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The History of Liposuction

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This article aims to familiarize the reader with the history of liposuction. The author documents the landmark events and characters in the development of this revolutionary and widely known procedure. Included is a historical discussion of the obstacles and the triumphs the practitioners and the procedure itself has seen, as well as a review of relevant scientific data placed in its appropriate historical context up through modern day.

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The history of any great therapeutic technique in modern medicine is usually quite dramatic and entertaining. One only needs to look at the history of hand washing when Semmelweis proved that medical students were carrying infections from cadavers they dissected to the women in the labor and delivery ward. A decade earlier, Dr Oliver Wendell Holmes was ridiculed for even suggesting that the hands of a gentleman could do such a thing!¹ The discovery of penicillin is also historically fascinating. It was stumbled on when Fleming noticed that a petri dish accidentally left uncovered grew a blue mold that could suppress staphylococcal growth.²

The evolution of modern tumescent liposuction has had its own revolutionary discoveries, maybe not so wide reaching as hand washing or penicillin, but similarly polarizing. Included among these dramatic events have been turf wars among different specialties to lay claim to liposuction as their own; and the fight for office-based tumescent liposuction surgery in light of its superior safety profile over the dry, hospital-based technique.³⁻⁶ The 90s saw the rise and fall of ultrasonic liposuction, which ultimately provided an unintended upside. Today, debates continue over the utility of newer technologies introduced to augment liposuction, such as laser-assisted lipolysis or powered liposuction using a reciprocating cannula.^{7,8} Let us start at the beginning and follow up the historical timeline.

The first reported attempt at cosmetic sculpting of fat is most commonly attributed to Dr Charles Dujarrier in 1921. He was a French OB/GYN whose dancer patient wanted to

improve the shape of her ankles and knees. To that end, he used a uterine curette subcutaneously to remove fat from the desired area, but with a tragic result because he injured her femoral artery and ultimately she got gangrene and had her leg amputated.⁹ For decades after this, it does not seem from the published data that many gave too much thought to the cosmetic sculpting of fat. Before the advent of liposuction, the favored technique was Pitanguy's technique of dermolipectomy, which was en bloc removal of the excess skin and underlying fat. He first described this in the 1960s for the reshaping of trochanteric lipodystrophy.¹⁰ Dermolipectomy did lead to satisfying cosmetic results when compared with other treatment methods available at the time, though it did leave significant scarring by today's standards.¹¹ This technique has evolved into the lower body lifting procedures seen today after massive weight loss.

Fast-forward to 1976, the dawn of modern liposuction. The "dry" technique of machine suction-assisted lipectomy via blunt cannulas was first described by Giorgio and Arpad Fischer, who were a father and son working in Rome at the time. They also developed the criss-crossing technique from multiple sites and helped popularize the term of "Liposculpture" later on.^{9,12} They had good results using their revolutionary technique with a definite cosmetic advantage over Pitanguy's resection,¹³ but their dry technique's outcomes were complicated by hematoma and seroma formation. Less of these complications were seen with this technique than with the sharp suction curettage introduced by Kesselring and Meyer in 1978, which was worse and fell out of favor. This technique involved a sharp curette on the end of a cannula with strong suction applied.¹⁴

In western Europe, Dr Pierre Fournier was taking interest and practicing the Fischer's dry suction technique in Paris, as

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was Dr Yves Illouz. Illouz is credited with developing the first version of a wet, tumescent technique that mitigated blood loss by distending the skin and preserving neurovascular bundles in the fat septae to nourish the overlying skin. Dr Rhoda Narins describes this method, which she learned in 1982 in her textbook, as “injecting a few cubic centimeters of hypotonic saline every 2 cm.”⁹ In an interesting bit of academic irony, Fournier provided the first published account of this “wet” technique in 1983 in an article entitled: “Lipodissection in body sculpting: the **dry** procedure.” Here, he and Dr Otteni advocated the advantages of wet, blunt cannula, honey-combed suction lipectomy that Illouz had also been teaching.¹⁵ Dr Fournier tirelessly disseminated the wet technique to physicians of different specialties throughout the world.¹⁶ This generosity in teaching others is considered among his greatest contributions to the procedure.

The westerly migration of liposuction continued to the United States, when in 1977 the first American to learn liposuction was dermatologist Dr Lawrence Field. He visited Paris and learned liposuction first hand from Dr Fournier and Dr Fischer, using the Fischer’s suction machine and techniques.^{16,17} Together, these physicians began to disseminate the technique of liposuction throughout the world and various specialties. Illouz’s first non-dermatologic American surgeon pupil of note was Dr Norman Martin, an otolaryngologist in 1980, who brought the technique to Los Angeles.⁹

