



(Print pagebreak 1083)

CHAPTER 11.2

Nonfacial Aesthetic Surgery

Angeline F. Lim, MD

David M. Kahn, MD

George W. Commons, MD¹

Lindsey Vokach-Brodsky, MB, ChB, FFARCS

Bruce D. Halperin, MD¹

¹Liposuction

(Print pagebreak 1084)

Augmentation Mammoplasty

Surgical Considerations

Description: **Augmentation mammoplasty** is accomplished through the use of saline or silicone gel-filled breast implants. The surgery may be performed under GA or local anesthesia with sedation. The patient is positioned either with the arms abducted at 90° or with the hands on the abdomen. Local anesthetic (\pm epinephrine) is infiltrated into the skin at the incision site and under the glandular tissue. Implant insertion can be done through inframammary, periareolar, transaxillary, or transumbilical incisions. The implant is placed in a pocket that is created either beneath the mammary gland (subglandular), under the pectoralis muscle (submuscular), partially subglandular and partially submuscular (dual-plane), or beneath the pectoralis fascia (subfascial), depending on the surgeon's preference and the amount of tissue available. An endoscope may be used to assist with dissection of the pocket. When the implant is placed in the submuscular position, the pectoralis muscle is divided from its insertion along the inframammary fold and sometimes along the sternal insertion to allow the muscle to drape over the implant. Regardless of the location of the pocket, the surgical wound is carefully irrigated and inspected for hemostasis. Sizers, either predetermined volumes of silicone gel or adjustable saline- or air-filled temporary implants, may be used to help determine the appropriate final volume and placement. The patient may be placed in the seated position to assess the size, shape, and symmetry of the breasts. The sizers are then replaced with the permanent prostheses. If permanent saline implants are used, they are filled with saline until the desired volume is reached; gel-filled implants do not have alterable volumes. The wounds are closed, and dressings are applied ([Fig. 11.2-1](#)).

Augmentation mammoplasty usually is performed as an outpatient procedure, although some patients may want an overnight stay for pain management and antiemetics. PONV is not uncommon, and all efforts should be made to decrease its frequency.

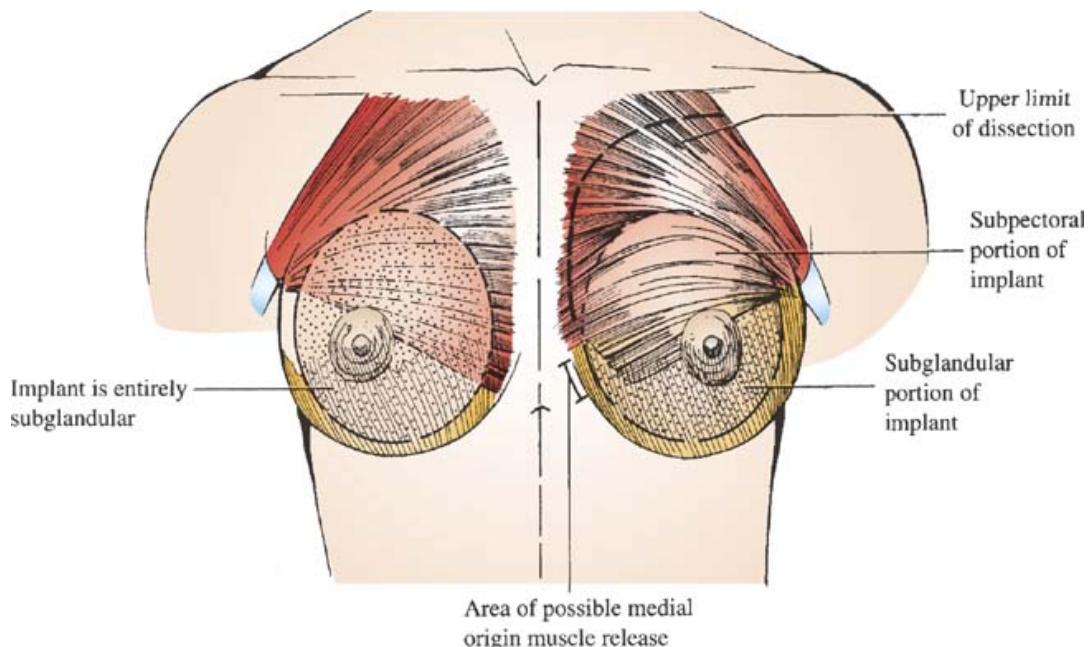


Figure 11.2-1. 1. Breast augmentation. Implants may be placed in a subglandular or subpectoral position. (Reproduced with permission from Spear SL: *The Breast: Principles and Art*. Lippincott-Raven: 1998.)

(Print pagebreak 1085)

Variant procedure or approaches: The endoscopic transumbilical approach is used much less frequently.

Preop Diagnosis: Hypomastia, breast ptosis

Summary of Procedures

Position	Supine
Incision	Inframammary; periareolar; transaxillary; or transumbilical
Antibiotics	Cefazolin 1 g iv
Unique considerations	May place patient in sitting position during procedure.
Surgical time	1 h
Closing considerations	May need patient in sitting position for application of dressings.
EBL	Minimal
Postop care	Outpatient procedure
Mortality	Rare
Morbidity	Prosthesis failure: 5% Capsular contracture: 5% Hematoma: 3% Infection: 2% Wound dehiscence: < 1% Cosmetic disappointments
Pain score	3–4

Patient Population Characteristics

Age range	Typically 17–45 yr, but also may be done on the contralateral breast in a patient undergoing breast reconstruction.
------------------	---

Incidence

329,396 performed in the United States in 2006; the most common cosmetic surgical procedure

Developmental; involution after breast feeding; age-related atrophy or ptosis

Not common, but can be seen with Poland's syndrome.

Anesthetic Considerations

See [Anesthetic Considerations following Mastopexy/Breast Lift, p. 1089](#).

Suggested Readings

1. Cooter RD, Rudkin GE, Gardiner SE: Day case breast augmentation under paravertebral blockade: a prospective study of 100 consecutive patients. *Aesthetic Plast Surg* 2007; 31(6):666–73.
2. Graf RM, Bernandes A, Rippel R, et al: Subfascial breast implant: a new procedure. *Plast Reconstr Surg* 2003; 111(2): 904–8.
3. McLaughlin JK, Lipworth L, Murphy DK, et al: The safety of silicone gel-filled breast implants: a review of the epidemiologic evidence. *Ann Plast Surg* 2007; 59(5):569–80.
4. See Suggested Readings Mastopexy/Breast Lift, p. 1090.
5. Tebbetts JB: Dual plane breast augmentation: optimizing implant-soft tissue relationships in a wide range of breast types. *Plast Reconstr Surg* 2001; 107(5):1255–72.

