Letter to the Editor

Intraoperative Ultrasonography to Guide Intramuscular Buttock Implants

Raul Gonzalez, MD; and Fernando Mauad, MD

Ultrasoundography (US) is useful for a number of purposes. Intraoperative ultrasound (IOUS) provides better spatial and contrast resolution of the anatomical structures and organs than any other imaging method and is used mainly to identify nonpalpable lesions, guide surgical procedures, and stage local tumor disease. In plastic surgery, US is not commonly used as a transoperative guide, although there are reports of IOUS having been used to guide the dissecting instrument for surgical treatment of fibrous tissue gynecomastia through mini-incisions.

The objective of this letter is to describe the application of IOUS as a guide for intramuscular undermining during gluteal implant surgery. Over the past 12 months, we have performed nine intramuscular gluteal implant surgeries with this method. The primary goal of implementing IOUS during these procedures was to prove that the anatomic structures and points that act as a reference in our XYZ technique were reliable sites—that is, we sought to prove that by following the reference points, the surgeon is in fact on the right path to dissecting a plane within the muscle at the desired depth. We feel that this goal has been fully achieved.

Although this forum is not appropriate for a full discussion of the data generated in this nine-patient series and we plan to address the reliability of the XYZ technique in a separate publication, the study led us to believe that the use of IOUS might be of great help to other surgeons in undermining inside the muscle at an adequate plane. In this way, it can provide surgeons (beginners or experienced) with a method for safer intramuscular dissection, and it can also act as a useful tool for teaching intramuscular gluteal implant surgery. This is of great relevance since one of the drawbacks of gluteal implant surgery is that if the dissection plane within the gluteus maximus muscle is incorrectly bisected, the implant may be visible postoperatively, which is an unacceptable complication in this procedure.

Specifically, with regard to the GM, the surgeon must ensure that bisection occurs exactly at the muscle’s mid-thickness, so that the portion anterior to the implant and the one posterior to it are of the same thickness, rendering a sort of implant-muscle “sandwich,” which we actually refer to as the “sandwich plane.” This prevents a situation in which unequal thickness in the muscle division could result in atrophy of the thinner side by the pressure exerted on the implant in a muscle partially deprived of its innervations and blood supply. Another fundamental principle of our previously-described technique is that the dissection should not proceed beyond the lateral limit of the GM, both for aesthetic reasons and to avoid injuring the gluteus medius. Dissection of a sandwich plane is not easy since undermining is performed blindly rather than in an open field; on its lateral aspect, the GM is thinner, and the surgeon is unable to visualize how deep the undermining is going.

To address this problem, our XYZ technique relies on palpable points on the pelvis to guide the undermining within the muscle’s limits. The lateral limit of the muscle is identified by drawing a line (G) from a point over the iliac crest, 4 cm lateral to the upper-posterior iliac spine, until it reaches the lateral-posterior aspect of the trochanter. The mid-muscle thickness is measured on two points—points close to its lateral limit (X) and the other next to the lateral limit (Y). The first is found through the incision that opens the muscle, next to the sacrum. After opening the muscle, its thickness is measured as the surgeon inserts an index finger deeply into the muscle opening until the sacrotuberous ligament—which is the anterior limit of the muscle—is palpated. The distance between the ligament and the muscle wall is the exact thickness of the muscle at that site (4.5-6 cm on average); dividing this measurement in half provides the mid-muscle thickness, which is Point X. The second point is identified over Line G’s most cephalic portion. In this area, the mid-muscle thickness corresponds exactly with the junction of the iliac bone and iliac crest. The surgeon uses a finger to palpate strong pressure on Line G, 2 or 3 cm below the iliac crest, until he or she feels that the finger is parallel to the lower aspect of the iliac crest, at which point the fingertip will be indicating (more or less) the junction of the iliac crest and iliac bone—that is, the mid-muscle thickness. Once this second point is identified, the path between Points X and Y acts as a dissection line on which undermining is going.
the mid-muscle thickness. Dissection is performed with a 30 × 2-cm dissector; downward undermining is performed by rotating the dissector and, because of the anatomical points identified earlier, is easily kept at the mid-thickness plane, guided by the muscular fibers.

Even with anatomical reference points, lack of training early in the learning curve may lead surgeons to advance the undermining instrument past (or short of) the point indicated by the fingertip, which may result in a less-than-ideal depth of dissection. It is for this reason that IOUS has played an important role in our method of intramuscular implantation. With IOUS, we are able to verify that the tip of the blade is actually at the mid-muscle thickness—that is, we can confirm that the muscle was correctly bisected into two equal halves.

To incorporate US into our gluteal augmentation procedure, the ultrasonographer preoperatively explores the area together with the surgeon, identifying the anatomical elements including the iliac crest, gluteus maximus and medius muscles, and the GM’s lateral limit over Line G, over which they also measure the muscle thickness on that area. The surgeon then finds the key points and performs the dissection maneuver on a line between Points X and Y as described earlier (this may be done without the IOUS); as Point Y is reached, the transducer is placed over Line G, taking the place of the finger that indicated Point Y. At this point, the tip of the dissecting blade will be visible. If the maneuver has been successful, the image will show the muscle’s lateral limit along with the blade tip, which will appear at the mid-muscle thickness (Figure 1). If the image shows that the dissecting blade is located more superficially or deeper than the ideal plane, the surgeon can retract the blade and begin the dissection again, correcting the blade’s direction. This enables any surgeon, even a beginner, to confirm the surgical path and determine whether the undermining was properly performed, ensuring that no harm was done to the muscle and avoiding postoperative implant visibility.

**Disclosures**

The authors declared no potential conflicts of interest with respect to the research, authorship, and publication of this article.

**REFERENCES**