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High-Volume Lipofilling/Fat Transfer. New Methods, Techniques, and Technologies. What Is the Science?

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KEYWORDS
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KEY POINTS
- High-volume lipofilling has become widely used for gluteal augmentation with high patient satisfaction rates and durable results.
- Intramuscular grafting has demonstrated survival of fat graft injected more rapidly and in larger aliquots than possible in the breast and face, allowing for lipofilling volumes of 1 L and above per side.
- Creating a frame for the buttocks by lipocontouring a patient's trunk, abdomen, hips, and legs is the only way to achieve truly excellent results—gluteal augmentation is only 1 part of a comprehensive plan.
- Patients must be counseled regarding the low but present risk of fat embolism or death in cases of high-volume gluteal lipofilling if graft placement into the muscle is planned, and the provider must always exercise great care with intramuscular graft placement.

INTRODUCTION

Advances in liposuction and grafting techniques and equipment have enabled transfer of larger volumes of fat autograft than ever before. High-volume lipofilling has been effective in primary augmentation as well as reconstruction scenarios in the breast [1,2] and has found a popular application in gluteal augmentation. Lipofilling presents an attractive option to patients because the downsides of implants are avoided, natural feel of the tissues is preserved, and the liposuction to harvest the fat improves the appearance of the donor areas. Although seemingly simple in concept, high-volume lipofilling has its own set of complexities and pitfalls that must be accounted for to avoid complications and provide aesthetically pleasing results.

Lipofilling in the buttocks for augmentation and contouring is discussed later, because this is the more hotly discussed application of high-volume fat transfer at this time. Lipofilling for breast reconstruction and augmentation has several other complexities outside the scope of this text and is well described elsewhere [2,3].

Buttock augmentation, pioneered by Toledo [4], has gained great popularity in the United States in recent years, as evidenced by consumer online search patterns, putting it second only to breast augmentation [5].

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Unlike the breast, a large amount of graft can be transferred due to the large subcutaneous fat and gluteus maximus muscle recipient sites. Although it is often the focus of discussion, buttock augmentation should be part of a liposculpture plan that must address the abdomen, flanks, back, hips, and thighs. Sculpting the frame for the augmented buttock is a complex endeavor and only the basics are included. Excellent descriptions and videos are available on this topic, which extend beyond the scope of this article [6,7].

Fuller hips and buttocks have become more desirable recently, and patients are requesting dramatic augmentations. These requires intramuscular graft placement, because the subcutaneous tissues can only support a limited amount of graft. This is of crucial importance because there is a correlation between fat embolism in gluteal auto-augmentation cases and grafting in the deep muscular layers, and providers must be aware of these risks.

SURGICAL TECHNIQUE

- Patient evaluation and preoperative planning
  - Patients' expectations and concepts of ideal body shape vary—some may seek maximal projection and volume, whereas others may want to recreate their younger, athletic body contours. A patient's goals dictate the donor sites available and the contouring that needs to be done, the amount of harvested fat available, and the augmentation plan in relation to need for intramuscular grafting.
  - The lipocontouring plan must address the flanks, abdomen, and back to create a smooth transition from torso to buttock and hips. It is key to suction any excess superolaterally to the gluteus maximus projection—this avoids the appearance of squared-off buttocks superiorly.
  - A general guideline is to aim for a 0.60 to 0.65 waist-to-hip ratio on the anteroposterior (AP) view, 0.70 waist-to-hip ratio on the lateral view, and for the most projecting point of the buttocks to be at the midpoint of the curvature, with 50% of the volume above and below. A useful landmark for this level is the coccyx, which should align with the pubis and greater femoral trochanter to localize the vertical midpoint of the buttocks [8].
  - Preoperatively, mark the bony landmarks (anterior superior iliac spine [ASIS] and posterior superior iliac spine [PSIS]), iliac crest, greater trochanter, and pubic symphysis), any areas of adipose excess around the buttocks to be suctioned, the donor sites, and the intertrochanteric depression, if present.
- Preparation and patient positioning
  - Patient is prepped circumferentially with warmed betadine solution and then assisted to the operating room (OR) table, which is covered with a sterile drape and towel, used later to turn the patient. Arms and legs up to the knees are covered with sterile stockinettes after intravenous (IV) catheters, pulse oximetry monitors, and sequential compression devices are in place.
  - After induction of anesthesia, the liposuction is started in the supine position, then lateral decubitus position, prior to turning to prone for the bulk of the lipofilling. The patient can be partially turned to lateral decubitus again, if needed, to graft the lateral areas and the intertrochanteric depression, before being turned back to supine for extubation.
  - Liposuction and grafting access sites are reprepped after all position changes.
- Procedural approach
  - The overall procedure is divided into 3 components: tumescence and liposuction, fat graft processing, and fat graft injection.
  - Anesthesia and tumescence
    - Fat grafting to the buttocks can be performed under IV sedation, but providers first starting to incorporate it into their practice may prefer general anesthesia at the outset. Under general anesthesia, the tumescent solution may be formulated without lidocaine to avoid any risk of any lidocaine toxicity with no impact on postoperative pain [9].
    - Any lidocaine used should be under 45 mg/kg [10]. Epinephrine dose should not exceed 0.07 mg/kg or 10 mg total [11,12].
    - The authors prefer infiltrating to tumescence with warmed lactated Ringer solution and epinephrine 1:1,000,000 (1 ampule of epinephrine 1:1000 in 1 L of lactated Ringer solution) under general anesthesia.
  - Liposuction
    - Most of the liposuction is in the deep plane to evenly decrease the subcutaneous adipose layer, where aggressive cannula designs may be used per surgeon preference. For contouring the superficial layer over the anterior abdomen, a less aggressive design minimizes