

LIPOSUCTION

Review of Anatomy, Techniques, Anesthesia &
Safety

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Disclosures

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ASPS Cosmetic Surgery Statistics

Procedure	2020	2019	2021
Breast Augmt.	193,073	287,085	212,500
Liposuction*	211,067	265,209	354,015
Rhinoplasty	352,555	362,299	389,155
Blepharoplasty	325,212	354,105	327,514
Facelift	234,374	261,987	133,856

* This number may be understated as the ASPS survey does not include all specialties performing liposuction procedures.

History Liposuction

(for reference only)

- Liposuction was originally described by Drs. Arpad & Giorgio Fischer (Ob-gyn, father & son) in Rome, Italy in 1974 and was published in **1976**. They used dry technique & large blunt cannulas (same as used for D&C).
- Dr. Yves-Gerald Illouz, a French plastic surgeon born in Algeria, developed interest in liposuction in 1977 and visited Drs. Fischer. Dr. Illouz developed hypotonic saline hydro-dissection technique.

History of Liposuction continued (2)

- Dr. Pierre Fournier, an Ob-gyn, in France in 1978, made innovations including the addition of Lidocaine, introduced multi-port entry, syringe lipo-sculpture and eventually mega-liposuction.
- Liposuction was imported into the U.S. by physicians who attended liposuction courses by Illouz & Fournier in Paris – Drs. Rhoda Narins, (Derm '78), Lawrence Field (Derm '78), Norman Martin (ENT '79).

History of Liposuction continued (3)

- Liposuction was **initially rejected** by French and US plastic surgeons; it was not accepted until Dr. Illouz was invited to present his experience to the ASPS annual meeting in 1982.
- In 1982, first U.S. workshop on Liposuction was organized by **AACS** by Drs. Newman (ENT) & Dolsky (plastic surgeon) in Philadelphia.
- First live liposuction workshop in the US was conducted by **AACS** in Hollywood, CA in 1983.

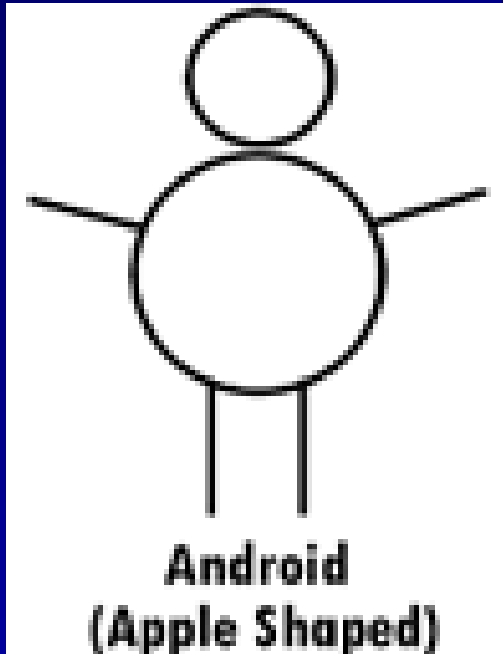
History of Liposuction continued (4)

- In 1985, Jeffery Klein (Derm.) learned about liposuction at a course by Drs. Fenno (ENT) & Johnson in 1985. He developed tumescent technique of liposuction out of necessity. Being a dermatologist, he was denied liposuction privileges at Hoag Memorial hospital in Newport Beach, CA. Thus, he developed office-based liposuction under strict local anesthesia.
- Thus, based on documentable history, liposuction was both first described & innovated by “non-plastic” **cosmetic surgeons.**

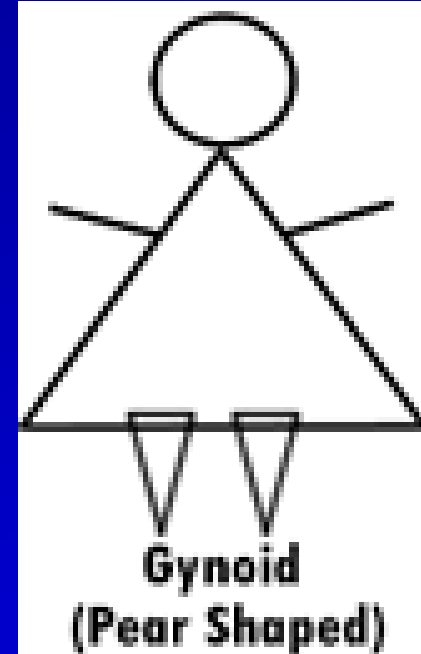
AACS Guidelines for Liposuction Surgery 2006

- Although dated, it is an important & thoughtful document. It deserves reading.
- It is available on the AACS website.
- It has an extensive bibliography referencing many original articles not normally quoted by the standard plastic surgery literature.

Gender Differences in the Distribution of Adipose Tissue

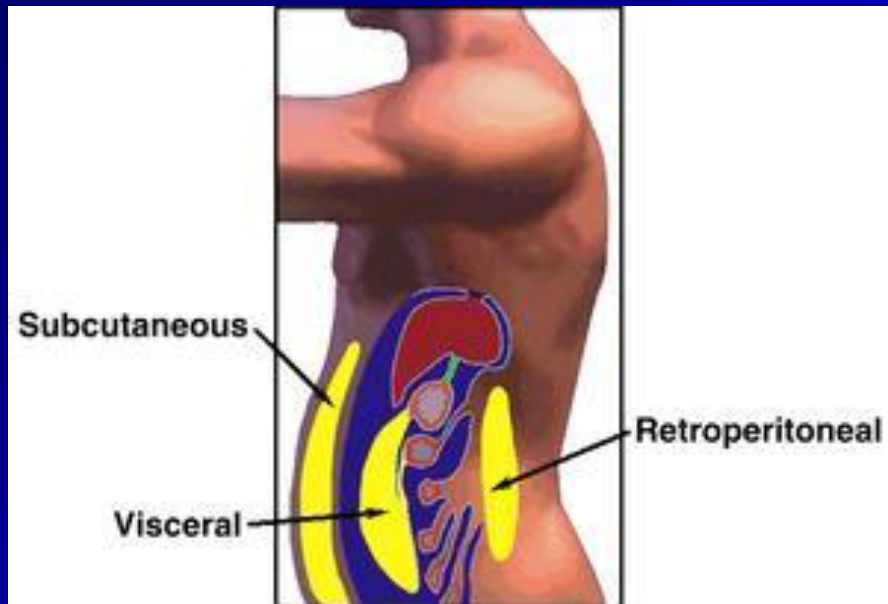


Upper and lower abdomen, flanks and nape of the neck

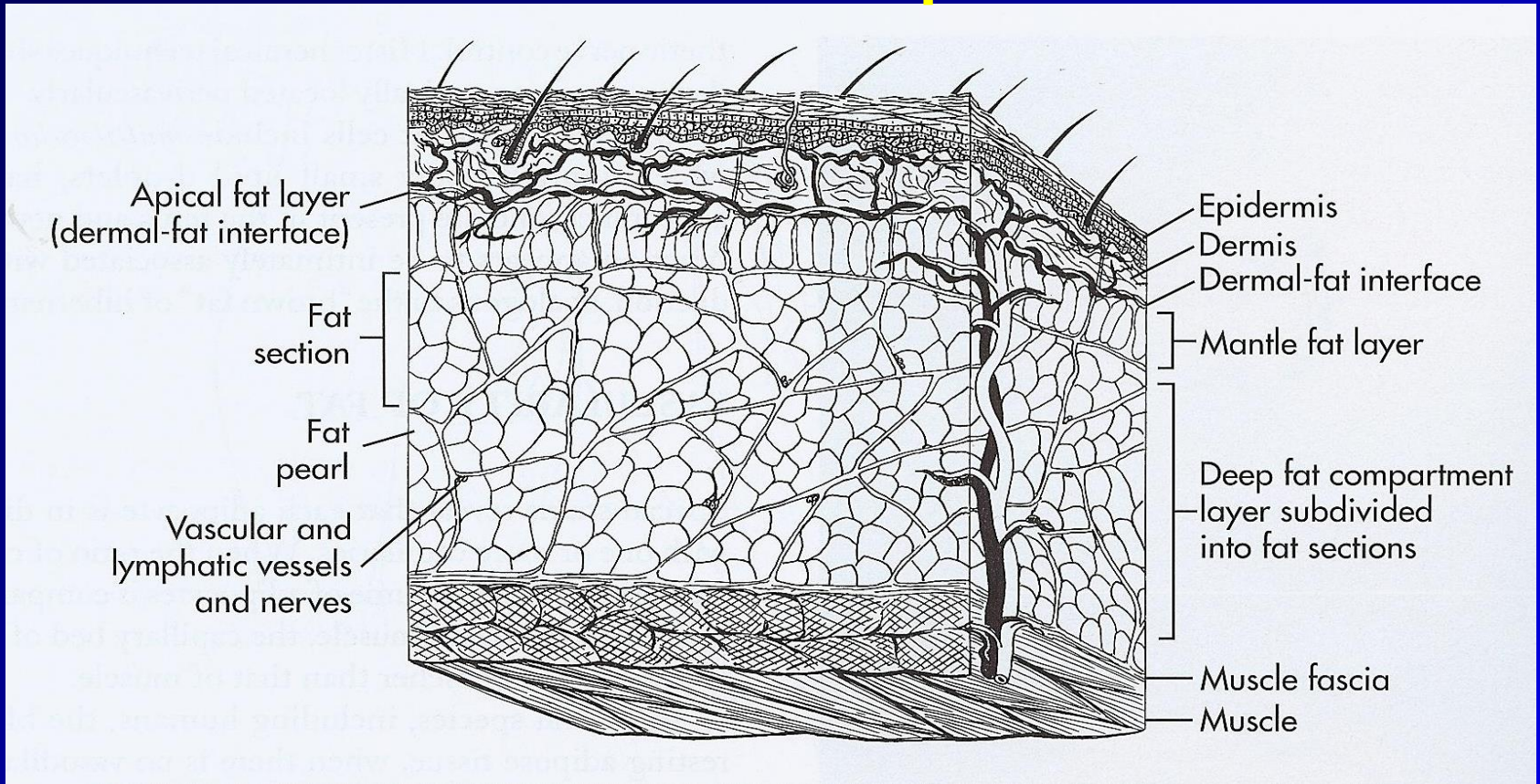


Lower abdomen, hips, upper thighs and buttocks

Adipose Tissue in the Abdomen



Subcutaneous Adipose Tissue



Subcutaneous tissue is bounded above by reticular dermis consisting of collagenous fibers in a net-like (reticular) pattern

Adipocyte (Fat Cells)

- Adipocyte is typically 0.1mm in diameter with some cells half the size and some twice the size.
 - Fat is stored in adipocytes in a semi-liquid state as triglycerides and cholesteryl ester.
 - Average 70 kg adult has **30 billion cells** weighing 30 lbs pounds (13.5kg).
 - **Number of fat cells is mostly static after puberty; with excess weight gain the fat cell will increase about four-fold in volume before dividing.**
 - Fat cells are metabolically active and secrete several adipokines: Resistin, adiponectin, leptin & apelin.
-

Body Mass Index & Obesity

□ BMI= weight (kg) / height (m)²

□ BMI= weight (lbs) / height (in)² x 704.5

- BMI of 18.5-24.9 healthy weight
- BMI of 25-29.9 considered overweight
- BMI of >30 is obese
- BMI of >40 is morbidly obese

Patient Selection for Liposuction

- Patients with stable weight
- Patients with areas of adipose tissue not responding to diet and exercise
- Patients with BMI < 30
- Patients without significant skin laxity or numerous stretch marks
- **Patients must be committed to keep their post-op weight stable**

Patient Evaluation

- ❑ Skin quality, presence of stretch marks, cellulite
- ❑ Pinch test (assess thickness of adipose tissue)
- ❑ Evaluate musculo-fascial contour of **abdomen**
 - Consider intra-abdominal fat
 - Asses for umbilical and other **hernias**
 - Asses for Rectus muscle diastasis (“mommy pooch”)
- ❑ Note presence of abdominal scars
- ❑ Select areas of liposuction, estimate the anticipated amount of fat to be removed and decide on a single versus staged procedures

Contra-indications to Liposuction

- ❑ Morbidly obese patients
- ❑ Unstable weight, recent weight gain
- ❑ Unrealistic expectations / Body Dysmorphic Syndrome
- ❑ Poor skin elasticity (excessive skin laxity)
- ❑ Intra-abdominal fat deposits
- ❑ Complicating medical conditions (history of bleeding disorders, cardiac disease, thrombophlebitis)

Abdominal Ventral Hernia



Pre-operative evaluation

- ❑ **Always think safety**
- ❑ Recognize the unhealthy patient
- ❑ Prevent Deep Venous Thrombosis
- ❑ Minimize blood loss
- ❑ Consider total surgery/anesthesia time

Tumescent Anesthesia

- Tumescent technique (Dr. Jeffery Klein revolutionized liposuction)
- Tumescence (swelling or enlargement)
 - Infusion 3:1 or greater amount of fluid as compared to the amount to be suctioned out
 - Provides firmness to the tissue to facilitate fat removal and sculpting
 - Minimizes blood loss

Benefits of Tumescent Anesthesia

- ❑ Pure tumescent anesthesia is performed using at most oral sedation or none
- ❑ Lidocaine decreases post-operative discomfort
- ❑ Lidocaine has a bacteriostatic effect
- ❑ Liposuction using tumescent fluid can be combined with I.V. sedation or general
- ❑ Addition of bupivacaine to tumescent solution is not recommended due to a risk of an irreversible cardiac arrest

Tumescent Fluid

□ Klein's Tumescent Solution Formula

- Normal Saline 1000mL
- Lidocaine 1% 50mL 500mg
- Epinephrine 1:1000 1mL 1mg
- NaHCO₃ 8.4% 10mL 10 mEq

**Results in Lidocaine 0.05% with
1:1,000,000 Epinephrine**

□ MEMORIZE THIS FORMULA

□ REMEMBER: 1% equals to 10mg/mL

Mixing of Tumescent Fluid (1)

Memorize 1% = 10mg/mL

Thus, one 50mL bottle of 1% lidocaine contains 500mg of lidocaine.

