

FACULTY DISCUSSION & STUDY GUIDE

In addition to the review of the ASPS EdNet course modular material, this guide is provided as a tool for faculty use in preparation for a weekly conference. By following and addressing the points below, any plastic surgeon should be able to step in to teach the curriculum in a consistent and complete manner.

X. Aesthetic

X.F.1. Body Contouring: Abdominoplasty

By Edward Luce, MD

Financed with a grant from The Hoopes Foundation.

A. Anatomy, evaluation

1. What is the normal distance from the anterior vulvar commissure to the top of the mons? (Approximately 6 cm) Distance from the top of the mons to umbilicus? (11-13 cm.)
 - a. The umbilicus in the vast majority of patients is located on what transverse plane anatomically? (A line drawn through the apex of the iliac crests, although the range may be as far as 3 cm superior to said line.)
 - b. What is the respect to the relationship between the transverse width of the rib cage, hip width, and the waist, that is aesthetically more pleasing in a woman? (Hips wider than the rib cage which in turn is wider than the waist.)
 - c. What measurement defines a long versus short-waisted patient? (In reality, assuming the transverse width of the ribcage is held constant, the measurement of the vertical distance from the inferior edge of the rib cage to a transverse line drawn through the umbilicus.)

Editor's Notes: The musculo-fascia anatomy of the abdomen is discussed in the Abdominal Wall submodule VI.C.3.

2. Describe the zones of adherence of the superficial fascial system. (Inguinal crease, supraumbilical midline, and the iliac crest in men; between the iliac crest and the lateral rib cage in women.)
 - a. What are the fascia layers superficial to the anterior rectus fascia? (Scarpa's deep and Camper's more superficial.)

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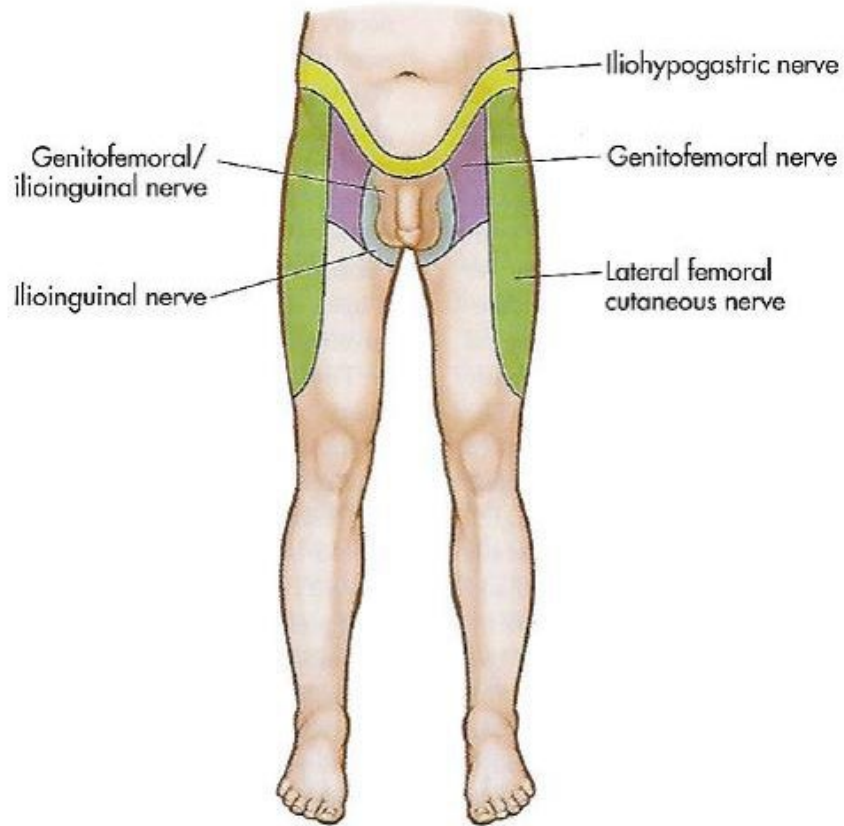
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3. Describe the vascular zones of the abdomen. (Essentially three zones: a central zone I, that extends from an inferior transverse line roughly half-way between pubis and the umbilicus and superiorly to the epigastrium and laterally for a variable distance that roughly corresponds to the lateral border of the rectus or slightly further; zone II which is a transverse zone that encompasses the lower one-half of the lower quadrants of the abdomen extending to an intersection with the inguinal creases laterally; zone III which is lateral to zone I the length of the abdomen and extends into the flanks and over the iliac crests bilaterally.)
 - a. What is the blood supply of each? (Intercostal and lumbar perforators to III; the DIEA and DSEA for I; the SIEA, SCIA; and superficial external pudendal for II. DIEA is deep inferior epigastric, DSEA is deep superior epigastric, SIEA is superficial inferior epigastric, and SCIA is superficial circumflex iliac.)
 - b. What are the key nerves relevant to the performance of abdominoplasty? (Lateral femoral cutaneous provides sensation just medial to the anterior superior iliac spine and lateral aspect of the hip and most of the lateral thigh; the ilioinguinal and genito-femoral both of which cross an abdominoplasty incision and innervate the mons, lateral vulva in women or scrotum in men, and the upper medial thigh.)