(Print pagebreak 1086)

Reduction Mammoplasty

Surgical Considerations

Description: Breast reduction surgery can be done as an outpatient procedure or with an overnight stay. One might choose to admit the patient overnight in a hospital setting to monitor for hematoma formation and evidence of decreased blood supply to the nipple-areola complex. For these patients, the pain from this procedure is relatively low; therefore, PONV tends to be the greater issue in the immediate postoperative period.

The traditional type of breast reduction performed in the U.S. is the **inferior pedicle technique** using a Wise pattern (“anchor-type” scar) for the skin excision ([Fig. 11.2-2](#)). Markings are made with the patient upright in the preoperative holding area. The areola is marked circumferentially with an areola sizer and incised. The remaining incision lines are scored with a scalpel. Next, the inferior pedicle, which contains the neurovascular supply to the nipple-areola complex, is deepithelialized. Excess skin and breast tissue are excised, preserving the pedicle of tissue that will compose the breast mound. The resected tissue from each breast, which can range from 200–1,000 g, is weighed as an adjunctive method of ensuring symmetry. Temporary skin closure with staples allows the patient to be placed in a sitting position so that the breasts can be evaluated for symmetry. When the surgeon is satisfied with the appearance of the breasts, they are closed with sutures. Drains may be placed, depending on surgeon preference ([Fig. 11.2-2](#)). After the skin has been closed, the location of the nipple and areola is marked and excised, and the nipple-areola complex is delivered and sutured into position. Soft, supportive dressings are placed.

A technique that has gained in popularity recently is the **vertical reduction mammoplasty**, which shares the fundamental principles of excision of excess breast tissue and preservation of blood flow to the nipple-areola complex, but differs in choice of skin incision and pedicle. Relatively more time is spent performing the tissue excision and pedicle shaping, but wound closure time is greatly decreased (resulting in a “lollipop-type” scar) compared with the traditional Wise-pattern technique.

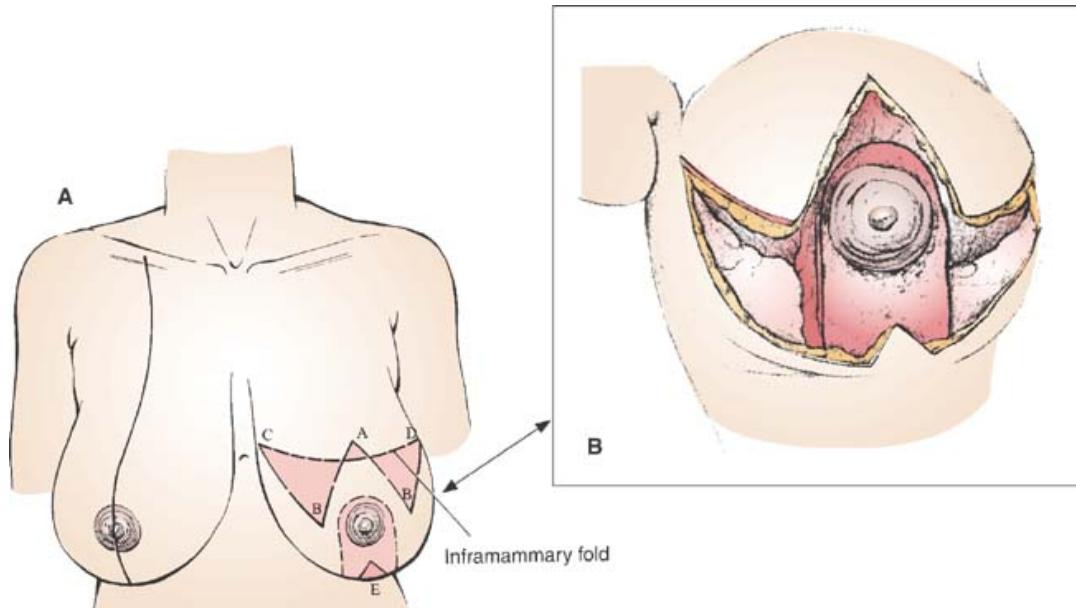


Figure 11.2-2. Reduction mammoplasty using an inferior pedicle technique. **A:** The skin and breast tissue on the medial and lateral sides of the pedicle are resected. **B:** The medial and lateral skin envelopes are sutured at the midline, leaving an inverted-T shaped scar. (Reproduced with permission from Spear SL: *The Breast: Principles and Art*. Lippincott-Raven: 1998.)

(Print pagebreak 1087)

Variant procedure or approaches: **Liposuction** may be used in combination with this procedure. Reduction mammoplasty using liposuction alone has increased in popularity.

Preop diagnosis: Macromastia, gigantomastia, mammary hypertrophy

Summary of Procedures

Position	Supine, arm abducted 90°
Incision	Marked preop. Most have circumareolar incision with an inferior anchor-shaped extension (Fig. 11.2-2) or a short vertical component ("lollipop" scar).
Antibiotics	Cefazolin 1 g iv
Unique considerations	May place patient in sitting position during procedure to assess symmetry; Foley catheter; SCDs
Surgical time	2–5 h, depending on volume of reduction and technique
Closing considerations	May place patient in sitting position for application of dressings.
EBL	100–200 mL
Postop care	Outpatient or 24-h stay for pain/nausea management. Avoid the use of Toradol in the first 24 h because of the large, raw surface created between the skin flaps and breast tissue.
Mortality	Minimal
	Dehiscence: 5%
	Infection: 1%
	Seroma/hematoma: < 1% (may require re-exploration)
Morbidity	Skin flap necrosis
	Loss of nipple-areola complex (may require urgent reexploration)
	Loss of nipple-areola sensation
	Hypertrophic scarring
	Cosmetic disappointments

Patient Population Characteristics

Age range	25–65 yr
Incidence	104,455 performed in the United States in 2006 ¹
Etiology	Developmental; child-bearing; obesity
Associated conditions	None common

Anesthetic Considerations

See [Anesthetic Considerations following Mastopexy/Breast Lift, p. 1089.](#)

Suggested Readings

1. Hall-Findlay, E: A simplified vertical reduction mammoplasty: shortening the learning curve. *Plast Reconstr Surg* 1999; 104(3):748–59.
2. Lejour M: Vertical mammoplasty and liposuction of the breast. *Plast Reconstr Surg* 1994; 94(1):100–14.
3. Lejour M: Vertical mammoplasty: early complications after 250 personal consecutive cases. *Plast Reconstr Surg* 1999; 104(3):764–70.
4. Palmieri B, Benuzzi G, Costa A, et al: Breast reduction and subsequent cancer: a prophylactic perspective. *Breast* 2006; 15(4):476–81.
5. See Suggested Readings Mastopexy/Breast Lift, p. 1090.

