Complications of classical liposuction performed for cosmetic purposes

Complicações em lipoaspiração clássica para fins estéticos

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ABSTRACT

Liposuction for esthetic purposes aims to remove fat in healthy patients and reduce localized fat accumulation, called lipodystrophy, in order to improve body contour. In the last 3 decades, the liposuction technique has improved dramatically. However, like any other surgical procedure, it is not without complications. Here, we reviewed the literature on PubMed to identify complications after classic liposuction performed solely for esthetic purposes. In total, 210 articles were found using the term "complication in liposuction," 86 with "complication after liposuction," 27 with "fat embolism after liposuction," 7 with "fat embolism following liposuction," and 16 with "deaths related to liposuction." Among these articles, only 84 including cases of fat embolism after liposuction, visceral perforation, vascular injury, blindness, and herpes zoster infection among others were considered to be related to the subject. Based on the analyzed articles, we can conclude that liposuction is a highly effective procedure when well indicated and performed accurately. Despite this, there are inherent risks. This review found many articles addressing complications, predominantly pulmonary fat embolism, after liposuction for esthetic purposes.

Keywords: Lipectomy. Postoperative complications. Fat embolism.

RESUMO

A lipoaspiração realizada para procedimentos estéticos tem como objetivo a retirada de gordura em pacientes saudáveis e redução do acúmulo de gordura localizada, a chamada lipodistrofia, levando à melhora no contorno corporal. Nas últimas três décadas, a lipoaspiração vem sendo aperfeiçoada; porém, como qualquer outro procedimento cirúrgico, não é isenta de complicações. O objetivo deste estudo é realizar revisão da bibliografia, por meio do PubMed, identificando as complicações após lipoaspiração clássica, incluindo apenas aquelas realizadas com finalidade estética. Foram encontrados 210 artigos empregando a expressão *"complication in liposuction"*, 86 artigos com *"complication after liposuction"*, 27 artigos com "*fat embolism after liposuction*", 7 artigos com *"fat embolism following liposuction"* e 16 artigos com *"deaths related to liposuction"*. Dentre esses artigos, apenas 84 foram considerados relacionados ao assunto, sendo encontrados casos de embolia gordurosa após lipoaspiração, perfuração visceral, lesão vascular, cegueira e infecção por herpes zoster, entre outros relatos. Com base nos artigos analisados foi possível concluir que a lipoaspiração é um procedimento altamente eficaz quando bem indicado e bem realizado, porém existem riscos inerentes ao ato cirúrgico. Este levantamento constatou que existem

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muitos artigos abordando complicações após lipoaspiração para fins estéticos, e a embolia gordurosa pulmonar apresenta alta incidência.

Descritores: Lipectomia. Complicações pós-operatórias. Embolia gordurosa.

INTRODUCTION

Liposuction performed as an esthetic procedure for the removal of fat in healthy patients is intended to reduce localized fat accumulation, called lipodystrophy, and improve body contour. In the last 3 decades, the liposuction procedure has undergone improvements to reduce the invasiveness of the surgery and preserve local circulation[1,2]. According to the statistics of the American Society of Plastic Surgeons (ASPS), approximately 198,000 individuals underwent liposuction in the United States in 2009[3], making it the 4th most common esthetic procedure. The Datafolha Institute and the Brazilian Society of Plastic Surgery (BSPS)[4], which is among the largest plastic surgery entities worldwide, report that 629,000 plastic surgeries per year are performed in Brazil, and 73% of them are esthetic and 27% are reconstructive. Among the esthetic surgical procedures, 20% are liposuctions, second only to breast augmentation. More than 90,000 liposuction surgeries per year are carried out in Brazil[4].