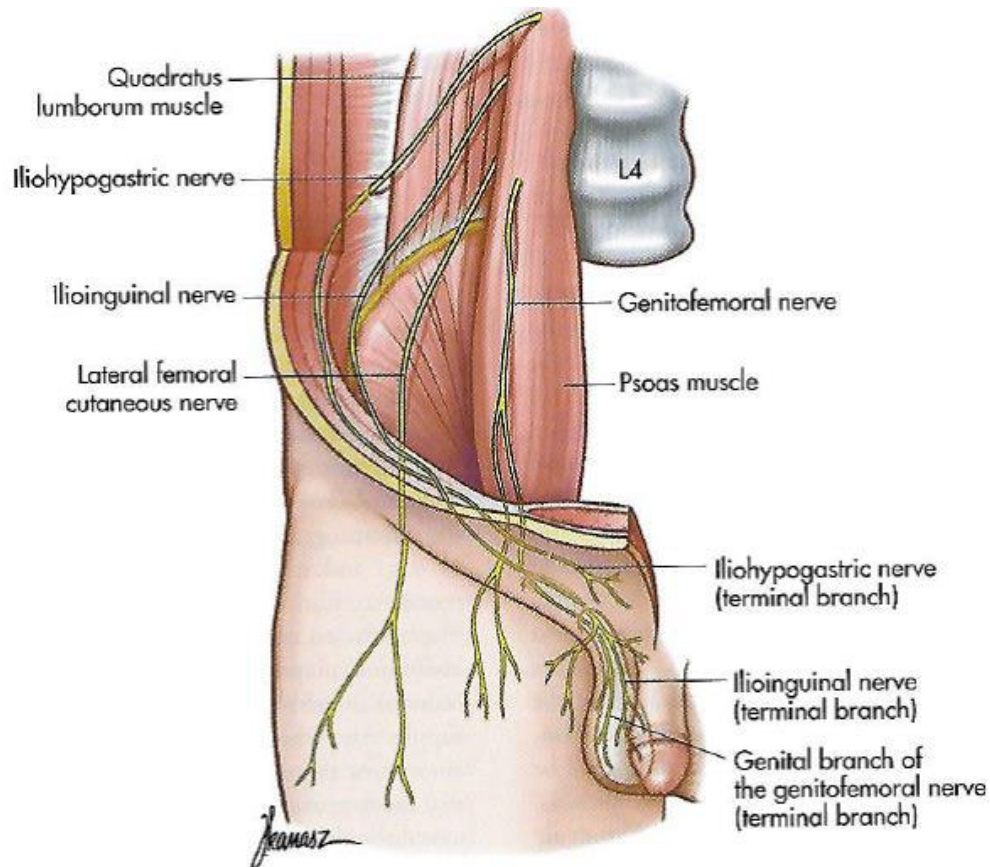
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4. What are the three components or variables in operative planning in abdominoplasty? (Skin, fat, musculofascial laxity. The relative proportion of each of those three components; skin laxity, magnitude of fat, and laxity of the anterior rectus fascia determine which procedure will be offered.)
5. In terms of fat accumulation, differentiate between men and women in the following: timing of increase in intraabdominal fat, location of increase in subcutaneous fat, change in location of the increase in fat in pre versus post menopausal females. (Men tend to increase their intraabdominal fat younger in life; the subcutaneous fat is distributed centrally in males and more laterally over hips, flanks, trochanters in women; post-menopausal women distribute their fat similar to men, centrally and intra abdominal.)
6. Liposuction is commonly performed in conjunction with an abdominoplasty. Describe Matarasso's zones of safety in such a combination of procedures and critique. (The lower or infra umbilical abdomen skin and

