadvertent lesions in the abdominal wall due to the maintenance of the patient's proprioception during the surgical act, in addition to reducing the cost of the procedure.^{2,3,7}

The anamnesis, physical examination and pre-operative laboratory and imaging tests allow the detection of anatomical abnormalities in the abdominal wall (such as hernias, diastasis of the rectus abdominus muscle, cutaneous sagging and blood dyscrasia, among other alterations) that can result in complications in the intra- and immediate post-operative periods.

This study's objective was to describe the epidemiological and anthropometrical characteristics, techniques (aspirated site, infused volume, aspirate volume and volume of the supernatant fat aspirated), and intra- and immediate post-operative complications associated with liposuction under tumescent anesthesia, performed in the Department of Dermatology of the ABC Medical School.

METHODS

This is a retrospective analysis of the records of patients who received liposuction in the outpatient clinic of ABC Medical School's Department of Dermatology from February 2000 to December 2005. The present study was approved by the Institution's Committee of Ethics and Research.

During this period, 567 procedures were performed; 543 patient records were analyzed. Patients' demographic and

anthropometrical data – such as gender, age, weight, height and body mass index (BMI) – and data related to the procedures – such as treated area, volume of tumescent solution infused and aspirated volume (total volume and fat volume, without the supernatant) were assessed. The areas treated were: the abdomen (anterior and lateral) inner and outer thighs and other areas such as the chin, back and arms. The fat volume was converted into weight (grams), based on the adipose tissue's density, estimated at 0.93 g/ml. The tumescent solution used consisted of a blend of 1 ml 0.1% adrenaline, 40 ml 2% lidocaine, 10 ml 10% sodium bicarbonate, and 1,000 ml 0.9% saline solution. Information about complications related to surgical interventions was obtained. All of the surgical procedures were performed under local anesthesia and appropriate antiseptic conditions. Intra-operative antibiotic therapy was employed (1 g intravenous cephalothin).

The data were analyzed using SPSS 13.0 statistical software, and expressed in terms of means and standard deviations.

RESULTS

Most patients (98%) were female, with ages between 18 and 61 (mean 33 ± 8 years). Weight and height data were available in only 30 of the records; average BMI was 22 ± 2 kg/m² and average weight was 59 ± 7 kg (range 47–79 kg). Graph 1 presents the distribution of the procedures according to the time periods analyzed. The abdomen was the area with the greatest number of liposuction procedures (Graph 2). The amount of aspirated fat was similar among the analyzed areas; however, the abdominal area required the infusion of a greater amount of tumescent solution (Table 1 and Graph 3). Taking all procedures into account, for each 100 ml of tumescent solution infused, 70 ml

were aspirated, with roughly 59 ml of fat for each 100 ml aspirated (Graph 4). The quantity of aspirated fat as a percentage of body weight ranged from 0.43 to 1.66% (average $0.97 \pm 0.33\%$).