When making Klein's formula tumescent solution, think about lidocaine and epinephrine components separately.



Useful to remember

$$1\% = 10\text{mg/mL}$$



Derivation: $1\% = 1/100 = 1 \text{ part}/100 \text{ parts}$ (same units cancel) = $1\text{gm}/100\text{gm} = 1,000\text{mg}/100\text{gm}$

In the metric system, 1gm of water has a volume of 1mL (cc) at 4 degrees Celcius, i.e. water has a density of 1gm/mL . Thus, from above, $1,000\text{mg}/100\text{gm} = 1,000\text{mg}/100\text{mL} = 10\text{mg/mL}$.

So, $2\% = 20\text{mg/mL}$; $0.5\% = 5\text{mg/mL}$

Mixing of Tumescence Fluid (2)

One liter (1,000mL) of standard Klein's solution has 500mg of lidocaine and 1mL of epinephrine 1:1,000.



1mg/mL of epinephrine in one liter (1,000 mL) will be diluted to 1:1,000,000

Mixing of Tumescent Fluid (3)

So, if you use one 50mL bottle of lidocaine 1% with epinephrine 1:100,000, you need to add additional 0.5mL of epinephrine (1:1,000) to make standard Klein solution. It already contains the correct amount of lidocaine.



Mixing of Tumescence Fluid (4)

**Double Klein's solution =
1000 mg Lidocaine and 1:1
million epinephrine in 1 Liter
NS or LR**



**Can be made using
2 bottles of 1% lidocaine w/ epi**

Variations in Tumescent Solution

□ For General Anesthesia (Super-wet technique)

- Normal Saline 1000mL
- 1% Lidocaine 40mL 400mg
- 1:1000 Epinephrine 0.5mL 0.5mg
- NaHCO₃ 8.4% none

- This results in Lidocaine 0.04% with 1:2,000,000 Epinephrine

Normal Saline & Lactated Ringer's (LR)

- Both NS and LR are used for tumescent solution. At one time, there was concern about use of LR as causing possible metabolic alkalosis, but this was only a theoretical concern.
- When using Lactated Ringers for tumescence without using general anesthesia, add 5mL of sodium bicarbonate to decrease pain & a burning sensation during infiltration.

Lidocaine

- ❑ Provides local analgesia
- ❑ Decreases requirement need for analgesia
- ❑ According to the PDR, the maximum dose Lidocaine with Epinephrine is 7mg/kg
- ❑ **In 1987 Dr. Klein demonstrated that 35 mg/kg safe when injected as tumescent fluid technique, and later this was increased to 50-55 mg/kg**
- ❑ Has variable absorption (face vs. body)
- ❑ Metabolized primarily by Cytochrome P450
- ❑ Only ten percent is excreted unchanged in urine

Lidocaine

- ❑ Ostad, Kageyama, Moy: *Dematol.Surg.* 1986 demonstrated that Lidocaine levels up to 55 mg/kg are safe for liposuction
- ❑ Ten percent is excreted unchanged in urine

Lidocaine & Tumescent Solution

- ❑ Lidocaine is lipophilic
- ❑ Onset of anesthesia takes 15 minutes and reaches maximum at 25 minutes in the presence of epinephrine
- ❑ **Peak plasma levels typically achieved at 12 hours after injection in body liposuction**
- ❑ Peak levels in the face occur earlier
- ❑ Lidocaine remains in tissues for up to 18 hours
- ❑ Only about 20% of infiltrated Lidocaine is removed by liposuction--measurement of aspirate

Absorption of Lidocaine

- Slow absorption of Lidocaine from a tumescent solution to serum occurs because:
 - Interstitial pressure above capillary pressure collapses capillaries and venules
 - Fluid volume increases the diffusion distance
 - Fluid dilution decreases concentration gradient
 - Epinephrine vasoconstriction decreases capillary absorption
 - Adipose tissue is relatively avascular
 - Lidocaine is **lipophilic**; fat cells act as a reservoir for & limit immediate absorption into serum

Drugs that increase levels of Lidocaine in serum

Mechanism of action – these medications **decrease Lidocaine breakdown** by inhibition of Cytochrome P450 enzymes

- Benzodiazepines
- Tricyclic antidepressants
- SSRI's anti-depressants
- Anti-fungals
- Calcium channel blockers

Inhibitors of Cytochrome CYP 450 3A4 enzymes

ANTIFUNGAL MEDICATIONS

Fluconazole
Itraconazole
Ketoconazole
Miconazole

BENZODIAZEPINES

Alprazolam
Diazepam
Flurazepam
Midazolam
Triazolam

CALCIUM CHANNEL BLOCKERS

Amiodarone
Diltiazem
Felodipine
Nicardipine
Nifedipine
Verapamil

MACROLIDE ANTIBIOTICS

Clarithromycin
Erythromycin
Troleandomycin

PROTEASE INHIBITORS

Indinavir
Nelfinavir
Ritonavir
Saquinavir

SELECTIVE SEROTONIN REUPTAKE INHIBITOR (SSRI)

ANTIDEPRESSANTS

Fluoxetine
Fluvoxamine
Nefazodone
Paroxetine
Sertraline

Lidocaine Toxicity

- ❑ Toxicity is **biphasic** (excitation followed by depression). It affects organs with high vascularity, the brain & the heart
 - ❑ **Neurologic symptoms – occur at lower doses (3 to 6 mcg/mL) :**
 - Light headedness, dizziness
 - Visual disturbances
 - Headache
 - Peri-oral tingling, numbness
 - Sedation
 - Impaired concentration
 - Dysarthria
 - Tinnitus
 - Metallic taste
 - Muscular twitching, tremors
-

Lidocaine Toxicity – continued (2)

- Cardiac toxicity seen with higher plasma levels (>5 mcg/mL)
- Plasma concentrations <5 mcg/mL are unlikely to have cardiovascular toxicity
 - Levels of 5-10 mcg/mL may cause hypotension from **both** vascular smooth muscle relaxation and cardiac suppression
 - Direct cardiac effects may include:
 - Negative inotropy
 - Arrhythmias
 - widened PR interval, widened QRS, sinus bradycardia, sinus arrest, partial or complete AV dissociation

Lidocaine Toxicity – Continued (3)

□ CNS symptoms

- may be masked in patients pre-medicated with benzodiazepines, and thus, the first sign of toxicity may be cardiovascular in nature

□ When blood levels are very high ($>10\text{mcg/mL}$)

- patients may experience respiratory depression or arrest and cardiovascular collapse

Treatment of Lidocaine Toxicity

- ❑ Intralipid-20® (20%)
 - Normally used for IV hyper-alimentation
 - Serves as a vehicle for other medications such as propofol & etomidate
 - Provides a “lipid sink” for binding of lipophylic local anesthetics -Lidocaine & Bupivacaine in the serum
 - **Dosage:** IV bolus administration 100 mL (1.5mg/kg) of Intralipid over 1 min, (may repeat up to 3mg/kg), followed by continuous infusion of 1,000 mL/hr

Treatment of Lidocaine Toxicity (2)

- Anti-convulsants
 - benzodiazepines (midazolam, lorazepam or diazepam)
- Vasopressors such as IV ephedrine and vasopressin as needed
- Draw blood for lidocaine blood level

Treatment of Lidocaine Toxicity (3)

- ❑ Best treatment is prevention.
- ❑ Mix your own tumescent solution or closely supervise your RN assistants when mixing tumescent fluids.
- ❑ Calculate & review the safe, maximum lidocaine limits.
- ❑ Reduce total dose of lidocaine whenever possible.
- ❑ Keep accurate record & track the amount.

Epinephrine

- Used for vaso-constrictive effects, usually 1mL of epinephrine 1:1,000 per liter of NS or LR
- Use with caution in patients with underlying heart disease and hypertension
- Upper limit has been cited as 0.07 mg/kg but some have proposed as much as 10mg per procedure

Sodium bicarbonate

- Decreases pain during the infiltration of tumescent fluid, whether NS or LR, especially in awake or lightly sedated patients;
- Infiltrate tumescent solution slowly

2006 Guidelines for Liposuction Surgery

□ Documentation

- Pre-operative weight
- Anatomical sites treated
- Quantity & concentration of tumescent fluid
- Total doses of drugs utilized
- Total volume of fat extracted
- Volume of supra-natant fat
- Technique & devices utilized
- Type of anesthesia
- Drains (if placed)
- Postoperative garments utilized

Liposuction Aspirate

Document volumes by photos:

Total volume
suctioned out

Volume of supra-
natant fat

Infra-natant is low in
hematocrit; does not
clot when collected
into a jar



2006 Guidelines for Liposuction Surgery

- ❑ Max lidocaine 45-55 mg/kg
- ❑ Mega-liposuction
 - >6000mL supranatant fat
 - Serial liposuction preferred
 - Higher morbidity/mortality
- ❑ Maximum safe removal of fat
 - 5000 mL supranatant fat
- ❑ Use sterile technique
- ❑ Continuous monitoring
 - Vitals, O2 sat, EKG, ETCO2 (if general)
 - I.V access if >100 cc fat removed
- ❑ At least one person must be ACLS trained
- ❑ Location – facility accredited by AAAHC or equivalent

Drug & Volume Limits for Liposuction

- Maximum dosing of lidocaine
 - - ASPS 35mg/kg
 - AAD 45mg/kg
 - **AACS 55mg/kg**
 - Maximum dosing of epinephrine
 - Oregon 0.07 mg/kg, Colorado 0.05 mg/kg
 - Maximum volume fat aspirate
 - AACS - 5L
 - Florida - 4L
 - Oregon 5% of body weight up to 4.5L max
-

Tranexamic acid (TXA)

- ❑ Synthetic analog of the amino acid lysine.
- ❑ Available in tablet and IV form. FDA-approved for prevention of excessive blood loss from major trauma, post-partum bleeding, surgery, tooth removal, nosebleeds, and heavy menstruation.
- ❑ Anti-fibrinolytic, reversibly binds lysine receptor sites on plasminogen. Decreases the conversion of plasminogen to plasmin, thus preventing fibrin degradation and preserving the fibrin matrix framework.
- ❑ Side-effects occur rarely - changes in color vision
- ❑ No increase in blood clotting in patients without clotting disorders.

Use of Tranexamic Acid to Reduce Blood Loss in Liposuction

Cansancao, Alvaro Luiz et al. Plastic and Reconstructive Surgery: May 2018 - Volume 141(5) pg 1132-1135

- Twenty women undergoing liposuction were divided into two groups: Ten received 10 mg/kg of tranexamic acid IV versus ten control patients without TXA. They measured hematocrit preop, in lipo-aspirate (infranant) and postop.
- Hematocrit levels at day 7 postoperatively were 48 percent higher in the ten TXA.
- One percent drop in the hematocrit level was found after liposuction of 812 ± 432 ml in TXA and 379 ± 204 ml in the group without TXA.
- **Thus, the use of tranexamic acid could allow for same aspiration of 114 percent more fat, with comparable variation in hematocrit levels.**

Operative Considerations

Choice of Anesthesia

- Always use tumescent or superwet technique
- Can use oral sedation, IV sedation, local only (for cases with small number of areas and small volume of aspirate)
- General anesthesia, esp. for large volume cases, and when combined with abdominoplasty, body lift, etc.

