

# An Update on the Role of Subcutaneous Infiltration in Suction-Assisted Lipoplasty

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In 1997, we reviewed the available literature on the role of various subcutaneous infiltration techniques in suction-assisted lipoplasty.<sup>1</sup> Our conclusions were: (1) The use of subcutaneous infiltration solution leads to decreased blood loss as a percentage of aspirate, which allows a larger volume of fat to be safely aspirated. (2) Hypodermoclysis reduces the need for intravenous administration of fluids perioperatively. (3) Lidocaine may be used at dosages higher than those listed in standard texts. (4) There is no consensus regarding the optimal composition or amount of subcutaneous infiltration solution for safety or for optimal aesthetic results.

Since 1997, we have gained significantly more experience with liposuction, especially large-volume liposuction (defined as removal of >5 liters of total aspirate). On the basis of our experience with more than 600 patients, we have refined our technique for circumferential liposuction, to further enhance the safety and aesthetic results. Here we update our conclusions on a point-by-point basis.

The limit for large-volume liposuction has been increased with the use of subcutaneous infiltration. We have performed aspirations of more than 5 liters for more than 200 patients and, based on our data, have developed the following guidelines for fluid resuscitation<sup>2,3</sup>: (1) for small volumes (<5 liters of total aspirate) (total aspirate indicates the raw volume aspirated, including the fat content and recovered wetting solution), maintenance fluid plus subcutaneous wetting solution; (2) for large

volumes ( $\geq 5$  liters of total aspirate), maintenance fluid plus subcutaneous wetting solution plus 0.25 ml of intravenously administered crystalloid per 1 ml of aspirate above 5 liters.

Several studies of the amounts of lidocaine that can be safely used during liposuction have been published.<sup>4-18</sup> In 1997, based on review of the available literature, we suggested that doses of more than 7 mg/kg are safe in the context of liposuction. The reports by Klein,<sup>6</sup> Samdal et al.,<sup>13</sup> Burk et al.,<sup>16</sup> and Ostad et al.<sup>17</sup> have demonstrated that the upper limit is significantly greater than 7 mg/kg. Our clinical work supports the use of 35 mg/kg as the safe limit for liposuction.

We have maintained our use of the superwet technique for subcutaneous infiltration, which is defined as 1 ml of infiltrate per 1 ml of aspirate.<sup>19</sup> There are no proven, literature-supported advantages, with respect to safety and efficacy, with the use of ratios greater than 1:1. We have chosen this technique on the basis of its ability to achieve similar reductions in blood loss, compared with the tumescent technique (approximately 1 percent of the volume aspirated), but without the potential for complications such as fluid overload and congestive heart failure. In our experience, we have found the superwet technique to be extremely safe. We have encountered no cases of pulmonary embolism, fluid overload, or death in more than 600 consecutive liposuction cases.

We have expanded the general safety guidelines in our original conclusions<sup>20</sup> (Table I), as follows: (1) Patients should be in good general

From the Department of Plastic Surgery, University of Texas Southwestern Medical Center. Received for publication April 9, 2002.  
Follow-up to Rohrich, R. J., Beran, S. J., and Fodor, P. B. The role of subcutaneous infiltration in suction-assisted lipoplasty: A review. *Plast. Reconstr. Surg.* 99: 514, 1997.



TABLE I  
Safety Guidelines for Liposuction\*

1. Appropriate patient selection (American Society of Anesthesiologists' class I, within 30 percent of ideal body weight)
2. Use of superwet infiltration technique
3. Meticulous monitoring of volume status (urinary catheterization, noninvasive hemodynamic monitoring, communication with the anesthesiologist)
4. Judicious fluid resuscitation†
  - a. For aspirate of <5 liters, maintenance fluid plus subcutaneous infiltrate
  - b. For aspirate of >5 liters, maintenance fluid plus subcutaneous infiltrate plus 0.25 ml of intravenously administered crystalloid per 1 ml of aspirate above 5 liters
5. Overnight monitoring of large-volume (>5 liters of total aspirate) liposuction patients in an appropriate health care facility
6. Use of pneumatic compression devices in cases performed under general anesthesia or lasting longer than 1 hour
7. Maintenance of total lidocaine doses below 35 mg/kg (wetting solution)

\* From Rohrich, R. J., and Muzaffar, A. R. Discussion of fatal outcomes from liposuction: Census survey of cosmetic surgeons (Discussion). *Plast. Reconstr. Surg.* 105: 447, 2000.

† Individualized on the basis of the patient's urine output and hemodynamic parameters.

health (American Society of Anesthesiologists' class I) and within 30 percent of their ideal body weight. (2) Pneumatic compression devices should be used in all cases. (3) Meticulous monitoring of volume status is imperative, as is close communication between the surgeon and the anesthesiologist. (4) Patients undergoing large-volume liposuction (>5 liters) should be monitored overnight as inpatients.

We continue to improve our technique on the basis of the available data and our own experience. The refinements noted here represent our current practices. We will continue to modify our practices on the basis of ongoing research abroad and at our own institution. We are in the process of formally reviewing our experience with both isolated liposuction and combined liposuction, and we will report the findings. Furthermore, we are currently using both an animal model and a human model (both institutional review board approved) to study the complex physiological changes that occur during lipoplasty, and we will report our conclusions. We look forward to those results, and we will continue to detail our experiences and the subsequent changes in how we perform liposuction safely and effectively.

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