Featured Operative Technique

Gluteal Implants: The "XYZ" Intramuscular Method

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Abstract

Gluteal implants are an effective and predictable way to remodel the buttocks. However, depending on the anatomical plane employed and the manner in which the implant pocket is dissected, the results can be frustrating. The only way to prevent palpable or visible implants (the major causes of a poor result) is through the intramuscular plane. The author presents his XYZ technique, which provides anatomical reference points to guide the intramuscular dissection procedure in a feasible and safe way, resulting in a low complication rate.

Keywords

buttock implants, gluteal prostheses, intramuscular implants, body contouring

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Gluteal implants provide a method for achieving effective buttocks remodeling in a way that is not always possible with other methods. Unlike fat grafts, insertion of an implant achieves the desired round shape through a concentrated projection, which a graft is not capable of providing. Intramuscular implants can also be combined with grafts in selective areas when necessary, providing even better results. However, because of the associated complications, many surgeons have been reticent to perform gluteal remodeling with implants on a regular basis. The main problems to avoid in a gluteal implant surgery are seroma, dehiscence, extrusion, and a visible or palpable implant. Perceptible breast implants may be acceptable, but perceptible buttocks implants are very embarrassing to patients. The complications listed above occur in a different fashion and at very different rates on each anatomical plane: subfascial, subcutaneous, submuscular, and intramuscular.

ADVANTAGES OF THE INTRAMUSCULAR PLANE

Placing a gluteal implant in the subcutaneous and subfascial planes may result in perceptible implants, even when the technique is well performed. Implant visibility in those planes can be immediate, or it can appear after two to three years due to loosening of the fascia and subcutaneous tissue at the implant site. In the submuscular plane (between the gluteus maximus and medium), because of the local anatomy's relationship with the sciatic nerve, caudal undermining should not extend beyond the lower edge of the pyramidal muscle, which restricts the implant pocket at the upper part of the buttocks, giving an impression of "double buttocks," especially in patients who have long buttocks.

The intramuscular plane is the least likely to be associated with perceptible implant problems (and complications of any kind). When the technique is well performed, the muscle cover provided in this plane is enough to hide the implant. Even in this preferable plane, however, certain principles must be satisfied to avoid asymmetry, muscle damage, or a visible implant.

PRINCIPLES FOR INTRAMUSCULAR UNDERMINING

The gluteus maximus muscle (GM) can be partially bisected to accommodate an implant without having its function altered. However, to preserve muscular function and obtain good aesthetic results, certain principles must be followed when dissecting the intramuscular space. Specifically, (1)

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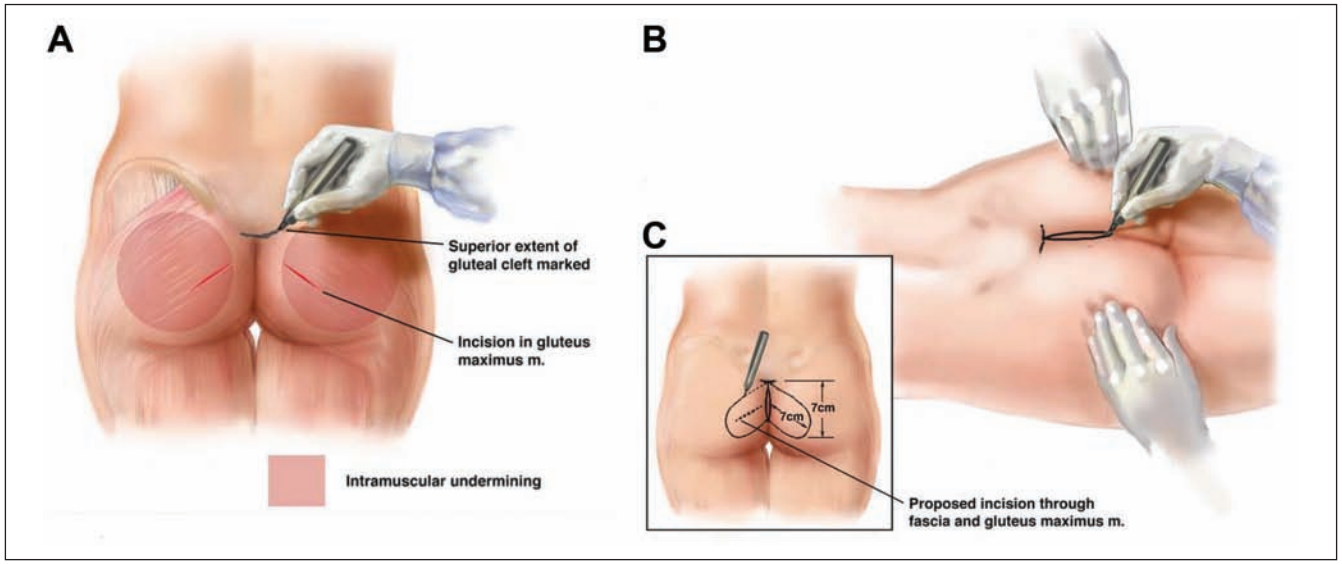

