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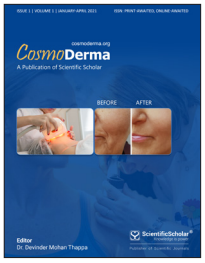

Looking Back in History

History of liposuction for body contouring

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INTRODUCTION

One of the operations that plastic surgeons throughout the world conduct most frequently is liposuction. Since liposuction is not effectively documented by plastic surgeons, it is vastly undervalued. Although liposuction was first performed in the early 20th century, it has just recently become more commonplace globally and for 10 years in India. Over the past 40 years, liposuction has transformed from a mechanical debulking procedure to a high-definition body sculpting and proportioning treatment. With liposuction becoming more and more popular, a variety of techniques and technologies have been developed to make this task easier and quicker for the surgeon and speed the patient's recovery.[1] Over 50 new tools or methods have been introduced in the past 10 years to supplement, improve, or completely replace liposuction. With the introduction of these modern technologies and a better understanding of the processes biomechanics, liposuction has emerged as the most popular and secure procedure in the field of plastic surgery as it is currently practiced.[2] Sculpting the shape of a body is thus made possible. We aim to describe the history and development of body contouring surgery with high volume lipoaspirates and how it became safer in this article. Despite this, liposuction remains the esthetic operation that Indian plastic surgeons undertake the most frequently. However, there is a big difference between what Indian doctors tell their patients and what their patients think about whether liposuction is a good idea and if it is safe.

BACKGROUND

Liposuction is a cosmetic surgical procedure that uses suction to remove extra fat from beneath the skin. Initial period of liposuction was done by manual debulking surgery by making incisions. The idea of body sculpting and fat removal was initially proposed by French surgeon Charles Dujarier in the 1920s, which is when liposuction origins may be found. However, enthusiasm in the idea of body contouring declined in the decades that followed after an operation carried out by Dujarier led to gangrene in a model's leg.[1,2] Over the years, developments such as laser assisted and ultrasonic assisted have improved the liposuction procedure, making it easier and causing less pain, blood loss, and other difficulties to remove fat. In this article, we will discuss the history of the evolution of this procedure since its inception. The blunt tunneling technique, from which contemporary liposuction emerged, was created in 1974 by surgeons Arpad and Giorgio Fischer operating in Rome, Italy. Even though liposuction entered the medical world in the early 20th century, around the 1920s, it was not until Illouz that it gained widespread acceptance.[3] Illouz created smaller-diameter blunt cannulas. When a French doctor named Dr. Yves Gerard Illouz introduced the "Illouz Method," which showed how to get rid of fat cells with the help of suction, liposuction became very popular.[4] Illouz demonstrated the wet

technique by injecting saline and hyaluronidase into the fat before suctioning, allowing for hydrodissection, thereby reducing trauma. The surgery could be carried out as a day-care case for body contouring of a smaller area with the help of tumescent anesthesia. Yves-Gerard Illouz broke up the fat deposits in the tissue by injecting fluid there through cannulas, and then the suction apparatus removed them. This method's outcomes showed great repeatability and were connected to reduced morbidity. Although initially the evolution in liposuction was related to the refinement of the blunt end cannulas, the surgery was performed under general anesthesia and, in some instances, without injecting fluid to hydrodissect, which led to significant blood loss in the lipoaspirate.[5] Following this, a different surgeon by the name of Pierre Fournier modified the surgical incision technique, added the use of compression techniques following surgery, and introduced the use of lidocaine as a local anesthetic. In the 1980s, Americans started experimenting with the procedure and came up with a number of ways to make people sleepy without using general anesthesia.[4,5] Doctors started using ultrasound toward the end of the 1990s to liquefy fat so that it could be removed more quickly. More than four decades elapsed when, in 1975, a cosmetic surgery team developed the technique of liposuction by introducing a cannula attached to a suction machine. In so doing, they produced consistent results with the lower risks.