(Print pagebreak 1088)

Mastopexy/Breast Lift

Surgical Considerations

Description: Mastopexy procedures reduce the volume of the skin envelope to match the volume of the breast gland. Depending on the degree of ptosis (“droopy breasts”) and the wishes of the patient, the ptosis may be treated by augmentation alone to increase the volume of the breast, by skin excision alone to reduce the skin envelope appropriately, or by a combination of a mastopexy and an augmentation.

The operation itself resembles a reduction mammoplasty, except that breast tissue is generally excised minimally or not at all, and an implant may be added (**mastopexy/augmentation**). The patient is marked before surgery in the upright position. After the induction of anesthesia, the arms are positioned either on the abdomen or abducted 90°. The procedure begins with the areola being marked circumferentially with an areola sizer, and then incised. Next, the skin flaps are elevated. The breast tissue is moved to a higher position on the chest wall, and the skin is redraped and tailor-tacked closed. The patient is placed in a sitting position to assess for symmetry and nipple location. The nipple-areola complex is then brought out into its new position, and dressings are applied.

Preop diagnosis: Breast ptosis

Summary of Procedures

Position	Supine
Incision	Circumareolar ± inferior vertical extension or complete anchor
Antibiotics	Cefazolin 1 g iv
Unique considerations	May place patient in sitting position during procedure.
Surgical time	2–4 h
Closing considerations	May place patient in sitting position for application of dressings. > 100 mL
EBL	Outpatient or 24-h stay
Postop care	Minimal
Mortality	Wound healing: 5% Infection: 1%
Morbidity	Seroma/hematoma: < 1% Hypertrophic scarring Cosmetic disappointments
Pain score	3–4

Patient Population Characteristics

Age range	35–65 yr
Incidence	103,788 performed in the United States in 2006
Etiology	Age-related ptosis; involution after breastfeeding; weight loss
Associated conditions	None common

(Print pagebreak 1089)

■ Anesthetic Considerations for Mammoplasty/Mastopexy

▲ Preoperative

Typically, three patient populations present for mammoplasty: (a) healthy individuals, for breast reduction/augmentation/lift or removal of an implant; (b) morbidly obese, for breast reduction; (c) breast cancer patients, for reconstruction after mastectomy. (For preop considerations in the morbidly obese patient, see [Anesthetic Considerations for Abdominoplasty, p. 1094](#).) Breast cancer patients undergoing mastectomy with immediate reconstruction will not have had either chemotherapy or radiation. The following considerations are for breast cancer patients undergoing delayed reconstruction postchemotherapy.

Respiratory

Pulmonary fibrosis may complicate chemotherapy. Alkylating agents (e.g., cyclophosphamide and melphalan), used to treat breast cancer, have some pulmonary toxicity. Consider pulmonary fibrosis in a patient reporting dyspnea, nonproductive cough, and fever.

Tests: Consider CXR; ABG, PFTs as indicated from H&P.

Cardiomyopathy and CHF may result from chemotherapy, especially doxorubicin (Adriamycin) $> 550 \text{ mg/m}^2$.

Tests: Consider ECG; ECHO, if indicated from H&P.

Note any previous damage to long thoracic nerves, as evidenced by winged scapula deformity.

Avoid iv and BP cuff on mastectomy side.

Cardiovascular

Neurologic

Musculoskeletal

Hematologic

Leukopenia, thrombocytopenia, and anemia from chemotherapy may be present.

Tests: CBC; Plt count

Renal/Hepatic

Methotrexate can produce some renal and hepatic dysfunction.

Tests: Cr; LFTs

Laboratory

Other tests as indicated from H&P, prior chemotherapy, obesity.

Premedication

Midazolam 1–2 mg iv immediately preop. Surgeon may want to mark the patient's skin preop, with patient standing. Delay premedication until this has been done.

Intraoperative

Anesthetic technique: GETA

Induction

Standard induction (see [p. B-2](#)). with surgeons regarding use of a nerve stimulator during dissection (and the need to avoid muscle relaxants). Consider LTA to minimize coughing during position changes.

Maintenance

Standard maintenance (see [p. B-2](#)). Surgeons may want patient sitting for part of the procedure. Pneumothorax should be considered with any change in lung inflation pressure, O₂sat, or BP.

Emergence

During some of the procedure and for application of dressing, patient may be moved to sitting position, with consequent coughing, bucking, etc. (Rx: deeper anesthesia, e.g., propofol 0.5 mg/kg or lidocaine 1 mg/kg.) Watch BP carefully and treat orthostatic hypotension if it occurs, usually with a fluid bolus if the patient is not fluid sensitive (Hx of CHF or renal failure).

Blood and fluid requirements

IV 16–18 ga × 1
NS/LR @ 4–8 mL/kg/h

Minimal blood loss for simple reconstruction, augmentation, or reduction; larger blood losses anticipated for combined procedures (e.g., mastectomy with immediate reconstruction or flap reconstruction).

Monitoring

Standard monitors ([p. B-1](#))

Arterial line in the morbidly obese
Avoid HTN, bucking, and straining; these may cause or exacerbate bleeding at reconstruction site. Careful padding and unwrapping of arms to protect them during position change.

(Print pagebreak 1090)

Postoperative

Complications

Pneumothorax

Pain management

PCA (see [p. C-3](#))

Suggested Readings

1. American Society of Plastic Surgeons web site: www.plasticsurgery.org
2. Arain MR, Buggy DJ. Anaesthesia for cancer patients. *Curr Opin Anaesthesiol* 2007; 20(3):247–53.
3. Baker, JL: Augmentation mammoplasty: general considerations. In *Surgery of the Breast: Principles and Art*. Spear SL, ed. Lippincott-Raven, Philadelphia: 1998, 845–54.



4. Elliott LF: Circumareolar mastopexy with augmentation. *Clin Plast Surg* 2002; 29(3): 337–47.
5. Hoffman, S: Inferior pedicle technique in breast reduction. In *Surgery of the Breast: Principles and Art*. Spear SL, ed. Lippincott-Raven, Philadelphia: 1998, 761–72.
6. Kuruba R, Koche LS, Murr MM. Preoperative assessment and perioperative care of patients undergoing bariatric surgery. *Med Clin North Am* 2007; 91(3):339–51.
7. Matarasso A. Suction mammoplasty: the use of suction lipectomy alone to reduce large breasts. *Clin Plast Surg* 2002; 29 (3):433–43.
8. Vascone HC, Holley DT: Use of the TRAM and latissimus dorsi flaps in autogenous breast reconstruction. *Clin Plast Surg* 1995; 22(1):153–66.
9. Warren AG, Morris DJ, Houlihan MJ, Slavin SA. Breast reconstruction in a changing breast cancer treatment paradigm. *Plast Reconstr Surg* 2008; 121(4):1116–26.

