Update on Gluteal Fat Grafting Safety

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Disclosures

None related to this topic
Gluteal Fat Grafting

• >20,000 in 2017 (>18,000 in 2016)
• Estimated 1 in 3000 mortality
• Protocols not standardized
• Performed by non-plastic surgeons
• Deaths continue to be reported
Serious Complications

- Sciatic nerve paresthesia
- Fat necrosis
- Infection
- Sepsis
- Necrotizing fasciitis

- 3567 patients in 20 studies
- Fat Embolism 0.08% (1 in 1250)
Cause of Death

• Fatal fat embolism due to
  • Fat entering the venous circulation
  • Associated with injury to the gluteal veins

• Autopsy findings in every patient
  • Fat seen within gluteal muscle
  • No case with fat only in subcutaneous plane
Fat Embolism vs Fat Embolism Syndrome

**Fat Embolism**
- Fat globules in pulmonary circulation
- Acute event during fat injection
- Direct obstruction of major veins
- Cardiorespiratory failure
- Extremely poor prognosis
- Immediate supportive care
- Unknown role for embolectomy

**Fat Embolism Syndrome (FES)**
- Rare clinical syndrome
- Appears 1 to 3 days after liposuction
- Dehydration may contribute
- Respiratory failure
- Neurocognitive deficit
- Skin petechiae
- Supportive therapy & mechanical ventilation
  - Prompt recognition (10% mortality)
  - Late recognition (35% mortality)
Liposuction Releases Fat into Circulation

• Animal study of liposuction
• 60 min after liposuction
  • Fat seen in blood
  • Lipid deposits seen in lungs
• Unknown clinical relevance
Micro vs Macroscopic Fat Embolism

- **Microscopic** = Fat Embolism Syndrome
- **Macroscopic** = Fat Embolism
- 15 to 50 mL of fat embolism can kill an adult
- Clinical presentation similar to VTE
- Pig model pattern of cardiac function
  - Immediate **deterioration**
  - 10 to 30 min of **improvement**
  - 30 to 60 min of **worsening until death**

- Initial intraoperative deterioration may appear to improve. However surgery should be terminated and specialized care should be sought during that 10 to 60 minutes when the patient appears to improve, otherwise, the risk of intraoperative death is very high.
Fat Embolism: Direct Injury to Gluteal Veins
Fat Absorbed by Negative Venous Pressure
Autopsy Results after Buttock Fat Injection

• Volume of fat injected was NOT large
• Largest 300 cc per buttock
• Average 214 cc per side
• Intramuscular injection is the problem

Deaths Caused by Gluteal Lipoinjection: What Are We Doing Wrong?

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Guadalajara, Jalisco, México; and
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Background: Intramuscular gluteal lipoinjection has become one of the most commonly used surgical procedures for achieving improvement in the gluteal contour; however, there are few studies that report and analyze the causes of secondary death from this surgical procedure.

Methods: An analysis of secondary deaths from gluteal lipoinjection procedures was performed in Mexico and Colombia over periods of 10 and 15 years, respectively. In Mexico, the study was performed through a survey of all members of the Mexican Association of Reconstructive, Plastic and Aesthetic

2015
Fat in Gluteus Maximus Muscle – Common Finding
Macroscopic Fat in Vena Cava – Intraoperative Death
Macroscopic Fat in Right Atrium – Intraoperative Death
Macroscopic Fat in Lung – Intraoperative Death
Solution: Don’t Injection Into Muscles
Was Gluteal Injection Ever Recommended?

Techniques in Cosmetic Surgery

Buttock Augmentation: Case Studies of Fat Injection Monitored by Magnetic Resonance Imaging

William L. Murillo, M.D.
New Orleans, LA, and Cali, Colombia

• 162 patients reported in 2004
• “…fat is infiltrated into upper gluteal muscle layer…”
• MRI at 4 and 12 months
Systematic Review of 4015 Cases

- 46% - Both subcutaneous & intramuscular
- 27% - Intramuscular only
- 20% - Subcutaneous only
- 7% - Subcutaneous & subfascial
Is it Acceptable to Inject Gluteal Muscles?

“Later, we injected deeper toward the gluteal muscle to expand and augment its volume.”

Based on current knowledge, and lack of full understanding of gluteal vascular anatomy in relation to superficial landmarks, there is no rational reason to inject the gluteal muscles.
Is it Acceptable to Inject Gluteal Muscles?

“When grafting into the gluteal musculature, only the superficial region of the muscle is grafted, and fat is distributed in locations far from the gluteal artery and veins.”

Based on current knowledge, and lack of full understanding of gluteal vascular anatomy in relation to superficial landmarks, there is no rational reason to inject the gluteal muscles.
Stay Safe: Know the Anatomy

“Inject in subcutaneous or superficial muscle and only in subcutaneous plane in triangle of Danger”

Based on current knowledge, and lack of full understanding of gluteal vascular anatomy in relation to superficial landmarks, there is no rational reason to inject the gluteal muscles.

