

LIPOSUCTION : WHAT WE KNOW NOW

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SUMMARY

Liposuction performed by trained personnel and under sterile conditions is an effective and safe method of body contouring. A review of our current knowledge of its morbidity and mortality is being presented.

(Key Words : Liposuction, Suction-assisted Lipectomy)

Liposuction is a very popular topic today with both the lay public and the professional circles. The purpose of this paper is to present a review of this relatively recent procedure and to update the reader on the latest information concerning morbidity and mortality. We include the results of our own series of patients performed over four years. We hope you find this both interesting and perhaps helpful in your practice.

Background

Historically, body contouring surgical procedures consisted primarily of dermatolipectomies, in which areas of fat and overlying skin were removed en bloc and the defect closed, with a resulting large scar which often healed very poorly. In effect, one defect was replaced with another (Ottani et al., 1984). The idea of a "closed" technique in which fat was removed through a small incision and the overlying skin left undisturbed was first described in the literature in 1964 (Schrudde, 1972). His technique consisted of using a curette to remove accumulations of fat. This procedure led to post-operative complications since the creation of a large, open curetted plane allowed the formation of hematomas, seromas, skin necrosis and aesthetic deformities. In 1977 Yves-Gerard Illouz published his initial work on the use of a blunt cannula combined with suction to perform lipectomies (Illouz, 1980). This technique was introduced to the United States in 1981 and is now the number one cosmetic surgical procedure in this country.

Theory

By using a blunt cannula with a side opening, a series of "tunnels" are made by repeated passes into the area being treated. The blunt tip helps to displace the nutrient vessels and cutaneous nerves to the side, preventing their avulsion. The side opening allows the relatively fragile fat to be aspirated through the cannula and out through the tubing in which approximately one atmosphere (760 mm of Hg) of negative pressure can be developed. Examples of typical cannulas in use are shown in (Fig. 1). The net result is a honeycomb pattern of fat removal, rather than a dissected open

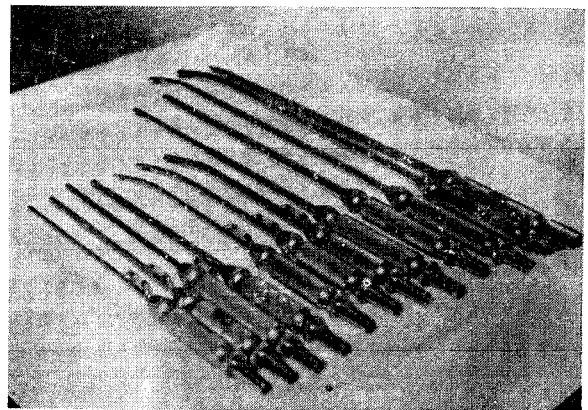


Fig. 1. Examples of various sizes of cannulas.

plane. Although previous animal studies (Faust, 1984 and Kral, 1976) have been inconclusive, it is believed that removal of fat cells is permanent. Excessive caloric intake post-operatively however can eventually lead to hypertrophy of the remaining cells. It may

prove difficult to develop an accurate experimental model to evaluate the human adipose response to liposuction.

Indications and Contraindications

The most common indication by far for liposuction is localized fat deposits which are resistant to diet and exercise. These have been aptly described as "figure faults" (Ersek, 1986). Other common indications include unsightly fat deposits in the region of lateral femoral flank, abdomen, buttocks, medial upper thigh, and medial knee. It can also be used in defatting reconstructive flaps, removal of lipomas and in conjuncture with excision in treating gynecomastia.

Liposuction is contraindicated in generalized obesity. It is not a method of weight reduction, but a method of contouring. Patients with unrealistic expectations must be excluded as with any cosmetic procedure. Advancing age and even excess skin laxity are relative contraindication. Since the ultimate outcome of liposuction depends on adequate skin turgor to allow the overlying skin to redrape properly, excessive skin laxity can lead to a suboptimal result with bagginess. However, some of these patients, after being made aware of this potential problem, are content with the idea that post-operatively they may have some skin wrinkling or bagginess, but that they will have an improved contour in clothing. Under these circumstances they may wish to proceed. Any uncontrolled medical problems would be a contraindication as with other elective surgeries.