Figure 1. (A) The top of the intergluteal crease is marked with a line (line A), with the patient standing to ensure that the incision is made entirely within the intergluteal cleft. (B) With the patient lying down, marks are made to guide the muscle approach. Beginning at line A, a 3- to 4-mm-wide and 7-cm-long spindle-shaped strip is drawn over the intergluteal cleft to guide the skin incision, preserving the sacrocutaneous ligament. (C) From this line, an "inverted heart" is drawn; the ends are 7 cm away from the crease, to guide the detachment for muscle exposure. The fascial-muscular incision is made within this detachment area, following the direction of the muscle fibers.

the undermining must be restricted to the gluteus maximus, and (2) the undermining must split the muscle in half, leaving the same amount of muscle in front of and behind the implant. Undermining too deeply, too superficially, or too deeply at one point and too superficially at another may lead to muscle damage, specifically in areas where the muscle is thinner. Those areas may atrophy due to an eventual ischemia caused by the implant pressure on poorly irrigated tissues and also by denervation or lack of electric stimuli passing through a muscle that has little volume. If the detachment is superficial or if it partially externalizes the implant, the implant may be visible and palpable.

THE SANDWICH PLANE: THE IDEAL INTRAMUSCULAR PLANE

In the technique described in this article, the intramuscular plane dissected according to the principles above is an ideal plane, which this author calls the "sandwich plane" (because the implant is "sandwiched" between the bisected muscle). In practice, intramuscular undermining at the ideal plane is difficult, as there are intraoperative challenges that hamper the procedure. First, during detachment, it is impossible to assess the depth. Second, the skin changes place in ventral decubitus, therefore rendering useless the previous skin markings to indicate implant positioning. Last and most importantly, there is no anatomical undermining plane to be followed.

A surgeon may overcome these potential pitfalls by intraoperatively identifying the muscle's limits and the exact midpoint of its width in order to bisect it. This is the major feature of the XYZ technique: to provide key points that will simplify muscle bisection at the ideal plane.

SURGICAL TECHNIQUE

In this author's clinic, it is preferable to perform surgery under epidural anesthesia with a catheter because the catheter may be left in for 48 hours, which allows adequate analgesia to be delivered with 20 mL ropivacaine doses at 0.2% every six or eight hours. Since the pain might be strong, it is advisable to introduce the epidural catheter as soon as the surgery is over when using general anesthesia. After the antisepsis procedure, a dressing should be sutured over the anal area to avoid contamination.

The Intergluteal Incision and Muscle Approach

The only preoperative skin mark made with the patient standing is a line (line A) that shows the top of the intergluteal crease and prevents the incision from becoming visible (Figure 1A). Following anesthesia, the patient is placed on the operating table in the prone position; starting at line A, a spindle-shaped double line of 7 or 8 cm in length is demarcated on the intergluteal crease, measuring 3 or 4 mm at its broadest dimension (Figure 1B). Following this marking, a strip of skin is obtained, preserving on its base the sacrocutaneous ligament, which this author

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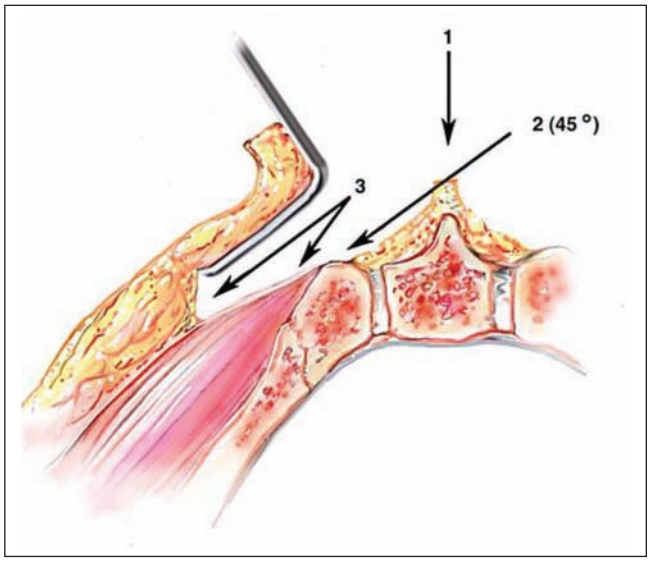

Figure 2. The incision follows the outline of the small skin strip shown in Figure 1. After cutting the skin (1), the subcutaneous tissue is dissected at 45 degrees until the muscle and fascia are found (2), and the dissection advances over the fascia to undermine the entire inverted heart area (3).

described in 1992.[1] That ligament is an anatomic structure that forms the intergluteal crease and will serve to close the incision. At each side of this skin strip, a 7-cm-long hemi-ellipse is drawn in the direction of the muscle fibers. This sketch, shaped as an inverted heart, will guide the suprafascial detachment to expose the muscle (Figure 1C). The subcutaneous tissue under this detachment is infiltrated with an epinephrine solution to provide hemostatic effect.

The incision follows the outline of the small skin strip. After cutting the skin, the subcutaneous plane is dissected at 45 degrees until the muscle and fascia are found; the dissection advances over the fascia to undermine the entire inverted heart, which was previously marked on the skin (Figure 2). Muscle and fascia are opened with the knife along the muscle fibers from the sacrum border to the bottom of the detached area, with the incision measuring about 6 cm (Figure 3A). Through this incision, a cleft is made by the index finger (Figure 3B). Once the muscle is opened, the surgeon must identify its half-width at this site in order to bisect the muscle pursuant to the principles above.

