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CLINICAL FINDINGS IN COMPLICATIONS AND DEATHS FROM LIPOSUCTION

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ARTIGO DE REVISÃO

RESUMO

Introdução: A lipoaspiração é um dos procedimentos estéticos mais realizados mundialmente, principalmente devido aos seus resultados estéticos rápidos e à alta demanda de pacientes que buscam uma silhueta corporal definida. No entanto, complicações e até mortes relacionadas a este procedimento foram documentadas. Objetivos: Este estudo revisa achados clínicos e fatores de risco que prejudicam complicações graves e mortalidade em pacientes submetidos à lipoaspiração, com o objetivo de identificar os principais fatores de risco e propor medidas de segurança para a prática. Metodologia: Esta revisão foi realizada por meio de pesquisas em bases de dados como PubMed, Scielo e MEDLINE, abrangendo estudos publicados entre 2000 e 2023. Foram considerados artigos que relatam casos de complicações e mortes decorrentes da lipoaspiração. Os critérios de inclusão incluíram estudos observacionais, relatos de caso e revisões sistemáticas, totalizando 18 artigos. Resultados e Discussão: Os estudos mostram que o volume aspirado, a duração do procedimento e a técnica cirúrgica são determinantes críticos para a segurança da lipoaspiração. A prática de medidas de segurança, como o uso de tecnologias modernas para visualização e controle do procedimento, bem como a escolha adequada do paciente, é essencial para reduzir o número de complicações graves. Conclusão: A lipoaspiração é um procedimento cirúrgico que pode oferecer bons resultados estéticos quando realizado em pacientes cuidadosamente selecionados. No entanto, as contra-indicações devem ser rigorosamente observadas para minimizar os riscos e garantir a segurança do paciente. Avaliações pré-operatórias apresentadas e acompanhamento pós-operatório são essenciais para reduzir os riscos e melhorar os resultados do procedimento.

Palavras-chave: Lipoaspiração, Complicações Cirúrgicas, Morte, Intercorrências, Segurança na Cirurgia Estética.

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ABSTRACT

Introduction: Liposuction is one of the most commonly performed aesthetic procedures worldwide, mainly due to its quick aesthetic results and high demand among patients seeking a defined body silhouette. However, complications and even deaths associated with this procedure have been documented. Objectives: This study reviews clinical findings and risk factors that contribute to serious complications and mortality in patients undergoing liposuction, with the aim of identifying the main risk factors and proposing safety measures for the practice.Methodology: This review was carried out by searching databases such as PubMed, Scielo and MEDLINE, covering studies published between 2000 and 2023. Articles reporting cases of complications and deaths resulting from liposuction were considered. The inclusion criteria included observational studies, case reports and systematic reviews, totaling 18 articles. Results and Discussion: Studies show that the volume aspirated, the duration of the procedure and the surgical technique are critical determinants of liposuction safety. The practice of safety measures, such as the use of modern technologies for visualization and control of the procedure, as well as the appropriate choice of patient, is essential to reduce the number of serious complications. Conclusion: Liposuction is a surgical procedure that can offer good aesthetic results when performed on carefully selected patients. However, contraindications must be strictly observed to minimize risks and ensure patient safety. Detailed preoperative assessments and postoperative follow-up are essential to reduce risks and optimize the results of the procedure.

Keywords: Liposuction, Surgical Complications, Death, Intercurrences, Safety in Aesthetic Surgery

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INTRODUCTION

Liposuction is one of the most commonly performed cosmetic procedures in Brazil, but like any surgery, it has risks. Between 1987 and 2015, 102 liposuction-related deaths were recorded in the country. Most of these deaths occurred on the day of surgery or up to the seventh post-operative day, totaling 82.82% of cases. The main causes of death identified were pulmonary thromboembolism (17.44%), organ perforation (13.95%) and infections (9.3%) [1].

Liposuction, also known as aspiration lipectomy, is an aesthetic surgical procedure used to remove localized fat deposits in order to improve body contour. The technique was developed in the 1970s and has since undergone several innovations that have improved its efficacy and safety [1].