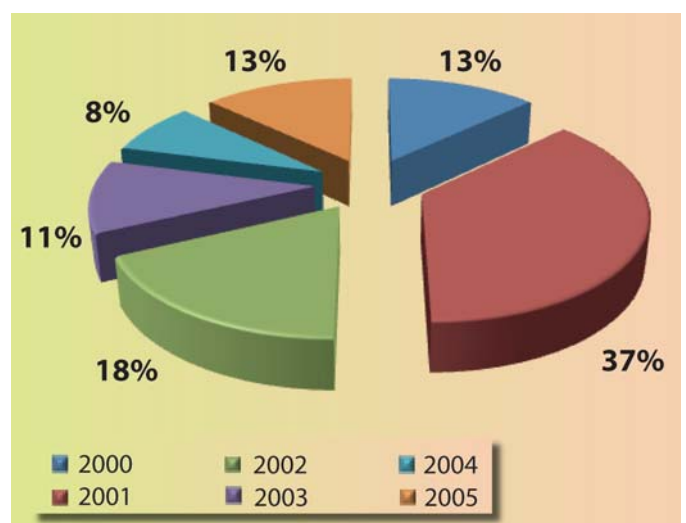
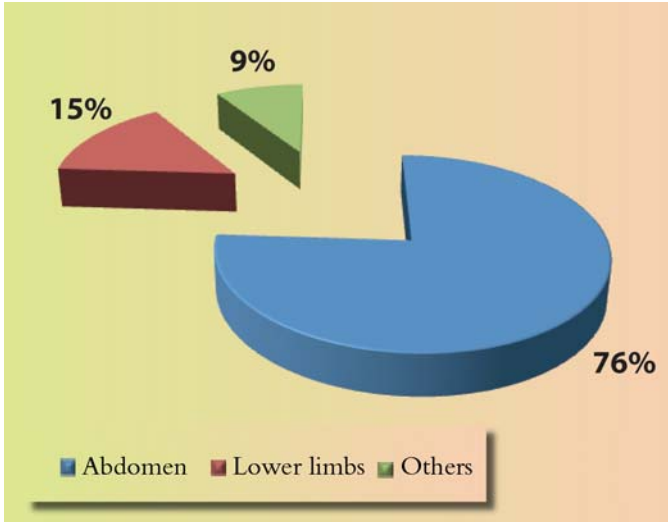
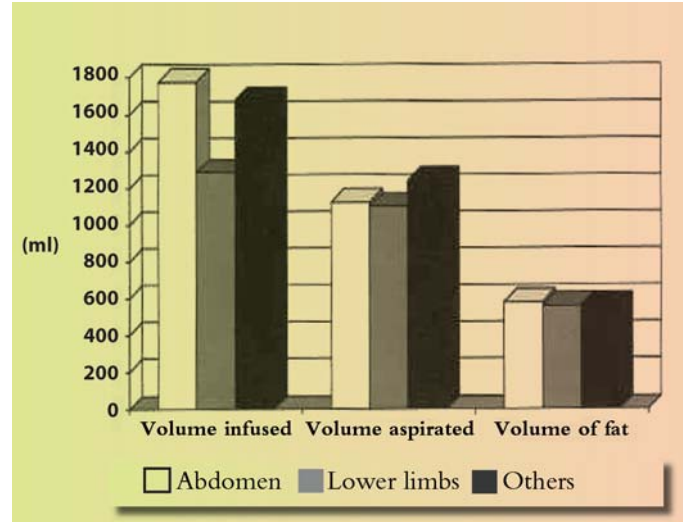


Gráfico 1 - Number of liposuctions surveyed, by year conducted



Graph 2 - Areas of the body where liposuction was performed



Graph 3 - Volume infused, volume aspirated and volume of fat, by area of the body

Six adverse events were observed, none serious, presenting gravity. There were 4 cases of drug reactions pharmacodermia and only 2 cases of significant bleeding during the surgical procedure (1.2%). None of the patients required hospitalization due to complications.

DISCUSSION

The safety of liposuction procedures increased significantly after the advent of the tumescent anesthesia technique.^{2,3,4,8} It allows the aspiration of more than 3,000 ml of fat in a single surgical intervention, without the need of blood transfusion. The use of local anesthesia eliminates the need for anesthetic medication in doses that can alter protective airway reflexes or cause ventilatory depression.^{3,5,6}

This surgical technique reduces blood loss to 1% of the aspirated volume – compared to losses of up to 45% in other liposuction techniques that do not use tumescent anesthetic solution.^{3,4,8,9} Combining lidocaine with adrenaline prolongs its anesthetic effect and promotes slow and gradual absorption. The risk of toxicity – which is a function of the substance’s peak plasma concentration – is thus reduced.^{3,7,8,10}

A good surgical outcome begins at the pre-operative evaluation, with the selection of healthy patients that have: normal BMIs, areas containing localized fat deposits that are resistant to diet and exercise, and realistic expectations regarding the results

of the surgical procedure.⁵

Statistical analysis revealed that the epidemiological data linked to age groups, gender and the more frequently operated area in the patients studied were in line with those in the medical literature.^{4,11,12} The finding that patient’s Body Mass Index (BMI) were within the normal range highlights the fact that the objective of liposuction is to reshape the body and not to treat obesity.^{4,5} In this study, the abdomen was the more frequently operated area, which fits with the data described by Hanke and colleagues and Utiyama and others, who studied 15 336 and 288 liposuctions, respectively, conducted using the tumescent technique.^{5,12}