Intraoperative Identification of the GM Muscle's Thickness and Lateral Limit

To bisect the muscle on the sandwich plane, the midpoint of the muscle thickness must be intraoperatively identified on at least two points: one medial, inside the muscular incision (called point X), and the other lateral (called point Y). The surgeon must also know the lateral limit of the GM muscle.

Point X—the medial point. Close to the sacrum, the muscle thickness varies between 4 and 7 cm. To check the thickness, we introduce the index finger in a caudal direction through the muscle cleft made as described above, pressing deeply until the sacral tuberous ligament is found. This ligament, upon palpating, should feel like a human finger. Because this ligament is the anterior limit of the muscle, the distance between the muscle's posterior surface and the ligament indicates the muscle thickness at this spot. To calculate the midpoint of the thickness (the location of point X), divide the total thickness by two, but keep in mind that, in practice, the smallest thickness that should be left as muscle cover is 2.5 cm.

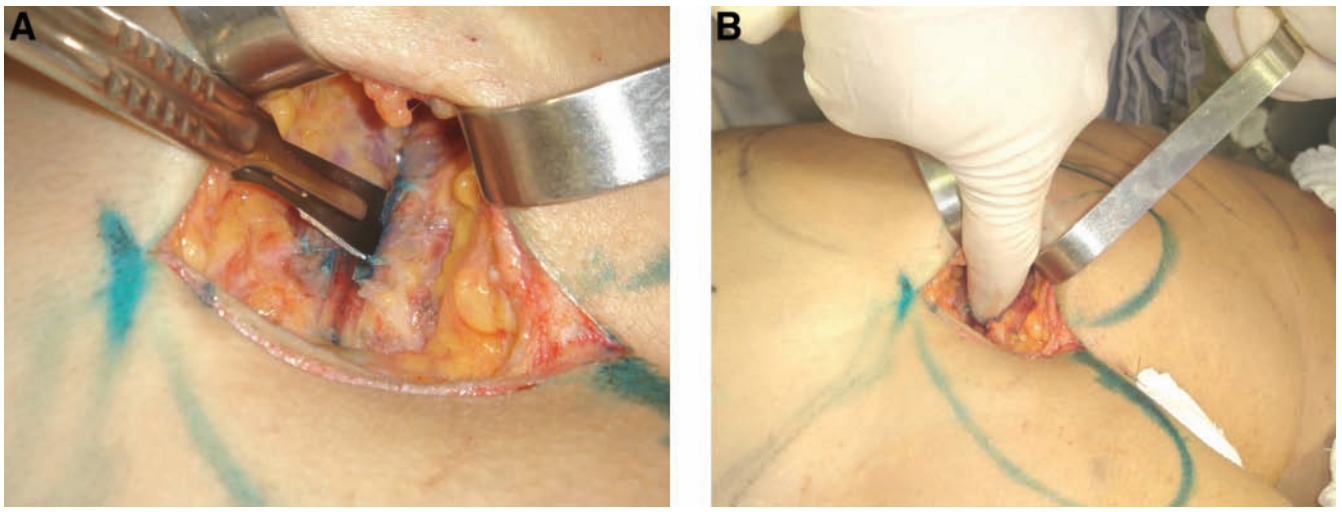

Figure 3. (A) The fascia is cut from the bottom of the detached area to the area very near the sacrum. (B) With the tip of the index finger, a 2.5- to 3-cm-deep cleft is made, depending on the muscle thickness. Pressing the finger caudally, the sacrotuberal ligament can be palpated, indicating the muscle thickness. Point X should be placed at the midpoint of the muscle thickness and always at least 2.5 cm deep.