Oral Sedation

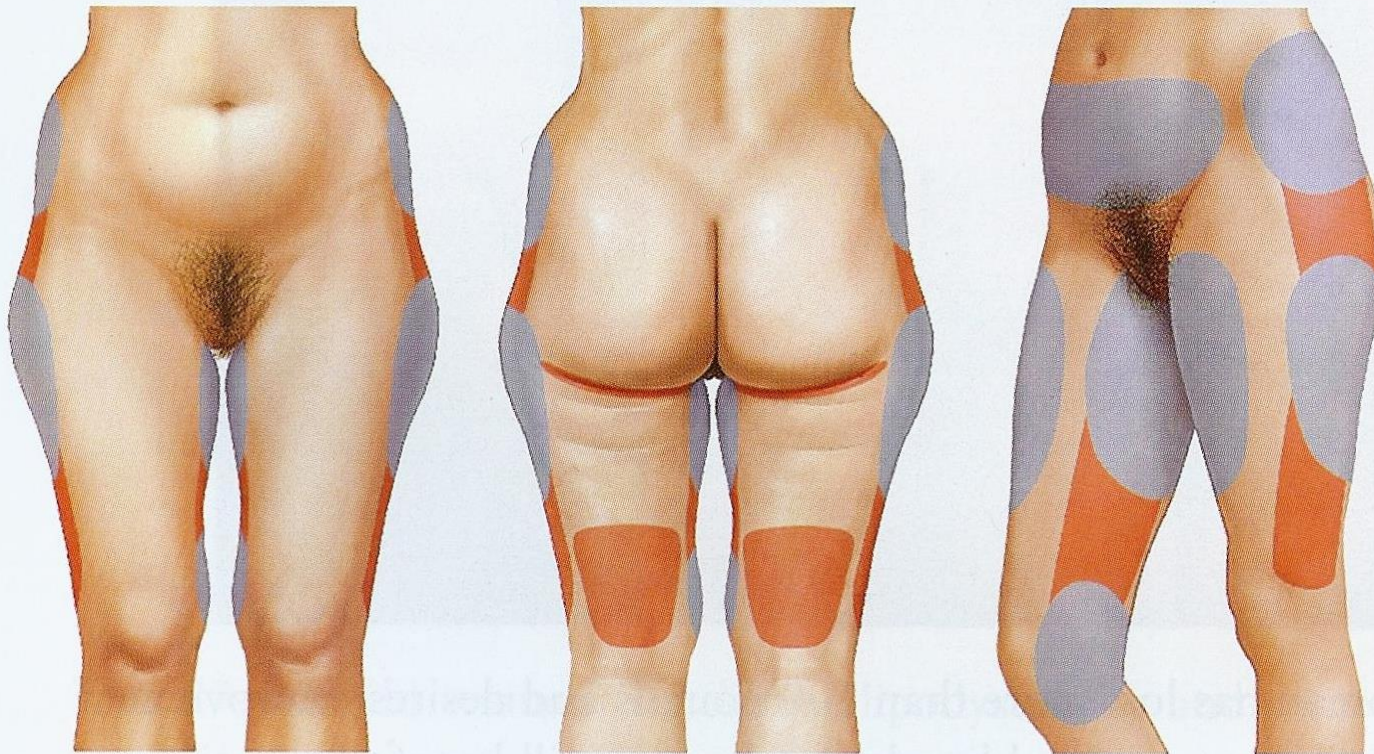
- Useful in properly selected patients & when performing moderate volume liposuction
- Pre-medicate with oral alprezolam 2mg or triazolam 0.5mg, oxycodone/acetaminophen 5mg/325mg, and promethazine 12.5 -25mg or ondansetron 4mg
- Establish IV access for fat aspirate > 100cc
- Use tumescent fluid with 750mg-1000mg lidocaine per liter for smaller cases
- Use the higher concentrations, esp. in the peri-umbilical region; also may add oral tabs prn

Photographic documentation of pre-operative markings



Respect the Zones of Adherence

ZONES OF ADHERENCE



- Inferolateral iliotibial tract
- Gluteal crease
- Lateral gluteal depression
- Middle medial thigh
- Distal posterior thigh

Incisions (Adits) for Liposuction

- Incision (small stabs) must be designed to minimize post-op visibility, especially in pts. with Fitzpatrick >type 3 skin.
 - **Adit** is an engineering term that describes a horizontal opening by which a mine is entered or drained. A micro-**adit** used in tumescent **liposuction** is a small circular hole made by a 2 mm skin biopsy punch. Micro- adits (or stab incisions) without suturing facilitate post-operative drainage.
-

Peristaltic Infusion Pump & Multi-port Infiltration Cannula



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Estimates of Tumescant Fluid Volume (for reference only)

- ❑ Whole face and neck -- 250mL
- ❑ Typical neck – 100mL
- ❑ Upper arms -- 500mL
- ❑ Bra-roll– 1,000mL
- ❑ Male chest – 1,000mL
- ❑ Upper abdomen--1,000mL
- ❑ Lower abdomen--1,000mL
- ❑ Waist & hips-- 1,000mL
- ❑ Mons pubis -- 250 mL
- ❑ Medial thighs – 250-500mL
- ❑ Lateral thighs – 250 mL
- ❑ Medial knee < 100 mL
- ❑ Calves – 250mL

Infiltration of Tumescent Fluid

- ❑ Incisions are made with a #11 blade, about 5mm wide to diminish friction burns
- ❑ Infiltration cannula is attached to a peristaltic pump
- ❑ Approximately up to 3:1 ratio of infiltrate to anticipated fat aspirate (less if doing superwet technique)
- ❑ Infiltrate to increased tissue turgor and skin blanching and feather into adjacent areas

Infiltration of tumescent fluid

- Use highest tolerable speed when sedated or under general anesthesia
- Try depot and then return with higher-speed passes
- Fan out in all directions
- Beware of sensitive areas
- Can use several access ports to allow for cross-tunneling

Lipo-disruption

- ❑ Prior to suctioning – may use Bluggerman-Mangubat disruptor cannula
- ❑ May use PAL-assisted 4mm flared Mercedes cannula (basket) with vacuum suction off for lipo-disruption prior to liposuction
- ❑ **Endpoint is looser glide with less resistance**
- ❑ Special attention needed to hard to reach or sensitive areas
- ❑ Always consider lipo-disruption at the end of procedure to smooth out irregularities

Types of Liposuction

- ❑ Suction-assisted (SAL)
- ❑ Syringe-assisted (for small lipo-transfer)
- ❑ Power-assisted (PAL)
- ❑ Ultrasonic-assisted (UAL) = VASER
- ❑ Laser-assisted (LAL)
- ❑ Radio-frequency-assisted (RFAL)

Suction-assisted Liposuction- SAL

- ❑ Cannula connected to vacuum suction set at 1 atm (-29cm H₂O) or 20-30 cc syringe with Johnny lock or equivalent
- ❑ Multiple styles of cannulas and spatulas available with multiple hub configurations
- ❑ Advantages:
 - time tested technique, low cost, multiple cannula size and configurations
- ❑ Disadvantages:
 - difficulty in treating fibrous areas, operator fatigue

Cannula hole configurations

- ❑ Most common is the Mercedes configuration
- ❑ Can use expanded Mercedes (basket) or double Mercedes for additional speed
- ❑ Most cannulas have blunt tips to decrease the likelihood of penetrating unwanted areas
- ❑ Toledo V tip configuration allows cutting action of fibrous areas and release areas with existing scars, used infrequently

**MERCEDES**

Featuring three openings in a circumferential pattern near the distal tip of the shaft

**ACCELERATOR III™**

Three openings in a triangular pattern. Our most popular tip design.

**LAS VEGAS™**

Similar to the Accelerator III, the Las Vegas employs a single distal opening with two proximal openings. Less aggressive at the tip. Ideal for feathering.

**STANDARD**

The cannula that started it all. One opening near the tip.

**GILLILAND ETCHING CANNULA**

Four openings in a linear pattern. Distal end of each opening is raised for etching of subcutaneous tissue.

**BECKER™**

Riblike projections facilitate breakdown of tissue prior to aspiration, increasing speed and efficiency in a wide range of procedures.

**BECKER TEAR DROP™**

Similar to the Becker™, with proximally flared ribs.

**SPATULA**

So named because of its flattened profile, the spatula cannula is ideal for cervical and facial procedures.

**KEEL COBRA**

"V" shaped design allows easy penetration and unprecedented efficiency and control. Two side openings near the tip and a single hole positioned below.

**FOURNIER**

Three openings in a linear pattern

**KEEL COBRA II**

Grooved laterally for improved guidance and tissue ingress, the Keel Cobra II features side openings near the tip and a third proximal hole similar to the Keel Cobra, above.

**SATTLER™**

24 small lumens surrounding distal tip.

**CANDY CANE™**

Features three elongated lumens in a spiral pattern as shown.

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Cannula Diameter

Though not rigorously demonstrated, many physicians think that cannulas with outside diameter $>4\text{mm}$ are associated with higher rates of irregularities and seroma formation. Consider use of larger diameter cannulas when the overlying flap will be excised, i.e. in lipo-abdominoplasty

Intra-operative Comfort & Safety

- ❑ Use warm fluids
- ❑ Use warm prepping solution
- ❑ Use warming blankets
- ❑ Set proper O.R. temperature to avoid hypothermia
- ❑ Position patient appropriately
- ❑ Pad all pressure points
- ❑ Flex knees over a pillow

Liposuction Procedure

- Work as fast as you physically feel comfortable
- Use position changes and adit changes efficiently
- Suction in all directions circumferentially
- Work distal to proximal toward incisions to avoid indents and over-suction close to the adit
- Use long cannulas and use them to full length whenever possible
- Use the guide hand to provide compression and bring fat to cannula in a FLAT plane
- Have the assistant provide counter-tension

End Points of Liposuction

- ❑ Improvement of contour
- ❑ Loss of tissue resistance
- ❑ Symmetrical pinch test
- ❑ Increased bloody aspirate
- ❑ Volume of total aspirate relative to the infiltrated volume

Power-Assisted Liposuction

- Liposuction cannula connected to a powered hand piece that provides reciprocating movement forward and backward, 2-12 mm movement at 4,000--6,000 cycles/min
- Advantages:
 - less operator fatigue
 - decreased operative time
- Disadvantages:
 - cost



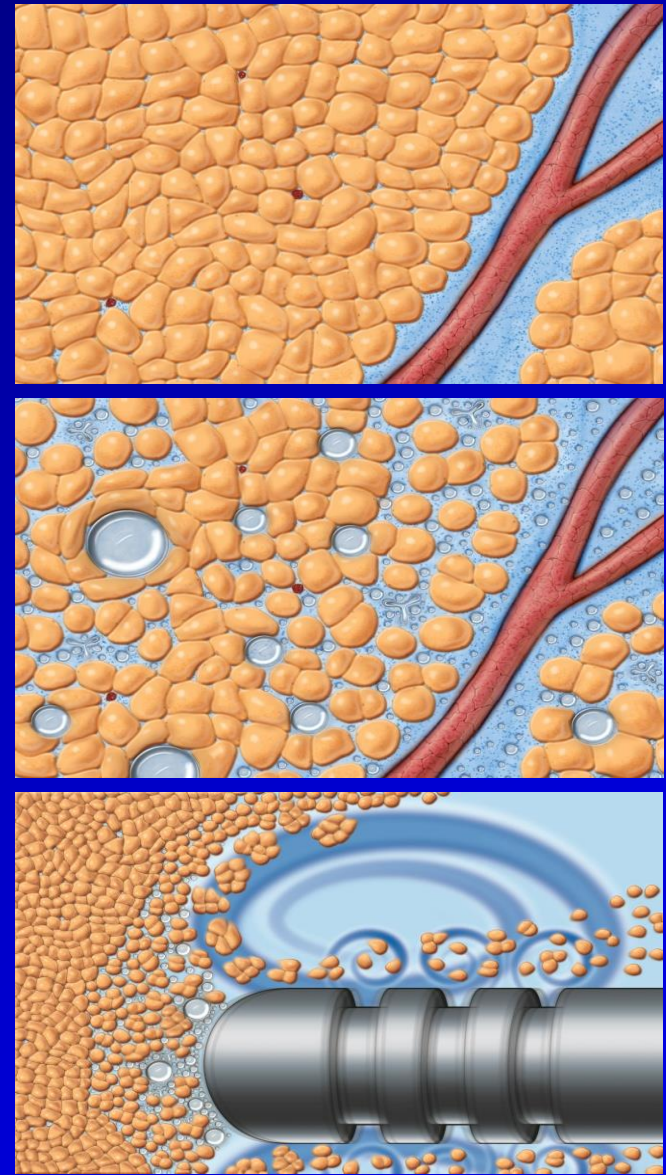
VASER[®] vibration Amplification of Sound Energy at Resonance