The abdomen was also the site that was infused with the greatest volume of tumescent solution when compared to other treated areas. The greatest volume infused was 4,600 ml, with the amounts of lidocaine and adrenaline not exceeding the maximum safety limits of 55 mg/kg and 50 mg/kg, respectively, according to the literature.⁶ The greatest aspirated fat volume found in this

survey was 1,500 ml, which is significantly less than the maximum of 4,500 ml recommended by the American Academy of Dermatology’s 2001 guidelines for a single surgical intervention with tumescent anesthesia.⁶ There are no maximum recommendations regarding the ratio of volume of aspirated fat to body weight in liposuctions with tumescent

Table 1. Volume infused, volume aspirated, volume of fat and amount of fat aspirated by area of the body

	Volume infused (ml)	Volume aspirated (ml)	Volume of fat (ml)	Aspirated fat (g)
Abdomen	1.778±769	1.125±442	581±262	540±244
Lower limbs	1.299±789	1.100±695	560±356	521±331
Others	1.676±608	1.240±688	564±416	524±387
Total	1.699±777	1.132±482	576±293	536±272

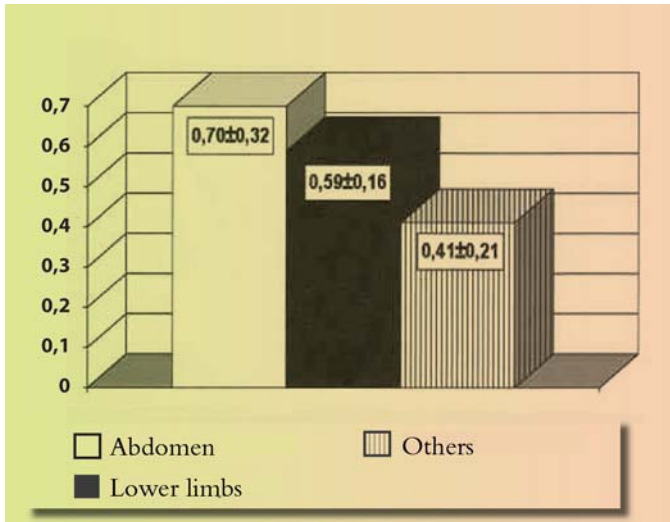


Gráfico 4 - Ratios between volumes

anesthesia.⁴

The volume of fat aspirated from the studied patients was smaller than that described in a study conducted in the United States¹², and roughly similar to that reported in a Brazilian study⁵. Neither our study nor the Brazilian study reached the maximum recommended volume of fat removed⁶ – which may help explain the small number of complications observed in our analysis. The study patients also presented with a low ratio of fat to body weight.

Serious complications such as pulmonary thromboembolism, viscera perforation, hypotension, shock and even death are described more frequently in liposuctions performed under general anesthesia and deep sedation.^{1,4,8,11} The frequency of complications in liposuctions with tumescent anesthesia is 2.11%, with scrotal region and labia majora edema being the most common, followed by infections in the operated site and permanent cutaneous irregularities.^{6,8}

The complications observed in study patients who presented normal pre-operative examinations were: urticariform eruptions (three cases) and excessive bleeding during the surgical procedure (one patient), having imposed the end of the surgical procedure before the planned time. These were minor complications that were not caused by mistakes in surgical technique or to inadequate pre-operative evaluation, and did not require hospitalization.^{4,8} It is important to note that there have been no deaths reported in the literature resulting from liposuction performed using the tumescent anesthesia technique.^{5-8,11}

Besides avoiding the risks and side effects of more invasive anesthetic techniques, tumescent anesthesia allows the aspiration of great amounts of fat with decreased loss of blood during the procedure, reduces post-surgical tissular irregularities and reduces costs.^{3,4,7} Our study's analysis confirms the safety of the tumescent anesthesia technique, reiterating that dermatologists with specific surgical training are capable of performing it. ●

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