Materials and Methods

With the patient standing, the areas to be aspirated are marked out with a skin marker in a topographical fashion. Prophylactic intravenous antibiotics are administered. The majority of the procedures are performed under general anesthesia, although small localized areas can be done under local anesthesia only. The patient is sterilely prepped and draped.

Many surgeons use a "wet" technique in which the areas to be treated are infiltrated with a solution containing a local anesthetic and a vasoconstrictor, usually lidocaine with epinephrine. This infiltration has been found to decrease blood loss and help control post-operative pain (Hetter, 1984).

Under sterile operating room conditions, 1 cm incisions are made in inconspicuous areas such the inguinal fold, medial fold, umbilicus, and others, to obtain access to the areas to be treated. Pre-tunneling is accomplished by making several passes without the suction attached to the cannula. This helps to delineate an even plane from which the suctioning will be completed. With the vacuum suction now attached and the cannula fenestrations facing away from the skin, serial passes are made using the opposite hand as a guide in maintaining at least 1 cm of subcutaneous tissue between the skin and the cannula (Fig. 2). Intraoperative crystalloid replacement is approximately 3 cc's for each 1 cc of fat removed



Fig. 2. Intraoperative photograph showing cannula in place during an abdominal liposuction procedure.

and the amount of fat removed should be limited to less than 3,000 cc's at any given setting; less than 2,000 cc's if an outpatient procedure is planned. Following adequate removal as judged both visually and by palpation, wounds are closed with 1-2 subcutaneous sutures of absorbable material, followed by

skin strips. Patients are placed in an elastic garment appropriate for the areas treated and transferred to the recovery room.

Patients are requested to wear the elastic garments except while showering for 3-6 weeks, depending on the extent of the liposuction performed. This helps to minimize edema and allow the skin to redrape in a desirable position. Oral antibiotics are given for 48 hours afterwards and an oral analgesic is given.

Observations

Complications can be loosely divided into true medical complications as discussed below and suboptimal aesthetic results. The possible suboptimal results include: waviness of the skin, temporary paresthesia, transient hyperpigmentation, skin laxity or bagginess, prolonged edema and insufficient excessive fat removal.

In a study of 1,249 operations compiled by Pitman and Teimourian (Pitman, 1985), the most frequent of these was persistent hyperesthesia in 2.6%. Prolonged edema complicated 1.4% of cases and hyperpigmentation occurred in 1%. Insufficient fat removal accounted for 10.8%. One might surmise that since this study was completed early in the development of liposuction that surgeons were being somewhat cautious in their approach. Excessive waviness occurred in 7.4% and asymmetry, excessive removal of fat and scarring occurred infrequently.

True medical complications as documented in the same study showed seroma in 1.6%, hematoma in 0.8%, localized infection in 0.6% and skin slough in 0.2%. No mortalities were recorded in the Pitman study, although 2 deaths were known to have occurred in other institutions at the same time of the report's publication. Also, there were no mortalities noted in 3,000 cases reviewed by the Illouz in 1983 (Illouz, 1983).

The incidence of mortality and serious morbidity is documented well in a study compiled by the Ad Hoc Committee on New Procedures of the American Society of Plastic and

Reconstructive Surgeons released in September 1977 (ASPRS, 1987). This was a retrospective study covering over 100,000 cases of liposuction during the preceding 5 years. The Committee reported that 11 deaths were recorded in patients undergoing liposuction procedures (0.01% mortality) and there were 9 non-fatal cases of serious morbidity.

These deaths can be divided into 2 groups (Tab. 1). The first consists of those cases in which liposuction was the only procedure

Table 1. Eleven deaths

—Liposuction only procedure	
2	Necrotizing fasciitis
2	Hypovolemic shock and/or fat embolism
—Liposuction in combination with another procedure	
4	Pulmonary embolism
1	Infection/DIC
1	Pulmonary fat embolism
1	Probable fat embolism

performed, and this accounts for 4 deaths. Two were due to necrotizing fasciitis and two were due to shock and/or fat embolism.

The second group of deaths involved liposuction performed in conjunction with another procedure, most often abdominoplasty. Of the 7 deaths in this group, 4 were due to pulmonary embolism, 1 by infection and disseminated intravascular coagulation, 1 by pulmonary fat embolism and 1 by probable fat embolism.

