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# High Definition Liposuction: A Challenge for a Perfect Body Contouring

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## Abstract

During the last decades, the plastic surgery field has made important advances in terms of clinical results and developing new surgical techniques, minimizing complications and reducing the mortality rates. An innovative and new technique is called High Definition LipoSculpture. This is an advanced sculpting technique that creates an athletic and sculpted appearance. The aim of this chapter is to review the principal concepts that involve this technique and describe its clinical application. An electronic literature review was conducted in order to find the most recent medical literature published in this field. Keywords used were plastic surgery, liposuction, body contouring, aesthetic medicine, and surgical procedure. High definition liposuction procedures should be considered revolutionary in the plastic surgery field.

**Keywords:** plastic surgery, liposuction, body contouring, aesthetic medicine, surgical procedure

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## 1. Introduction

During the last decades, the plastic surgery field has made important advances in terms of clinical results and developing new surgical techniques, minimizing complications and reducing the mortality rates. On the other hand, the revolution of new technologies such as medical devices has opened other alternatives in the current clinical practice [1, 2].

There is no secret about the popularity that plastic surgery procedures have gained even in women and men, as a part of a social-aesthetic revolution that find better bodies and improve personal image. Since its introduction, liposuction has undergone several technical challenges and has improved the clinical outcomes [3, 4].

A wide range of technological advancements has been released to replace traditional methods of suctioning fat: ultrasound, power, laser, and radiofrequency. Each surgical alternative has its own benefits and complications. Different medical device companies across the world are continuously working on the safe surgical instruments for this type of surgical procedures [5]. The dreamed liposuction device has to be in the position to offer different functions at the same time: (1) remove excess of fat, (2) keep safe the surrounded soft tissue, (3) devices allowed to be used under local anesthesia, and (4) device results avoid bruising and swelling [6–8].

An innovative and new technique is called High Definition LipoSculpture. This is an advanced sculpting technique that creates an athletic and sculpted appearance. The objective of this procedure is to remove both superficial and deep fat that surrounds muscle groups in order to enhance the visibility of underlying toning and musculature. This technique could be applied in multiple body areas such as abdomen, chest, waist, back, buttocks, arms, flanks, and thighs [2, 4].

The aim of this chapter is to review the principal concepts that involve this technique and describe its clinical application.

## 2. Background

Obesity, overweight, and metabolic syndrome are a public health issue nowadays. Countries such as the United States report an estimate of 40% of the adult population suffer from this health problem. This spectrum of diseases is associated with high rates of mortality in comparison with cancer, cardiovascular disease, and violent deaths [9, 10].

Recent clinical studies predict that in 2013, more than the 50% of the worldwide population would be facing this reality. Weight loss including strategies such as dietary changes and exercise usually does not achieve the desired weight loss goals. Based on this, bariatric and metabolic surgery has become the treatment of choice for obesity and morbid obesity [11].

The Roux-En-Y gastric bypass still remains the gold standard surgical option for obese patients. In the course of achieving massive weight loss and resolution of comorbidities, bariatric surgery creates quality-of-life problems that are in the medical field of plastic surgeons. Despite the numerous health advantages of bariatric surgery, disgruntled patients complained of disturbing lax skin and subcutaneous tissue [5, 8, 12].

Plastic surgeons learned during the last years that change in body contour with repulsive hanging skin and bizarre rolls of skin and fat. Due to this, High Definition LipoSculpture has been presented as a safe and effective option [13].

### 3. Literature review methods

An electronic literature review was conducted in order to find the most recent medical literature published in this field. Using the keywords such as plastic surgery, liposuction, body contouring, aesthetic medicine, and surgical procedure, the following databases were consulted: Pubmed, Lilacs, Proquest, Cochrane, Ovid, and Google Scholar. With the aim to maximize the number of articles, no date limit in the search was set, and manuscripts in English, Spanish, and Portuguese were considered.

Initially, 87 articles were obtained, of which 25 met the inclusion criteria. However, only 23 were referenced in the current work with a focus on high definition liposuction and body contouring or gave important theoretical contributions.