Brachioplasty

Surgical Considerations

Description: Brachioplasty is performed as outpatient surgery for patients who note “flabbiness” or a “bat-wing” appearance of their upper arms. Markings are done in the preoperative holding area with the patient upright, arms abducted and flexed. An incision is made starting along the chest wall or in the axilla, extending onto the upper arm and stopping before the elbow. Excess skin and soft tissue are excised, and the incision is closed, sometimes over a drain. Dressings are applied, often followed by a compression garment or ACE wraps.

Usual preop diagnosis: Upper arm laxity or redundancy, lipodystrophy.

Summary of Procedures

Position	Supine, arms abducted
Incision	From chest/axilla, extending along lower inner arm
Unique considerations	Both arms must be mobile and prepped circumferentially; SCDs
Antibiotics	Cefazolin 1 g iv
Surgical time	1–2 h
EBL	Minimal
Postop care	Avoid ketorolac first 24–48 h
Mortality	Minimal
	Seroma: 10%
	Hypertrophic scarring: 10%
Morbidity	Dehiscence: 7.5%
	Infection: 5–7%
	Nerve injury: 5%
Pain score	3–4

(Print pagebreak 1091)

Patient Population Characteristics

Age range	20–65 yr
Male:Female	1:50
Incidence	14,886 performed in the United States in 2006
Etiology	Overweight; aging; massive weight loss
Associated conditions	Obesity

Anesthetic Considerations

Preoperative

Patients presenting for brachioplasty have often undergone gastric bypass surgery with massive weight loss. If morbidly obese an appropriate preoperative work up should be performed. IV access may be difficult. Consider need for IV access in lower limb or neck due to bilateral arm surgery. (See [Anesthesia considerations in morbid obesity, p. 502](#).)

Intraoperative

Anesthetic technique: GETA, routine monitors

Procedure may be combined with other plastic procedures, necessitating position changes.

Induction

Standard induction (see [p. B-2](#)) for healthy patients. Special considerations for the morbidly obese include prophylaxis for aspiration, followed by rapid-sequence induction in an appropriately positioned patient (see [Fig. 7.2-6](#)). If mandibular and cervical mobility are decreased by excessive soft tissue, plan awake fiber optic intubation (see [p. B-5](#)) with the patient sitting. Anticipate rapid O₂desaturation during periods of hypoventilation, even with adequate preoxygenation.

Maintenance

Standard maintenance (see [p. B-2](#)). Calculate drug dosage on basis of lean body mass. In the obese, controlled ventilation with large TV and high inspired O₂concentration is recommended. Positioning may be difficult and care must be taken to give adequate padding and support.

Emergence

Give antiemetics (ondansetron 4 mg) 20 min before conclusion of surgery.

Blood and fluid requirements

Minimal blood loss, 18 ga × 1
NS/LR @ 4–8 mL/h

Monitoring

Standard monitors

(Print pagebreak 1092)

Postoperative

Pain Management

PCA
oral medications for outpatients
As indicated by patient condition

Tests

Suggested Readings

1. Hurwitz DJ, Holland SW: The L brachioplasty: an innovative approach to correct excess tissue of the upper arm, axilla, and lateral chest. *Plast Reconstr Surg* 2006; 117(2):403–11; discussion 412–3.



2. Knoetgen J 3rd, Moran SL: Long-term outcomes and complications associated with brachioplasty: a retrospective review and cadaveric study. *Plast Reconstr Surg* 2006; 117 (7): 2219–23.
3. Lockwood TE: Brachioplasty with superficial fascial system suspension. *Plast Reconstr Surg* 1995; 96(4):912–20.

Abdominoplasty

Surgical Considerations

Description: Patients who present for **abdominoplasty** have laxity in the abdominal wall musculature and excess skin and adipose tissue. This laxity may be associated with rectus muscle diastasis. **Liposuction** often is performed before abdominoplasty to remove additional adipose tissue and improve contour.

Incision lines are marked on the patient preoperatively in the upright position ([Fig. 11.2-3](#)). The umbilicus is circumscribed, with care taken to preserve its blood supply. An incision is made above the pubic hairline and extended (*Print pagebreak 1093*) bilaterally to each anterior superior iliac spine. Electrocautery is used to raise a flap of skin, subcutaneous tissue, and fat at the level of the abdominal wall fascia. The dissection extends cephalad to the costal margin. The operating table is flexed to place the patient in the semi-Fowler position. The elevated flap is pulled down to overlap the inferior incision, and the redundant soft tissue is excised in a tailor-tack fashion ([Fig. 11.2-4](#)). The surgical area is inspected for hemostasis and irrigated. Sutures may be placed to plicate the abdominal wall musculature if there is laxity. Fibrin sealant may be sprayed to aid in hemostasis. The wound is closed over drains, and the umbilicus is brought out through a new incision. Dressings, which may include an abdominal binder, are applied. The patient is maintained in the semi-Fowler position during transfer from the operating table. The patient may elect to have the procedure as an outpatient or with an overnight stay in a monitored facility.

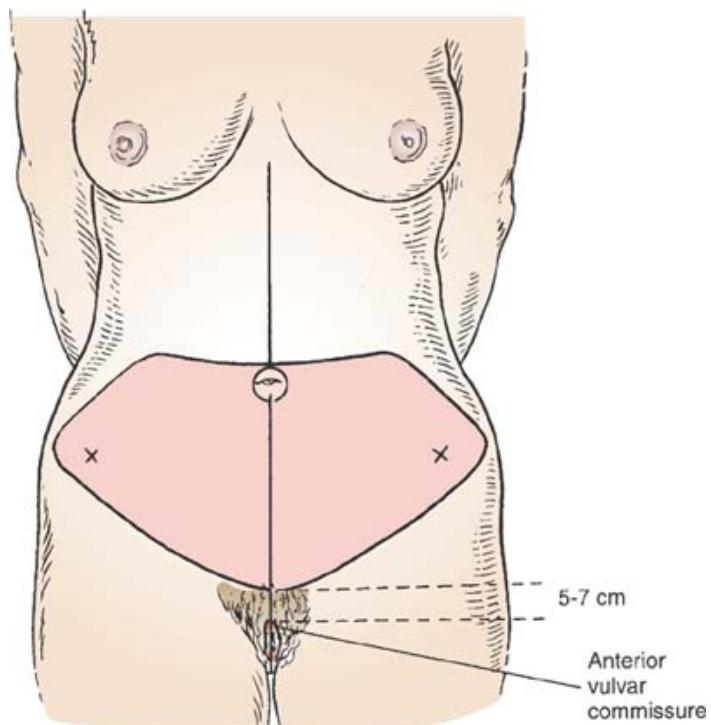


Figure 11.2-3. 3. Abdominoplasty, markings for incisions. (Reproduced with permission from Aston SJ, Beasley RW, Thorne CHM: *Grabb & Smith's Plastic Surgery*, 5th edition. Lippincott-Raven: 1997.)