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soft tissue will be mostly excised with a full abdominoplasty. The central supra umbilical area viewed as a inverted U is termed by Matarasso as area 3 or cautious. A broader both lateral and superior inverted U surrounding this zone, Matarasso area 2 could have limited liposuction. Finally, the most lateral flank areas, hips, and lateral subcostal angles are viewed as “safe” or area one.

Actually this classification is difficult to reconcile with the Huger classification of the abdominal wall by vascular supply. A more contemporary thought is undermining done cautiously as the subcostal angles are approached, limited suctioning in this area superiorly while more liposuction can be accomplished over the hips and lower flanks and limited suctioning and undermining in the most superior portion of the epigastrium.)

7. In the abdominoplasty consult, besides patient goals, what would be three key questions in addition to other medical history questions? (Smoking, diabetes, personal or family history of thromboembolic disease.)
8. Outline the important aspects of the physical exam, in particular, the bony framework, skin, fat, and musculo-fascial system. (The height of the waist should be assessed as a ratio of the distance from the subcostal angle to the iliac crest to the transverse width of the waist and the rib cage; skin: scars, striae, pinch test including lateral soft tissue excess; fat: distinguish between intra-and extra abdominal fat by having the patient tense the recti muscles; musculo-fascial: laxity, diastasis, hernia. Measure the distance from the top of the mons to umbilicus. Ascertain for the potential presence of hernia by a Valsalva maneuver in supine position. Examine for the presence of scars.)

Editorial comment:

The importance of the height vs. the width of the waist as well as the aesthetics of the width of the bony pelvis can be illustrated by the difference between two women. Each 5ft 5in in height and 160lb in weight or a BMI of 27 and each with the same skin laxity. One woman may have a relatively narrow bony pelvis but a moderately obese and protuberant abdomen. The other woman may have a wider bony pelvis and a short vertical height to the waist but actually little localized adiposity in the abdomen. The first woman could

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anticipate a reasonable result with abdominoplasty, fascial plication, ect. The second woman would have a modest result, if any, from abdominoplasty.

B. Operative approaches

1. The readings outlined a “menu” of available procedures for contouring the abdomen dependent on the physical findings including magnitude of skin laxity and degree of localized adiposity. Discuss that menu and give the pros and cons. (At one end of the spectrum, the abdomen that is primarily fat with little laxity of skin can be addressed with liposuction alone. The next step of the hierarchy of procedures would be a “mini”-abdominoplasty procedure combined with liposuction with an excision of an inferior ellipse of skin in the lower central abdomen only. Thirdly, a “limited” abdominoplasty is a more lengthy incision than a mini abdominoplasty but still confined within the anterior superior iliac spines and combined with transection of the stalk of the umbilicus to allow the umbilicus to “float” inferiorly. The remaining three procedures are a standard abdominoplasty as discussed below, an extended or high lateral tension abdominoplasty also discussed below, and finally a combined transverse and vertical incision or fleur-d-lis. Very few patients have indications for just a limited skin excision alone. The limiting factor in a limited abdominoplasty with a floating umbilicus is the degree of narrowing of the distance between the umbilicus and the top of the mons, 10-11 cm but can be combined with liposuction as well as fascial imbrication of the lower abdomen. An alternative to a floating umbilicus is to create a new site for the umbilicus in the abdominal skin apron and close the original site with also a short vertical incision closure of the old umbilicus site between umbilicus and mons.)
2. Describe options for management of the umbilicus and how selection of an appropriate option can be accomplished. (In a miniabdominoplasty the umbilicus is left in situ and is pulled somewhat inferiorly which can only be performed to a limited extent. A second option is to transect and allow the umbilicus to “float” inferiorly which again can only be performed to a limited extent since a low lying umbilicus, less than 10 cm from the top of the mons, is aesthetically undesirable. Thirdly, and most commonly the umbilicus is released with a circumumbilical incision and is repositioned into a separate and new incision through the abdominal skin. In this last option the old umbilicus incision site can be incorporated in the skin excision. Otherwise, a short vertical midline excision closure and scar will be necessary.)