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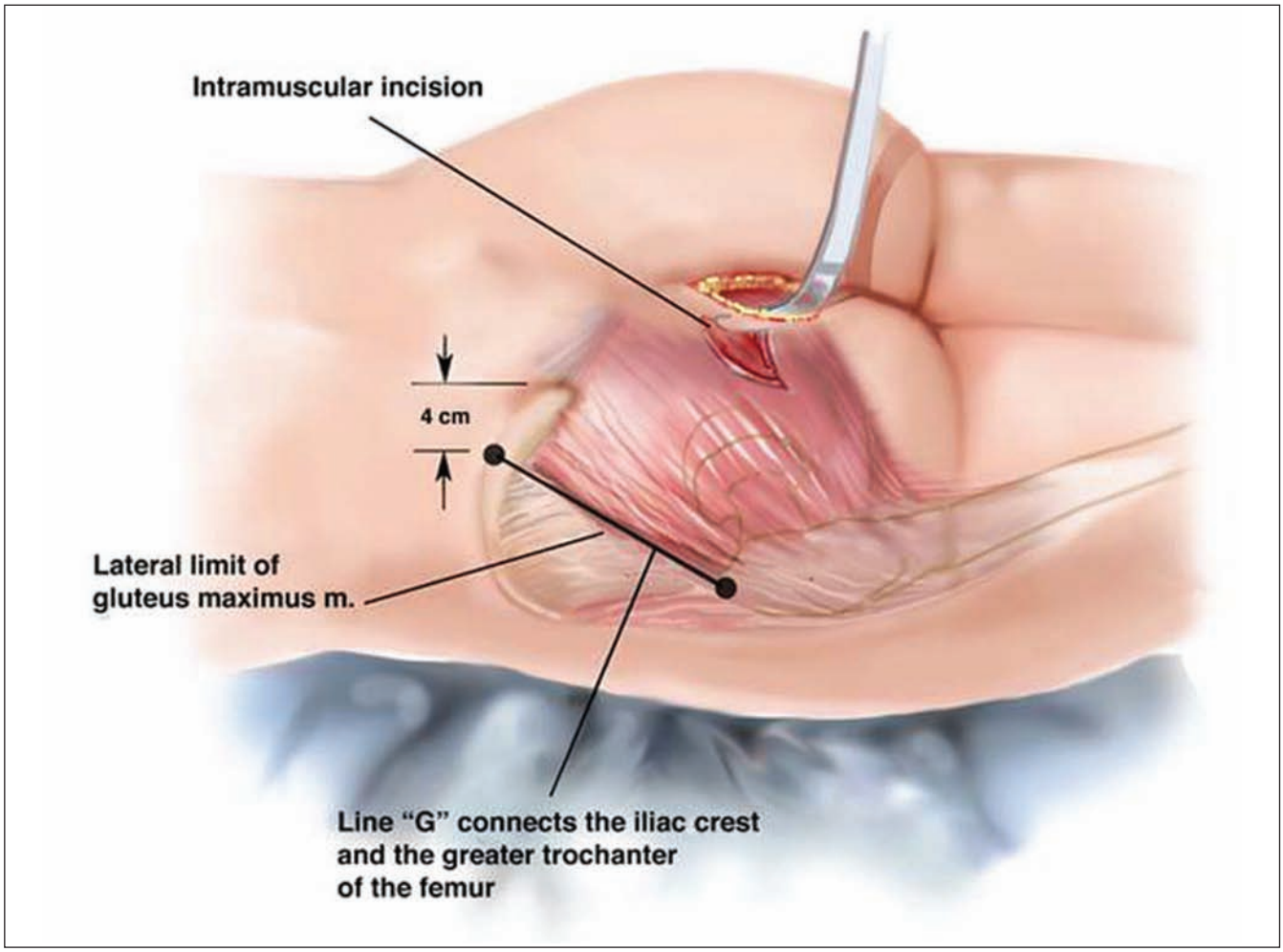

Figure 4. Line G, which shows the lateral limit of the muscle, is drawn from a point on the iliac crest at 4 cm from the upper-posterior iliac spine, up to the lateral-posterior aspect of the trochanter. This line should be marked in the operating room with the patient in the prone position and ready for surgery.

Line G—the GM's lateral limits. To find the lateral limit at the cephalic portion of the muscle, we palpate the superior-posterior iliac spine and mark a point at a 4-cm distance on the iliac crest. As the trochanter's anterolateral aspect indicates the lateral limit on the caudal portion, we may draw a line to identify the muscle's lateral limit, joining the point at the iliac crest and the trochanter. We have labeled this "line G" (Figure 4).

Point Y—the lateral point. On the lateral part of GM muscle, the area close to the iliac crest is a good point at which to identify the midpoint of muscular thickness because the crest can serve as a guide. At this spot, the GM is about 2 cm thick; half of the muscle adheres to the iliac crest and the other half to the iliac bone. The point where the crest joins the bone is the midpoint of muscle thickness. In practice, to find the mid-thickness, the iliac crest should be palpated downward over line G. When the surgeon's finger is parallel to the iliac crest, the fingertip will be very close to the point where the iliac crest joins the iliac bone—that is, the muscle's thickness midpoint (Figure 5).

Bisection of the Muscle

The GM is bisected with a 35 × 2-cm straight steel blade and the dissection should run cephalic from point X to point Y. The bisection is a bimanual procedure, with one hand driving the underminer and the fingers of the other indicating point Y to guide the way. Before introducing the detacher, the first few centimeters should be detached with the index finger. The detacher must be pushed firmly toward point Y, progressing in very short thrusts forward and backward, breaking the septae that divide the muscle in fascicles. Each thrust must be strong, because the septae are quite firm and resistant. Circular-tip instruments or large spatulas are inadequate to break the septae. The detacher should be kept slanted against

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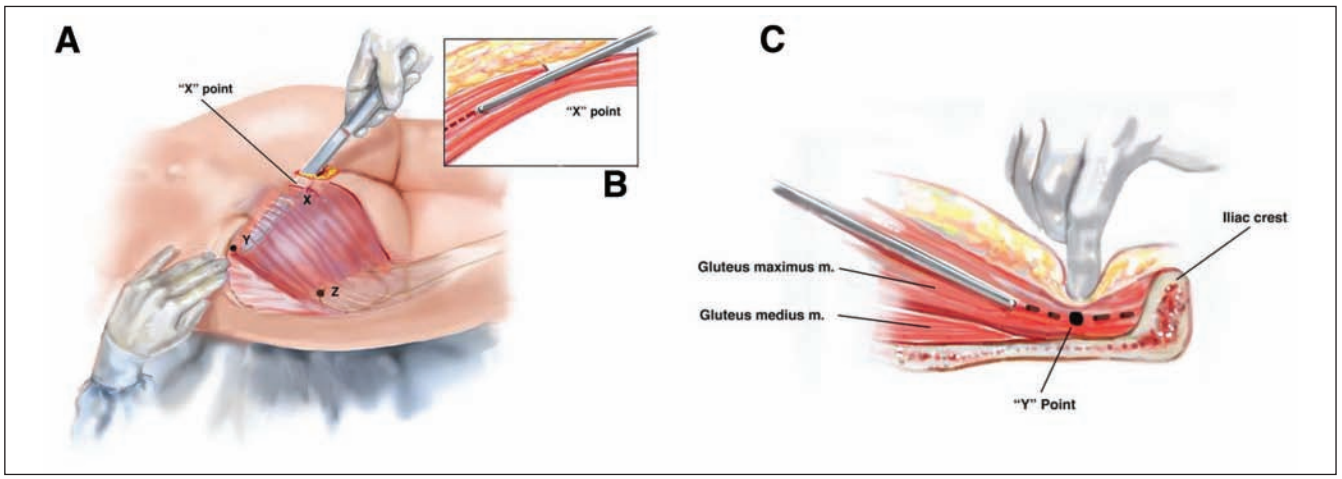

