

# Water Jet-Assisted Lipoplasty

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Water jet–assisted lipoplasty channels a thin, targeted, fan-shaped jet into adipose tissue to loosen tissue structure and release adipocytes. According to the authors, water jet–assisted lipoplasty facilitates preinfiltration of modified tumescent solution to create analgesia, resulting in painless or near painless lipoplasty. The authors contend that, with this method, patient safety has increased considerably, even in extensive procedures. (*Aesthetic Surg J* 2007;27:342–346)

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Ever since Klein<sup>1</sup> wrote about the tumescent technique for lipoplasty with local anesthesia, the removal of unwanted fat deposits has become one of the most common aesthetic surgery procedures in the world. Several mechanical methods for infiltration of fluid and aspiration of fat deposits have since been developed, further extending these concepts.<sup>2-5</sup> However, the basic idea has not changed; administration of fluid, sometimes in considerable quantities, is intrinsic to the performance of lipoplasty. However, medications in these fluids can cause unwanted side effects. Aside from volume-related electrolyte shifts and resulting circular reactions,<sup>6</sup> the added analgesics can produce several unwanted effects<sup>7,8</sup> that can appear days after the procedure.<sup>9</sup>

To avoid the side effects of high doses of active medications, many surgeons perform aspiration with the patient under general anesthesia. The number and severity of complications increases considerably for procedures with tumescent techniques that are carried out with patients under general anesthesia.<sup>10-14</sup>

Analysis of current lipoplasty techniques, demonstrating strengths, weaknesses, and potential risks, indicates that swelling of tissue in preparation for aspiration of fat cells is always the main variable. No modern procedure, regardless of the type of anesthesia used, can proceed without it. Therefore the challenge in performing lipoplasty is in the seemingly unavoidable side effects associated with the use of tumescent solution. To answer this challenge, a method was developed to maximize the advantages of the tumescent method, while minimizing the drawbacks.

## Background

Water jet–assisted lipoplasty (WAL) uses a thin, targeted, fan-shaped jet, called *Body-Jet* (human med, Mecklenburg-West Pomerania, Germany), to apply fluid during WAL. The purpose of the fluid is not to cut sharply through tissue, but to loosen fat cells with as little damage as possible. The jet is channeled into adipose tissue to loosen the tissue structure and release adipocytes. This is an active process, replacing the traditional mechanism of passive entry of fluid through diffusion and osmosis.

Using *Body-Jet* WAL, a pressure system directs the infiltration solution through a closed tubing system (via a piston pump) into a very thin application cannula (Figure 1). The application cannula is surrounded by an external cannula that can vary in diameter and arrangement of openings, depending on its purpose. The flow rate of the infiltrate, as well as the application pressure can be selected from several different levels through a software guidance system. For technical reasons a pulsating jet is produced instead of a continuous jet of fluid. This effective jet delivers an impact comparable with a powerful shower head. Therefore there is no possibility of a traumatic “tearing up” effect. Because the pressure systems for infiltration and suction operate independently, these processes can be controlled separately. A premarket approval application for *Body-Jet* has been submitted to the Food and Drug Administration.

## Modified Infiltration Solution

A two-stage process, with two different tumescent solutions, provides long-lasting, maximum anesthetization with minimal side effects. First, preinfiltration produces rapid generalized anesthetization and vasoconstriction in the entire treatment area. Then, to increase the analgesia effect and to maximize vasoconstriction, aspiration is performed with a “rinsing solution,” containing only small quantities of analgesic. The infiltration solution (on the basis of pharmacokinetics), consists of a relatively short-acting analgesic with rapid uptake combined with a long-acting analgesic with slow



**Figure 1.** *Body-Jet device.*

uptake. This formulation is intended to increase the spectra of effectiveness, while keeping the side effects of each agent minimal.<sup>15,16</sup>

Presently, we use lidocaine and ropivacaine, which are both considered very safe when administered in appropriate doses.<sup>17,9</sup> Additionally, we use epinephrine for vasoconstriction.

### **Preparation, Infiltration, Rinsing, and Suction Aspiration**

Prepare the patient for the procedure as usual. Typically, you should be able to reach the suction area from at least 2 sites to facilitate aspiration via a “criss-cross” technique. Advance the cannula relatively near the surface, and glide it smoothly through the adipose tissue.

After you have performed infiltration, it is not necessary to wait before starting the aspiration. Anesthetization and vasoconstriction take place over a shorter period of time because of controlled high infiltration and simultaneous suction.