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3. What are the several basic elements of an abdominoplasty? (SAL, skin excision, contouring of the musculo-fascial system with plication, reimplantation of the umbilicus.)
 - a. Draw the abdomen and outline the incision for a standard or full abdominoplasty. (A “handlebar” incision that begins centrally and inferiorly at the top of the mons and/or 6 cm from the anterior vulvar commissure extends laterally 1-2 cm above the inguinal crease and then further laterally and superiorly toward and over the iliac crest. An alternate design is a “smile” configuration that differs by a more inferior location of the lateral extension. Perhaps does not permit the same degree of flank skin-soft tissue excision, if desired. See below. Always ascertain with the patient’s clothing, satisfaction with the design. The midline should be marked both infra- and supra-umbilically.)
 - b. Draw the recommended undermining. (Essentially a inverted U with narrowing of the lateral extent of the undermining as one proceeds superiorly into the epigastrium. Undermining at the subcostal angles, if any, should be judicious and conservative depending on patient risk factors.)
 - c. In what plane is the undermining performed and why? (A thin layer of a loose areolar tissue is left intact on the anterior rectus fascia to diminish seroma incidence.)
4. Essentially, what are the options for management of skin and soft tissue laxity that extends laterally over the iliac crest and into the flanks? (Either a high lateral tension or an extension of the handlebar abdominoplasty that extends laterally and superiorly into the flanks and as far posterior as feasible in the supine position. Residual dog ears may occur.)
 - a. Differentiate a panniculectomy from an abdominoplasty. (Centrally a panniculectomy is performed for a pannus or overhang of skin and fat and is done simply in a amputation manner without undermining.)
5. Defatting of the residual skin flap is performed at what plane and why? (The fat deep to the superficial fascial system or Scarpa’s fascia can be excised since the vascular supply to the skin lies principally in the superficial fat.)

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6. What percentage incidence of complications would you quote to a patient who has under consideration a standard abdominoplasty who does not smoke? (2-5% incidence of wound dehiscence/slough, a 2-6% frequency of a seroma that requires aspiration, a one-half-1% of deep vein thrombosis with perhaps 1 in 5 to 1 in 10 of those patients sustaining a pulmonary embolism.)
7. In general terms, describe and classify thrombo-embolic risks for plastic surgery patients. (Risk factors are age, 40-60, greater than 60; obesity, magnitude and duration of surgery, known past history of thrombo-embolus, documented hypercoagulable state, cancer, history of smoking.)

Editor's Note: Appropriate VTE prophylaxis is discussed in the Patient Safety Module XII.

C. High Lateral Tension abdominoplasty

A reading has been included about high lateral tension abdominoplasty, HLT, with superficial fascial system suspension.

1. What are the two assumptions about abdominoplasty that advocates of HLT believe are incorrect and what is the basic premise? (The two unwarranted assumptions according to the readings is that wide undermining to the costal margins is necessary for adequate abdominal flap advancement and that discontinuous central abdominal skin relaxation occurs primarily vertically. The premise is that undermining is possible to loosen soft tissues without direct undermining.)
 - a. The advocates of HLT believe that a truncal skin relaxation occurs where maximally? (Laterally, resulting in a superior-medial loosening toward the epigastrium.)
2. What are the three essential components of the HLT surgical approach? (Undermining only centrally, wide liposuction of the flanks upper abdomen and hips; a skin resection pattern that places the highest tension, according to the readings, laterally; anchoring of the superficial fascial systems to external oblique fascia externally with large caliber sutures.)

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3. Critique: (Lockwood's contention is that a lower incidence of skin necrosis is obtained because placement of the tension laterally rather than centrally and that the truncal laxity can be addressed more laterally than centrally.