The year 1982 was a banner year for the new liposuction procedure and seems to be the year that the technique really began to explosively root into American medicine. In the middle of that year a group of multispecialty physicians, including Narins and other dermatologists, attended a large course in Paris hosted by Fournier and Illouz.^{9,16} The first American-based course on liposuction was taught by Philadelphia plastic surgeon Dr Richard Dolsky and Julius Newman, a cosmetic surgeon with an otolaryngology background. Dr Newman and Richard Webster developed interspecialty courses on liposuction offered via the American Academy of Cosmetic Surgery. Dr Newman is widely credited with coining the term “Lipo-Suction” at about this time as well.¹⁸ Before this, the technique went by many names, including liposculpture, suction lipectomy, suction lipoplasty, and lipodissection. Plastic surgery was introduced to the Fischer, Illouz, and Fournier technique, and interspecialty rivalries began heating. This is demonstrated keenly by Illouz who signed a contract to teach the technique only to plastic surgeons at the behest of the American Society of Plastic and Reconstructive Surgeons, who were excited by what they saw in the early 1980s. They strongly wanted to promote themselves as liposuction practitioners by excluding the training of other types of specialists.⁹ By the mid-80s, liposuction began to branch out across America. During these years, many luminary physicians learned and helped teach this procedure to their peers and pupils, fostering interest, curiosity, and awareness. Some residency programs even began to offer the procedure to their residents during this period as well.¹⁸

A significant event in the history of fat surgery took place in 1987, thanks to the revelations of Dr Jeffery Klein, a derma-

tologic surgeon from California. Until this time, all larger liposuctions were done under general anesthesia in the operating room. Dermatologists were interested in doing procedures in the efficient and familiar environment of their own offices, rather than in hospital operating rooms. However, given the amount of fat to be removed, local anesthesia seemed unsafe as the maximum recommended dose of lidocaine with epinephrine is 7 mg/kg.¹⁸ In 1987, Dr Klein found a safe way to perform liposuction with local anesthesia with tumescent fluid containing dilute lidocaine. He began his work in 1985 after being intrigued at a course where liposuction was done only under general anesthesia. He set out to find out how much liposuction could be done using local anesthesia. His first patient was one with a transverse hysterectomy scar, having an overlying fatty deposit. He used local infiltration of standard, commercially available 1% lidocaine with 1:100,000 epinephrine. Klein suctioned less than 100 mL out. The patient experienced a painless procedure, but did have some side effects from the epinephrine. He was encouraged and on subsequent patients, he began diluting the solution, noting that complications went down, volumes went up, and anesthesia remained complete.¹⁹ Eventually, his optimal formula was 0.05% lidocaine, 1:1,000,000 million epinephrine, and 10 mL of bicarbonate plus a liter of normal saline.²⁰ His tumescent fluid technique revolutionized liposuction and fat transfer. Tumescent anesthesia minimized blood loss, reduced infection (partially because of the bacteriostatic properties of lidocaine), and also separated the procedure from the more virulent pathogens in hospital operating suites. Klein’s tumescent fluid also provided a durable 24 hours of postprocedure anesthesia and also allowed cosmetic surgeons to do more cases than before its advent, and if infiltrated using a controlled rate and manner, proved nearly painless to the patient.¹⁶ In 1990, Klein showed that by infiltrating tumescent fluid into the fat 35 mg/kg of lidocaine could be safely used by measuring plasma levels of the drug. This clearly demonstrated the absorption of lidocaine when infiltrated via tumescent fluid into fat occurs differently than when injected dermally using standard concentrations.²¹ This fluid is also used for harvesting fat for cosmetic transfer augmentations and can be used for reconstructive surgery by the office-based surgeon for large flap repairs.

During the 1980s and 90s, the plastic surgeons, used to the now rapidly obsolescing Illouz dry method, were slow to convert to the tumescent technique and it took them time to accept the recognized benefits of properly performed tumescent liposuction. Several factors facilitated this transition, one of which, surprisingly, was plastic surgery’s strong commitment to the development of ultrasonic liposuction.¹⁸ Ultrasonic liposuction was first introduced in 1992 by Zocchi as a way to ease the physical workload on the surgeon and facilitate skin retraction by the application of ultrasonic heat to aid in the dissolution of fat. It was hoped that this would also allow the use of smaller cannulas, thus protecting the neurovascular structures even more.²² Coincidentally, ultrasonic liposuction required the tumescent technique to use the technology. Initially, ultrasound energy was applied externally to the skin in an attempt to facilitate its expected benefits, but

not much happened. The later modifications introduced by Zocchi used titanium probes inserted to deliver the ultrasonic energy, followed by suction. Ultimately, ultrasonic liposuction became defunct when it was recognized that it did not work any better than Klein's technique²³ and that the complication rate was higher, including skin burns, seroma formation, and paradoxically increased blood loss.^{24,25} In fact, in a 1998 study by Maxwell and Gingrass, 28 of 250 ultrasonic liposuction patients developed a seroma.²⁴ In retrospect, the best thing to come out of ultrasonic liposuction was that plastic surgeons finally gained an appreciation with the use and benefits of tumescent fluid.²⁶ Once comfortable with it first hand, adoption of Klein's technique began to be met with less resistance in that specialty.