### 4. Procedures

#### 4.1. Patient selection

Initially, all the patients are examined and evaluated in plastic surgery consultation, and complete medical records are reviewed including previous surgical procedures, current medication use, and recent laboratory analysis. Considering that this type of surgical procedure is created to be a sculpting procedure rather than a debulking technique, an appropriate patients' selection is necessary. A good muscle tone without an excessive amount of fat or skin laxity is expected (body mass index < 30) [3, 14].

Once the physical examination is performed, lipodystrophy throughout the trunk has to be evaluated. Patients are requested to perform various muscle contractions in the clinical assessment to evaluate separately the muscle groups that contribute to the contour of the torso. Finally, skin laxity, elasticity, and quality of tissue are considered [15, 16].

For male patients, there are other aspects to be included in the clinical assessment: the presence of gynecomastia, chest contour, and volume of fat in this area. In the female cases, a comparable estimate is performed: the buttocks, lumbosacral angle, fat disposition in the lateral thighs, and perigluteal area are considered [4, 7, 12].

The physical examination is suggested to include documentation of scars, hernias, and other potential routine findings. Upon completion of the history and physical examination, based on our current clinical guidelines, patients are scheduled for an extra medical examination by the anesthesia department, to have the chance to evaluate other current medical issues ongoing at the same time. Once the patient meets the clinical requirements for this procedure, a final appointment is suggested to show a quick presentation explaining the surgical presentation in details, focused on benefits and potential complications. At the end of this medical visit, patients sign informed consent forms to continue with the medical process of surgery scheduling [17, 18].

## 4.2. Preoperative care

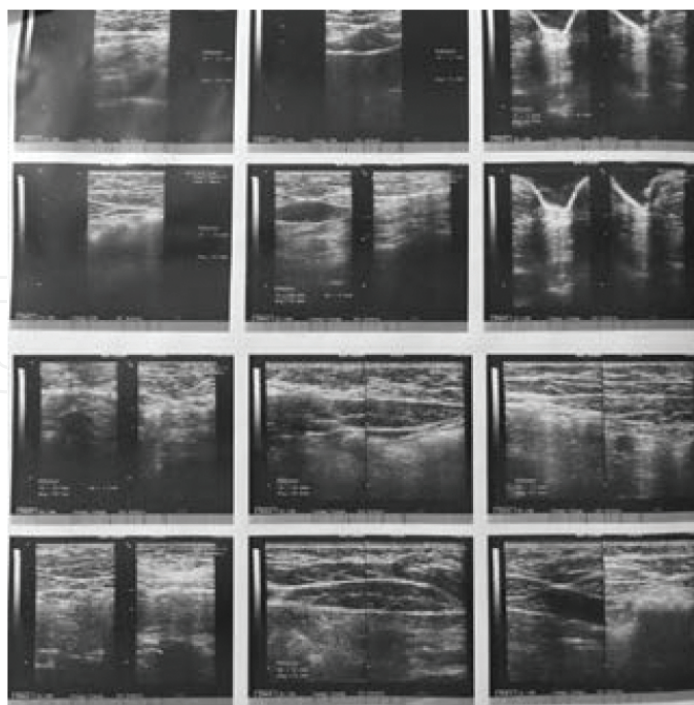
Patients are requested to be in the ambulatory surgery service 2 h prior to the surgical time. A new medical assessment is conducted to review the general medical status of the patient on the surgery day. Recent laboratory test results, electrocardiograms, and thorax X-rays are reviewed prior to authorizing the patient to be transferred to the operating room. Based on the patients' medical conditions and preferences, epidural or general anesthesia is offered by the anesthesia team.

Preoperative strategies that involve medication such as thromboembolism prophylaxis included low-weight heparin, intravenous corticosteroids, analgesics, and antibiotic prophylaxis are administrated with the main goal to keep the patient in the best condition possible and avoid potential clinical complications.