The critique centers on changes and practice over the past 20 years as well as some error in Lockwood's basic premise. Although at the time of Lockwood's writing liposuction was either contraindicated or very limited in scale when done at the same setting as abdominoplasty, the specialty has begun to realize that more extensive liposuction is possible providing the area of the superior intercostal and segmental perforators are avoided. The classic undermining of the abdominal wall to the level of the subcostal angles also has fallen out of favor with less extensive undermining superiorly and laterally along the rib cage and concentrated more centrally. The pattern of undermining resembles an inverted "U". The process of closure of the abdominoplasty also addresses the issue of blood supply by advancement of skin laxity from lateral to central which is an offshoot of Lockwood's concept. Most importantly, although lateral truncal laxity exists as described by the author, that laxity is *inferior* in distribution and much less superiorly as evident in the design and performance of circumferential body lifts. The superior truncal soft tissue has substantial zones of adherence along the entire length of trunk, which do not lend to disruption particularly in the thorax.

What has been learned from Lockwood, though, is the ability to undermine hip-thigh soft tissue with a cannula or dissector and advancement of that soft tissue with secure points established from the superficial fascial system inferiorly to abdominal wall fascia superiorly. The benefit is some element of a hip lift in conjunction with abdominoplasty. To do so requires modification of the design of the abdominoplasty with a more superior and more oblique angle to the handle of the "handlebar" component, a modification that must be described to the patient for consent.)

D. Liposuction

1. Besides expectations, what are the essential elements of the history to be obtained from the liposuction patient? (A history of weight gain, or loss, and pattern of same, history indicative of an increased risk of thromboembolic disease.)

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2. What are some of the caveats about physical exam of the liposuction patient? (Assess the element of skin laxity, the BMI, the intra-abdominal fat component particularly in males, the presence of abdominal incisions and possible hernias, and distribution of excess fat, presence of cellulite.)
3. Discuss lidocaine toxicity in terms of maximum dosage, absorption pattern in liposuction, symptoms and plasma levels seen in mild toxicity and clinical findings and plasma levels in severe toxicity. (The peak lidocaine plasma levels when used with the tumescent technique in liposuction may not peak until ten or twelve hours after infiltration. The general acceptance for lidocaine doses in liposuction is 35mg/kg, although many perhaps most surgeons use substantially lower doses. Mild toxicity is seen at plasma levels between 3-6 micrograms/mL with symptoms of lightheadedness, drowsiness, tinnitus, a metallic taste in the mouth, and slurred speech. Severe toxicity is seen at higher plasma levels in a vicinity of ten to twelve micrograms per cc and may occur with muscle twitching, convulsions, central nervous system depression, and coma.)
 - a. What is the recommended maximal dose of *epinephrine* utilized in tumescent solution? (0.07mg/kg or 5cc, 5 mg, of a 1 to 1,000 concentration in a 70 kg patient.)

Editorial Comment: Management of lidocaine toxicity is discussed in I. Basic Principles

C. Local anesthetics.

4. Define the difference between super wet and tumescent technique. (Super wet is a 1 to 1 ratio of volume of infiltration versus aspirate. Tumescent can be as high as 3 to 1 ratio. Actually, the division between the two is not concise. A commonly employed formula for tumescent solution is 30 cc of 1% lidocaine without epinephrine and 1 cc of 1-1000 epinephrine per 1000 cc of Ringer's lactate for a maximum of 5000 cc. Beyond 5L, one should consider deletion of the epinephrine.)
 - a. What would be the milligrams per kilograms of lidocaine in the administration of 5000 cc with the formula above? (The calculations are 30 cc of 1% times 5 liters equals 150 cc of 1% or 1.5 grams. For a 70 kilogram patient 1500 milligrams would represent a 21 gram per kilogram dosage.)