The main aim of liposuction is body shaping, not necessarily significant weight loss. It is indicated for patients who have areas of persistent fat that do not respond to diet or exercise, such as abdominal fat, fat on the thighs, hips, back or arms [1-2].

The procedure is carried out by inserting thin cannulas connected to a vacuum cleaner into the subcutaneous layers of the skin. The fat is then degraded and suctioned out, providing removal of the adipose tissue [3].

Despite being widely used for aesthetic purposes, liposuction can also be indicated to correct medical conditions such as lipodystrophy, an alteration in the distribution of body fat that can occur due to factors such as medication or disease. However, like any surgical procedure, liposuction involves risks, such as infections, irregularities in body contour and complications related to anesthesia. It is therefore essential that the procedure is carried out by qualified professionals and in a suitable environment, with adequate post-operative follow-up [4].

In recent years, several variations of liposuction have been developed, such as laser liposuction, ultrasound-assisted liposuction (VASER) and tumescent liposuction, which involves the injection of saline and anesthetic solutions to facilitate fat removal and reduce trauma during surgery [5].

In summary, liposuction is a consolidated body remodeling technique that provides significant aesthetic results, but it requires a careful assessment of the patient's

health conditions and rigorous technical execution to guarantee satisfactory and safe results [2,4].

Liposuction, an aesthetic surgical procedure aimed at removing localized fat deposits, has gained increasing popularity in recent decades. This phenomenon can be attributed to a combination of social, cultural and technological factors that influence the perception of beauty and the demand for aesthetic interventions. This article analyzes the reasons behind the rise in popularity of liposuction, the implications for public health and future trends [6].

Liposuction, developed in the 1970s, has evolved significantly over the years, becoming one of the most sought-after aesthetic interventions globally. This growth is evidenced by statistics from organizations such as the American Society of Plastic Surgeons, which reported a 63% increase in liposuction procedures performed between 1997 and 2018. The present study seeks to understand the factors that have contributed to this upward trend [2, 7, 10].

The rise in popularity of liposuction can be attributed to various social and cultural changes. Social pressure to meet often unrealistic standards of beauty, exacerbated by the influence of social networks and the media, has encouraged the search for aesthetic procedures. Celebrities and influencers who share their positive experiences with liposuction have a significant impact on public perceptions of the procedure, making it more acceptable and desirable [2, 7, 10].

In addition, the growing acceptance of cosmetic surgery as a legitimate way of improving appearance and self-esteem contributes to the popularity of liposuction. The stigma associated with aesthetic procedures has decreased, allowing more individuals to seek out these interventions [10].

Advances in liposuction techniques also play a crucial role in increasing the popularity of the procedure. Innovations such as laser liposuction and ultrasound liposuction have made the procedure less invasive, with shorter recovery times and fewer side effects. These improvements have not only increased the safety of the procedure, but have also made it more attractive to patients looking for quick and effective results [8].

Although liposuction is considered safe when performed by qualified professionals, the growing popularity of the procedure raises public health concerns. It

is crucial to ensure that patients are well informed about the associated risks, realistic expectations and the importance of choosing certified surgeons. Increased demand can lead to inappropriate practices or surgeries performed by unqualified professionals, resulting in complications and dissatisfaction [8].

As the popularity of liposuction continues to grow, it is likely that new techniques and approaches will be developed to meet consumer demand. Personalization of aesthetic procedures, taking into account patients' anatomy and individual preferences, may become the norm. In addition, the integration of digital technologies, such as 3D simulations, can help patients visualize potential outcomes before surgery, improving informed decision-making [9].

The growth in popularity of liposuction reflects profound changes in social, cultural and technological norms. While the procedure offers significant benefits for many, it is essential to address public health concerns and ensure that patients receive accurate information. As the demand for liposuction continues to rise, research and education about the procedure will be key to ensuring safe and satisfactory results [10].

Liposuction complications include a wide range of complications, from minor injuries such as hematomas and infections to life-threatening conditions such as fat embolism and hypovolemic shock. Clinical studies have identified specific risk factors, such as the volume of fat aspirated, the use of inadequate anesthesia and the presence of comorbidities. Understanding the clinical findings in each type of complication allows doctors to establish safer protocols that minimize the risk of complications and simultaneously increase the effectiveness of treatment [8 - 11].