After you swap the infiltration cannula for the suction cannula, immediately begin the aspiration process. As a general rule, the fluid leads the way; the cannula simply follows and penetrates “soft areas.” The functional structures are displaced by the jet and thereby protected from mechanical trauma. A smooth and force-free method of working is always a sure sign of an atraumatic and safe procedure.

When you have almost finished reducing the fat deposits, rework and shape the details, using the additional cannulas to conclude the lipoplasty. The best way to evaluate your work is with the patient standing; therefore, at several junctures during the aspiration process, have the patient stand.

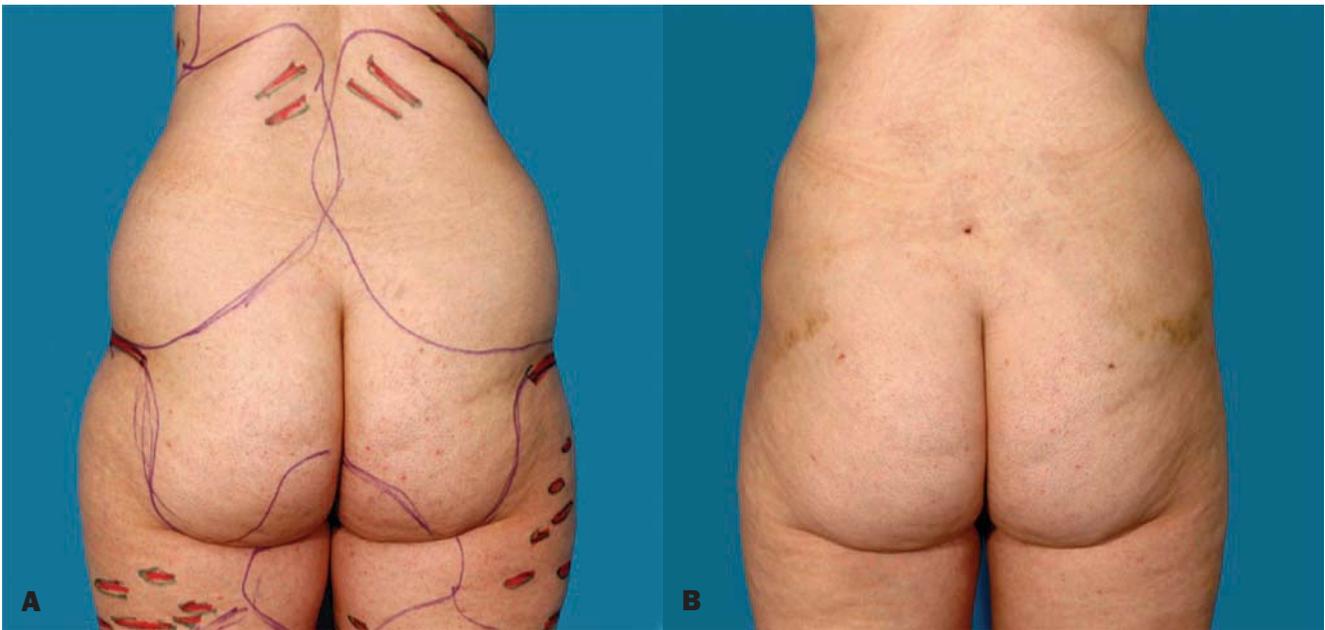
In total, we have carried out more than 800 treatments since 2001, using this procedure. These clinical trials were performed in Hamburg, Germany. Here is a summary of our results:

- Compared with the quantity of tumescent solution used in conventional manual lipoplasty, an average of 20% to 30% was used in preinfiltration, depending on the findings of the authors.
- The length of time tumescent solution remains in the tissue, as well as the resulting absorption times, are all considerably lower for the recommended infiltration solutions compared with all other tumescence-based lipoplasty techniques.
- The average patient satisfaction rate for both the procedure and the final outcome was higher than 94%.

### **Conclusion**

On the basis of our clinical experience administering Body-Jet WAL with the patient under local anesthesia, we have found that:

1. WAL presents a new and safe method that is suitable for all types of lipoplasty.
2. In almost all cases, WAL facilitates use of preinfiltration of modified tumescent solution to create analgesia that is suitable for the performance of painless or near painless lipoplasty. Therefore lipoplasty with the patient under general anesthesia or sedation that suppresses consciousness is no longer necessary.
3. There is significantly reduced pain-related impairment during and after the procedure compared with standard tumescent technique. Patients recover quickly and return to normal daily activities rapidly.