- Useful for treatment of fibrous areas, revision liposuction, fat harvesting and increased skin tightening
- Energy and cannulas are designed to minimize trauma and preserve viability of fat cells & aipose-derived Mesenchymal Progenitor Cells



How VASER[®] Ultrasound Works

- ❑ There are millions of microscopic air bubbles in the tumescent solution
- ❑ When exposed to ultrasound energy, bubbles expand and eventually collapse
- ❑ Bubbles act as miniature crowbars to force the fat cells apart
- ❑ Once the fat is loosened, it is mixed with the tumescent fluid to form an emulsion
- ❑ **Acoustic streaming** causes intense localized swirling to further break up the fat into small clusters of cells
- ❑ Small groups of cells are excellent for fat transfer



Vaser Ultrasonic Liposuction

- Emulsifies fat
 - cavitation and micro-mechanical effects
- Some cannulas employ standard suction, others require routine liposuction after performing ultrasonic emulsification
- Especially useful for fibrous areas
- Disadvantages:
 - cost, time, potential dermal heat injuries

Concept of Bulk Heating

- Additional energy (laser or radio-frequency) is delivered into the subcutaneous tissues to achieve temperatures of 45 - 47 degrees C to induce new collagenesis and to increase skin contracture beyond that achieved by SAL alone
- Indicated for patients with increased skin laxity, but need to achieve the bulk heating – time consuming & technique dependent
- Actual skin tightening often occurs less than advertised by the manufacturers

SMART-LIPO Lasers

(for reference only)

- Smartlipo™ evolved through multiple improvements since its introduction in 2005
- 1st generation 1064 Nd:YAG lasers, power 6-18W delivered through 0.6mm-1mm diameter fibers
- SMART-Lipo Triplex has
 - 1064, 1320 and 1440nm wave lengths
 - 24 – 40 Watts of power
 - 40 Hz max repetition rate
 - 150 μ s pulse width



Laser-assisted Liposuction (for reference only)

□ Indications

- Localized small deposits of fat
- Useful for fat emulsification
- Useful for revision surgery and fibrous areas

□ Advantages

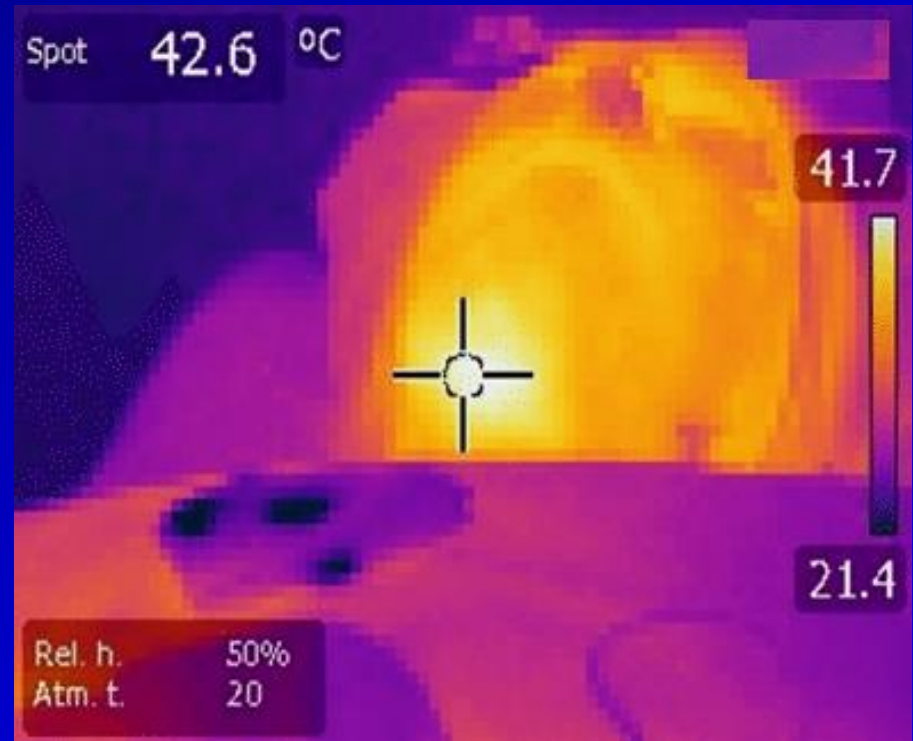
- Potentially less bleeding and tissue trauma
- Potentially better skin contracture

□ Disadvantages

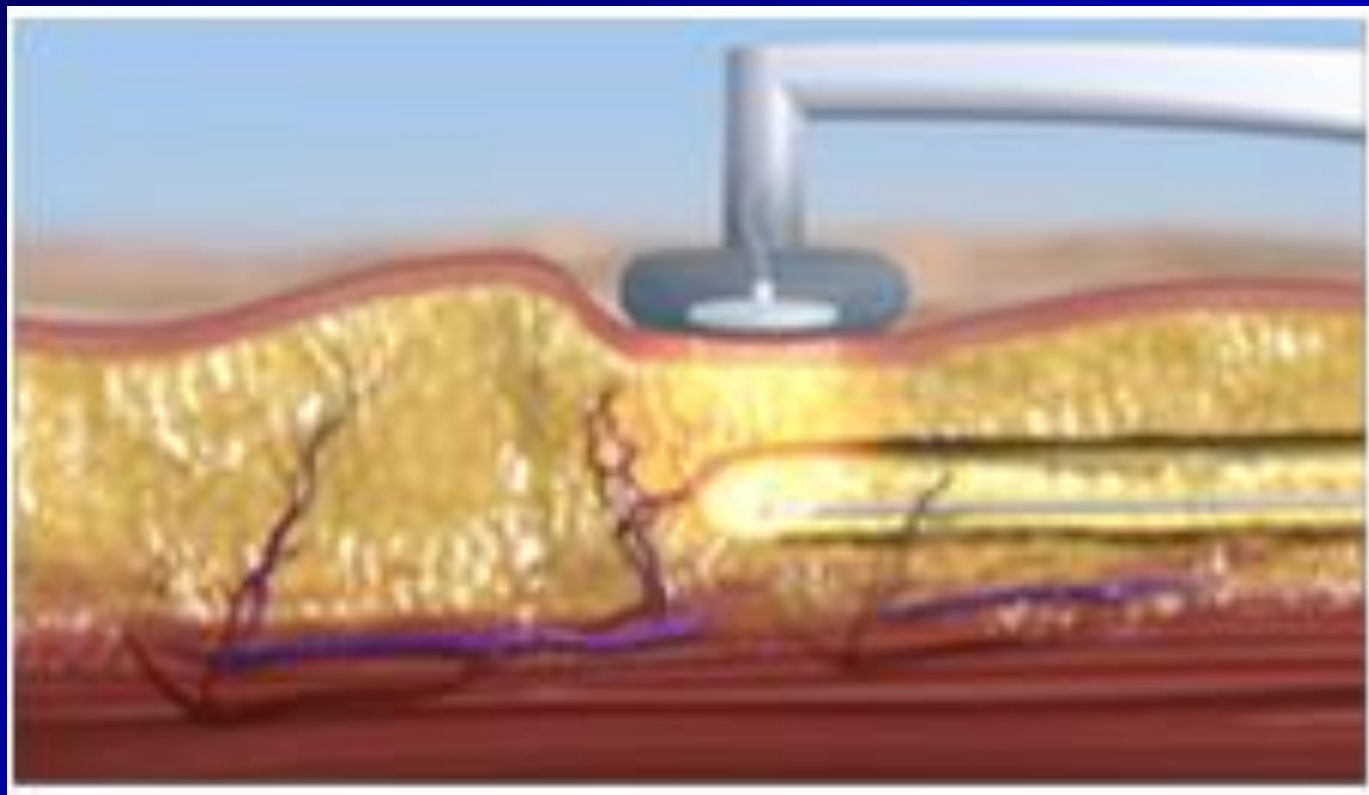
- Burn injury to dermis
- Cost

Thermi-tite & FLIR Camera (for reference only)

Radio-frequency system designed for skin tightening. Infrared intra-operative imaging is used to assure uniform distribution of subcutaneous temperature (bulk heating) needed for fat melting and enhancement of skin tightening.



BodyTite – RF-assisted liposuction



Continuous monitoring of temperature at the tip of the internal subcutaneous probe

Renuvion (formerly J-Plasma)



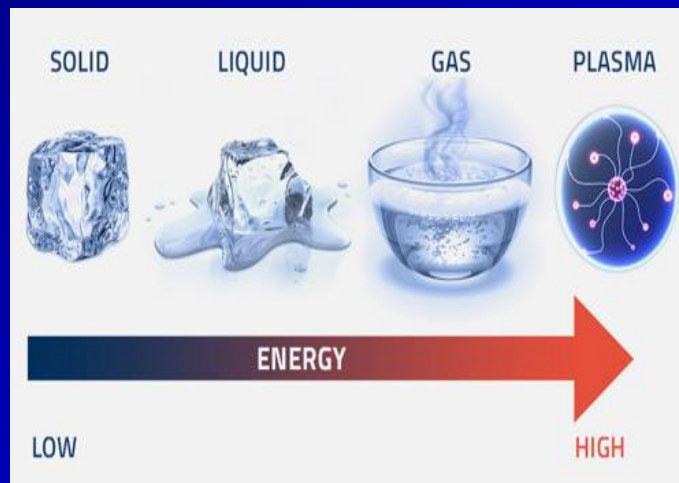
Helium gas is excited by waves of RF energy to create a stream of cool plasma. Only 0.1% of helium forms the plasma with heating to $>85^{\circ}\text{C}$ for 0.040 to 0.080 seconds while the remaining 99.9% of the helium gas cools down the tissue. The system achieves contracture of the fibro-septal network and stimulation of collagen synthesis.



Disadvantages:

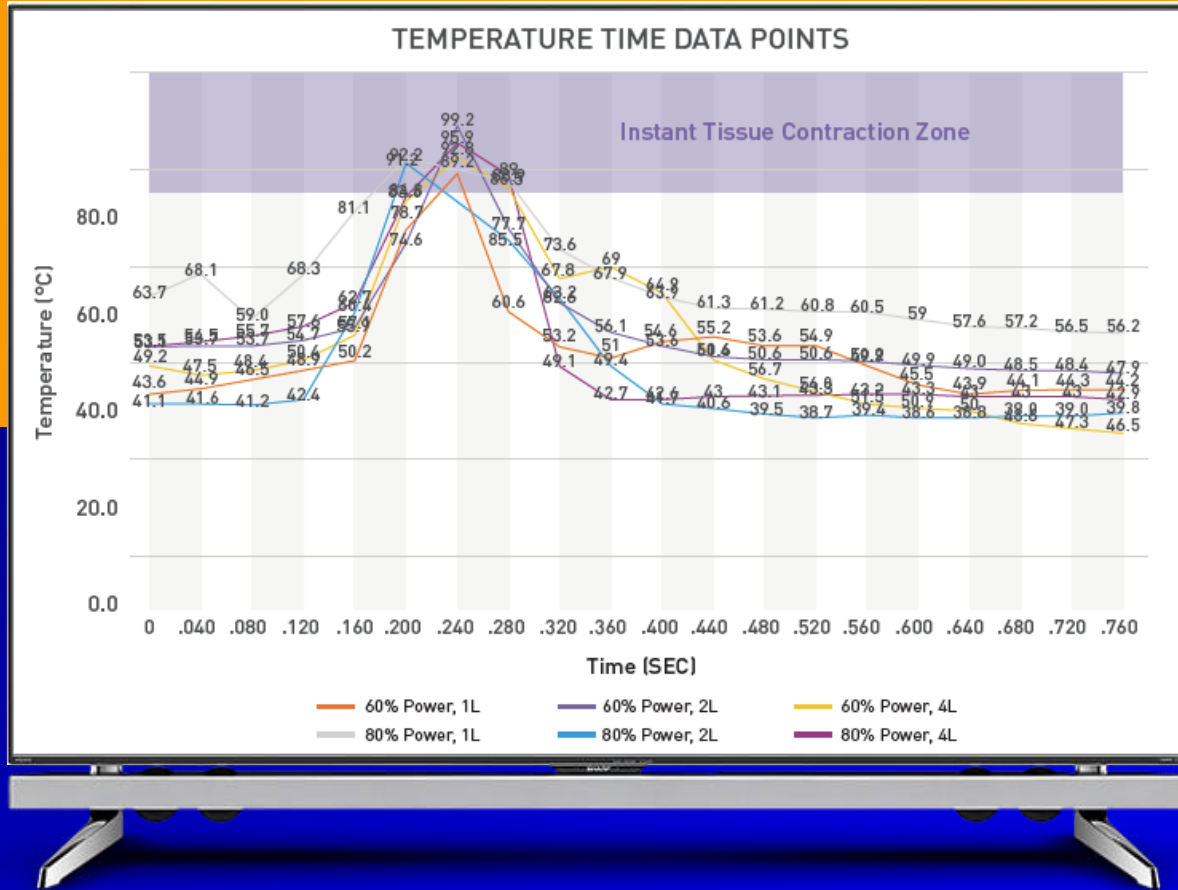
Cost Equipment & Disposables

Plasma Energy—the 4th State of Energy



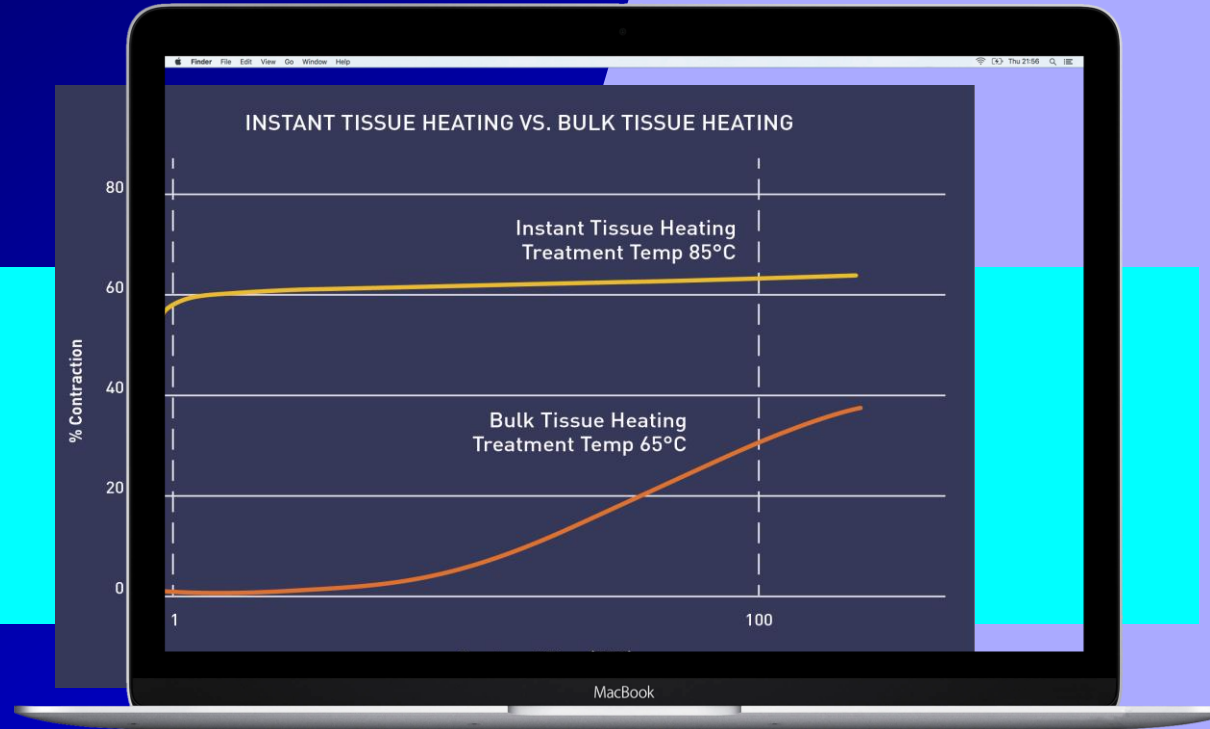
- Plasma is created by adding energy to a gas stream
- Target is hydrated collagen
- Minimal diffusion of thermal energy to adjacent tissue.

Renuvion Temperature Time Data Points¹



Instant Tissue Heating vs. Bulk Tissue Heating

- > Collagen reacts very predictably to the application of heat
- > At higher temperatures, shorter treatment times can be used to achieve maximum contraction^{2,3,4,5,6}



Prevention of Complications

- ❑ Better to err on less suctioning under-resection)
- ❑ Avoid superficial liposuction
- ❑ Use care with aggressive cannulas
- ❑ Assistant may help to stretch the area
- ❑ Move cannula to different area with each pass
- ❑ Use multiple incisions
 - Facilitates criss-cross pattern for liposuction
 - Ensure incision size is appropriate for cannula size

Prevention of Complications

- ❑ Maintain intra-operative data sheet
- ❑ Superficial liposuction/dermal injury is not necessary for skin contracture
- ❑ Do not close incisions or suture them loosely
- ❑ Pad pressure points (ankles, ulnar nerve, etc, under sedation or general anesthesia)
- ❑ Abduct arms to less than 90 degrees to prevent brachial plexus injury
- ❑ Careful in the prone position; pad & protect pressure points

Post-operative Care

- ❑ Cover punctures with super-adsorbent pads & chucks, consider adult diapers
- ❑ Place compression garment next morning
 - Garment to be worn 24 hours a day for 2 weeks, then half day for additional 2-4 weeks
- ❑ Massage therapy – dough-rolling pins
- ❑ Possibly use repeat session of external ultrasound or lymphatic massage for lumpiness and swelling

Complications

“Learn from mistakes of others. You can’t live long enough to make them all yourself.” *Eleanor Roosevelt*

Prevention of Complications

- ❑ Recognize the unhealthy patient's Medical History: allergies, cardiac, pulmonary DVT risk, etc.

- ❑ Stay rather superficial & tangential with cannulas knowing the location of the tip at all times
 - Small diameter infusion cannulas are more dangerous
 - Can cause abdominal perforations
 - Can cause intra-thoracic entry & pneumothorax

- ❑ History of prior liposuction or Cool-sculpting
 - Concrete-like interstitial scarring
 - Increased cannula resistance

Recognize the Unhealthy Patient

- Large patients = may be trouble. BMI>32 associated with increased incidence of all complications
 - More difficult anesthesia management
 - Higher **DVT** risk
 - Potential skin necrosis
 - Higher rate of irregularities, residual skin laxity
 - Require more extensive experience

Poor Patient Selection (visceral, intra-abdominal fat)



Complications

- ❑ Local, rather mild complications are fairly common.
- ❑ Local, serious complications are rare.
- ❑ Systemic complications – both, minor and serious, are not frequent but can be fatal.

Common & Less Serious Complications

- ❑ Skin surface irregularities
- ❑ Numbness & dysesthesia
- ❑ Seromas or hematomas
- ❑ Friction burns & focal skin necrosis
- ❑ Allergic reactions to drugs
- ❑ Noticeable scars
- ❑ Skin discoloration
- ❑ Nerve injury –esp. sensory neuropraxia

Contour & Skin Surface Irregularities

- ❑ Lipo-trough
 - Excessive and uneven removal of fat
 - Large aggressive cannulas
 - Improper patient positioning
 - Carelessness
- ❑ Lipo-knot
 - Focal area of insufficient liposuction
- ❑ Temporary Lumpiness
 - First noticed 1-2 weeks after surgery
 - May be the result of impaired lymphatic drainage
 - Most pronounced 2-4 weeks after surgery

Correction of a Lipotrop over-resection contour deformity

Correction of lipotrop using lipo-shifting & fat transfer.



Hyperpigmentation



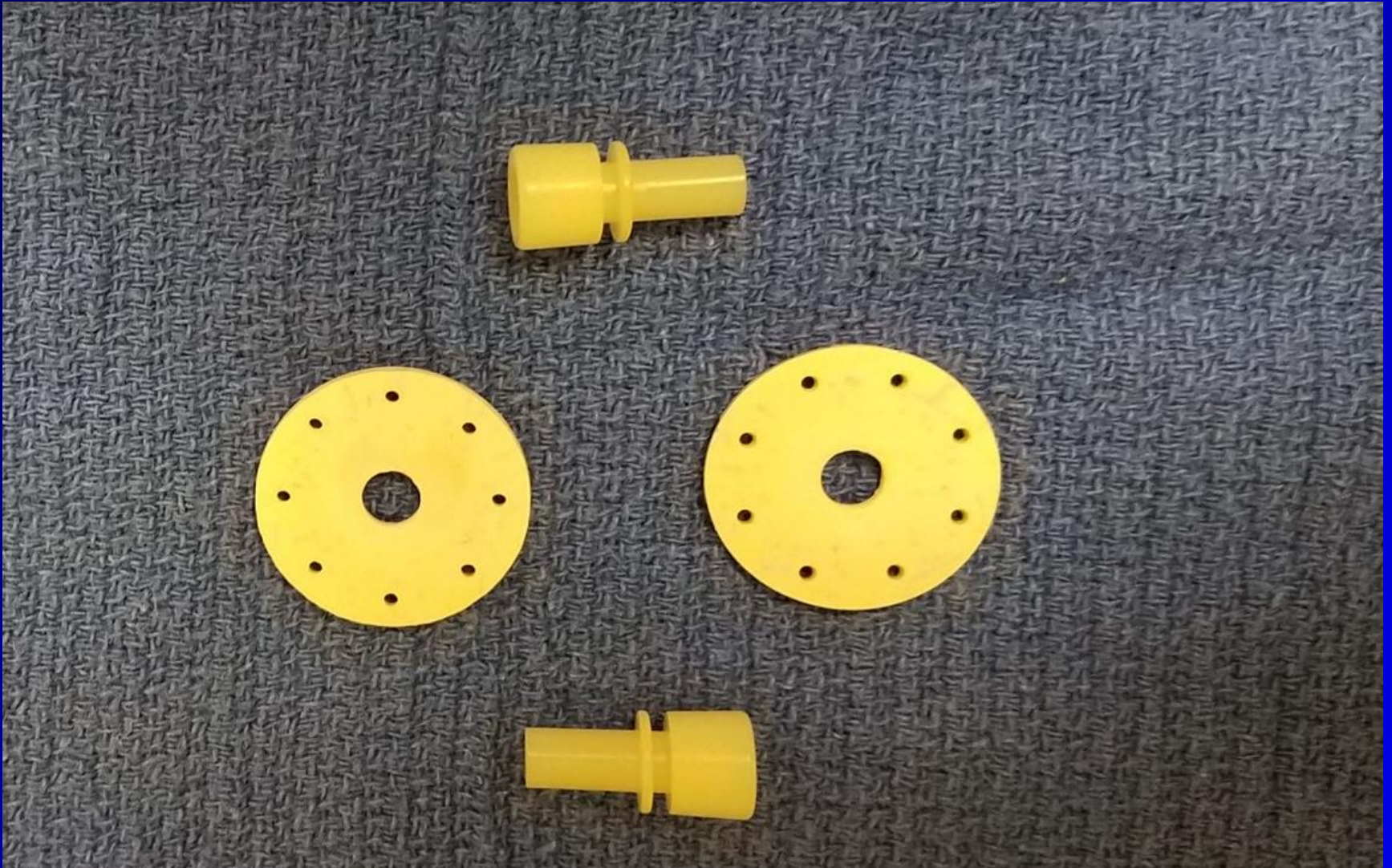
□ Causes:

- Dermal trauma/friction

□ Treatment:

- Hydroquinone 4% cream bid
- Kojic acid cream 2-4% qd

Adit inserts - prevention of friction burns



Jan Zempenyi, MD

Bel-Red Center for Aesthetic Surgery, P.S.

Adit insert - friction burn prevention



Cutaneous Burns

□ Causes:

- Dermal injury from superficial liposuction
- May prevent with adequate size incision and ointment or K-Y jelly lubrication
- Thermal burn from ultrasonic liposuction
- Contributing factors: smoking, diabetes

□ Treatment:

- Local wound debridement
- Topical Silver Sulfadiazine 1% cream bid

Seroma

- Associated factors, possible etiology
 - Larger cannula size
 - Obese patients BMI>30
 - Larger volume liposuction
 - Additional energy used: Laser & ultrasonic liposuction

Treatment of Seromas

- ❑ Serial needle aspiration, compression with garment
- ❑ Evacuation & hyper-inflation with air
- ❑ Insertion of seroma catheter, may benefit from diagnostic ultrasound assist
- ❑ Seromadesis (air infiltration, hypertonic saline, talc, tetracycline)
- ❑ Injection of fibrin sealant (eg. Tisseel®)

Severe and Uncommon Complications

□ Anesthesia

- IV fluid overload
- Hypothermia
 - Acidosis
 - Defective coagulation
- Aspiration pneumonia
- Severe hypoxia
- Cardiac arrest
- Allergies
- Lidocaine toxicity
- Malignant hyperthermia

□ Intra-operative care

- excessive blood loss
- injury to the abdominal organs

□ Post-operative care

- Deep venous thrombosis
- Pulmonary embolism
- Infections < 1%
- Necrotizing fasciitis

Lipoaspiration and Its Complications: A Safe Operation

Lázaro Cárdenas-Camarena, M.D.