However, like any other surgical procedure, liposuction is not without local or systemic complications. Among several local complications, the most predominant are irregularities in the skin (visible and tangible), prolonged edema, ecchymosis, hyperpigmentation, changes in skin sensitivity, seromas, hematomas, lipodystrophy, insufficient correction, ulcers, necrosis of the skin, local infections, contact dermatitis, unesthetic scars, and persistent edema. Systemic complications of classic liposuction include visceral perforations, allergic reactions to medications during intra- and postoperative care, fever, systemic infection, cardiac arrhythmias, tachycardia, anemia, hypovolemic shock, pulmonary thromboembolism, severe vein thrombosis, fat embolism, fat embolism syndrome, sepsis, and even death[5-8]. Cases of complications, especially severe ones, are discussed extensively by the media and general population.

The objective of this study was to review the literature on PubMed to identify the complications associated with classic liposuction performed solely for esthetic purposes.

METHODS

The research was performed using the MEDLINE/PubMed database from July 2010 to March 2011. All published articles assessing complications in liposuction carried out for esthetic purposes were evaluated regardless of whether other surgical procedures were performed. The following search terms were used: "complication after liposuction," "complication in liposuction," "fat embolism after liposuction," "fat embolism following liposuction," and "deaths related to liposuction."

Articles were divided into case reports, experimental studies, complications in isolated liposuctions, or complications associated with other procedures. In total, 84 articles of interest were found after excluding all duplicate and irrelevant works and those not meeting the aim of the present study.

RESULTS AND DISCUSSION

In total, 210 articles were found using the expression "complication in liposuction," 86 with "complication after liposuction," 27 with "fat embolism after liposuction," 7 with "fat embolism following liposuction," and 16 with "deaths related to liposuction."

After careful selection and 5 different searches, we found 41 case reports[9-17]. Of these, 3 reported death after liposuction for esthetic purposes, and 2 of these reports were published in the last 5 years[13,16]. We also found 4 experimental studies on liposuction complications[18-21].

Unusual complications were as follows: 1 case of vascular injury with perforation of a large vessel during liposuction[9]; 2 cases of intestinal perforation[22]; 4 articles reporting severe bacterial infections after liposuction[23,24]; 1 case of herpes zoster[25]; 1 case of urethral injury[26]; and 3 articles on vision loss associated with liposuction. However, there was 1 article which described a patient who previously had idiopathic intracranial hypertension, being two of these symptoms presented in the last five years[27,28].

Four well-executed experimental studies addressing the complications of liposuction were selected[18-21]; 3 of these studies were carried out using Wistar rats, while the other 1 used pigs. These works assessed the variable incidence of pulmonary embolism after liposuction. The incidences of pulmonary embolism in rats after liposuction are higher in the studies performed by El-Ali & Gourlay[18] and Senen et al.[21] than that in the study carried out by Franco et al.[19].

Pulmonary fat embolism after liposuction is often undiagnosable since the clinical presentation can vary greatly, ranging from slight dyspnea, tachycardia, elevated temperature, and petechiae on the skin to severe cases of respiratory

failure and death. Its symptoms are nonspecific and often confused with those of pulmonary thromboembolism, thus resulting in severe vein thrombosis[10,12,17,19]. Although the exact risk of developing fat pulmonary embolism has not been established, death occurs in 15% of diagnosed cases. Mentz[14] poses a relevant question: "how many subclinical cases were undetected, thus not being diagnosed and published so far?"

Grazer & Jong[5] present a table of articles detailing the highly variable incidence of mortality in liposuction: from 3 per 100,000 cases of elective abdominal wall hernia and up to 162 per 100,000 cases.

Teimourian & Rogers[29] retrospectively studied 75,000 cases and report the incidence of complications to be >0.1%; the complications include severe venous thrombosis, pulmonary thromboembolism, fat embolism, skin loss, anesthetic complications, cardiac arrhythmias, organ perforation, bleeding, and transfusion-related complications. They reported that 2 patients died as a result of fat embolism and thromboembolism, with an incidence of 2.6 per 100,000.