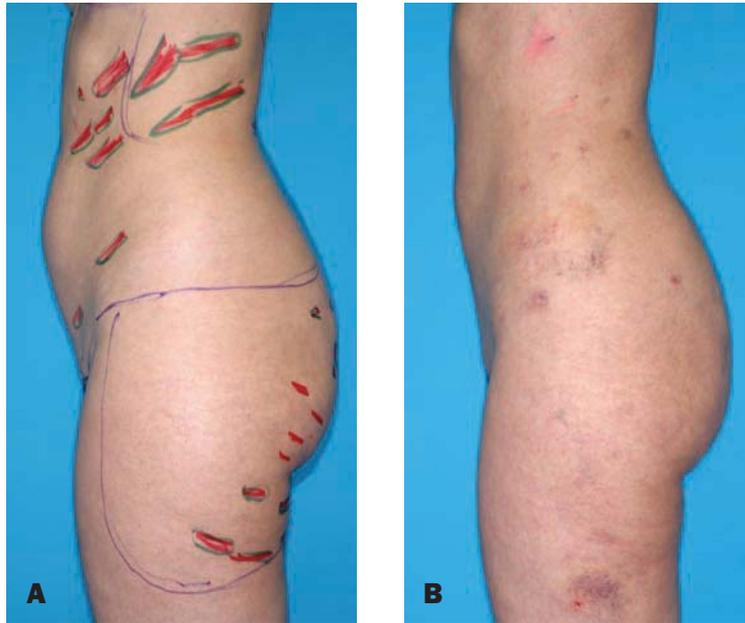
**Figure 2.** **A,** Preoperative view of a 52-year-old woman. **B,** Postoperative view 1 week after undergoing WAL.



**Figure 3.** **A,** Preoperative view of a 60-year-old man. **B,** Postoperative view 2 days after undergoing WAL.

4. Considerably less intraoperative swelling allows the surgeon to realize the target result with greater precision.
5. Fine shaping of small deposits with precision is also possible. This enables surgeons to accommodate the increasing patient demands for contouring.

It is notable that patient safety has increased considerably, even in extensive procedures. The limitations and drawbacks of other infiltration methods are reduced or eliminated. This new method of simultaneous fluid in and out allows the surgeon and patient new consistent levels of comfort and security. ■



**Figure 4. A,** Preoperative view of a 51-year-old woman. **B,** Postoperative view 1 week after undergoing WAL.



**Figure 5. A,** Preoperative view of a 51-year-old woman. **B,** Postoperative view 1 day after undergoing WAL.

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**References**

1. Klein J.A. The tumescent technique for liposuction surgery. *J Am Acad Cosmetic Surg* 1987;4:263-267.
2. Klein JA. The tumescent technique: anesthesia and modified liposuction technique. *Dermatol Clin* 1990;8:424-437.
3. Zocchi ML. Ultrasonic-assisted lipoplasty. *Aesthetic Plast Reconstr Surg* 1996;23:575-598.
4. Gasparotti M. Superficial liposuction: a new application for the technique for aged and flaccid skin. *Aesthetic Plast Surg* 1992;16:141-153.
5. Neira R, Ortiz-Neira C. Low level laser-assisted liposculpture: clinical report of 700 cases. *Aesthetic Surg J* 2002;22:451-455.