Figure 5. (A) The step between points X (identified in Figure 3B) and Y bisects the muscle. The maneuver should be performed with both hands: one guiding the detacher (a straight 30 × 2-cm steel blade) and the other indicating point Y, with the fingertips firmly pressing on line G. The detacher progresses, first against the sacral and then the iliac bone. (B) The detacher advances into the muscle thickness, beginning at point X and always guided by the fingertips that indicate point Y. (C) As the mid-thickness of the gluteus maximus muscle over line G is on the intersection of iliac crest and iliac bone, this spot can be identified by pressing the iliac crest with one or two fingers and then sliding them, always pressing tightly, until the fingers are parallel to the iliac crest and its lower border is felt.

the sacral bone, which provides a better guide for this maneuver (Figure 5).

The Basic Triangular Detachment

After the initial bisection of the muscle, the detacher is propped up on the muscle incision fibers and rotated, as a lever, toward the trochanter. The muscle fibers guide the detacher, always at the mid-thickness of the muscle, and offer little resistance as it passes toward the trochanter (Figure 6). The last stop of the rotation, close to the trochanter, is called point Z, the third point on the ideal bisection plane. This rotation produces a primary triangular detachment, with points X, Y, and Z being on the triangle's vertices. Based on the three points described, this technique is called the XYZ gluteoplasty. Before withdrawing the detacher, a long, slightly curved 12- or 13-cm retractor is placed in the detached area and directed toward point Y. A smaller retractor is directed more caudally, to provide a view of the detachment. Muscle septa and remaining fibers close to the sacrum that were not torn by the rotation maneuver must be broken with the index finger first, followed by a larger detacher.

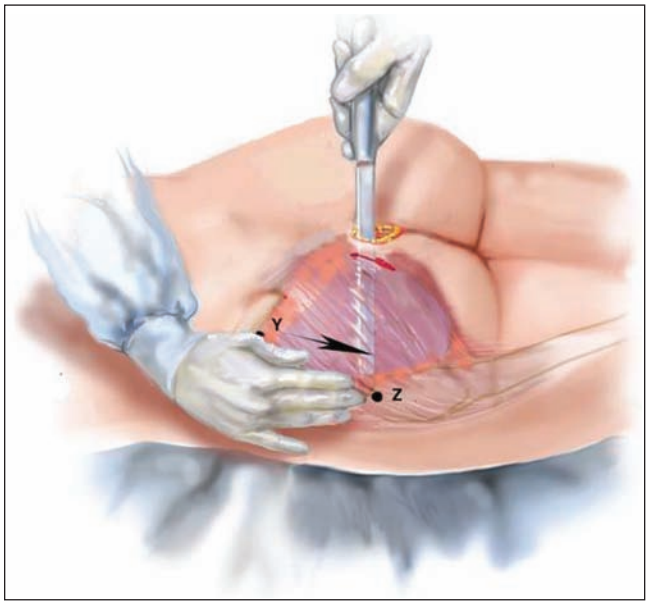

Figure 6. Once the detacher has reached point Y, a circular motion is made with the detacher, leaning it on the muscle fibers of the incision and rotating until it is close to the trochanter. This last point reached by the rotation is called point Z, the third point of the triangle formed by the detacher's path.

The Implant Pocket Adjustment

The XYZ triangular detachment must be enlarged according to the size and shape of the chosen implant. Always following in the direction of the fibers of the bisected muscle, the detachment is enlarged at its caudal and lateral portions with an instrument devised by the author, called the "duck bill" or Gonzalez detacher (Richter, São

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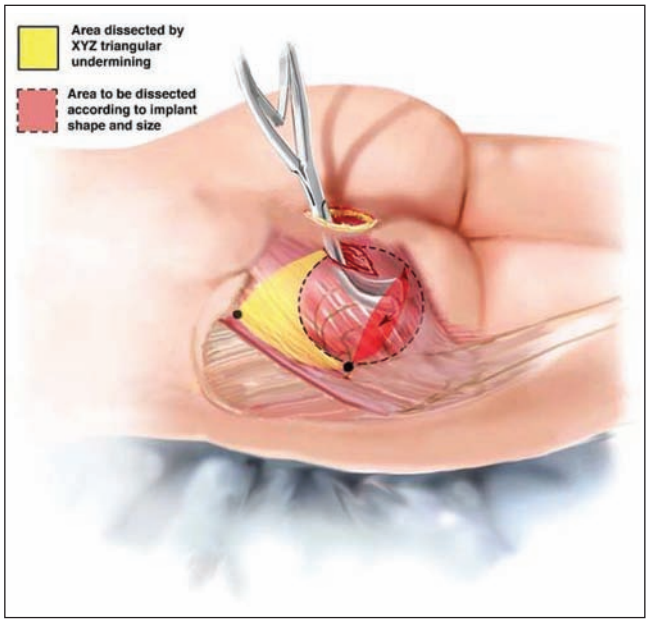

Figure 7. The Gonzalez detacher, shaped like a duck's bill with curved branches, completes the first triangular detachment (in yellow) to suit the implant's size and model. It opens and closes as it advances forward, making detachment relatively easy.