ROLE OF TUMESCENT ANAESTHESIA

Tumescence is the state of being "swollen and firm." Tumescent liposuction uses large volumes of very dilute and hypotonic solutions of a vasoconstrictor agent that are gently injected into the subcutaneous fat and virtually eliminates surgical blood loss. Illouz exhibited the wet infusion technique, which minimizes blood loss and facilitates liposuction. In 1987, Klein successfully described tumescent local anesthesia. This tumescent anesthesia greatly reduced blood loss without the risk of general anesthesia, making large volume liposuction safer and enabling more precise body contouring.[6] The most important changes in the past 40 years have been to the tumescent anesthesia and the fluid that is injected. This has made it possible for surgery to be done under local anesthesia with sedation at first and then without sedation. Later on Klein popularized this in 1987 by doing the procedure under local anesthetic alone while utilizing huge amounts of highly diluted local anesthetic to allow for a larger volume of lipoaspirate.[7] Klein's infusion solution had 10 ml of 8.4% bicarbonate per liter of saline, 1:100,000 epinephrine, and 0.05% lidocaine.[8] In addition, he showed that while a large amount of this diluted mixture was safe, bleeding was significantly reduced. When liposuction was performed without the use of tumescent, bleeding was an issue. Even for huge volumes of lipoaspirate, the tumescent approach resulted in fewer hospitalizations, lower expenditures, and fewer dangers for the patient.[9]

EQUIPMENT

For liposuction, initially, big cannula, some even up to 1 cm in diameter, was used. These tools hurt the nerve and blood vessel bundles and sometimes made, people have strange shapes, seromas, or hematomas.[10] A variety of smaller cannulas were created since the subsequent application of local anesthesia required a light touch. The size of the conventional cannulas of the 1980s was enormous, with cross-sectional areas 9–25 times larger than that of today's 2 mm microcannulas and diameters of 6–10 mm.[11] The average internal diameter of the cannulas used nowadays is <6 mm, and some of them are much smaller, measuring <0.6 mm. Blunt-tipped cannulas are common because they lessen bleeding and blood vessel damage [Figure 1]. The use of several side apertures enables effective fat evacuation. As some surgeons prefer the use of silent and disposable equipment, manual systems made up of syringes and cannula tips have also been created. These systems are more common in tiny local aspirations of localized fat bulges. They have gained popularity as a backup system as well. Aspiration units, which were made by manufacturers in collaboration with surgeons, have gotten stronger and quieter over time, making the operating room a more effective and comfortable place to work. Modern powered liposuction systems such as the Micro Aire use reciprocating cannulas to remove fat more easily and with less physical effort from the surgeon.

TECHNIQUE

Although liposuction initially employed a vacuum pump (a suction machine), Toledo in Brazil began using disposable syringes that could be equipped with blunt-end cannulas

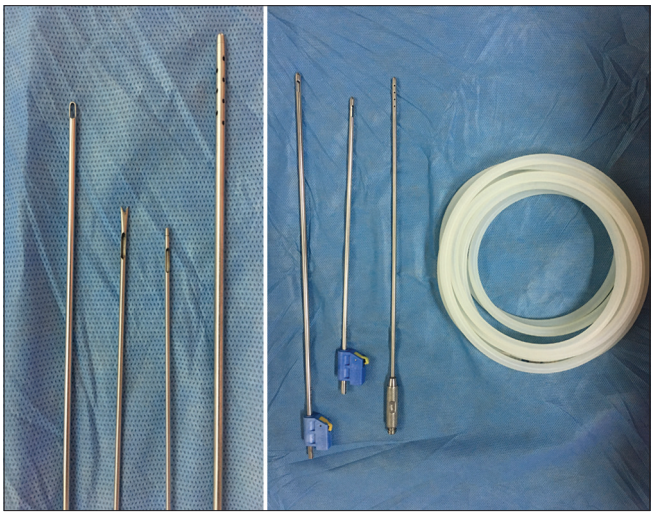

Figure 1: Liposuction cannulas and tubings.