## 4.3. Surgical technique

### 4.3.1. Ultrasound evaluation

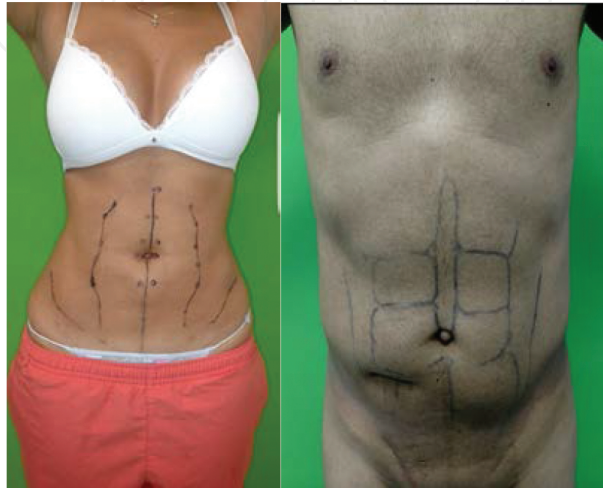
Performing an abdominal ultrasonography, the abdominal muscle groups are evaluated. The median, paramedian, and lateral muscle layer planes in the iliac fossae and flanks are comparatively evaluated and demarcated, the boundaries of the rectus muscles, rectus fascia, especially in the supraumbilical region and the contour of the superior oblique with the superficial fascicule close to the iliac edge and correlated with anterior rectus on each side (**Figure 1**).



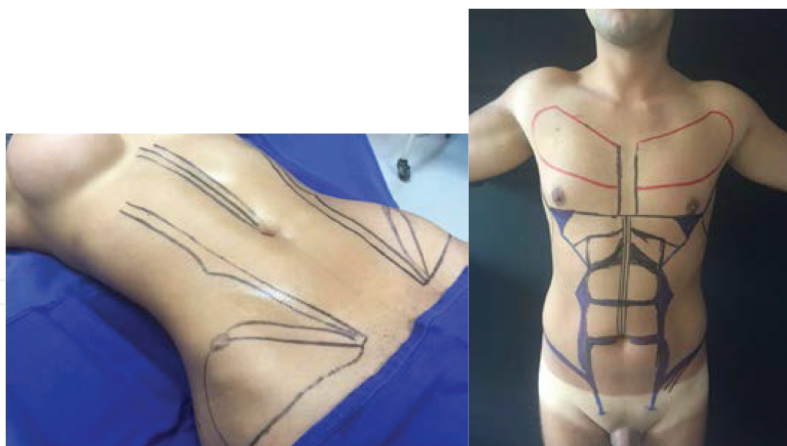
**Figure 1.** Initial ultrasound evaluation.

#### 4.3.2. Preoperative marking

Once the patients arrive into the operating room, the first step is the surgical marking (**Figure 2**). This is performed with the patient initially in supine and in the upright standing position. It is essential to identify and understand the superficial anatomy and topography. Erroneous marking will lead to deformities and abnormal appearance and affects clinical outcomes [19].



**Figure 2.** Preoperative marking.



**Figure 3.** Preoperative marking.

The surface anatomy differs between men and women patients. In women, the transversal lines in the rectus abdominis muscle are not aesthetically desired. In men, the landmarks marked are the pectoralis major, serratus anterior, rectus abdominis, external oblique, iliac crest, and inguinal ligaments and the relationship between those structures. In women, the landmarks are the serratus anterior, rectus abdominis, external oblique, iliac crest, and inguinal ligaments. Other anatomical areas of care comprise the lateral and posterior torso (**Figure 3**) [19, 20].



#### 4.3.3. Surgical technique

Under general or epidural anesthesia and previous asepsis and antisepsis, on sterile surgical fields, plastic surgeon initiates the procedure. Infiltration is performed with Klein solution, with tumescence technique. It starts with deep fat liposuction with power-assisted liposuction (PAL). After obtaining the redundant fat tissue and achieve a uniform surface, ultrasound-assisted liposuction (UAL) system is used following anatomical landmarks for 3–5 min per zone. Later, a lipoaspiration is performed with PAL system fat tissue surface along anatomical landmarks. Finally, a foam dressing is placed along the lines of the marking.