Detailed analysis of complications provides an understanding of the underlying mechanisms of failure, allowing for early intervention. For example, the rapid diagnosis and management of a fat embolism can be decisive for the patient's recovery. Furthermore, the assessment of associated risk factors can guide the appropriate selection of candidates for the procedure, preventing complications in more vulnerable patients [12-13].

Although rare, deaths in liposuction represent a critical aspect of medical practice. The main associated causes of mortality include fat embolism, anesthetic complications and perforations of internal organs. Detailed clinical investigation of these

cases makes it possible to identify errors and technical deficiencies that can be avoided in future interventions [11].

Retrospective studies of deaths offer valuable insight for the medical community, helping to establish practice guidelines that protect patients. In addition, the study of deaths contributes to the improvement of resuscitation and support procedures, as well as to the development of techniques that minimize risks during surgery, such as the use of imaging devices for guidance [12].

The systematic analysis of clinical findings in complications and deaths is an essential tool for improving clinical practice, making it safer and more efficient. Evidence-based protocols can be created from these studies, resulting in more standardized procedures that are less prone to error. The dissemination of such findings to health professionals and patients contributes to a more realistic understanding of the risks, allowing for an informed decision on whether to perform liposuction [12].

For public health, the knowledge generated from these studies plays a vital role in regulating and monitoring aesthetic surgical procedures, encouraging the qualification and training of the professionals involved. It also allows the health system to identify trends and demands associated with emergency care and rehabilitation from surgical complications [10].

The study of clinical findings in complications and deaths from liposuction is fundamental to the evolution of medical practices, promoting safe and effective patient care. By carefully analyzing this information, it is possible to establish a scientific basis for safer interventions and the prevention of serious adverse events [13].

METHODOLOGY

This review was based on a search of databases such as PubMed, Scielo and MEDLINE, covering studies published between 2000 and 2023. Articles reporting cases of complications and deaths resulting from liposuction were considered. The inclusion criteria included observational studies, case reports and systematic reviews, totaling 18 articles.

Type of review

Type of study: Systematic literature review.

Approach: Qualitative and descriptive review of articles published on the subject.

Data Sources and Databases

Sources: Scientific literature databases such as PubMed, Scielo, Embase, Lilacs and Google Scholar.

Inclusion and Exclusion Criteria

- ✓ Inclusion criteria:
- ✓ Articles in English, Portuguese and Spanish.
- ✓ Studies published in peer-reviewed scientific journals.
- ✓ Studies dealing with clinical complications, complications and deaths specific to liposuction, whether case studies, systematic reviews or meta-analyses.

Exclusion Criteria:

- ✓ Articles that do not provide information on complications or deaths specific to liposuction.
- ✓ Studies with very small samples or insufficient information.
- ✓ Articles focusing on other plastic surgeries that do not include data exclusive to liposuction.

DISCUSSION

The findings of this review indicate that liposuction, although considered safe, presents significant risks, especially in patients with high risk factors. Strategies for reducing complications include rigorous screening of patients, a detailed assessment of clinical conditions, the use of minimally invasive techniques and careful post-operative follow-up [2].

Studies show that the volume aspirated, the duration of the procedure and the surgical technique are critical determinants of liposuction safety. The practice of safety measures, such as the use of modern technologies to visualize and control the procedure, as well as the appropriate choice of patient, is essential to reduce the number of serious complications [13].

The history of liposuction is marked by important technical advances and regulations over the years. We will divide this evolution into three main topics:

1. Evolution of the procedure

Liposuction emerged in the mid-1970s, when French surgeon Yves-Gerard Illouz developed a technique for removing localized fat with a less invasive method than previous procedures. The initial procedure involved injecting saline solution to break down the fat, followed by aspiration of the fat using cannulas, which reduced trauma and recovery time [12, 15].