Nine cases of serious morbidity were recorded (Tab. 2). These include 3 pulmonary embolisms (blood), 3 pulmonary fat embolism syndromes, 2 infections and 1 bowel perforation. Pulmonary fat embolism syndrome is a result of pulmonary vascular permeability changes secondary to free fatty acids. This leads to

Table 2. Nine cases serious morbidity

3	Pulmonary embolism
3	Pulmonary fat embolism syndromes
2	Infections
1	Intraperitoneal and bowel perforation

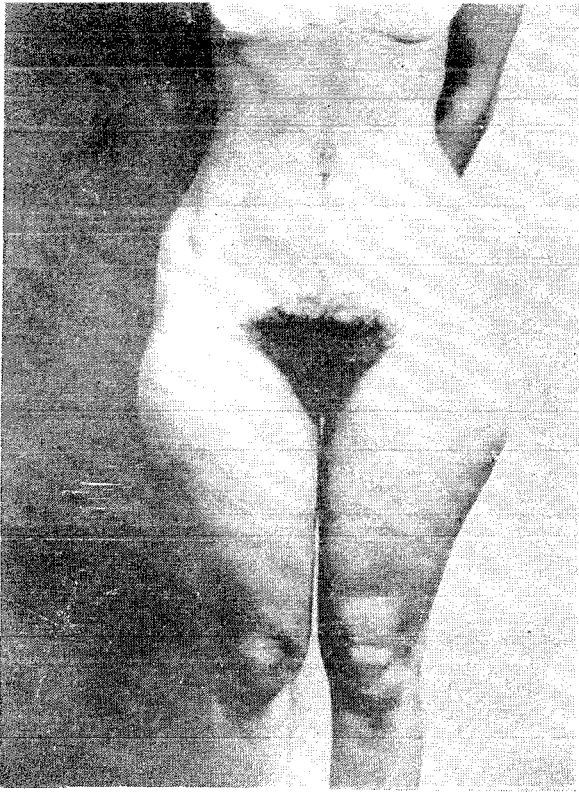


Fig. 3. Pre-operative photograph of typical abdominal and lateral thigh deformity.

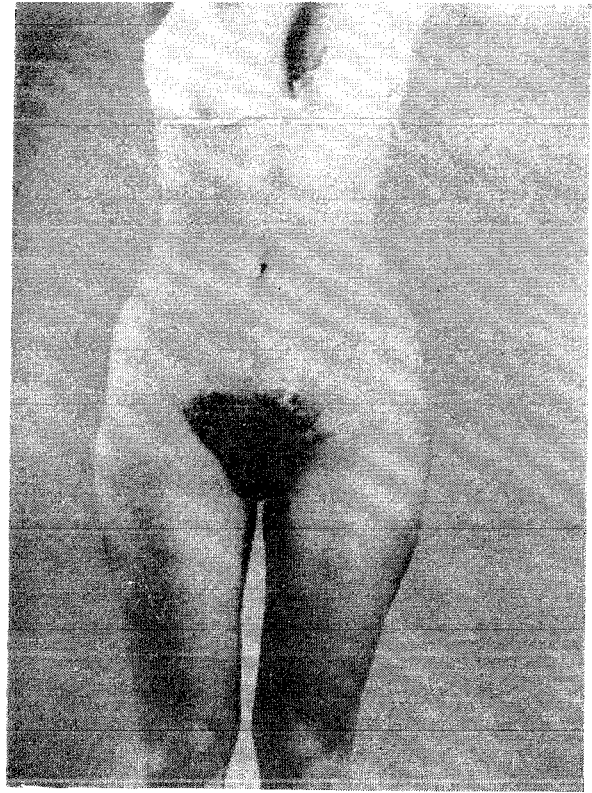


Fig. 4. Post-operative result with improved contours.