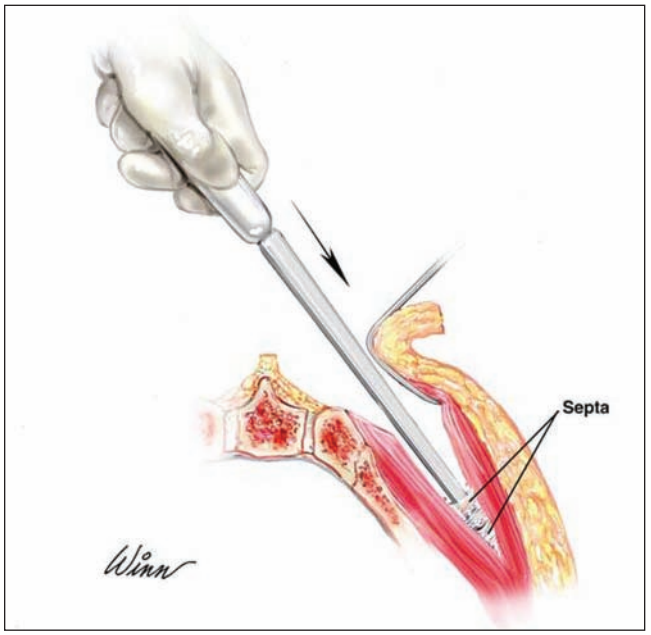

Figure 8. During the detachment, several interfascicule septa can disturb the procedure and must be broken with a strong blade in order to obtain proper pocket undermining.

Paulo and Rhosse, Ribeirão Preto, Brazil).[2,3] Its rhombic blades (shaped like a duck's bill) open when the grip is pressed. With rapid and repeated push-and-open movements, the pocket is enlarged (Figure 7). The remaining septa must be broken with a flat, 4 × 30-cm detacher, similar to the one used between points X and Y, but wider (Figure 8). The pocket adjustment should enable comfortable placement of the implant. (A video of the operative technique appears at www.aestheticsurgeryjournal.com.)

Drainage

Drainage tubes are placed inside the muscle pocket at a point adjacent to the lower part of the incision and are left in place for 48 hours.

Incision Closure

The muscular incision edges are closed with nylon 2-0 sutures. The inverted heart detachment surfaces, including the one left close to the flap in order to preserve the sacral-cutaneous ligament, are brought together with 2-0 Vicryl (Ethicon, Inc., Santa Barbara, CA) quilt sutures (Baroudi sutures), avoiding dead spaces at all costs. The epidermis on this ligament is stripped and sutures are made, taking the ligament as well as the subcutaneous and deep derma of both sides of the incision at 1 cm intervals, providing adequate closure. A few 4-0 Vicryl (Ethicon, Inc.) sutures close the deep dermal plane, ending with a continuous 6-0 suture. The final sutures must not evert the surgical wound's edges because this leads to micronecrosis of the edges and dehiscence.

Patient results are shown in Figure 9.

POSTOPERATIVE CARE

It essential to maintain the epidural analgesia catheter because the major inconvenience of this surgery is the severe pain the patient may experience during the first few postoperative days. Pain pumps have been tested in our clinic but with poor effect. On the first postoperative day, the patient should lie in the prone position, supported by special hexagonal, 10-cm high, very firm pillows placed in Fowler's position. The ventral decubitus position should be avoided, in order to prevent fluids from the detached area from flowing to the sciatic nerve area and causing pain. When using the special pillow, the buttocks must not touch the mattress, thus remaining free of any pressure. If a pillow with these features is not available, the lateral decubitus position is advised. The patient should begin ambulating and sitting as soon as possible. From the second postoperative day forward, the lateral decubitus position is encouraged. The patient should avoid long periods in the prone or ventral position. Neither girths nor adhesive tape dressings are necessary. Driving is allowed after 10 days.