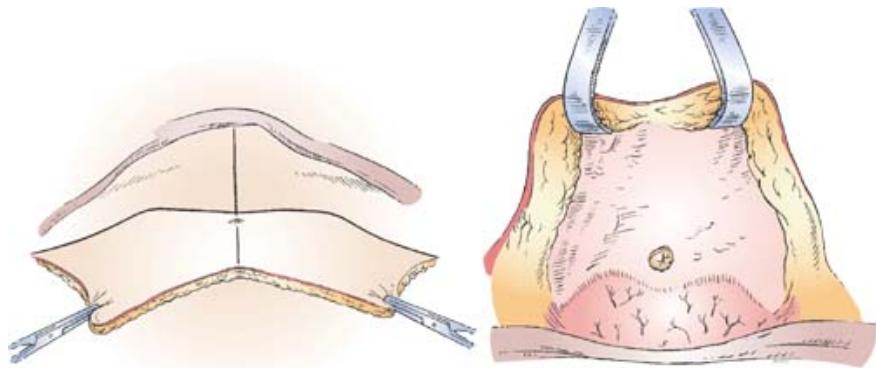


Figure 11.2-4. After the lower incision has been made and the abdominal flap has been elevated, the flap is pulled down to overlap the inferior incision, and the redundant soft tissue is excised in a tailor-tack fashion. (Reproduced with permission from Aston SJ, Beasley RW, Thorne CHM: *Grabb & Smith's Plastic Surgery*, 5th edition. Lippincott-Raven: 1997).

Variant procedure or approaches: Patients who require additional width reduction may have a *fleur de lis* abdominoplasty (vertical midline extension of incision and scar). Panniculectomy (simple resection of overhanging skin and soft tissue) can be performed alone without the fascial plication, particularly in the case of morbidly obese patients. Mini-abdominoplasty may be performed in those patients who require less extensive dissection.

Usual preop diagnosis: Abdominal wall laxity; rectus diastasis; lipodystrophy; redundant skin and soft tissue

Summary of Procedures

Position	Supine
Incision	Extended Pfannenstiel's; periumbilical; vertical midline extension if needed
Unique considerations	Foley catheter; SCDs
Antibiotics	Cefazolin 1 g iv
Surgical time	1.5–4 h
Closing considerations	Flex table to facilitate closure; patient must subsequently remain in semi-Fowler position.
EBL	100 mL, not including blood contained in specimen.
Postop care	Maintain flexed position; avoid ketorolac in the first 24–48 h.
Mortality	0–1%
Morbidity	Ileus: 10% Infection: 2–3% Dehiscence: 1% Fat embolism: 1% DVT: 1% Hematoma Seroma
Pain score	4–6

(Print pagebreak 1094)

Patient Population Characteristics

Age range	20–65 yr
Male:Female	1:25
Incidence	146,240 performed in the United States in 2006; fifth most common cosmetic surgical procedure.



Etiology

Associated conditions

Overweight; laxity of skin after pregnancy; massive weight loss
Obesity

Anesthetic Considerations

Preoperative

Typically, there are two patient populations for abdominoplasty: the generally healthy, and the morbidly obese. Some patients have Hx of amphetamine, cocaine, or thyroid hormone abuse, and ↑ incidence of hiatal hernia. The following considerations focus on the morbidly obese patient (body weight $\geq 2 \times$ ideal weight). Ideal body weight can be estimated by subtracting 100 (male) or 105 (female) from height in cm).

Respiratory

In the morbidly obese patient, findings include: ↑ O₂ consumption, ↑CO₂ production, restrictive lung disease, ↓ FRC, ↓ ERV, ↓ VC, ↓ IC, and ↓ PaO₂. These changes are exacerbated by the supine position. Younger patients may show alveolar hyperventilation in response to hypoxemia; older patients may not, and may retain CO₂. Patients may have obesity hypoventilation syndrome (Pickwickian syndrome) and sleep apnea; with intermittent airway obstruction, hypoxemia, and hypercarbia during sleep, which may → pulmonary HTN. Obese patients are at ↑ risk of pulmonary aspiration due to ↑ incidence of hiatal hernia, GERD, and ↑ gastric volumes (typically > 25 mL with pH < 2.5). See Premedication, below, for aspiration prophylaxis.

Tests: Consider CXR, room-air ABG, and PFT (helpful, but generally do not predict postop complications, e.g., atelectasis, pneumonia).

↑ CO and ↑ blood volume → LVH. Chronic hypoxia and pulmonary compromise may produce right heart failure, ↓ exercise tolerance, ↑ risk of CAD, and pulmonary systemic HTN. Patients with LVH may have ↑ dysrhythmias. Some patients may have previously taken fenfluramine alone or in combination with phentermine for weight loss. Those patients should be evaluated for pulmonary HTN (e.g., dyspnea, central cyanosis, right axis deviation, and CXR changes) and valvular heart disease.

Tests: ECG (↑HR, conduction abnormalities, LVH); CXR (cardiomegaly)

Increased incidence of diabetes, hypercholesterolemia, hypertriglyceridemia, liver abnormalities, ↓ plasma folate, B₁₂, ↑ incidence of cholelithiasis, nephrolithiasis. Determine whether electrolyte abnormalities are present in patient S/P ileojejunal bypass.

Tests: As indicated from H&P.

Polycythemia suggests chronic hypoxemia (see Respiratory, above).

Tests: Hb/Hct

Other tests as indicated from H&P.

Sedative premedication is avoided in the morbidly obese due to their pulmonary compromise. Aspiration prophylaxis is essential: ranitidine 100 mg po or iv the evening before, and 60–90 min before surgery, plus nonparticulate antacid (Na citrate 0.3 M, 30 mL po) preinduction. Additionally, metoclopramide 10 mg iv may be given, although it has not been shown to be more effective in combination with an H₂blocker than the H₂blocker

Cardiovascular

Metabolic

Hematologic

Laboratory

Premedication



alone. For the healthy outpatient, midazolam 1–2 mg iv immediately preop may lessen anxiety.

(Print pagebreak 1095)

Intraoperative

Anesthetic technique: GETA. Morbidly obese patients may not tolerate the supine position for an extended period of time. Consider placement of thoracic epidural for postop pain control.