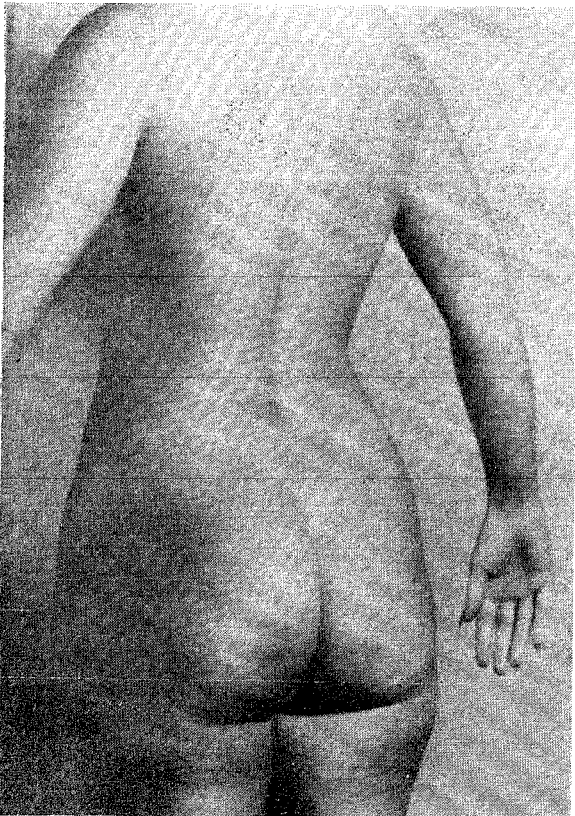


Fig. 5. Posterior oblique photograph of lateral trochanteric and iliac crest deformity.

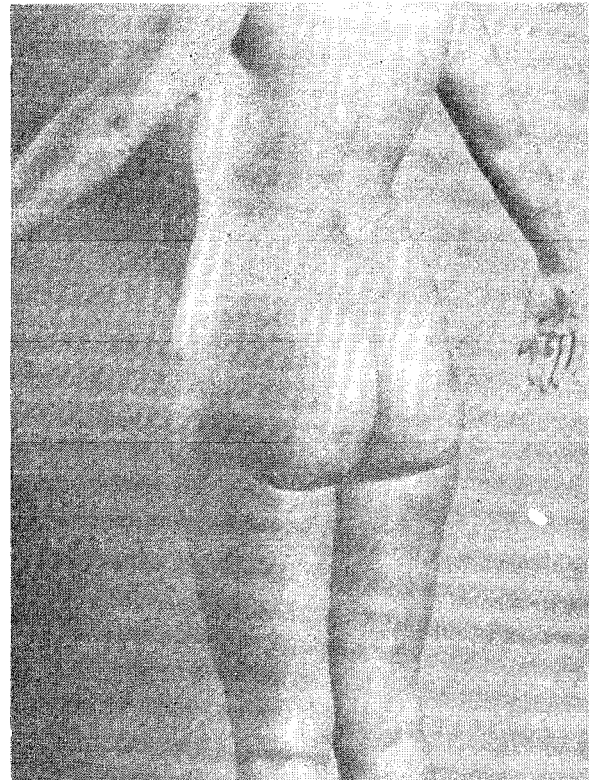


Fig. 6. Post-operative result after aspiration of approximately 675 cc's of fat.

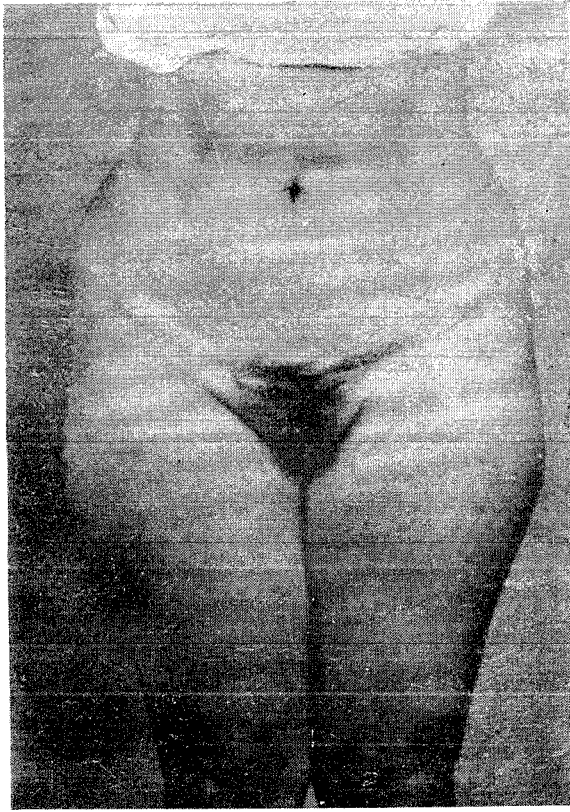


Fig. 7. AP photograph showing moderate degree of medial and lateral trochanteric fat deposits along with lower abdomen and iliacs.