in 1988. This method improved the accuracy and delicacy of liposuction while also making the fat transferable. If liposuction is required in smaller locations, syringe suction can be used [Figure 2]. For larger amounts, vacuum pump aided liposuction [Figure 3] was used, and the syringe system was used for more precise liposuction.[11,12] Zochhi invented ultrasonic liposuction for the 1st time in 1992. It produced a replacement for traditional blunt cannula suction. The goal was to reduce the effort of the surgeon, expedite surgery, enhance liposuction outcomes, and utilize smaller cannulas, which would lessen tissue trauma and safeguard crucial structures like the neurovascular bundles. For safer results, the tumescent approach had to be used with the ultrasonic technology. After liposuction, titanium probes were used to administer ultrasonic energy.[13] Jewell described the advancement of ultrasound energy delivery using vibration amplification of sound energy at resonance (VASER) technology in the first report on the clinical application of a third-generation ultrasound device [Figure 4] that provides pulsed low-power ultrasound with high efficiency using various sizes of tiny diameter robust titanium probes (VASER). The energy applied to the tissues was around one-fourth as great as with earlier devices, and the pulsed mode produced less heat. Following the early use of hollow probe ultrasonic liposuction in the 1990s, which had unsatisfactory results, another modality — (VASER; Solta Medical, Inc., Hayward, Calif.) was enthusiastically brought to the United States. Nagy and Vanek contrasted VASER-assisted lipoplasty and suction-assisted liposuction (SAL). They looked at two objective endpoints: Blood loss and skin retraction. VASER showed a minimum advantage of 3 cc/100 cc of aspirate, as well as a 6% increase in skin retraction.[13] Patients and surgeons were unable to distinguish between the sides treated with either technique. The treatment of the male and female breast, face, neck, and fibrous body areas (trunk and back) is now included in the expanded applications of VASER lipolysis and liposculpture, in addition to combined excisional body contouring operations of all kinds. Goldman *et al*. used an updated 1064-nm-wavelength neodymium: yttrium-aluminum-garnet laser to show that the laser caused small blood vessels to clot, adipocytes to break, the reticular dermis to reorganize, and collagen to clot in fat tissue.[14] A major development in liposuction surgery occurred in 2006 with the introduction of laser-assisted liposuction, which targets fat cells with coherent light to deliver energy. The recent use of the 1440-nm laser for emulsification may be shown to be effective, despite the lack of clear proof for the use of lasers in liposuction. The longer wavelength absorbs 20 times more in adipose tissue than wavelengths of 1064 nm or 1320 nm and 40 times more than wavelengths of 924 nm or 980 nm.[15] The adipocyte membrane was ruptured by the laser, releasing oil into the extracellular matrix. The dermis is reorganized along with neocollagen remodeling and creation as a result of the laser radiation. Afterward, a vacuum pump and blunt-end cannula were used to aspirate the fluid that was created during this operation.

Figure 2: Syringe suction-assisted liposuction.

Figure 3: Liposuction apparatus.

Figure 4: Ultrasonic liposuction equipment.

Paul and Mulholland developed radiofrequency-assisted liposuction and soft-tissue contraction technology. They showed that energy could be sent to the dermis while heating

Table 1: Milestones in liposuction.