Guadalajara, Mexico

TABLE IV
Major Complications ($n = 1047$ patients)

Type of Complication	No. of Patients	Percentage	Remarks
Fat embolism syndrome	2	0.19	In both patients, minor lipoaspiration was combined with gluteal lipoinjection. One patient also had abdominoplasty and the other one received breast implants
Cutaneous necrosis	1	0.1	Patient had two previous liposuctions
Extended infection	1	0.1	Late infection in the area where the drains were placed
Total	4	0.38	

Serious Surgical Complications (uncommon)

- ❑ Permanent sensory nerve dysfunction
- ❑ Infections / Necrotizing Fasciitis
- ❑ Viscus perforation

Infections



Necrotizing Fasciitis

- ❑ Type I – polymicrobial (aerobic/anaerobic)
- ❑ Type II- Group A β -hemolytic streptococci
- ❑ A rare but devastating complication
- ❑ Mortality 25-40%

Type I NF

(Polymicrobial - more common)

- ❑ Group B streptococci
- ❑ Anaerobes
 - Bacteroides sp.
 - Peptostreptococcus sp.
 - Clostridium sp.
- ❑ Enterococci
 - Gram-negative bacteria
 - E. coli
 - Proteus sp.
 - Klebsiella
 - Pseudomonas
 - Serretia marcescens
 - Pasteurella sp.

Type II NF (less common)

- Group A β -hemolytic streptococci
 - Strep. pyogenes
- Staphylococci
 - Coagulase negative and positive

Presentation of Necrotizing Fasciitis

- ❑ Severe pain, may be along with inflammation
- ❑ May appear as a cellulitis
- ❑ Bronzing of skin and bullae formation within 3-5 days
- ❑ Finally becomes dull, blue-grey hue followed by frank necrosis

Necrotizing Fasciitis

□ Blood tests

- May show elevated WBC, hyperglycemia, hypocalcemia, elevated CPK
- Bacteremia is seen in 46% of blood cultures

Management of NF

- Early diagnosis
- Fluid resuscitation & hospitalization
- Broad spectrum antibiotics to cover staph, strep, gm (–) rods and anaerobes
 - Clindamycin 600-1200mg I.V. tid
 - Cefuroxime 750-1500mg I.V. tid
- Surgical Management
 - Cornerstone of the treatment
 - Aggressive excision
 - Return to O.R. in 24-48 hours
- Adjunctive therapies
 - Hyperbaric oxygen
 - IV Immunoglobulin
 - Hemovac therapy to close already debrided defects

Systemic Complications

- ❑ Lidocaine toxicity (as mentioned previously)
- ❑ Liposuction syncope - hypovolemia
- ❑ Anemia
- ❑ DVT / PTE
- ❑ Pulmonary edema
- ❑ Fat embolism

Syncope, hemodilution & anemia

- ❑ Vasovagal syncope due to dehydration resulting from insufficient I.V. fluid replacement & third-spacing.
 - ❑ Even without liposuction, infusion of 5 Liters of tumescent fluid decreases the hematocrit by 10%.
 - ❑ Hemoglobin will fall by 1-3% by fifth day following liposuction due to aspirated blood and blood accumulation in the “third space”.
-

Hemodilution / Anemia

Healthy 70kg adult can lose up to 900 mL of whole blood before early signs of shock are evident.

- First signs: tachycardia and anxiousness
- Blood pressure does not drop until 15-30% of blood volume lost (approximately 750-1500 ml)

Survey of Systemic Complications

Grazer FM, deJong RH. Fatal Outcomes of Liposuction: Census Survey of Cosmetic Surgeons. *Plast Reconstr Surg.* 2000;105:436-446

Survey of North American members of the American Society for Aesthetic Plastic Surgery showed mortality rate 19.1 per 100,000 cases of liposuction. The main cause was pulmonary thrombo-embolism.

Systemic Complications

Housman TS, Lawrence N, Mellen BG, et al. The Safety of Liposuction: Results of National Survey. *Dermatol Surg.* 2002;28:971-978

Survey of 66,000 cases of true tumescent liposuction showed mortality rate of zero

Venous Thromboembolism

Virchow's Triad

- ❑ Stasis
- ❑ Vessel Damage
- ❑ Activation of Coagulation

Risk factors for DVT and PTE

- ❑ Recent surgery / having multiple procedures
- ❑ History of previous blood clots
- ❑ Hyper-coagulable states (e.g. Protein C or S deficiency, factor V-Leiden)
- ❑ Older patient
- ❑ Cancer
- ❑ Oral contraceptives (>35µg estrogen/day)
- ❑ Obesity
- ❑ Venous stasis / immobilization (prolonged bed rest)
- ❑ Large varicose veins
- ❑ Tobacco abuse

Venous Thrombosis and Pulmonary Embolism in Plastic Surgery

- Pannucci et al. 2011 published validation of Caprini Risk Assessment Model in PRS pts.
- Included 1,126 control patients
- Prevention Study: all had general anesthesia and planned post-op hospital admission without any chemoprophylaxis; had 60-day post-op follow-up; majority had scores of 3-6
- At 60 days overall VTE incidence was 1.69%
- **BUT 11.3 % of pts. with Caprini scores > 8 had a VTE event**

2005 Modified Caprini scale

Choose All That Apply

Each Risk Factor Represents 1 Point

- Age 41-60 years
- Minor surgery planned
- History of prior major surgery (< 1 month)
- Varicose veins
- History of inflammatory bowel disease
- Swollen legs (current)
- Obesity (BMI > 25)
- Acute myocardial infarction
- Congestive heart failure (< 1 month)
- Sepsis (< 1 month)
- Serious lung disease incl. pneumonia (< 1 month)
- Abnormal pulmonary function (COPD)
- Medical patient currently at bed rest
- Other risk factors _____

Each Risk Factor Represents 3 Points

- Age over 75 years
- History of DVT/PE
- Family history of thrombosis***
- Positive Factor V Leiden
- Positive Prothrombin 20210A
- Elevated serum homocysteine
- Positive lupus anticoagulant
- Elevated anticardiolipin antibodies
- Heparin-induced thrombocytopenia (HIT)
- Other congenital or acquired thrombophilia

If yes:
Type _____

*most frequently missed risk factor

Each Risk Factor Represents 2 Points

- Age 60-74 years
- Arthroscopic surgery
- Malignancy (present or previous)
- Major surgery (> 45 minutes)
- Laparoscopic surgery (> 45 minutes)
- Patient confined to bed (> 72 hours)
- Immobilizing plaster cast (< 1 month)
- Central venous access

Each Risk Factor Represents 5 Points

- Elective major lower extremity arthroplasty
- Hip, pelvis or leg fracture (< 1 month)
- Stroke (< 1 month)
- Multiple trauma (< 1 month)
- Acute spinal cord injury (paralysis)(< 1 month)

For Women Only (Each Represents 1 Point)

- Oral contraceptives or hormone replacement therapy
- Pregnancy or postpartum (<1 month)
- History of unexplained stillborn infant, recurrent spontaneous abortion (≥ 3), premature birth with toxemia or growth-restricted infant

Total Risk Factor Score

Deep Venous Thrombosis

□ Diagnosis:

- Most common symptom - **NONE**
- Calf pain, leg swelling, Homan's sign, venous cord
- Duplex ultrasound

□ Prevention:

- Discontinue OCPs 4 weeks before and 2 weeks after surgery
- TED hose
- Sequential Compression Devices intra-operatively and post-operatively
- Avoid too many surgical sites

□ Chemoprophylaxis:

- Low molecular weight heparin - enoxaparin (Lovenox) 40mg SQ qD begin within 6 hours of surgery, use till fully ambulatory

Mechanical Prophylaxis

- ❑ Compression Stockings
- ❑ Early Ambulation
- ❑ Warming Blanket
- ❑ Patient Positioning
- ❑ Sequential Compression Devices intra-operatively and post-operatively

Prophylaxis Recommendations

- Pre-Operative
 - Discontinue OCP's four weeks before and two weeks after surgery

 - Pre-Operative Holding
 - Graduated compression stockings
 - Maintain for one week
 - Intermittent compression devices (SCDs)
 - Maintain until next morning

 - Intra-Operative
 - Flex knees at 5 degrees with pillow

 - Post-Operative
 - Insist on early ambulation
-

Chemoprophylaxis

- ❑ In a higher risk patient, consider low molecular weight heparin (Lovenox) 40mg SQ daily until fully ambulatory.
- ❑ Begin within six hours following the onset of surgery, usually at the completion of the operation.
- ❑ Lovenox does not significantly increase the risk of a post-op hematoma; can be reversed with protamine sulfate
- ❑ Oral anti-coagulants: Rivaroxaban (Xarelto) and Apixiban (Eloquis) are both factor Xa inhibitors, FDA-approved for prevention of DVT following hip and knee replacement and prevention of clots in atrial fibrillation.
- ❑ Seem effective but are expensive & do not have a reversal agent.
- ❑ Morales et al. retrospectively compared 1,572 pts. following large volume liposuction treated with Lovenox versus oral anticoagulants and found them similarly effective. *Aesthet Surg J.* 2016 36(4) 440-9

Venapro DVT prevention

- ❑ Portable, home-use SCD for mechanical prophylaxis
- ❑ Rechargeable battery
- ❑ Compression to 50mm Hg once per minute
- ❑ Patient buys for \$200
- ❑ Patient keeps the device - does not return it



Effectiveness of Compression Stockings in Prevention of DVT

- Air travel study: 200 patients randomized w/ & w/o stockings
- All had duplex ultrasound before and after travel
- 12 pts who did not wear stockings were detected w/ symptomless DVT
- But NO DVT was detected in the volunteers using stockings
- Blood tests
 - 11 heterozygous for factor V mutation
 - 4 prothrombin gene mutation.
 - 2 DVT volunteers were positive for factor V Leiden.
 - Full blood count, platelet, and other assays were not predictive of DVT
- **10% of air travelers > 50 years develop symptomless DVT**
- **Elastic compression stockings are effective DVT prophylaxis**

Scurr JH, et al. *Frequency and prevention of symptomless deep venous thrombosis in long-haul flights: a randomized trial.* Lancet May 12, 2001;357:1485-9.

Pulmonary Thrombo-embolism

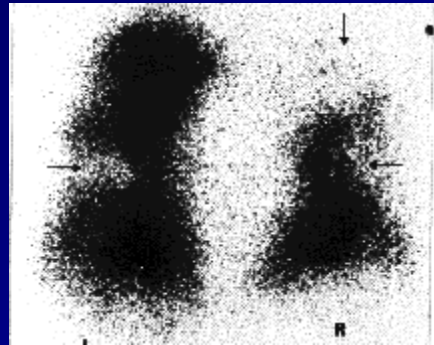
□ Symptoms

- Shortness of breath
- Chest pain (usually worse with breathing)
- Anxiety
- Dizziness, light headedness
- Tachycardia
- Hypotension

Pulmonary Thrombo-embolism

- Diagnosis
 - Chest x-ray
 - V/Q scan
 - Helical CT scan
 - Pulmonary angiogram

- Treatment
 - Anti-coagulation
 - ? Greenfield filter
 - 50% mortality rate



Hampton's Hump:

Wedge shaped opacity

Westermark's Sign:

Lung oligemia (radiolucency)