Costa et al.[10] describe the case of a Caucasian woman, who underwent bilateral mastopexy, abdominal liposuction, and fat grafting in the gluteus; on the third postoperative day, she developed progressive dyspnea and dry cough without other symptoms and was hospitalized in the intensive care unit. Clinical examination revealed tachypnea, tachycardia, and hypoxia in room air without alterations in pulmonary auscultation; radiography showed minimal bilateral interstitial infiltrate. The patient's condition worsened on the second day of hospitalization with the development of respiratory acidosis and was intubated and placed on assisted ventilation. After several examinations, she was diagnosed with acute respiratory failure secondary to fat embolism syndrome. The patient's condition improved after 8 days of intubation; she was then extubated and discharged after 1 month of hospitalization.

Although fat embolism is a rare complication of liposuction, it has serious consequences and several cases have been reported. However, its symptoms are nonspecific and often underestimated because the exact risk of developing this complication after liposuction has not been established. Fat embolism syndrome is defined as the presence of 2 of the following 3 clinical symptoms in the first 48 hours after trauma: petechiae on the skin, pulmonary discomfort, and mental disorder. According to Costa et al.[10], these findings are defined according to the criteria of Gurd and Wilson and are used to aid diagnosis. According to Mentz[14], a lesion in the fatty tissues and blood vessels can occur during the liposuction procedure, causing a massive release of fat emboli into the bloodstream. After liposuction, the residual particles of fat globules and lipids in the treated area enter the circulation. The fat particles and/or triglycerides that enter the venous circulation mechanically obstruct the pulmonary circulation or promote an inflammatory local reaction; in turn, these conditions trigger endothelial damage, causing pulmonary spasms, hemorrhage, edema, and pulmonary impairment. Emboli passing through the pulmonary circulation may damage the brain, kidneys, liver, and other organs, leading to further complications. The presence of fat droplets in both lung lavage and urine has been detected in fat embolism syndrome and is associated with symptoms such as tachycardia, tachypnea, elevated temperature, hypoxia, thrombocytopenia, and neurological disorders. After suspected diagnosis, clinical support is the designated treatment[14].

The collected data are presented in Tables 1 to 3.

CONCLUSIONS

Liposuction is a highly effective procedure when well indicated and performed accurately. However the risks associated with this surgical procedure need to be studied and understood in greater detail. We searched MEDLINE/PubMed and selected 84 articles of interest addressing the complications of liposuction performed solely for esthetic purposes. Fat embolism is a major complication reported in the articles studied and has also been demonstrated in experimental studies. Therefore, it should receive more attention since it's incidence after liposuction is relatively high regardless of whether it is associated with fat grafting. The experimental study of Franco et al.[19] highlights this potential risk; moreover, several other studies report patients that developed respiratory distress as a result of pulmonary embolism.

The incidence of complications resulting from fat embolism in humans is still low, probably due to the lack of studies or difficulty in diagnosis, especially in cases with unclear clinical symptoms. The postoperative period following liposuction surgery in humans requires more attention and a higher commitment of doctors who perform this procedure. Moreover, when diagnosed, these cases should be published in proper medical literature to further establish the actual incidence and complications of fat mobilization, which are very evident in several experimental studies[18-21]. New studies emphasizing clinical significance are needed as well as experimental research and clinical studies on this controversial issue; these studies will be of great interest for general population and surgeons who work in this area.

Furthermore, in young patients and healthy patients in most cases, very little morbidity and mortality is expected during the intra- and postoperative periods of any type of surgical procedure such as liposuction.

Table 1 – Articles on complications and/or deaths after liposuction.