COMPLICATIONS

If all of the principles described above are followed, the complication rate from the XYZ gluteoplasty should be

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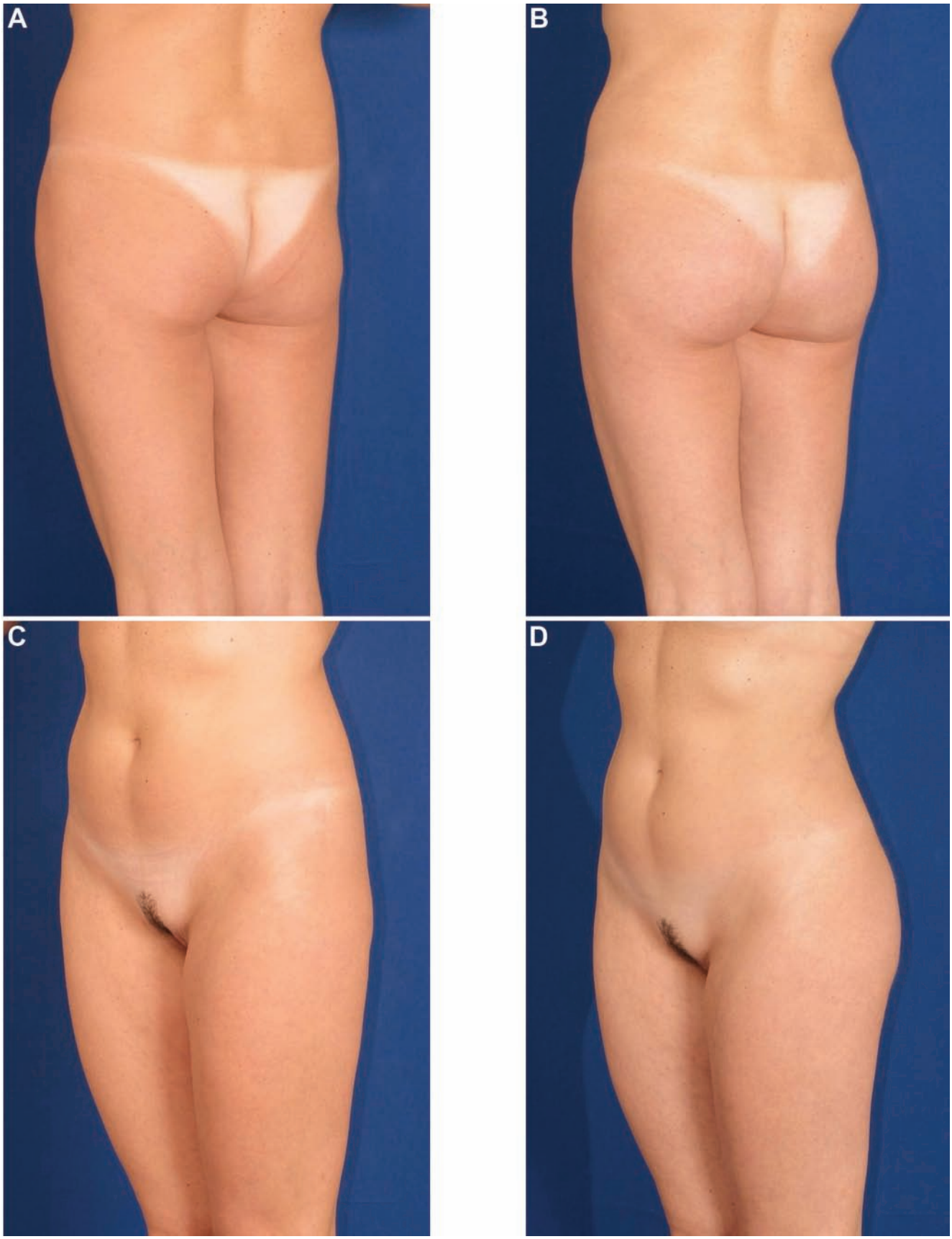

Figure 9. (A, C) A 33-year-old woman who sought treatment for lack of buttocks projection. (B, D) Seventeen months after buttocks reshaping using the XYZ method for intramuscular gluteal implants, with associated love handle liposuction and fat grafting on the isquiatic depression. A pair of 350-mL oval Quartzo high-projection implants were placed.

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low and comparable to that of any other aesthetic procedure. The most frequent complications can be divided in two groups: immediate (ie, those that arise within the first 30 postoperative days) and late. The most common immediate complications, in order of frequency, are pain, wound dehiscence, seroma, and infection. The most common late complications are muscular atrophy (when the undermining is not well guided and leaves only a thin muscular covering) and implant rotation due to pocket late enlargement; both may lead to visible implants. No late seroma or capsular contracture was observed with smooth- or micro-textured Quartzo implants (Silimed; Sientra, Inc, Rio de Janeiro, Brazil). Textured implants, however, have a high incidence of late seroma.

In 1046 cases performed since 1986, the dehiscence rates dropped from 14% overall to less than 10% in the last 500 cases. None of those cases required a reoperation to close the incision, except those that progressed to infection. Of the 11 cases of infection (1.051%), eight were resolved by cleaning the site and removing debris under general anesthesia and resterilizing the implant or changing it for a new one. In those cases, all planes were carefully resutured, and a drain was placed in the intramuscular pocket for 72 hours, providing culture and sensitivity-guided antibiotic therapy.

We found no changes of muscle function or measurable muscle atrophy in many patients investigated with magnetic resonance imaging and computed tomography scan, nor did we see any sign of muscle cell necrosis in the muscle biopsies we performed in eight cases of reoperation to either change or reaccommodate the implant in the correct position. However, in several secondary operations to correct visible implants for patients who underwent their original operations elsewhere, we noticed muscular atrophy of the posterior muscle layer (four of which were proven by muscle biopsy), which demonstrates the importance of splitting the muscle into two equal layers.