Basal infiltrate

Elevated diaphragm

Blunting of costophrenic angle

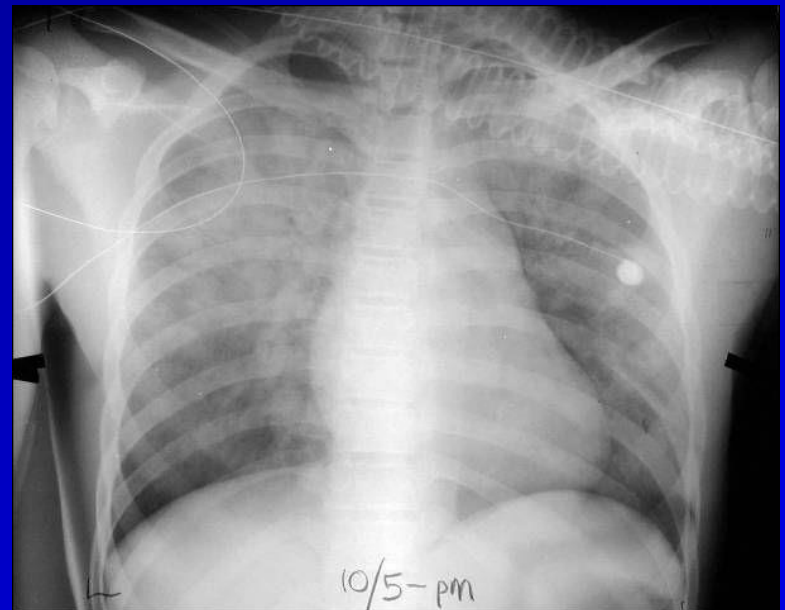
Pulmonary Edema

□ Presentation

- Basilar rales
- JVD
- Orthopnea
- Frothy pink sputum

□ Causes

- Excessive IV fluids
- Cardiogenic
 - Valve insufficiency
 - Left heart failure



Fat Embolism

- Major Diagnostic Criteria
 - Dyspnea, respiratory insufficiency
 - Confusion, Stupor, Delirium, Coma
 - Skin petechiae
- Minor Diagnostic Criteria
 - Fever > 38.5
 - Tachycardia
 - Jaundice
 - Retinal & Renal Changes
 - Anemia, Thrombocytopenia
 - Fat macroglobulinemia
 - Elevated sedimentation rate

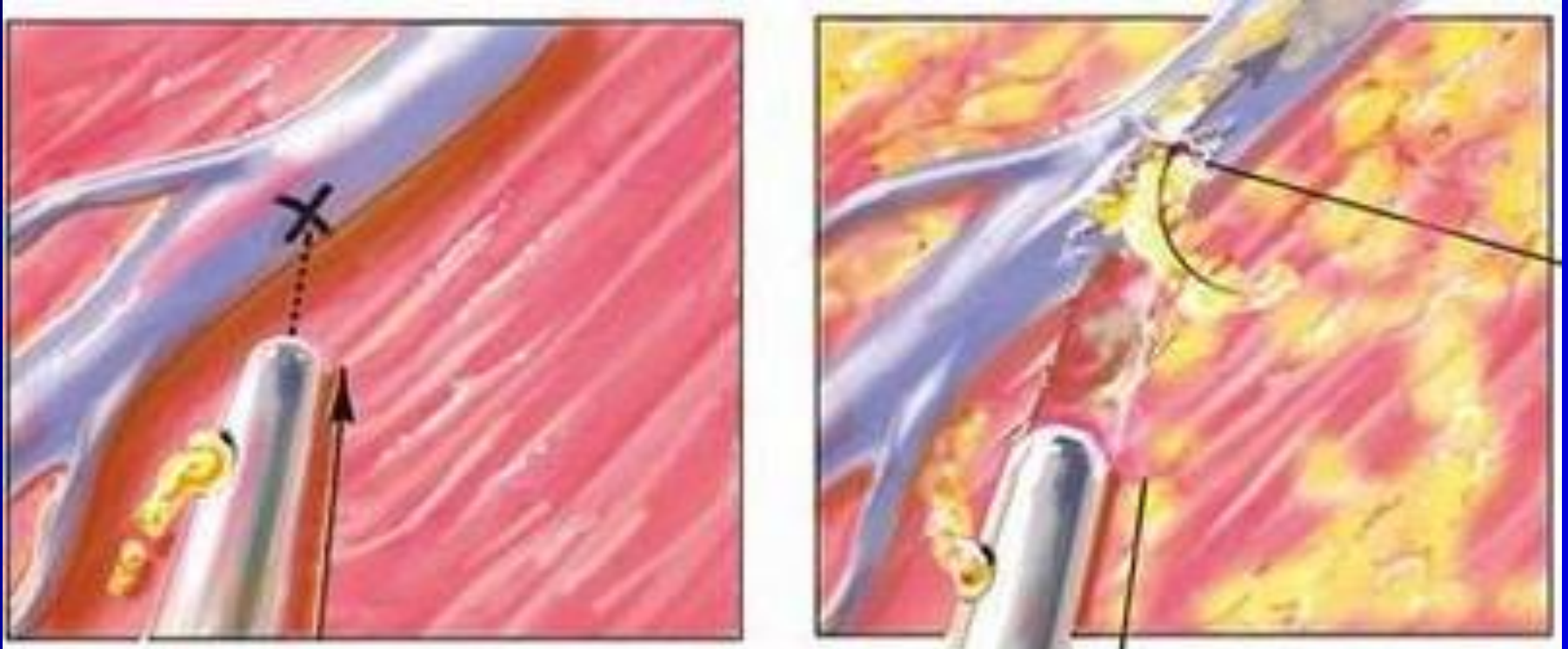
Pathophysiology of Fat Embolism

□ Fat micro-embolization

- Venous, subclinical micro-embolization is probably common following liposuction
- Mechanical plugging of vessels on the **arterial** side occurs if patient has a patent foramen ovale or an arterio-venous malformation
- Biochemical effects from enzymatic breakdown of the fat micro-emboli in the lung alveoli

□ Fat macro-embolization

Fat Macro-embolization into gluteal vein



Tear in the vein wall

Treatment Fat Embolism

- Treatment:
- Prevention with avoidance of intramuscular injections; ? perform under ULTZ control
 - Supportive
 - Treat symptoms of shock (blood/ IV Fluids)
 - Pulmonary supportive treatment – oxygen & if necessary intubation & mechanical ventilation

Special Considerations

- Gynecomastia)

Decide if excision of the breast gland & and possibly skin excision will be needed in addition to the liposuction

- When using liposuction breast reduction, consider assessment and documentation of fibrous tissue density using a mammogram

Gynecomastia Breast Reduction



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Gynecomastia Breast Reduction



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Gynecomastia

- ❑ The most common form seen in cosmetic surgery practice is pseudo-gynecomastia associated with long-standing obesity and decreased testosterone in older man.
- ❑ True gynecomastia involves enlargement of the breast gland and is a possible side-effect numerous medications or cannabis usage.
- ❑ Endocrinologic work-up may be needed to assess for increased production of estrogen, prolactin or decrease production of testosterone. Also consider mammogram to rule out breast cancer.

Technical Recommendations for Specific Areas

(For reference)

Face/Neck

- Stay above the SMAS
- Consider liposuction of Bichat's fat pad
- Consider parotid and masseteric hyperplasia/hypertrophy
- Beware CN VII- marginal mandibular
- Use 2-3mm cannulas, may use syringe SAL
- Do not skeletonize the skin
- Focus on enhancing jaw line and submental region to the first neck crease

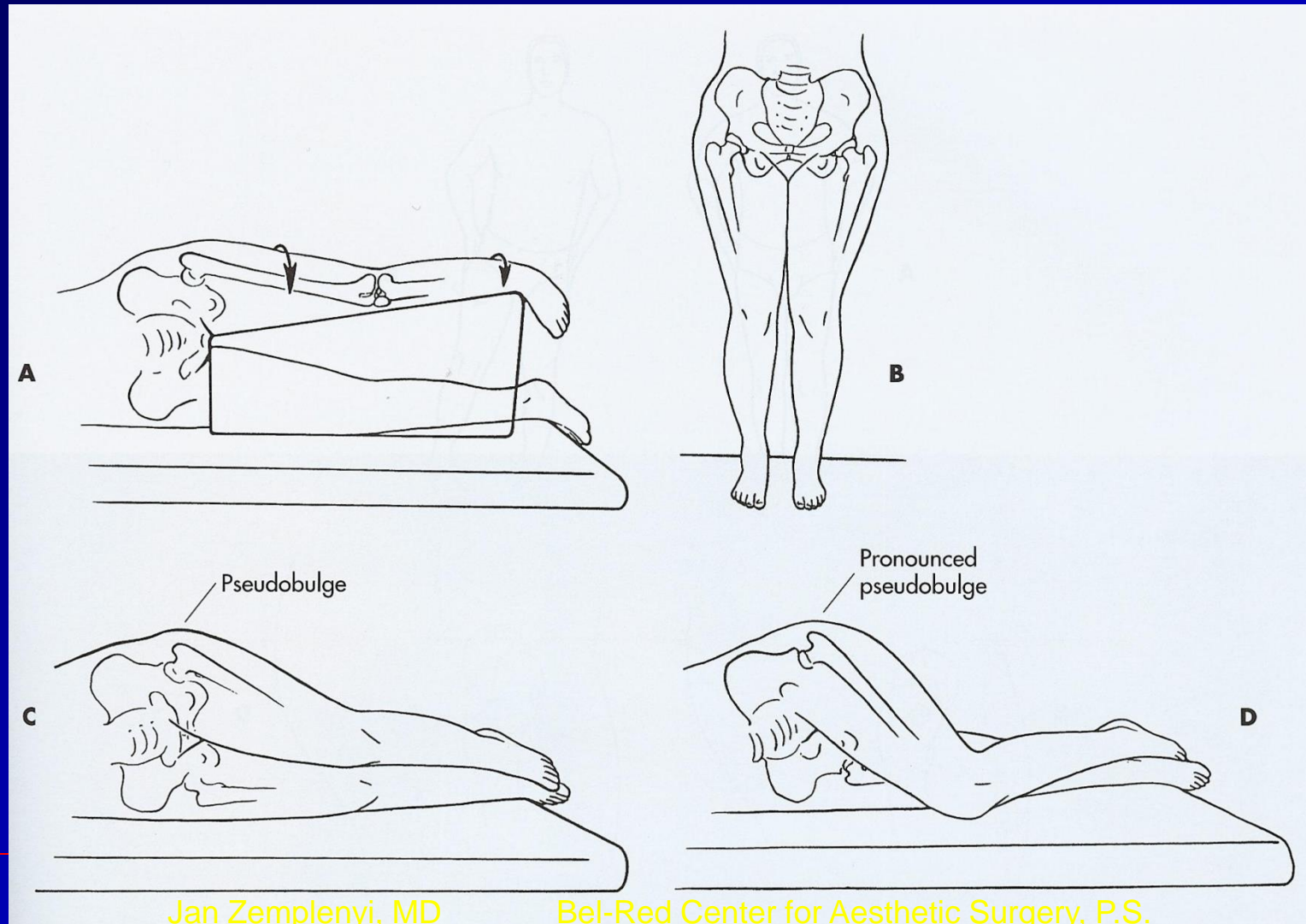
Abdomen

- ❑ Address the umbilicus early and effectively
- ❑ Use the umbilical port for 270 degrees of cannula rotation
- ❑ Make incisions in the supra-pubic and umbilical region
- ❑ Small, reducible hernias can be finger-isolated
- ❑ Beware lap bands, and consent for their potential destruction

Lateral thighs

- ❑ Convex area -- proceed carefully
- ❑ Be aware of the greater trochanter
- ❑ Small volume lipo-aspirate ~100mL
- ❑ Superior inguinal & subgluteal incision
- ❑ Consider lateral positioning of the patient

Liposuction of Lateral Thighs-precaution



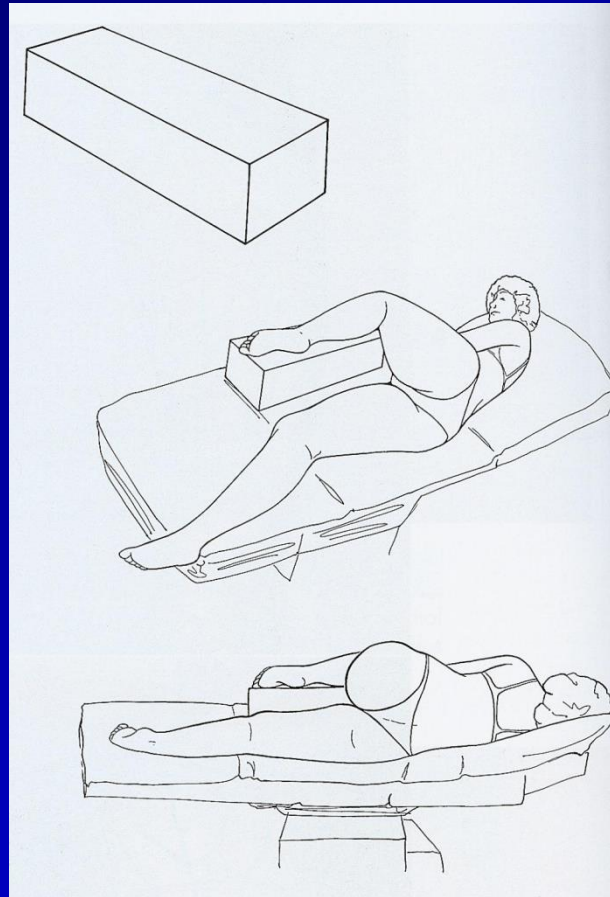
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Medial thighs