Year	Scientist	Achievement
1920	Charles Dujarier	Idea of body sculpting and fat removal
1974	Arpad and Giorgio Fischer	Blunt tunneling technique that serves as basis for modern liposuction. Fischer used suction machine for liposuction
1980	Pierre Fournier	Pioneered the use of local anesthetic agent during liposuction
1982	Yves-Gerard Illouz	Illouz method of liposuction – Injecting the infusate fluid under skin using cannula to break up fat deposits
1987	Jeffrey Klein	Introduced tumescent technique
1988	Toledo	Liposuction using disposable syringes
1992	Zochhi	Ultrasonic liposuction
1999	Coleman	Described coleman technique of liposuction
2003	Alfredo Hoyos	High definition liposculpture
2006	Kim and Geronemus	First Laser assisted liposuction
2006	Goldman *et al.*	Used an updated 1064 nm Nd-YAG laser for liposuction
2010	Paul and Mulholland	Radiofrequency-assisted liposuction

the deep adipose and subcutaneous tissue to much higher temperatures without hurting the skin.[16,17] In industry-funded *in vivo* research using the BodyTite (Invasix Ltd., Yokneam, Israel) device, linear contraction was seen at the 6-month follow-up and was much greater than what had been seen with any other technology. The linear contraction ranged from 12.7% to 47%, depending on the patient and treatment.[18] Water-assisted liposuction uses a dual-purpose cannula that emits pulsating, fan-shaped jets of tumescent solution, followed by simultaneous suctioning of the fatty tissue and the instilled fluid. In a single-surgeon study using the Body-Jet (Human Med, Eclipse Ltd., Dallas, Texas), the amount of blood loss was negligible.[19] At a national Colombian symposium in 2003, Colombian plastic surgeon Alfredo Hoyos demonstrated a significant advancement in technique. The high definition liposculpture (HDL) was invented by Hoyos. Hoyos and Millard explained that the term "liposculpture" refers to an artistic technique intended to highlight the structure of the muscles through the skin rather than just removing fat.[20] In contrast to mechanical liposuction, VASER HDL combines technology and expertise to achieve superior results, reduce stress on blood vessels, and remove both superficial and deep fat. The ultimate in liposuction is a process that eliminates fat and tightens skin without invasive or extensive excisional procedures. The important landmarks in the contribution for liposuction are summarized in the [Table 1].[1-20]

INDIAN SCENARIO

Aesthetic surgery and liposuction are still in their infancy in India. When discussing the extent of liposuction, we frequently hear the phrases "calculated guess" and "in my view," both of which imply ambiguity for such a routine treatment. The most popular esthetic surgery carried out by Indian plastic surgeons is liposuction. 32.5 are completed on average each year. Suction-assisted liposuction (SAL) was carried out by the majority of surgeons (64.7%)(SAL). About 73% of surgeons aspirated more than 5 L at a time. The vast majority (80.2%) agreed that there should be no absolute restrictions on liposuction. Abdominoplasty (90.7%) is the most often performed operation in conjunction with liposuction.[21] The Indian population is predisposed to the build-up of substantial fat deposits as a result of a mix of fatty cuisine, a sedentary lifestyle, and an unusual bodily habit. In addition, liposuction is the method of choice for body contouring in Indian patients due to their fascination with less invasive procedures and their aversion to scarring. Due to rising demand and media-driven depictions of scarless surgery with little recovery time, liposuction is now thought of as a straightforward treatment. Hence, some brave people who are not surgeons do it in dangerous places with little training in how to handle problems.

CONCLUSION

When liposuction was first introduced and popularized in the early 1980s, it altered the field of body contouring surgery and redefined plastic surgery for the future generations of surgeons. The most prevalent plastic surgery procedure, as well as one of the most common elective surgical procedures, remains to be liposuction. The technique for liposuction is always improving to make it a safer and better surgery. Although liposuction can be used as an adjuvant technique for body reshaping, it is not a treatment for obesity. Since liposculpture is a common surgery today, its popularity is growing. Moreover, as more practitioners and researchers become involved in this area and research continues into the understanding of adipocyte physiology, the fields of liposuction, lipolysis, obesity, and fat cell metabolism will continue to gain more interest and realize more advancement.

Declaration of patient consent

Patient's consent not required as there are no patients in this study.

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Conflicts of interest

There are no conflicts of interest.

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