In 1999, Coleman et al³ published data supporting the safety of tumescent liposuction performed by dermatologists. They reported that hospital-based liposuction using general anesthesia had led to more than 3 times the rate of law suits when compared with the tumescent technique. They also disclosed that liposuction malpractice suits brought against plastic surgeons were on the order of 113 times higher than that of dermatologists, even though dermatologists did approximately two-thirds as many cases. This speaks without ambiguity about the advantages of awake, office-based, tumescent liposuction. In this light, cosmetic surgeons also reconsidered the added expense of surgery in a hospital OR setting.

Other technical refinements continued to flow forth in the 1990s. In 1995, Klein published on the efficacy of compression garments as opposed to tape compression.²⁷ In 1996, a study showed that lidocaine, when given with Klein's tumescent technique, could be used safely up to doses of 55 mg/kg.²⁸

To modern cosmetic surgeons, the blunt cannula tumescent technique with postoperative compression garments is widely accepted as the gold standard liposuction procedure, and in the opinion of most experts, has yet to be significantly improved upon. It is also clear from many studies, case reports, and reviews that large volume tumescent liposuction should not be bundled with numerous add-on procedures under general anesthesia as the stellar safety profile begins to diminish. A clear set of guidelines and scientific references have been laid out by the ASDS for the cosmetic surgeon to maximize efficacy and safety.²⁹

Despite the success of tumescent liposuction, attempts to perfect or even replace this technique for fat removal continue. Laser-assisted lipolysis (LAL) is a recently developed procedure to remove fat. It is performed subcutaneously by a fiberoptically delivered laser under tumescent anesthesia. The first wavelength to be used in LAL was the 1064-nm laser. This procedure was first described in 2006 by Kim and Geronemus in the United States after being developed in South America and used in Europe earlier in the decade.³⁰ There is a lack of hard scientific evidence showing a clear advantage of LAL over modern liposuction technique. This, however, has not deterred the laser companies from making claims to LAL's superiority. The reasons anecdotally given include the light source's ability to add superior coagulation

Table 1 Summary of Laser-Assisted lipolysis Modalities

| Trade Name | Laser Type | Wavelength |
|---------------|------------|---------------|
| SmartLipo | Nd: YAG | 1064 nm |
| SlimLipo | Diode | 924, 975 nm |
| LipoLite | Nd: YAG | 1064 nm |
| ProLipo | Nd: YAG | 1064, 1320 nm |
| CoolLipo | Nd: YAG | 1320 nm |
| SmartLipo MPX | Nd: YAG | 1064, 1320 nm |

of blood vessels and to facilitate the destruction and removal of fat more so than tumescent liposuction.³¹ Echoes of ultrasonic liposuction anyone?

In 2008, Katz showed a series of 527 Smartlipo cases which included 4 skin burns secondary to laser heat,⁷ a complication not seen in tumescent liposuction. A side-by-side study out of Chile showed no benefit to Smartlipo and showed it lead to transient increase in serum triglycerides.³² The authors commented on the unprecedented marketing phenomenon resulting from the "explosive combination of laser and liposuction proving overwhelming" to their clients. This is a sign of the times for the cosmetic surgeon, who is constantly forced to weigh treatment with a well-established, older-proven modality versus the "latest greatest" unproven modalities demanded by patients after exposure to them in the media. Does Smartlipo really tighten the skin any better than retraction seen with traditional tumescent liposuction? Is it really worth the added expense of the equipment? Time will tell, as in 2009, these questions remain tempered with cautious optimism. There are studies in existence which describe this tightening in the published data, but there is no quantified data offered on skin tightening. There is just one side-by-side histologic (nonclinical) comparison with Klein's technique, and the differences were minimal.³³ The supporting evidence for its superiority is anecdotal. The claims of decreased blood loss are not well quantified either. What is offered are technical explanations of the mechanism of action.³³⁻³⁶ Most experts of traditional tumescent liposuction agree that blood loss has not been an issue when the technique is done properly. A summary of LAL modalities is presented in Table 1.

Also, exciting, relevant, and less controversial is the work being done to broaden the scope for the use of the tumescent technique. Within recent years, liposuction has been undergoing redevelopment for use in noncosmetic applications with good success. In 1988, Dr William Coleman III outlined numerous noncosmetic uses of liposuction and was the first to publish on tumescent liposuction being used to treat axillary hyperhidrosis, which has recently gotten much attention, thanks to the efficacy of Botox in these patients.³⁷ Recently, in 2008, other very well designed studies have shown clear advantages of liposuction for this indication.³⁸⁻⁴⁰ In another excellent study conducted in 2009, tumescent liposuction has also been resurrected for breast reduction surgery with very good results in selected patients. It avoids the disfiguring and difficult-to-heal anchor-shaped scars of traditional methods. It poses less risk of contour deformity and

nipple anesthesia as well.⁴¹ Liposuction was initially pioneered in breast reduction surgery very selectively by Matarasso and Courtiss in 1991.⁴²

In conclusion, what is certain about liposuction is that when performed using tumescent technique in an outpatient setting, as of 2009, it is superior. It is also apparent that it is most appropriately a multispecialty and international procedure, with more than just cosmetic indications. If history is any guideline, the future will be marked by fascinating and as of yet unthought-of advancements and applications for this iconic procedure.

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