6. Tucker GT. Local anaesthetic drugs—mode of action and pharmacokinetics. *Anaesthesia* 1990;38:983-1010.
7. McCaughey W. Adverse effects of local anesthetics. *Drug Safety* 1992;49:126-132.
8. Lindenblatt N, Belusa L, Teifenbach B, Schareck W, Olbrisch RR. Prilocaine plasma levels and methemoglobinemia in patients undergoing tumescent liposuction involving less than 2000 ml. *Aesthetic Plast Surg* 2004;28:435-440.
9. Housman T, Lawrence N, Mellen BG, George MN, Filippo JS, Cerveny KA, et al. The safety of liposuction: results of a national survey. *Dermatologic Surg* 2002;28:971-978.
10. Weinberg GL, Laurito CE, Geldner P, Pygon BH, Burton BK. Malignant ventricular dysrhythmias in a patient with isovaleric academia receiving general and local anesthesia for suction lipectomy. *J Clin Anesth* 1997;9:668-670.
11. Howland MA. Pharmacokinetics and toxicokinetics. In: Goldfrank LR, editor. *Goldfrank's toxicologic emergencies*. 6th ed. Stanford, CT: Appleton & Lange; 1998. p. 173-194.
12. Rigel DS, Wheeland RG. Deaths related to liposuction (letter; comment). *N Engl J Med* 1999;341:1001-1002; discussion:1002-1003.
13. Shiffman M. Medications potentially causing lidocaine toxicity. *American J Cosmetic Surg* 1998;15:227-228.
14. Klein JA. Superwet liposuction and pulmonary edema. In: *Tumescent technique tumescent anesthesia and microcannular liposuction*. St. Louis: Mosby; 2000. p. 61-66.
15. Lillis PJ. Liposuction surgery under local anesthesia: limited blood loss and minimal lidocaine absorption. *J Dermatolog Surg Oncology* 1988;14:1145-1148.
16. Rohrich RJ, Beran SJ. Is liposuction safe? *Plast Reconstr Surg* 1999;104;3:819-822.
17. Hanke CW, Bernstein G, Bullock BS. Safety of tumescent liposuction in 15,336 patients—national survey results. *Dermatolog Surg* 196;22:459-462.
- Illouz YG. Body contouring by lipolysis: a 5-year experience with over 3000 cases. *Plast Reconstr Surg* 1983;72:591-597.
- Kaminski MV, Lopez de Vaughan RM. The anatomy and physiology metabolism /nutrition of subcutaneous fat. In: Shiffman MA, Di Giuseppe A, editors. *Liposuction, principles and practice*. New York: Springer-Verlag; 2000. p. 17-24.
- Klein JA. Tumescent liposuction with local anesthesia. In: Lask GP, Moy RL, editors. *Principles and techniques of cutaneous surgery*. New York: McGraw Hill; 1996. p. 529-542.
- Parish TD. Pharmacokinetics of tumescent anesthesia. In: Shiffman, M.A., Di Giuseppe A, editors. *Liposuction, Principles and Practice*. New York: Springer-Verlag; 2006. p. 17-24.
- Pitman GH, Teimouran B. Suction lipectomy: complications and results by survey. *Plast Reconstr Surg* 1985;76:65-72.
- Rohrich RJ, Beran SJ, Fodor FB. The role of subcutaneous infiltration in suction-assisted lipoplasty: a review. *Plast Reconstr Surg* 1997;99:514-519.
- Salans LB, Cushman SW, Weismann RE. Studies of human adipose tissue, adipose cell size and number in nonobese and obese patients. *J Clin Invest* 1973;52:929-941.
- Scott DB. Evaluation of clinical tolerance of local anesthetic agents. *Br J Anesth* 1975;47:328-333.
- Shiffman M.A. Principles of liposuction. In: Shiffman MA, Di Giuseppe A, editors. *Liposuction, principles and practice*. New York: Springer-Verlag; 2006. p. 379-380.
- Sommer B. Vorteile und Nachteile der Tumeszenz-Lokalanästhesie. In: Sommer B, Sattier G, Hanke CW, editors. *Tumeszenz-Lokalanästhesie*. Berlin: Springer-Verlag; 1998. p. 40-44.
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## Bibliography

- American Society for Dermatological Surgery: Liposuction Guidelines 200;26:265-269.
- Brain SD, Williams TJ. Inflammatory oedema induced by synergism between calcitonin gene-related peptide (CGRP) and mediators of increased vascular permeability. *Br J Anesth* 1985;86:855-860.
- Breuninger H, Hobbach P, Schimek F. Ropivacaine: an important anesthetic agent for slow infusion and other forms of tumescent anesthesia. *Dermatologic Surgery* 1999;25:799-802.
- Coleman WP III, Katz B, Bruck M, Narins R, Lawrence N, Flynn TC, et al. The efficacy of powered liposuction. *Dermatolog Surg* 2001;27:735-738.
- Deeb M, Eed A. Megaliposuction: analysis of 1520 patients. *Aesthetic Plast Surg* 1999;123:16-22.
- Di Giuseppe A. Ultrasonically assisted liposculpturing: physical and technical principles and clinical applications. *Am J Cosmetic Surg* 1997;14:317-327.
- Di Giuseppe A. Ultrasound-assisted liposuction: physical and technical principles. In: Shiffman, MA, Di Giuseppe A, editors. *Liposuction, principles and practice*. New York: Springer-Verlag; 2006. p. 229-238.
- Esclamado RM, Damiano GA, Cummings CW. Effect of local hypothermia on early wound repair. *Arch Otolaryngol Head Neck Surg* 1990;116:803-808.
- Fischer G. First surgical treatment for modeling body's cellulite with three 5 mm incisions. *Bull Int Acad Cosm Surg* 1976;2:35-37.