- ❑ Inguinal micro-adit
- ❑ Consider inferior micro-adit, use 3mm cannula
- ❑ Small volume lipo-aspirate <250mL
- ❑ Lipo-troughs are common - soft fat area
- ❑ Work from high to low
- ❑ Proceed carefully
- ❑ Stay deep and conservative

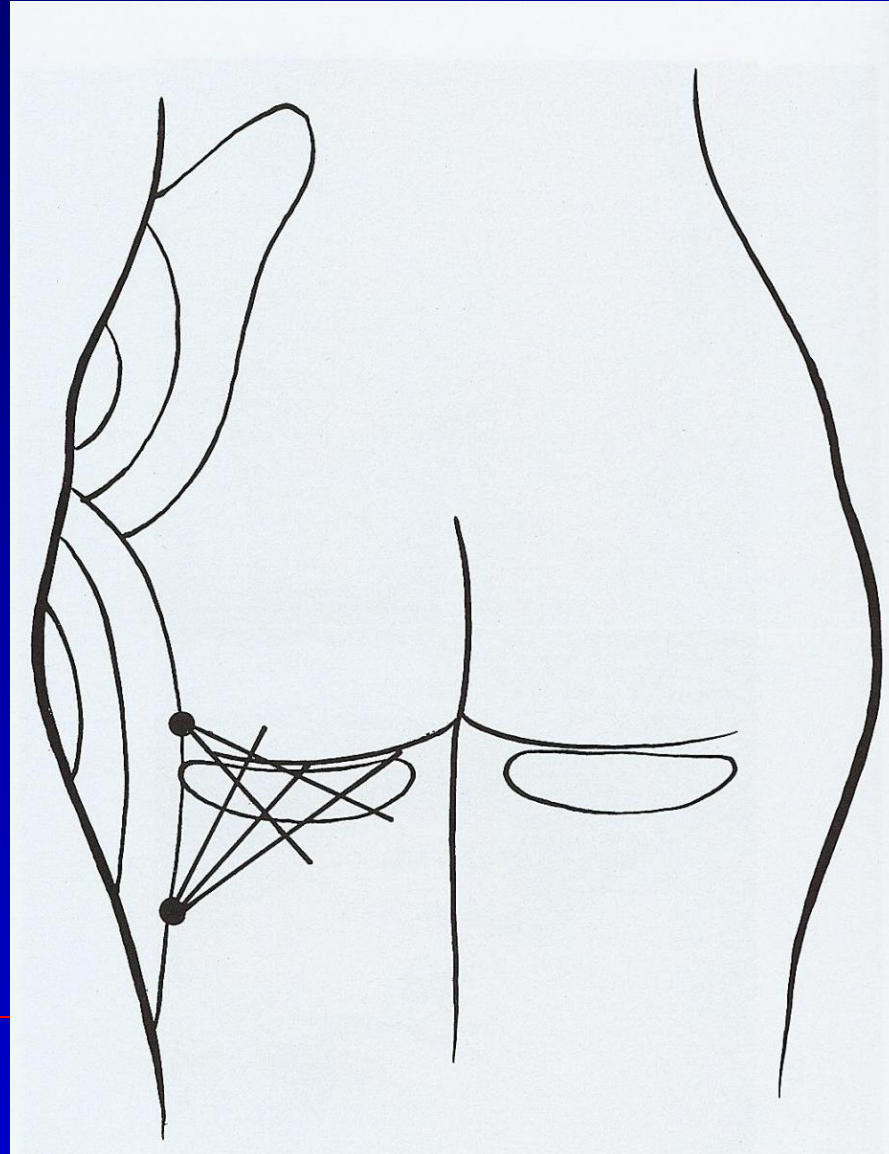
Liposuction of Knees/Inner Thighs



Banana roll

- Small volume of tumescent <100mL
- Avoid disruption of the subgluteal fold
- Preserve the lateral one-third for butt support
- Emphasize risk of increased cellulite appearance
- Beware of lowering position of the sugluteal fold by exposing the pre-existing true subgluteal fold

Banana roll & Infra-gluteal fold



Buttocks

- In general, just say no.
 - Can consider a gentle, deep, overall reduction.
 - Suggest staged treatment over months.

Sacrum

- Should be a smooth, diamond-shaped reduction with lateral wings over the buttocks
- Respect the true height of the buttocks (do not cut them off)

Medial knees

- ❑ Small volume lipoaspirate < 25mL
- ❑ Inferomedial inferior incision
- ❑ Generally, a rewarding and forgiving area

Calves

- ❑ Small volume lipo-aspirate < 100mL
- ❑ Supero-medial and supero-lateral incision for gastrocnemius area reduction
- ❑ Infero-medial and infero-lateral incision for contour of below the gastrocnemius
- ❑ Proceed carefully
- ❑ May cause post-op muscle spasm

Arms

- Typically two incisions above the elbow:
 - infero-medial - 2 cm above bottom of the bicipital groove
 - infero-lateral - 2cm along posterior aspect of upper arm
- Use prone position positioning with the supported arm “hanging off” the arm-board. Beware of injury to the ulnar nerve
- Be conservative, keeping the fat aspirate low, only about 50 to 100mL per side
- Inform about possible residual loose skin; consider for use of additional thermal energy devices for tightening; consent for possible, delayed crescent or full brachioplasty

Liposuction of the Arms



A



B

“Bra-Roll”

- ❑ Over-infiltrate with tumescent fluid, more than you would anticipate
- ❑ Contour lateral to the line of the trapezius
- ❑ Mark the patient’s bra line to decide the incision location(s)
- ❑ Beware of over resection of the waist
- ❑ In darker-skin patients, consider performing bra-roll treatment using adits in the axillae at the posterior axillary line and with the patient in the prone position (minimizes visible scars)

Gynecomastia

- ❑ Infiltrate the area below the NAC & gland very thoroughly
- ❑ Lipo-disrupt fibrous tissue
- ❑ Use spiral cannula or other aggressive cannula
- ❑ Consider additional thermal energy devices if available
- ❑ Don't overdo if only fat is to be suctioned out without planned breast gland excision
- ❑ Consent for a possible gland excision
- ❑ The goal is to get the NAC turned down and out
- ❑ Avoid suctioning cephalo-medially to the inferior border of the Pectoralis Major

Results

Neck Liposuction



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Neck Liposuction



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Neck Liposuction



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Arm Liposuction



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Hips/Flanks/"Love-handles"



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Thighs Liposuction



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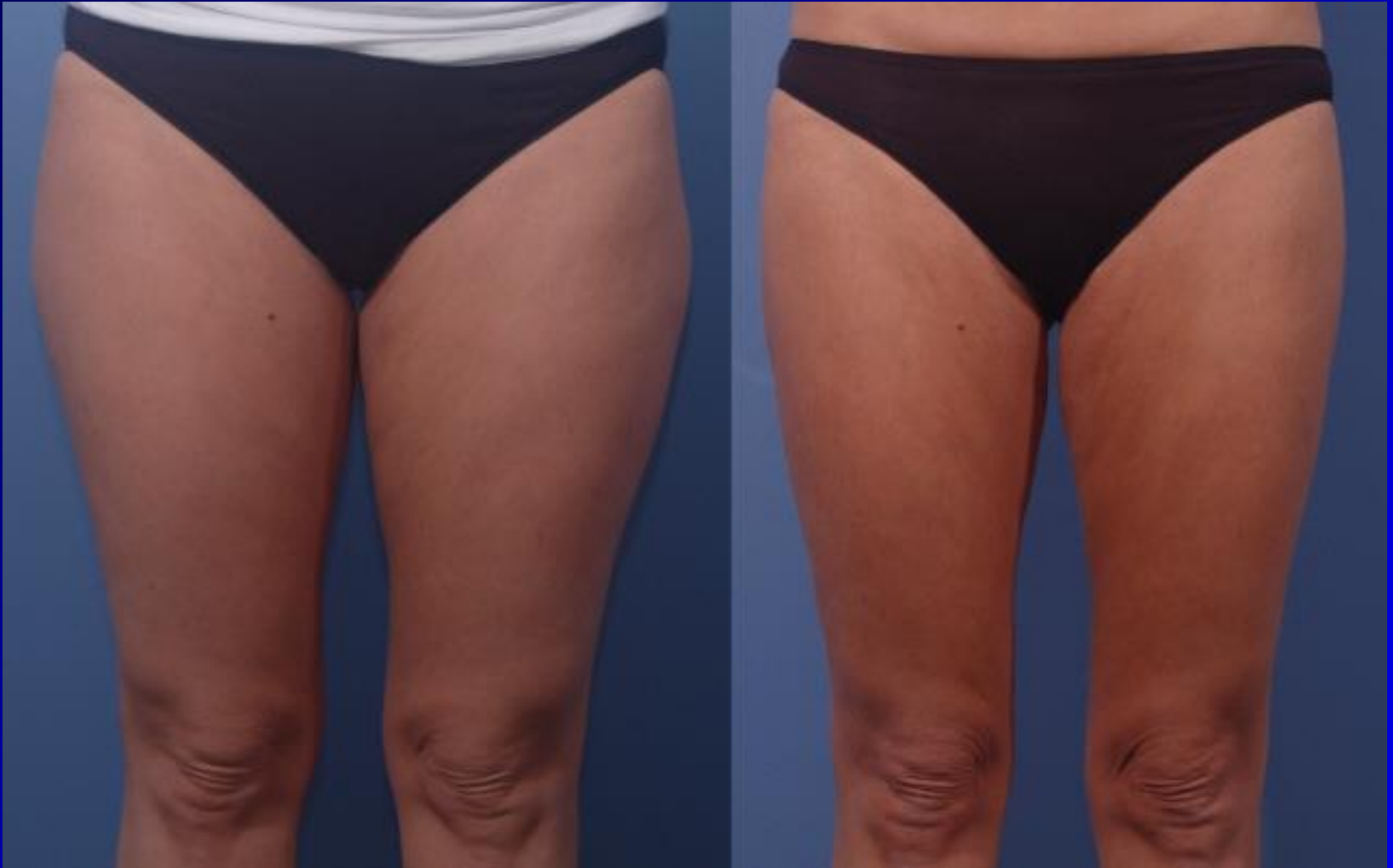
Thighs Liposuction



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Thighs Liposuction



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Abdomen Liposuction



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Abdomen Liposuction



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Case Presentations

38-year-old man 6ft, 225 lbs presents for consideration of body contouring and treatment of “man boobs”



What do you want to know?

PMH? Meds?

Tobacco? Cannabis?

What is his BMI?

Is he a good candidate?

Does he need gland excision?

Does he have mostly pseudo-gynecomastia (obesity).

What anesthesia will you use?

Day of Surgery

What is the maximum amount of lidocaine?

How will you mix the tumescence?

Where will you place the incisions?

What special devices will you use if available?



ANSWERS (1)

BMI = kg/meter²

Body weight= 225 lbs : 2.2 kg/lbs = **102 kg**

Height = 6 feet=72 inches x 2.54cm/inch=
183 cm = 1.83meters 1.83x1.83=3.35

BMI = 102/3.35 = 30.4

Maximum Lidocaine

102 kg x 55mg/kg = 5,625mg

Tumescent fluid mixed at 500mg
per Liter in this case

5,625mg : 500mg/L = 11.25 Liters

ANSWERS (2)

Incisions: Will start in lateral or prone position and access posterior “love handles”.

Then rotate into supine position, make the adits in the superior umbilicus for access to epigastrium.

And 1 or 2 suprapubic incision for access to the anterior flank and hypogastrium.

For gynecomastia consider VASER, aggressive Toledo or Candy-cane cannula or with PAL possibly with energy device such as Renuvion. Access through areolas and anterior axilla. For example, I will often use the left areolar incision to access the right breast through a small pre-sternal tunnel to allow for a longer excursion of the cannula.

POD #10

- ❑ Develops more pain and swelling in the hypogastrium?
- ❑ How will you aspirate?
- ❑ Will you send aspirate for culture?
- ❑ How many times will you aspirate?
- ❑ What will you do next if seroma persists?

ANSWERS (3)

After two aspirations, if the volume of the serous fluid is not significantly diminishing despite on going garment compression, I will have a radiologist insert in a seroma catheter under ultrasound control. I have tried to inflate air to close down a seroma and it did work too well. I have not done TCN seromadesis (sclerotherapy), but it as been described. Consider insertion of J-P drain.

Six months post-op



Thank you.

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