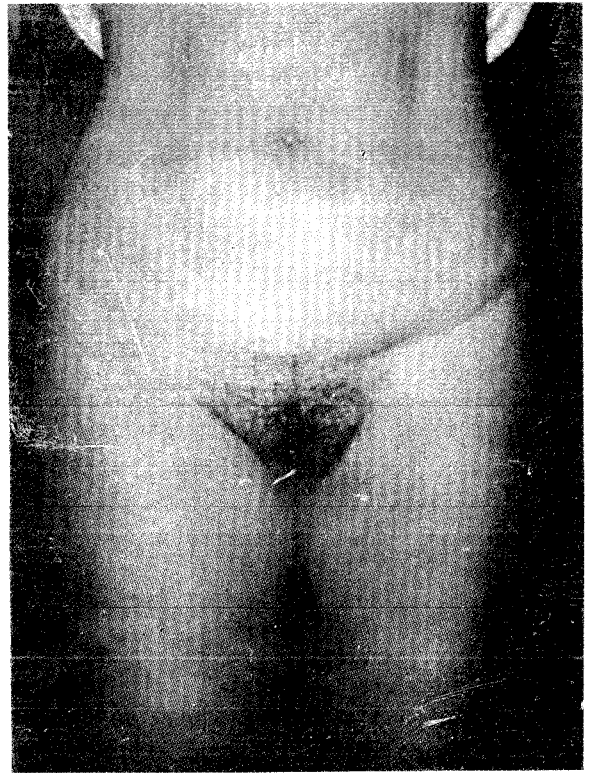


Fig. 8. Post-operative results of patient in Figure 7 with improvement medially in the crural area as well as laterally.

fluid accumulation in the interstitial and alveolar spaces. The bowel perforation occurred in a case combined with and preceded by a laparoscopic tubal ligation. It is felt that enough carbon dioxide remained following release to increase intraperitoneal tension and the risk of perforation.

Clinical Experience

From 1984 to present we have personally completed 120 liposuction cases. Initially these procedures were performed in a hospital setting. Since 1987 we have been using our private office surgical suite unless the patient is having another procedure done which requires hospital operating facilities. Fifty-one cases (42%) have been performed in the office facility. The average amount of fat aspirated from all cases was 1,280 cc's with a range of

55 cc's (cervical mental liposuction) to 3,200 cc's (multiple area aspirated).

We have had no mortalities or cases of serious morbidity such as those discussed above. Two patients received elective transfusions of

Table 3

Complications or Suboptimal aesthetic result in 120 cases	Percentage
Insufficient fat removal	4.2%
Hyperesthesia, temporary	3.3%
Persistent edema	2.5%
Rippling	1 %
Transfusion	1.6%
Pigmentation changes	0 %
Hematoma/Seroma	0 %
Wound infection	0 %
Skin slough	0 %

packed red blood cells for hemoglobins less than 9 gm%. One received a single unit and the other 2 units. Both of these cases were performed early in the series when it was common to use the larger 8-10 mm cannulas. Our incidence of suboptimal aesthetic results are shown in Table 3. Pre- and post-operative photographs are shown in Fig. 3 and 4 for a typical patient. The result in a case of lateral trochanteric and iliac crest deformity are shown in Fig. 5 and 6, while the result of liposuction

treatment in a case where lower abdomen and iliacs were involved is shown in (Fig. 7 and 8).

Conclusion

In spite of the above mentioned mortalities and complications, the incidence of these was rare overall. When performed by a capably trained surgeon, liposuction is a safe and effective treatment. Proper patient selection is also an important step in assuring a successful outcome, as is the strict use of sterile technique.

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