

## Current Evidence Based Practice Guidelines for Liposuction and Future Trends

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### Case Report

Modern Liposuction has evolved from humble beginnings as a rather experimental procedure 40 or so years ago, to being one of the most popular procedures in aesthetic surgery today. It was the second most popular aesthetic procedure globally (1,453,340 cases) [1] in 2016 (up 4%) as well as most popular procedure in the United States (414,335 cases), up 4.6% from 2015 [2].

Subsequent to Illouz's presentation of a technique for removing subcutaneous fat with a blunt cannula attached to a suction generating device at the 1982 Annual Meeting of the American Society of Plastic and Reconstructive Surgeons, the procedure has undergone many refinements and evolved with improvement in techniques and technology [3]. My endeavour in this article is to briefly discuss current evidence based best practice principles and highlight future trends.

Potential liposuction patients who strive to improve their appearance through diet, exercise, and a healthy lifestyle are more likely to be satisfied with their long-term postoperative results [4]. It is paramount for both the patient and the surgeon to remember that liposuction is not a weight-loss technique; it is a body reshaping (contouring) technique. A consensus statement on large-volume liposuction (defined as >5 liters of total aspirate), regardless of anaesthetic method, has underscored the recommendation for operating in either an acute-care hospital or in an accredited or licensed facility when removing large volumes [5].

Depending on patient characteristics liposuction can be done either in a hospital or office based setting, but the American Society of Plastic Surgeons Practice Advisory recommends avoiding neuraxial anaesthesia (i.e., spinal, epidural) in office-based settings because of potential hypotension and volume overload issues [6].

The super wet (infiltration of 1 mL per estimated mL of expected aspirate) and the tumescent (3 to 4 mL of wetting solution

per mL aspirated) are the most widely used wetting techniques in operation. The maximum recommended safe dose of lidocaine is 55mg/kg and that of epinephrine 50mcg/kg in the solution [7,8]. Recent data suggest that, for patients undergoing general anaesthesia with the super wet technique, the lidocaine component may be reduced and/or eliminated without postoperative sequel of increased pain [9,10]. This is important in view of the well-known toxicity issues associated. Wetting fluids should be warmed to room temperature and the patient should be maintained at normo-thermic temperatures to decrease postoperative complications.

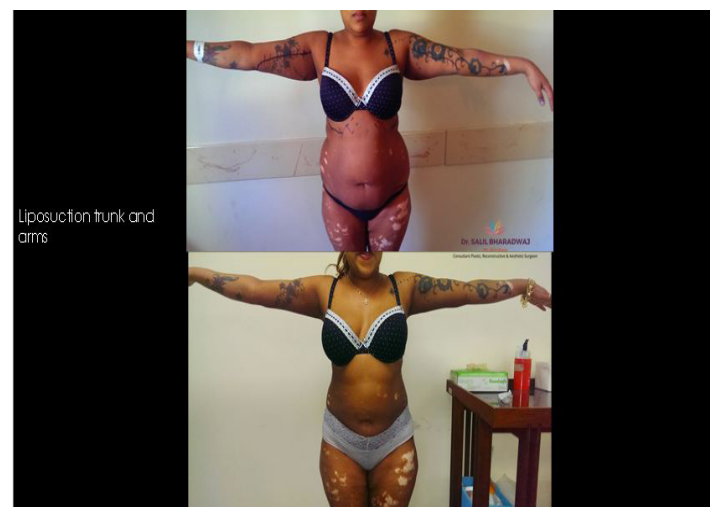
Fluid management guidelines for liposuction state that for small volume aspirations (less than 5 liters) maintenance fluid along with correction of preoperative losses as well as the subcutaneous infiltrate is adequate, whereas large volume liposuction (above 5 liters) in addition to the above, requires 0.25 ml of crystalloid per millilitre of aspirate above 5 liters [11,12].

New devices continue to emerge for use in this procedure, most of them with little evidence to support their claims of superiority. It is a formidable task for surgeons to stay abreast of all the latest techniques, technologies and, more importantly, evidence surrounding their uses. The common technologies in use are Suction Assisted Liposuction (SAL), Power Assisted Liposuction (PAL), Ultrasound Assisted Liposuction (UAL), Laser Assisted Liposuction (LAL) and the more recent Radio Frequency Assisted Liposuction (RFAL).

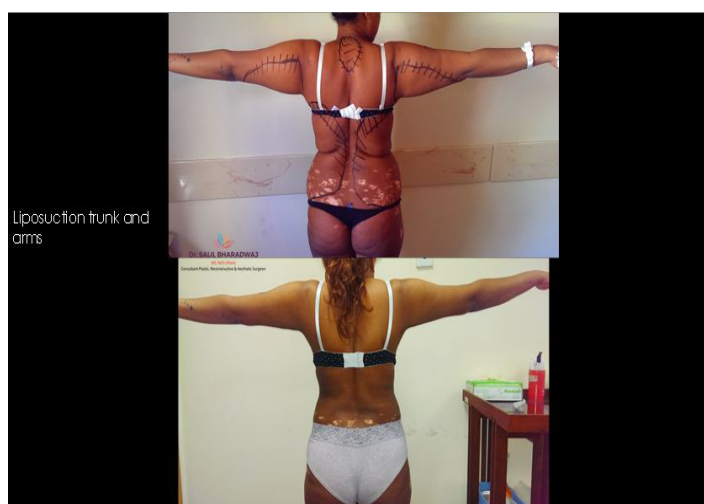
Though UAL and its current avatar VASER has been found to have some benefit in treating fibrotic areas and in limiting blood loss, larger incisions required, concerns with burns, cost, long learning curve and slow procedure times have seen its popularity on the decline, with erstwhile advocates now employing it in only 7-10% cases [13,14]. LAL has shown in a randomized, blinded study to result in up to 17% skin contraction and 25% improvement in skin elasticity [15]. On the contrary Prado et al. conducted