Standard induction (see [p. B-2](#)) for healthy patients.

Special considerations for the morbidly obese include prophylaxis for aspiration (see above), followed by rapid-sequence induction in an appropriately positioned patient (see [Fig. 7.2-6](#)). If mandibular and cervical mobility are decreased by excessive soft tissue, plan awake fiber optic intubation (see [p. B-5](#)) with the patient sitting. Anticipate rapid O₂desaturation during periods of hypoventilation, even with adequate preoxygenation.

Standard maintenance (see [p. B-2](#)). Calculate drug dosage on basis of lean body mass. In the obese, increased plasma fluoride concentrations are found after anesthesia with halothane and enflurane; controlled ventilation with large TV and high inspired O₂concentration is recommended. Because epinephrine infiltration generally is used to decrease blood loss, isoflurane is recommended as the least dysrhythmogenic of the inhalation agents in the presence of epinephrine. *NB: Midazolam has a prolonged half-life in obese patients, but awakening times from inhalational or narcotic-based anesthetics are comparable to those of nonobese patients.

Smooth emergence with minimal bucking, coughing, or retching to minimize tension on the suture line; give antiemetics (metoclopramide 10 mg and ondansetron 4 mg) 20 min before conclusion of surgery. Maintenance of flexed position will minimize tension on suture line. Small additional doses of narcotic (e.g., meperidine 10 mg) may be titrated to RR if patient is allowed to resume spontaneous respiration before the end of the case.

Induction

Maintenance

Emergence

Blood and fluid requirements

Moderate blood loss
IV: 16–18 ga × 1
NS/LR @ 6–10 mL/kg/h

Monitoring

Standard monitors (see [p. B-1](#)). Additional monitoring for the morbidly obese patient may include arterial and CVP lines.

± Arterial line
± CVP line

Positioning

Flexed position minimizes tension on suture line. Morbidly obese may require two OR tables side-by-side. Supine position may be poorly tolerated; monitor ventilation closely.

Pillows under knees and pad pressure points.
eyes.



Complications

Fat emboli

More common during liposuction.

(Print pagebreak 1096)

Postoperative

Complications

Patients may have postop ileus of 1–2 d duration.

Pain management

Epidural narcotics or PCA may be used ([p. C-3](#)).

Tests

Pulse oximetry

The morbidly obese should not be outpatients; they have an ↑ incidence of wound infection, DVT, PE, and postop pulmonary complications. Provide supplemental O₂ for the first 2 d postop. Keep patient in semisitting or flexed position to avoid undue stress on wound.

Monitor patient for postop respiratory depression.

Maximum reduction of arterial saturation may occur on postop day 2–3.

Suggested Readings

1. Greminger RF: The mini-abdominoplasty. *Plast Reconstr Surg* 1987; 79(3):356–65.
2. Kuruba R, Koche LS, Murr MM: Preoperative assessment and perioperative care of patients undergoing bariatric surgery. *Med Clin North Am* 2007; 91(3):339–51.
3. Lockwood T: High-lateral-tension abdominoplasty with superficial fascial system suspension. *Plast Reconstr Surg* 1995; 96(3):603–15.
4. Matarasso A: Liposuction as an adjunct to a full abdominoplasty. *Plast Reconstr Surg* 1995; 95(5):829–36.
5. Ogunnaike BO, Jones SB, Jones DB, et al: Anesthetic considerations for bariatric surgery. *Anesth Analg*. 2002 Dec;95(6):1793–805.
6. Regatieri FL, Mosquera MS: Liposuction anesthesia techniques. *Clin Plast Surg* 2006; 33(1):27–37, vi.
7. Seung-Jun O, Taller SR: Refinements in abdominoplasty. *Clin Plast Surg* 2002; 29(1):95–109.
8. Vaughan RW, Wise L: Postoperative arterial blood gas measurements in obese patients: effects of position on gas exchange. *Ann Surg* 1975; 182(6):705–9.
9. Vistnes, LM: *Procedures in Plastic and Reconstructive Surgery: How They Do It*. Little, Brown, Boston: 1991.
10. Yoho RA, Romaine JJ, O'Neil D: Review of the liposuction, abdominoplasty, and face-lift mortality and morbidity risk literature. *Dermatol Surg* 2005; 31(7 Pt 1):733–43; Erratum in: *Dermatol Surg* 2005; 31(9 Pt 1):1158.

Body Lifts

Surgical Considerations



Description: With heightened awareness of the importance of nutrition and exercise as well as the advent of improved gastric bypass and restriction techniques, more patients with massive weight loss are presenting to plastic surgeons for treatment of the resultant skin excess and laxity. Patients frequently have multiple areas of concern, from the face (see **Facelifts**) to the breasts (see **Mastopexy**) to the abdomen and thighs. Often patients will require circumferential torso plasty (combining **Abdominoplasty** with a modified buttocks lift), and/or extensive lower body work (medial and lateral thigh lifts). All of these body lift procedures may be combined with **liposuction** for additional contouring.

The patient is marked in the standing position in the preoperative holding area. Depending on surgeon preference, the initial operative position may begin supine, lateral decubitus, or prone. Incisions are made, and the marked excess skin and soft tissues are elevated and excised. The patient's position is changed as needed to allow for access to all of the surgical areas. Drains are placed. During wound closure, care is taken to close in several layers, beginning with the strength layer of the superficial fascial system. Dressings are applied, and compression garments or ACE wraps may also be used. The patient may elect to have the procedure as an outpatient but frequently choose to stay overnight in a monitored facility.

Usual preop diagnosis: Thigh and buttock laxity; lipodystrophy; redundant skin and soft tissue

(Print pagebreak 1097)

Summary of Procedures

Position	Multiple: supine, lateral decubitus, prone
Incision	Depending on the combination of procedures; may include circumferential waistline, transverse groin crease, possible medial thigh vertical extension
Unique considerations	Foley catheter; knee-high SCDs; appropriate pressure point padding Cefazolin 1 g iv 2–6 h
Antibiotics	50–100 mL, not including blood contained in specimen
Surgical time	Avoid ketorolac in the first 24–48 h; maintain semi-Fowler position for any procedures involving abdominoplasty
EBL	Minimal
Postop care	Seroma: 1–16% Dehiscence: 1–32% Skin necrosis: 1–10% Infection: 0.5–3.5% DVT/PE: 2–3%
Mortality	4–6
Morbidity	
Pain score	

Patient Population Characteristics

Age range	20–65 yr
Male:Female	1:4
Incidence	Thigh lift: 12,295 performed in the United States in 2006 Lower body lift: 10,323 performed in the United States in 2006
Etiology	Overweight; massive weight loss
Associated conditions	Obesity

Anesthetic Considerations

Patients may have had massive weight loss, or may be morbidly obese. (See [anesthetic considerations for abdominoplasty, p. 1094](#)).