Avoiding Complications

Twenty-three years ago, when the author first began performing gluteal implant operations, the complication rate was quite high. Subsequent experience and data have led to an increase in knowledge about ways in which the complication rate can be decreased. The technique presented here, which the author has also described previously,[2,3] includes the sum of all the solutions found. Each detail helps to reduce these originally high complication rates that vary between 30% and 80%, as reported in articles on the topic,[4] and lead to acceptable levels that are similar to most aesthetic surgeries.

Seroma. Seromas and everted edges causing micronecrosis are the major causes of wound dehiscence. A seroma may result either from the dissected intramuscular pocket or from the suprafascial detachment performed to expose the muscle, at the inverted heart area (and sometimes from liposuction in neighboring areas). If the suprafascial area is healing well, it is unlikely that the seroma from the intramuscular pocket will reach the skin incision; rather, it will be contained in the pocket without causing any harm. However, a seroma at the suprafascial detachment area can easily reach the skin and muscular incision, causing a breakdown. The extension and the manner by which such detachment is made, as well as its closure, are important in avoiding seroma and the subsequent dehiscence of the wound. The inverted, heart-shaped detachment keeps the muscle exposure limited as strictly necessary; larger and unnecessary detachments can lead to seroma formation and subsequent dehiscence. Quilting Baroudi-type sutures bring together the surfaces of the inverted heart detachment, eliminating dead space and reducing the risk of seroma. Textured implants must be avoided because of their causal relationship with late seromas.

Dehiscence. The deepithelialized strip of skin that preserves the sacrocutaneous ligament for incision closure very much improves healing, reducing not only the incidence of dehiscence but also the severity. When this strip of skin is used, any dehiscence usually opens at only one of the detached sides and has a favorable outcome; conversely, without the strip, both the detached sides break open and a large dehiscence results, which heals with difficulty. In a large dehiscence, the sacrocutaneous ligament prevents wide separation of the borders and serves as a base to anchor the two sides of the dehiscence if a new suture is required. It is not advisable to make two incisions close to the intergluteal cleft in an attempt to reduce the incidence of dehiscence because they leave two visible scars of poor quality instead of a single one hidden in the intergluteal cleft, which leaves a high-quality scar and has extremely low rates of significant dehiscence.

Pain. Drainage has two important advantages: avoiding seroma formation in the muscular pocket in the short term and better pain control. The fluids that remain in the pocket, if not properly drained, may descend by the force of gravity to the compartment anterior to the GM muscle and reach the sciatic nerve, causing sciatic pain. By remaining in the pocket, the fluid may lead to seroma formation. Avoiding the ventral decubitus position also helps to prevent pain, as described above.

Visible implants. Implant visibility can be avoided by utilizing the intramuscular plane and identifying landmarks to guide the muscular bisection in the ideal "sandwich plane," as described in the operative technique section. On the lateral portion of the GM muscle, there are two palpable bone references: the trochanter and the iliac crest. Many surgeons rely on the trochanter as a guide, but the crest has many advantages. The "point X–trochanter" path is inadequate because the lateral part of the muscle is hidden at the lateral aspect of the trochanter and thus not reached by the detacher, leading the surgeon to detach superficially or out of the plane. Furthermore, the muscle mass is convex at this path, which makes it difficult to achieve the correct bisection. The "point X–point Y" path, however, bisects the

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muscle at the optimal plane. The course between the two points is on the only flat area of the buttocks (the others are convex) and also the only course on which the whole muscle surface can be covered. In addition, the iliac crest is the only anatomical structure that is a good indicator of the muscle's mid-thickness at the lateral part of the GM; it cannot be found by relying on the trochanter. Therefore, the bisection achieved by using this path provides both correct muscle cover for the implant and symmetry, preventing the implant from becoming visible.

PLANNING THE IMPLANT CHOICE

Gluteal implants may be either round or oval and may be filled with highly cohesive silicone or made of soft silicone blocks that are very smooth to the touch. Round implants should be used only for shorter patients with short buttocks because tall patients or those with long buttocks who receive round implants may end up with a projection concentrated at the upper and medial poles without proper filling of the lower part of the buttocks.

Oval implants, also called anatomic implants, should be placed in the vertical position very close to the sacrum, with the larger part at the top in order to fill the upper pole more adequately. The Quartzo oval implant has proven to be an excellent choice with multiple indications.

The choice of size depends on the size of the pelvis and the desired augmentation. Sizes range from 200 to 500 mL. With round implants, one should opt for smaller sizes, between 220 to 240 mL for small women and 270 to 300 mL for a medium-height woman with medium-sized hips. If selecting a Quartzo implant, a medium-sized patient could accommodate a 350- or 400-mL implant because this device has less lateral projection (Figure 9). Sizes larger than these can lead to muscular compression and consequent atrophy that may render the implant visible. The pocket should house the implant comfortably and allow for easy muscle closure.

CONCLUSIONS

Gluteal implants provide remarkable results when remodeling buttocks, but the aesthetic results depend on the anatomic plane of the pocket. Although the intramuscular plane is the one that provides the best results, it may lead to visible or palpable implants if not dissected properly. To avoid this complication, the surgeon must split the GM muscle into two equal halves with anatomical reference points to guide the muscle detachment in a symmetrical way and at an adequate depth. The XYZ technique for augmentation gluteoplasty provides a guideline for the surgeon in determining the ideal plane during muscular dissection and predictable results with low complication rates.

Disclosures

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