#### 4.3.4. Postoperative care

Patients are required for a hospital stay at least 48–72 h postoperatively. Pain control, prophylaxis antibiotic, and antiinflammatory medications are given in order to improve the patients' comfort and avoid infections in the operative site. In some cases, open drains are placed both in female and male patients in the sacral area and inguinal area, respectively.

Other postoperative interventions are the use of mild-compression garment, stockings to prevent deep vein thrombosis, and an abdominal band for 4 weeks. Supplementary care includes lymphatic drainage massages and adjunctive external ultrasound (1-h session once a day for 10 days). Patients are scheduled for postoperatively follow-up at 1, 15, 30, and 90 days, respectively. Alarm signs and general recommendations are given for all the patients in order to reduce postoperative complications. The duration of the cosmetic results will be associated with the patient care in terms of healthy life styles and adequate medical follow-up. There is no accurate data describing failed procedures in the follow-up period [21].

## 5. Clinical results

There are limited clinical studies published in the current medical literature showing extensive series with appropriate and considerable follow-up; however, the level of satisfaction in



**Figure 4.** Clinical results: pre- vs. postoperative.

patients is surely high. In 2007, Dr. Hoyos published a study describing the experience in 306 patients using this surgical approach. In 306 subjects enrolled in the trial, 257 (84%) reported satisfactory results. In our clinical experience that include near to 80 patients, our level of patient satisfaction reached 90% (**Figures 4 and 5**) [3, 7, 12].



**Figure 5.** Clinical results: pre- vs. postoperative.

## 6. Potential complications

As expected in any surgical procedure, based on its nature, patients are exposed to clinical risk, some related with the anesthesia and other associated directly with the surgical technique. In the first group, one could find abnormalities in the cardiac rhythm, obstruction of the airway, allergic reactions, and bronchoaspiration. In the second group, one could find bleedings, low blood pressure, blood clots, pulmonary embolism, deep vein thrombosis, damage in neurovascular structures, hypothermia, and burning with surgical instruments and medical devices [5, 7, 21].

## 7. Future directions

Researchers and surgeon scientists devoted to improve the clinical outcomes in this surgical field are exploring new alternatives to develop new techniques and surgical approaches with minimal invasion. On the other hand, minimize tissue morbidity, decrease hospital stay and recovery time, and increase skin contraction/tightening are points to improve [22].

These priorities have led the medical and technical industry to develop new devices focused on noninvasive body contouring and nonsurgical adipose reducing techniques. A new medical approach called “High-Intensity Focused Ultrasound”(HIFU) is now available, which delivers



high-intensity ultrasonic energy to the deep subcutaneous tissue, producing heat capable of ablating adipose tissue and thermally modifying collagen. Cosmetic outcomes so far are very promising [23].

Other alternative that has been used by experts in this field is the cryolipolysis. This technique refers to use cold exposure to induce subcutaneous fat necrosis secondary to inflammatory reaction/cascade that affects the adipose tissue directly. Clinical studies have proven good clinical results in terms of reduction in the subcutaneous fat deposits and minimal complication rates [6, 7, 14].

Furthermore, radiofrequency devices are designed to use optical energies to treat directly the dermis and hypodermis. This technology allows to target principally the water located in the dermal layer; however, the target is controlled by thermal stress leading to dermal tightening and contraction. At the same time, in the same physical process, there is an activation of the dermal fibroblast to stimulate the new collagen formation. The utilization of bipolar radiofrequency in the hypodermis maximizes fat cell metabolism; devices such as BodyFx™, Invasix use this type of principles [8, 17, 23].

## 8. Conclusion

High definition liposuction procedures should be considered revolutionary in the plastic surgery field. They are more complex, difficult, and need a special learning curve. The procedures require surgeons to understand how the anatomical configuration skin-fat-muscle-skeletal structures help equally in the 3D superficial topography either in woman or in male human contouring. New technologies and novel medical devices coming up will lead in the future minimal scar procedures with better clinical outcomes.

## Author details

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