Staying Safe during Gluteal Fat Transplantation

Summary: Gluteal augmentation with fat transplantation is increasing in demand but has been associated with a concerning number of faulty reports. Despite these reports, various surgeons have safely performed gluteal fat transplantation on a large number of patients with no reported mortality. The important aspects of safely performing gluteal fat transplantation are reviewed. Proper patient selection, favorable instrumentation, patient positioning, proper technique, and knowledge of anatomy are critical to improving the safety of this procedure. Adherence to these key principles should allow a reduction in mortality from this procedure, which would safely allow its continued offering in the setting of increasingly high demand. (Plast. Reconstr. Surg. 141: 79, 2018.)
Critical Gluteal Anatomy

Superficial Muscles:
- Gluteus maximus
- Tensor fasciae latae

Deep Muscles:
- Gluteus medius
- Gluteus minimus
- Piriformis
- Gemellus superior
- Gemellus inferior
- Obturator internus
- Quadratus femoris
Gluteal Blood Vessels

- Superficial branches
- Superior gluteal vessels
- Inferior gluteal vessels
- Deep branches
- Lateral femoral circumflex vessels
- Medial femoral circumflex vessels
- First perforating vessels from deep vessels of thigh
Gluteal Blood Vessels: Large Danger Zone
Gluteal Nerves
Gluteal Nerves: Large Danger Zone
Recommendations

• Inject with large cannulas (blunt, >4 mm)
• Use rigid cannulas
• Continual motion during injection
• Superficial injection
• Avoid excessive graft fill pressure
Expansion Vibration & Curved Cannulas

Expansion Vibration Lipofilling: A New Technique in Large-Volume Fat Transplantation

Daniel Del Vecchio, M.D., M.B.A.
Simeon Wall, Jr., M.D.
Boston, Mass.; and Shreveport, La.

Background: Despite rapid growth, gluteal fat transplantation is an operation in search of science and a teachable technique. Long operating times, tedious syringe transfers, inability to shape the recipient site, and the risk of fat embolism all headline as impediments to clinical adoption of the procedure.

- Continuous roller pump fat injection
- Less concentrated fat
- Curved cannulas
- Jack knife position
ASEFR Task Force

Survey of 692 surgeons
• 198,857 gluteal fat grafting cases
• 32 fatal pulmonary fat emboli
• 103 nonfatal pulmonary fat emboli
• 3% had a patient fatality
• 7% had ≥1 pulmonary fat embolism
• Injecting into deep muscle significantly increased incidence of
  • Fatal pulmonary fat emboli
  • Nonfatal pulmonary fat emboli
Recommendations

• Don’t inject into deep muscle (any muscle)
• Use ≥4 mm single hole injection cannula
• Avoid downward angulation of cannula
• Position patient & incisions to avoid deep muscle injections
• Maintain constant 3-dimensional awareness of cannula tip
• Only inject when cannula is in motion
• Consider pulmonary fat embolism in unstable patients
• Review gluteal vascular anatomy
• Include fat embolism & alternatives in informed consent process
Multi-Society Task Force Recommendations

• Proper patient expectations
• Discuss alternatives, complications, & informed consent
• Consider staged procedures
• **Do NOT place fat in the muscle – subcutaneous space only**
  • Easy to unintentionally enter the muscle during injection
  • Stay mentally focused and aware of the cannula tip at every moment
  • Consider positioning for favor superficial approaches (table jackknife)
  • Use cannulas that are resistant to bending during injection
Multi-Society Task Force Recommendations

• No published series of BBLs done with intramuscular injections is large enough to demonstrate it can be done without the risk of fat embolism
• Subcutaneous plane has not been linked to pulmonary fat embolism
• The Task Force is actively performing anatomic studies and more specific technical guidelines will be forthcoming
  • Correlate deep and topographical anatomy
  • Define danger zones
  • Understand the mechanism of embolization
Recommended Technique

• Stay away from gluteal veins & sciatic nerve
• Inject fat only into subcutaneous space
• Concentrate on position of cannula tip throughout every stroke
  • Particularly in the medial half of the buttock overlying critical structures
• Access incisions best for superficial trajectory of cannula
• Palpate with non-dominant hand to assure cannula tip is superficial
• Use instruments that control the cannula
  • Avoid bendable cannulas
• Injection while cannula is in motion to avoid high-pressure bolus injection
PSF, ASERF, ISAPS Research

- Principal Investigator: Peter Rubin MD
- PSF, ASERF, and ISAPS funded cadaver study
  - Correlate deep and topographical anatomy
  - Define danger zones
  - Understand the mechanism of embolization
  - Relationship between danger zones and gluteal fat transfer technique
- Study performed July 14-15 and August 18-19 in Miami
- Anticipate results in late 2018
Launched in 2015, the GRAFT Registry uses web-based data collection to capture procedural and outcomes information on fat grafting procedures performed to all areas of the body. Since the registry launched:

- More than 11,000 patient visits, including procedure and follow-up, have been captured
- Data has been collected on 785 Fat Grafting to the Buttock procedures, with a complication rate of just over 3%.
• GRAFT has just opened in Brazil and Canada—the first of any of the ASPS/PSF registries to expand internationally.
• Benchmark reports available for practices to compare their performance to the Registry aggregate
• GRAFT app available for download to speed up data entry!
• Learn more today at www.plasticsurgery.org/registries

Support provided by Allergan
If You Have A Death

• Contact Plastic Surgery Foundation immediate
  • Keith Hume at khume@plasticsurgery.org
• Task Force members have assisted at autopsies
Stay Safe and Say No to “Hip Dips”
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For Physicians