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5. What are the recommendations for the location of performance and postoperative care of the large volume liposuction patient? (The ASPS recommendations are a maximum of 5,000 cc of aspirate in a non-hospital setting, information not available in the reading. General practice guidelines would recommend overnight observation for patients who have had large-volume liposuction. Regardless, if the facility is not hospital based, it should be accredited by one of the three routes for accreditation of outpatient facilities.)
6. Discuss the mundane elements of preoperative marking, incision placement, positioning, and maintenance of data. (Preoperative marking should be done in a standing position with a marking pen that will survive the prep. Incisions are placed as inconspicuous a location as possible in that skin folds. Positioning is dictated by the areas to be suctioned, the most extensive would be prone to supine. A continuous data sheet that records infiltrate and aspiration as well of course the intravenous fluid administration and urine output.)
7. Discuss in general the following liposuction modalities: ultrasound-assisted, suction-assisted, and power-assisted. (Ultrasound is as the name applies, the use of ultrasound energy that delivers fat liquefaction. Suction-assisted lipoplasty is essentially suction with a mechanical energy or power driven by the surgeon's movement of the cannula. Power-assisted lipoplasty is a external power source that moves the cannula tip in a forward and backward motion, replicating the surgeon's movement in suction-assisted lipoplasty.)
8. In what circumstances is UAL more likely to create excessive bleeding? (UAL performed in tissues beyond the limits of the tumescent fluid infiltration, cavitation effect in dry environment, worn out probe.)
9. What are the factors likely to increase the probability of seroma with UAL? (Increase ultrasound energy by increased time or generator setting; perhaps liposuction performed directly on fascia.)
10. What are the two cardinal rules to prevent thermal injury in UAL? (Use ultrasound only in those areas that have been infiltrated with tumescent solution and always keep the ultrasound probe in motion. Limit the duration of any one area to three minutes.)

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11. Discuss immediate, early, and late complications in terms of occurrence and prevention. (The most feared acute complication is thromboembolic phenomenon with pulmonary embolism. Other acute life-threatening complications include fluid overload, lidocaine toxicity and, rarely, intraabdominal injury. Early complications include seromas, skin loss, and, rarely, life-threatening infections. Principal late complications are those of contour irregularities and skin hyperpigmentation.)

Video Notes:

Boudreault DJ and Sieber DA, "Getting the best results in abdominoplasty: Current advanced concepts", *Plast. Recon. Surg.* (2019);143(3):628e

Video 1: Markings

1. Standard lines-inferior, superior midline
2. SAL lines-marks out posterior SAL which implies a prone position

Swanson E, "Prospective clinical study of 551 cases of liposuction and abdominoplasty performed individually and in combination", *PRSGO*, (2013);1(5):5

Video 1:

1. Infusion of tumescent by Klein pump with conscious sedation; UAL of various flank abdomen exc.

Video 2:

1. Excision of lower abdominal skin, undermining wider than an inverted "U"; rectus plication

Video 3:

1. Jack knife positioning for closure

Video 4:

1. Closure in layers as well as anchoring sutures

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Richter DF and Stoff A, Chapter 25 "Abdominoplasty procedures", Neligan PC, *Plastic Surgery*, Volume 2, (2013); pgs. **531-546**.

Matarasso A, Matarasso DM, and Matarasso EJ, "Abdominoplasty: Classic Principles and technique", *Clin. Plast. Surg.*, (2014);41:**Figures 5-7 ONLY**.

Boudreault DJ and Sieber DA, "Getting the best results in abdominoplasty: Current advanced concepts", *Plast. Reconstr. Surg.*, (2019);143(3):**628e-36e and Video 1 and Figure 1 ONLY**.

Rosenfield LK, "High tension abdominoplasty 2.0", *Clinics in Plastic Surgery*, (2010); 37:**441-46, 450-53, ONLY**.

Aly A, Editorial comments: "High tension abdominoplasty 2.0", *Clinics in Plastic Surgery*, (2010); 37:**467**.

Iverson, R.E., M.D.; Pao, V.S., M.D. "Liposuction", *Plast. Reconstr. Surg.*, (2008) Supplement, 121:**1-11**.

Swanson E, "Prospective clinical study of 551 cases of liposuction and abdominoplasty performed individually and in combination", *Plast. Reconstr. Surg. Glob. Open*, (2013);1(5):**5-13 (Including Videos 1-4)**.

Stephan PJ and Kenkel JM, "Updates and advances in liposuction", *Aesthetic Surgery Journal*, (2010);30(1):**83-92**.

de Souza Pinto EB, Abdala PC, et al. "Liposuction and VASER", *Clin. Plast. Surg.*, (2006);33(1):**107-115**.

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