Year, Author	Samples	Number of complications	Type of complications
2008, Lehnhardt et al.[8]	2,275 (65%) surveys returned between 1998 and 2002	72 cases of severe complications	23 deaths due to necrotizing fasciitis and different forms of sepsis Hemorrhage Abdominal visceral perforations Pulmonary embolism 57% of these complications occurred in the first 24 hours
2004, Hanke et al.[7]	688	14	Major complications: pneumothorax (1 case) Minor complications: anxiety due to trauma (1 case), dizziness (1 case), hematoma (3 cases), excessive discomfort (2 cases), hyperpigmentation (2 cases), hypotension (1 case), prolonged edema (1 case)
2002, Housman et al.[6]	66,570	36 types of severe complications	Massive infection (8 cases), perforation (5 cases), hypotension and shock (5 cases), hemorrhage (5 cases), fat thromboembolism or embolism (4 cases), reactions to anesthesia or medication (4 cases)
2000, Grazer & Jong[5]	496,245	95 deaths, 19.1:100,000	Pulmonary thromboembolism (23.1%), abdominal/visceral perforation, (14.6%), anesthetic complications due to medications or sedation (10%), fat embolism (8.5%), cardiorespiratory arrest (5.4%)
1999, Rao et al.[30]	48,527 general deaths in Nova York between 1993 and 1998	Of the total deaths, 5 occurred after tumescent liposuction performed by a general surgeon	3 deaths due to bradycardia and hypotension, 1 case of volume overload, 1 case of pulmonary thromboembolism

Table 2 – Case reports.

Year, Author	Type of complication	Number of cases	Evolution
2011, Erba et al.[11]	Fat embolism syndrome	1	Multiple organ failure
2011, Heinze et al.[13]	Necrotizing fasciitis	2 (one after liposuction, one after trauma)	Death
2010, Kattapuram & Avery[26]	Ureteral injury in the ureteropelvic junction	1	Surgical treatment with improvement
2010, Park et al.[24]	Necrotizing fasciitis	1	Scar
2009, Zandi[28]	Blindness	1	Loss of vision
2009, Choi & Shin[9]	Rupture of the iliac circumflex deep artery	1	Artery embolization with good outcome
2008, Costa et al.[10]	Respiratory distress syndrome due to fat embolism	1	Positive evolution after 1 month of admission
2006, Sharma et al.[22]	Intestinal perforation and necrotizing fasciitis	1	Emergency surgery
2004, Andrews et al.[25]	Herpes zoster affecting the skin	1	Antiretroviral treatment with good outcome

Table 3 – Experimental studies.

Year, Author	Number of operated cases and type of animal	Results
2011, Franco et al.[19]	30 rats divided into 3 groups: 1. control group, 10 animals 2. liposuctioned group, 10 animals 3. liposuctioned and fat-grafted group, 10 animals	• 6 (60%) cases of pulmonary fat embolism in liposuctioned and fat-grafted rats • 3 (30%) cases of pulmonary embolism in liposuctioned rats
2009, Senen et al.[21]	40 rats divided into 5 groups of 8 each: 1. Tumescent procedure – organs harvested at 1 hour 2. Dry procedure – organs harvested at 1 hour 3. Tumescent procedure – organs harvested at 48 hours 4. Dry procedure – organs harvested at 48 hours 5. Control group	• Fat embolism Lungs • 4 (50%) cases in group 1 • 8 (100%) cases in group 2 • 3 (37.5%) cases in group 3 • 3 (37.5%) cases in group 4 Kidneys • 4 (50%) cases in group 1 • 8 (100%) cases in group 2 • 3 (37.5%) cases in group 3 • 5 (62.5%) cases in group 4 Liver • 0 cases in group 1 • 2 (25%) cases in group 2 • 3 (37.5%) cases in group 3 • 0 cases in group 4 Brain • 0 cases in group 1 • 6 (75%) cases in group 2 • 0 cases group in 3 • 0 cases group in 4 Skin • 2 (25%) cases in group 1 • 0 cases in group 2 • 0 cases in group 3 • 0 cases in group 4
2006, El-Ali & Gourlay[18]	13 rats, 3 of which were controls	• 10 (100%) cases of fat pulmonary embolism • 1 (10%) case of cerebral embolism in the study group
2004, Kenkel et al.[20]	10 pigs, 1 of which was a control	Fat embolism in the lungs and kidneys in all animals (100%), except the control

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