Body lift procedures may be combined with liposuction. (See [anesthetic considerations, see p. 1099.](#))

Suggested Readings

1. Capella JF. Body lift. *Clin Plast Surg* 2008; 35(1):27–51.
2. Lockwood, TE: Fascial anchoring technique in medial thigh lifts. *Plast Reconstr Surg* 1988; 82(2):299–304.
3. Lockwood, TE: Lower body lift with superficial fascial system suspension. *Plast Reconstr Surg* 1993; 92(6):1112–22; discussion 1123–5.
4. Nemerofsky RB, Oliak DA, Capella JF: Body lift: an account of 200 consecutive cases in the massive weight loss patient. *Plast Reconstr Surg* 2006; 117(2):414–30.
5. Rohrich RJ, Gosman AA, Conrad MH, et al: Simplifying circumferential body contouring: the central body lift evolution. *Plast Reconstr Surg* 2006; 118(2): 525–35; discussion 536–8.
6. Strauch B, Herman C, Rohde C, et al: Mid-body contouring in the post-bariatric surgery patient. *Plast Reconstr Surg* 2006; 117 (7):2200–11.

(Print pagebreak 1098)

Liposuction

Surgical Considerations

Description: Liposuction remains the most commonly performed cosmetic surgical procedure in the United States. The surgical technique has changed since the introduction of the procedure in the late 1970s. For example, the preaspiration injection of epinephrine-containing wetting solution into the adipose tissue has expanded the use of the surgical procedure. Patients who desire a more dramatic cosmetic surgical result may now have larger volumes of fat removed safely, without losing large quantities of blood during surgery. All members of the surgical team must function in a coordinated fashion to avoid the many pitfalls associated with liposuction. Complications such as PE, fat emboli, fluid overload, toxicity from local anesthetics, and body-cavity perforation from both the wetting solution cannula and the suctioning cannula have been reported.

The current standards for performance of liposuction involve the use of an epinephrine-containing wetting solution injected into the subcutaneous tissue prior to aspiration. Most wetting solutions contain 1 L of LR, to which 1 mg of epinephrine and 200–500 mg of lidocaine are added. Epinephrine in the 1/1,000,000 concentration will provide excellent vasoconstriction in the adipose tissue before suctioning. The concentration of lidocaine depends on the primary anesthetic modality. For patients having GA or regional anesthesia, the lower concentration of local anesthetic will provide satisfactory postop analgesia. Higher concentrations of local anesthetic are needed for patients having liposuction under local anesthesia/MAC. Following administration of the wetting solution to the surgical region, 10–20 min is allowed for vasoconstriction to take place before suctioning. The large volume of local anesthetic and epinephrine-containing solution represents substantial risk to the patient (local anesthetic toxicity, HTN, cardiac arrhythmia, coronary insufficiency), along with the risk of perforation with the cannula.

Ultrasonic liposuction may be used to liquefy fat in the surgical region prior to or simultaneously with its removal. Power-assisted liposuction utilizes pressurized gases or an electrical motor to power the tip of the lipo cannula to improve the efficiency of the procedure. Complications reported during the use of the new technologies include seroma formation, increased blood loss, and increased risk of body cavity perforation.

Following completion of the surgery, incision sites are closed and sterile dressings are applied. Compressive garments may be worn by the patient for several d or wk, depending on the extent of the surgery. Discomfort in the surgical regions varies greatly from patient to patient, but may last from several d to several wk. Ultrasonic liposuction is now being used for the treatment of axillary osmidrosis (hyperhydrosis). Ultrasonic energy applied in the superficial planes of the skin of the axilla has successfully treated hyperhydrosis in a large number of patients. The procedure may be performed under local or general anesthesia.



Usual preop diagnosis: Obesity

Summary of Procedures

Position	According to body region (repositioning often required).
Incision	Incisions may be hidden in skin folds. The use of long injection and lipo cannulas will reduce the number of incisions.
Special instrumentation	Cannulas, aspirating machine; ultrasonic or power-assisted machinery
Antibiotics + other meds	Cefazolin 1 g. Dexamethasone 8 mg may be given during surgery.
Surgical time	2–7 h, depending on volume of resection and number of surgical sites
EBL	2–8% of total aspirate volume when using wetting solution before aspiration
Postop care	PACU for small-volume liposuction; hospitalization or postop monitoring for large-volume resection (> 5,000 mL)
Mortality	19.1/100,000 Pulmonary emboli Fat emboli Fluid overload
Morbidity	Local anesthetic toxicity Body cavity perforation Respiratory restriction from compressive garments has been noted in PACU. Wetting solution must be warmed before use to prevent hypothermia. Foley catheter monitoring is used for larger volume surgeries. TEDs, SCDs used on all cases.
Unique considerations	
Pain score	4–6

(Print pagebreak 1099)

Patient Population Characteristics

Age range	Teens–70 yr
Male:Female	< 1:9
Etiology	Quest for eternal youth

>Anesthetic Considerations

Preoperative

Patients considering liposuction should be in ASA category I or II. The ideal candidate for surgery should be physically active and have maintained a stable weight Hx for 6 mo–1 yr. Preop consultation with the surgical team is necessary for finalizing the anesthetic plan. Current techniques use the injection of wetting solution to reduce blood loss and to deliver local anesthetics for postop analgesia. Most wetting solutions contain lidocaine 200–500 mg/L combined with epinephrine 1 mg/L (1/1,000,000). Typically, 1 mL of wetting solution will be used for each 1 mL of anticipated fat resection. Because of the demand for more dramatic results, larger fat resections (large-volume liposuction > 5,000 mL) are being performed. These large-volume procedures may require postop hospitalization for patient monitoring (fluid shifts, ↓ Hct, pulmonary edema). Large volumes of wetting solution often are used in these procedures and require limiting iv fluids during surgery. In contrast, small-volume liposuction often requires larger volumes of iv fluid administration because of the small volumes of wetting solution that would be available for postop



hydration.

Respiratory

Postop discomfort following chest, upper back, and upper abdomen liposuction may interfere with respiration. Restrictive compression garments applied to the chest or upper abdomen also may restrict breathing. Patients with respiratory impairment may not be candidates for this procedure.