In the following decades, especially between the 1980s and 1990s, the procedure was improved to be safer and more effective. The technique expanded rapidly in the United States and Europe, becoming popular among patients interested in contouring body regions that were difficult to treat with diet and exercise alone [7, 9].

The Southeast region of Brazil has the highest number of plastic surgeries, including liposuction. This is due to the higher population concentration and the greater number of professionals specializing in the area [1].

Most liposuction procedures are performed on individuals aged between 19 and 50. This age group represents the majority of cosmetic surgical interventions in the country [1].

2. Techniques developed over the years

Over time, new techniques and technologies have been incorporated to improve the safety, control and results of liposuction.

Tumescent liposuction, developed in the 1980s (FIGURE 1), this technique involves the infiltration of a saline solution mixed with anesthetic and vasoconstrictor to reduce bleeding and pain. This approach has made the procedure safer and widely used to this day [13, 17].

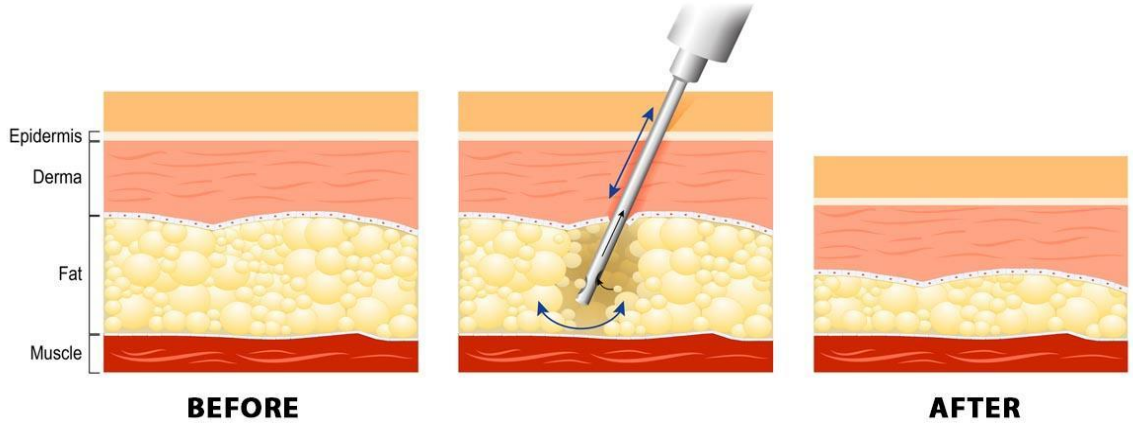

Figure 1. Tumescent Liposuction Technique. Source: estheticland.com/cosmetic-surgery/liposuction/tumescent-liposuction (2024).

To melt the fat before suction, which helps facilitate its removal and, in some cases, promotes skin tightening.

Figure 2. Laser in liposuction. Source: Grazer (2020).

Ultrasound Liposuction (Vaser) (FIGURE 3) uses ultrasonic waves to break down fat before suctioning it. This technique is considered less invasive and provides greater precision in delicate areas. Vibration-Assisted Liposuction (PAL) (FIGURE 4) uses a cannula that vibrates rapidly to break down fat. It is efficient and allows the surgeon greater control, especially in larger areas of the body [5, 11].

Figure 3. Ultrasound Liposuction Equipment (Vaser). Source: claudiolemos.com/cirurgia-plastica/cirurgia-plastica-masculina/lipoaspiracao-ultrasonica/

Figure 4. Professional Liposuction Device Plastic Surgery PAL Power Assisted Liposuction Vibration Liposuction with different cannula lipolysis machines. Source: Grazer (2020).

3. Legislation and regulations

Liposuction regulations vary from country to country, but all cosmetic surgery medical procedures generally follow guidelines to ensure patient safety:

In the USA, the Food and Drug Administration (FDA) regulates the use of liposuction devices and establishes safety requirements for the equipment. The American Society of Plastic Surgeons (ASPS) and the American Society for Aesthetic Plastic Surgery (ASAPS) also provide guidelines for safe and ethical practices in the procedure [6, 17].