a randomized, double-blind, controlled study examining LAL and SAL that showed no clinical difference in aesthetic outcomes between these techniques. Cost, slow operative time, multiple stages, potential for skin injury and the learning curve limits its usage [16]. PAL fared well in a three-way comparison (SAL vs. UAL vs. PAL) for overall efficiency, reduced vascular injury and most favourable cost-benefit ratio [17]. More recently, PAL was quantified as being 17% more efficient than SAL and less influenced by the region of fat distribution, the reciprocating motion aiding cannula penetration into ‘difficult’ and fibrous areas [18]. This technique has been found to cause less trauma, swelling and ecchymosis in addition to shorter recovery and diminished operator fatigue, particularly in large volume liposuction [19]. The early drawbacks of machine noise and excessive vibrations to operator have been overcome with the newer devices. Currently PAL is the author’s preferred technique.

RFAL is an emerging technology that produces controlled thermal injury at the sub dermal surface to enhance coetaneous contraction as it heals. There appears to be a biphasic skin contraction, with 14% and 24% noted at 6 and 12 weeks respectively; explained by a stimulation of neocollagenesis [20]. This technique has to be used in conjunction with SAL and though increasing operative time, it has shown promise. At the end of the day it’s not the type of device used but the surgeon’s skill and patient characteristics that determine the final result (Figure 1-3).



**Figure 1:** Liposuction trunk and arms.



**Figure 2:** Liposuction trunk and arms.





**Figure 3:** Liposuction of sub mandibular area and neck.

All plastic surgeons that perform liposuction should be familiar with the risks, unto wards equela, and complications associated with the procedure. Fortunately, most complications of liposuction are minor in nature and tend to resolve spontaneously. Venous thromboembolism following surgical procedures, particularly liposuction continues to generate a great deal of attention in the professional and lay media.

A recent article cited the incidence of deep vein thrombosis to be less than 1 percent in liposuction [21]. Newall et al. reported a 0 percent deep vein thrombosis rate in a retrospective series of patients who underwent large-volume liposuction and received chemoprophylaxis with low-molecular-weight heparin [22]. In 2011 the ASPS Venous Thromboembolism Task Force recommended risk stratification based on the 2005 Caprini scale for patients undergoing liposuction and the need for low molecular weight prophylaxis [23]. These guidelines should be incorporated by all plastic surgeons in their practice.

Although indirectly related to liposuction, the topic of fat transfer is among the most current and still debated topics in plastic surgery, despite initial investigations going back more than 25 years. Fat transfer may be performed as a primary procedure (e.g., breast or buttock augmentation), as an adjunct (e.g., face-lift surgery or breast reconstruction), or for the potential of “stem cell” therapy [24]. Adiposestem cell pluripotentiality and unlimited capacity for self-renewal, represents a great promise for tissue engineering. Cell-assisted lipotransfer is a novel approach to autologous fat transplantation in which adipose-derived stem cells are attached to the aspirated fat [25] (Figure 4).



**Figure 4:** Liposuction abdomen and flanks with fat transfer to buttocks.

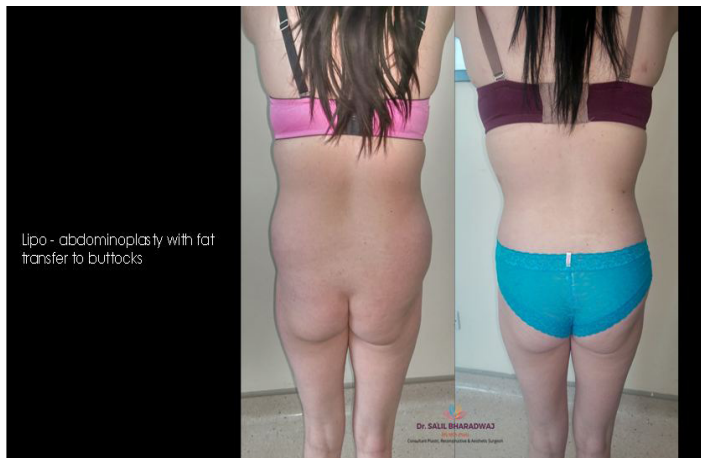
The “holy grail” for body-sculpting technology is non-invasive technologies that minimize tissue morbidity, decrease downtime, and increase skin contraction/tightening, which lessens the need for skin excision by way of surgical intervention. This has led to a new industry: non-invasive body contouring [26]. In this regard are non-invasive technologies as cryolipolysis (e.g Zerona™, Coolsculpt™), high-intensity focused ultrasound - HIFU (e.g Liposonix™) and radiofrequency devices (e.g Body FXTM) for fat cell disruption and lysis.

The proven benefit of liposuction as an adjunct in procedures such as abdominoplasty, breast reduction, face-neck lifting and body lifts cannot be stressed enough. It is an essential tool for the three-dimensional composite sculpting/remodelling of body structures (Figure 5,6).



**Figure 5:** Lipo - abdominoplasty with fat transfer to buttocks.





**Figure 6:** Lipo - abdominoplasty with fat transfer to buttocks.

When liposuction was first introduced and popularized in the early 1980s, it indelibly altered the field of body contouring surgery and redefined plastic surgery for future generations of surgeons. Unless a “cure” for obesity is discovered, or a tectonic shift in human nature, lifestyle, or fashion trends occurs, it is likely that our concerns with lipodystrophy will persist unabated. Moreover, as more practitioners and manufacturers 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 [24].

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