Patients with Hx of CHF or those with MVP may not be candidates for high-volume liposuction. Fluid management is based on volume status and the quantity of tumescent fluid injected during surgery. Tumescent solution injected into the subcutaneous tissue is absorbed over 48 h. Postop pulmonary edema has been reported 2° fluid overload in patients receiving larger volumes of tumescent injection. Some patients may have previously taken fenfluramine alone or in combination with phentermine for weight loss. Those patients should be evaluated for pulmonary HTN (e.g., dyspnea, central cyanosis, right axis deviation and CXR changes) and valvular heart disease. All weight control drugs should be D/C'd at least 2 wk before surgery.

Preop neurologic exam should be normal. Local anesthetic administration during tumescent injection may cause areas of numbness postop.

Vasoconstriction from epinephrine-containing wetting solutions greatly reduces blood loss to 2–8% of the total aspirate volume. Blood transfusion is rarely needed, even in larger volume resections.

Tests: Hct

Other tests as indicated from H&P.

Midazolam 1–2 mg or oral benzodiazepine (e.g., lorazepam 1 mg po 1–2 h preop)

Cardiovascular

Neurologic

Hematologic

Laboratory

Premedication

(Print pagebreak 1100)

Intraoperative

Anesthetic technique: Local anesthesia may be suitable for smaller volume liposuction. Regional anesthesia (spinal, epidural) may be used when the surgical regions are appropriate for this type of anesthetic. Concerns have been raised because of vasodilation →↑ blood loss +↑ fat embolization with regional anesthesia. GA ensures patient comfort and allows liposuction to be done on all body regions. Airway and ventilation control also provides safety during the surgery. SCDs or foot/ankle compression devices are used for all patients to reduce the risk of PE.

Induction

Standard induction (see [p. B-2](#)). Steroids (dexamethasone 8 mg) may be used to reduce postop swelling and may be of benefit in the event of fat embolism.

Standard maintenance (see [p. B-2](#)) with volatile anesthetics or propofol infusion.

Neuromuscular blockade as appropriate. GA is maintained during application of compression garments.

Antiemetic prophylaxis with metoclopramide (10–20 mg) and ondansetron (4 mg) is appropriate. Careful monitoring of respiratory function is necessary when surgery has been performed on the chest, back or upper abdomen, since compression garments may limit respiration.

Blood and fluid requirements

IV: 18 or 20 ga × 1
NS/LR

NS/LR volume determined by the needs of the case. Transfusion rarely needed, diuretics (e.g., furosemide 5–10 mg) may be needed for patients receiving large volumes of wetting solution. Larger intravenous fluid volumes are needed during smaller volume liposuction and

**Monitoring**

Standard monitors (see [p. B-1](#)).
± Foley catheter

Positioning

and pad pressure points.
eyes.
Repeat s frequently.

Complications

Local anesthetic toxicity
Excess blood loss
Volume overload
Abdominal cavity perforation
Peripheral nerve injury

Hypothermia
Fat embolism

restriction of IV fluid may be needed during large volume liposuction because of absorption of large volumes of wetting solution into the circulation.

UO monitoring mandatory on all large-volume lipo cases. Careful temperature monitoring.

Frequent intraop position checks are needed as patient position may change during surgery → potential for peripheral nerve injury. Documentation of avoidance of external ocular pressure Q 15 minutes while patients are in the prone position. Lidocaine 35–55 mg/kg has been shown to produce safe serum levels when used in a highly dilute solution (0.05–0.1%) with epinephrine for tumescent injection during liposuction. Peak plasma lidocaine level occurs 10–12 h after infusion. Peak epinephrine levels occur 5–6 h after infusion and leads to increases in cardiac index, heart rate.

Vigorous efforts needed to maintain body temperature (e.g., fluid warmer, Bair-Hugger).

(Print pagebreak 1101)

Postoperative**Complications**

Hypoxemia
HTN
Respiratory compromise

Pain management

PO analgesics
IV opiates

Consider fluid overload, fat embolism, pneumothorax or pulmonary edema in differential diagnosis (DDx).

Consider fluid overload and epinephrine effect in DDx.

May be 2° compression garments and pain. Patients often will be comfortable 2° residual local anesthesia, which may persist for 8–24 h. Oral analgesics are usually satisfactory for postop pain control.

Hct
Electrolytes

Hct
+ Electrolytes following large-volume procedures.

Suggested Readings

1. Burk RW III, Guzman-Stein G, Vasconez LO: Lidocaine and epinephrine levels in tumescent technique liposuction. *Plast Reconstr Surg* 1996; 97:1379.
2. Commons GW, Chang CC, Vistnes D, Halperin BD: Role of liposuction in morbid obesity. In *Problems in General Surgery*. Lippincott Williams & Wilkins, Philadelphia: 2000.
3. Commons GW, Halperin BD, Chang CC. Large volume liposuction: a review of 631 consecutive cases over 12 years. *Plast Reconstr Surg* 2001; 108:1753.
4. Commons GW, Halperin BD: Considerations in large volume liposuction. *Sem Plast Surg* 2002; 16(2).

5. Do DV, Kelley LC. Tumescent anesthesia: evolution and current uses. *Adv Dermatol*. 2007;23:33–46.
6. Gilliland M, Commons GW, Halperin BD: Safety issues in ultrasonic assisted large volume lipoplasty. *Clin Plast Surg* 1999; 26 (2)317–35.
7. Grazer FM, deJong RH: Fatal outcomes from liposuction: census survey of cosmetic surgeons. *Plast Reconstr Surg* 2000; 105 (1):436–48.
8. Hunstad JP: Body contouring in the obese patient. *Clin Plast Surg* 1996; 23(4):647–70.
9. Kenkel JM et.al. Hemodynamic physiology and thermoregulation in Liposuction *Plast Reconstr Surg* 2004 Aug; 114 (2): 503–13.
10. Klein JA: Tumescent technique for regional anesthesia permits lidocaine doses of 35 mg/kg for liposuction. *J Dermatol Surg Oncol* 1990; 16:248–63.
11. Meister F: Possible association between tumescent technique and life-threatening pulmonary complications. *Clin Plast Surg* 1996; 23:642.
12. Ostad A, Kageymis N, Moy RL: Tumescent anesthesia with a lidocaine dose of 55 mg/kg is safe for liposuction. *Dermatol Surg* 1996; 22:921–7.
13. Pitman GH, Aker JS, Tripp ZD: Tumescent liposuction: a surgeon's perspective. *Clin Plast Surg* 1996; 23(4):633–41.
14. Rohrck RJ, Leedy JE, Swamy R, Brown SA, Coleman J, Fluid resuscitation in liposuction: a retrospective review of 89 consecutive patients *Plast Reconstr Surg* 2006 Feb; 117(2): 431–5.
15. Samdal F, Amland PF, Bugge JF: Blood loss during liposuction using the tumescent technique. *Aesthetic Plast Surg* 1994; 18 (2):157–60.