In Brazil, the National Health Surveillance Agency (ANVISA) regulates the manufacture and import of the devices, while the Federal Council of Medicine (CFM) defines the rules for performing liposuction. For example, the CFM sets volume limits for fat removal, requiring the procedure to be carried out by trained professionals and in licensed environments [1].

In many European countries, the legislation and regulation of liposuction is similar, being guided by the European Union's regulations on the safety of medical devices, in addition to country-specific regulations [4, 18].

These regulations are essential to ensure that procedures are carried out safely, with qualified professionals and in authorized locations, minimizing risks and promoting better results.

4. Clinical findings and complications

4.1 Immediate complications

Blood loss during liposuction is one of the most frequent causes of immediate complications, varying according to the volume of fat removed and the size of the area treated [5].

Abdominal liposuction presents an increased risk of visceral injury, such as intestinal or liver perforation, leading to peritonitis and sepsis [3, 18].

Fat embolism is one of the most serious events associated with liposuction, occurring when fat particles enter the bloodstream. Symptoms include breathing difficulties and loss of consciousness, which can lead to death in severe cases [18].

4.2 Late complications

Wound infections and septicemia are frequent late complications, especially in cases where asepsis is inadequate [18].

Deep vein thrombosis and pulmonary embolism can be caused by prolonged postoperative immobilization, which can increase the risk of deep vein thrombosis (DVT) and, consequently, pulmonary embolism, which are significant causes of death in patients undergoing liposuction [12-13].

Necrosis of the skin and subcutaneous tissue can occur due to mechanical trauma or impaired vascularization [14].

5. Risk factors for complications and death

Several factors have been identified as aggravating serious complications and deaths in liposuction, among which Advanced Age and Comorbidities stand out. Older patients with pre-existing diseases such as hypertension, diabetes and obesity are at greater risk of complications [12-13].

The volume aspirated is directly proportional to the risk of hemorrhage and hypovolemic shock [12-13].

The surgeon's skill and experience are fundamental in preventing injuries and complications. Less experienced surgeons have a higher rate of complications, especially in large liposuction procedures [12-16].

The administration of anticoagulant drugs or other substances that alter blood coagulation can increase the risk of bleeding during and after the procedure [12-13].

6. Indications and Contraindications for Liposuction

Liposuction is one of the most commonly performed aesthetic procedures in the world, indicated for the removal of localized fat deposits that are resistant to diet and exercise. It is not an alternative for weight loss, but rather a resource for contouring specific areas with excess fat in individuals with a body weight close to ideal and with good skin elasticity.

6.1 Most Common Indications for Liposuction

The indications for liposuction generally involve body shaping in healthy patients who wish to improve the contour of areas such as the abdomen, thighs, buttocks, flanks, back, arms and, in some cases, the neck and face. Liposuction can be indicated for;

Resistant Localized Fat: For people who, even with diet and exercise, are unable to reduce fat accumulations in specific areas [12-13].

Correction of Body Asymmetry: In some cases, liposuction can be used to reduce differences between sides of the body or harmonize regions [12-17].

Aid in Combined Surgeries: Liposuction is often performed together with other surgeries, such as abdominoplasty, to improve aesthetic results.

The ideal patients for liposuction are those with a weight close to ideal, good physical health, realistic expectations of the results and skin elasticity that allows for natural contouring after fat removal [12-17].

6.2 Contraindications to Liposuction

Despite being considered a safe procedure, there are contraindications to liposuction, which can be divided into absolute and relative [12-17].

6.2.1 Absolute contraindications

- ✓ Absolute contraindications are those in which the procedure is completely contraindicated due to the high risk to the patient's health. They include:
- ✓ Severe Heart Disease: Patients with severe heart failure, uncontrolled arrhythmias or other heart conditions may be at increased risk during surgery.

- ✓ Coagulation Disorders: People with diseases such as hemophilia or other severe coagulation disorders are at increased risk of bleeding complications.
- ✓ Active Infections: Infections, especially in the area where liposuction is to be performed, increase the risk of systemic infection.
- ✓ Morbid Obesity: Liposuction is not recommended as a method of weight loss in cases of morbid obesity, as the surgical risks increase significantly.
- ✓ Pregnancy: The procedure is contraindicated during pregnancy due to the risks to mother and fetus.

6.2.2 Relative contraindications

- ✓ Relative contraindications are those in which the procedure can be performed, but requires caution and a careful assessment of risks and benefits [12-17]. They include:
- ✓ Diabetes Mellitus: Diabetic patients may have an increased risk of poor healing and infection. Liposuction can be performed on controlled diabetics, but requires close monitoring.
- ✓ Advanced Age: Age in itself is not an impediment, but the elderly may have reduced skin elasticity, greater fragility and other health problems that need to be considered.
- ✓ Psychological Disorders: In patients with body image disorders, the indication needs to be well assessed to avoid dissatisfaction and regret.
- ✓ Smoking: Smoking impairs healing and increases the risk of vascular and pulmonary complications. Smokers should stop using tobacco weeks before surgery.

7. Complications and Intercurrences in Liposuction Procedures

Liposuction is one of the most commonly performed cosmetic procedures worldwide, but, like any surgical intervention, it has inherent risks that can lead to both immediate and delayed complications. These risks range from common events, such as bruising and infections, to serious consequences, including death [12-17].

Complications associated with liposuction can be classified as immediate and delayed, depending on when they appear. Classifying these complications is important for early diagnosis and appropriate treatment, aiming to minimize the impact on the patient's health and improve the results of the procedure [10-16].

1. Immediate complications: These are those that arise in the first hours or days after the procedure.

- ✓ Bleeding: Blood loss during liposuction can occur, but is minimized by the use of specific techniques. However, in some cases, there may be significant bleeding, requiring strict monitoring and, in rare cases, transfusions.
- ✓ Hematoma: The formation of hematomas at the site of the procedure is common and, although it usually resolves spontaneously, it can cause discomfort and, in rare cases, lead to the need for drainage.
- ✓ Infection: This is a major complication and can occur in any surgery. Infection can range from a simple skin infection to more serious infections, such as necrotizing fasciitis or septicemia, both of which have a high risk of mortality if not treated promptly.

2. Late complications: These are those that manifest weeks or months after the procedure [12-17].

- ✓ Contour irregularities: An aesthetic complication that occurs due to uneven fat removal, resulting in irregular or asymmetrical body contours. This complication may require corrective treatments.
- ✓ Necrosis: Skin necrosis is a rarer but serious complication resulting from a loss of blood supply to the treated area. This condition can lead to extensive scarring and the need for reconstructive surgeries.

8. Deaths Associated with Liposuction

Although rare, deaths associated with liposuction have been documented and are often linked to complications involving the cardiovascular and respiratory systems, as well as severe infections [12-17].

Studies show that the mortality rate in liposuction is approximately 1 to 2 cases per 5,000 to 10,000 procedures. This statistic, although low in relation to the total

number of procedures performed, reinforces the importance of rigorous evaluation of candidates and the selection of qualified clinics [10-13].

Analyses reveal that cases of death frequently involve patients with underlying comorbidities, such as hypertension, heart problems or a history of thrombosis. In some cases, respiratory complications, such as pulmonary embolism, are prominent, especially in extensive surgeries or combined procedures [12-17].

Several risk factors may be associated with an increased chance of serious complications and deaths in liposuction. Among them, the following stand out: Patients with conditions such as hypertension, diabetes and heart problems are more predisposed to developing serious complications; Aspirations of large volumes increase the risk of fluid imbalance and circulatory complications; Combining liposuction with other procedures increases surgical time and the risk of thromboembolic complications; The professional's experience is essential to minimize risks. Surgeons specialized in aesthetic procedures and with adequate training reduce the incidence of complications [11-18].

CONCLUSION

Although liposuction is widely performed, it is crucial that patients and health professionals understand and discuss the risks inherent to the procedure.

Liposuction is a surgical procedure that can offer good aesthetic results when performed on carefully selected patients. However, contraindications must be strictly observed to minimize risks and ensure patient safety. Detailed preoperative evaluations and postoperative follow-up are essential to reduce risks and optimize the results of the procedure.

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