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Augmentation Gluteoplasty with Intramuscular Implants: Skin Marking and Rhomboid Pocket

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Abstract

Background: Increased volume and greater projection of the gluteal region are increasingly frequent reasons for consultation. Prosthesis placement in the intramuscular plane - the most used – offers satisfactory results but is not free of complications. We believe that respecting the limits of the gluteus maximus (GM) muscle reduces them. To this end, we propose a rhomboid-shaped pocket design, which allows the inclusion of larger implants and varied shapes, which provide volume and projection in the four quadrants with predominance in the lower pole.

Material and method: Between 2010 and 2023, 170 patients of both genders were analyzed, who underwent gluteoplasty augmentation. The anatomical bone accidents that we have taken as reference are indicated as the "four points" that give rise to our rhomboidal skin marking, in whose area the extension of the GM muscle is completely included, which was confirmed by ultrasound.

Results: With the creation of a "pocket" oriented by rhomboidal skin marking, the inclusion of larger prostheses was achieved and there were fewer positional complications. The relationship between the bone accidents used and the dimension of the muscle is constant, according to the ultrasound evaluation.

Conclusions: The intramuscular technique with a rhomboid pocket allows for the inclusion of larger implants by descending the dissection almost to the ischial tuberosity, obtaining a better volume effect in the lower poles of the buttocks.

Keywords: Gluteal prosthesis, Gluteal implants, Gluteoplasty, Aesthetic surgery, Surface anatomy

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Introduction

In cosmetic surgery, the gluteal region has seen increasing demand, both among women and men, who, in addition to increasing gluteal volume, request improvements in their shape and projection.

Cosmetic surgery in this area is relatively recent, beginning in the 1970s. Initial contributions are recognized as those of González-Ulloa [1] and Buchuck [2], followed by the valuable contribution of Robles et al. [3], who, after an anatomical study, described the retromuscular technique, which obtains good results, but has some limitations that were overcome with intramuscular techniques. Vergara and Marcos [4] published the intramuscular technique with an interesting case series, which was later refined and standardized by González [5], enabling the use of larger, "anatomically shaped" prostheses or implants.

The history of gluteoplasty (a term of Greek origin) with silicone prostheses demonstrates that they can be placed in different anatomical planes, from the most superficial to the deepest. The planes describe are subcutaneous, subfascial (subaponeurotic) [6], intramuscular, and retromuscular (submuscular). Currently, based on the results obtained, the technique of choice is the intramuscular space.

Other surgical procedures are also used to enhance the contour of the gluteal region, such as liposuction and fat transfer, as well as respective surgery of excess gluteal dermo-fatty tissue [7-9]. In this way, great advances have been made in surgical tactics and techniques for the aesthetic improvement of the gluteal area. However, they are not without potential complications, such as the formation of hematomas or seromas, infections, wound dehiscence, implant extrusion, malposition of the prosthesis, asymmetry, compression of an important blood vessel or nerve, etc. Any of these eventualities may require unwanted re-intervention.

Reports from other studies [10-12] of malposition cases indicate that one of them may be caused by not respecting the boundaries of the GM muscle during dissection.

The objective of this article is to present the rhomboidal skin marking with a vertical major axis, which corresponds to the intramuscular space ("pocket") that allows for the placement of larger prostheses. This marking-which we propose-consistent with the dimensions of the GM muscle. For its demarcation we used four bony landmarks that are expressed in the surface anatomy of the region and that we will describe in this work (Figure 1). We have added the ultrasound evaluation of the

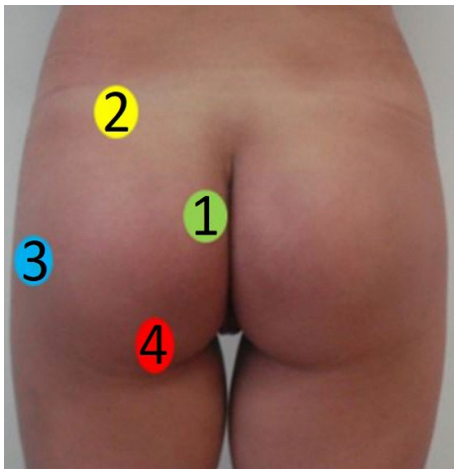

Figure 1: Rhomboidal skin marking that serves as a guide to create the space or area necessary to house the gluteal prosthesis via intramuscular injection.

surface of the GM muscle, which helps to indicate the area of coverage that the prosthesis would need.

Materials and Methods

A retrospective study was conducted on 170 patients who underwent gluteal augmentation surgery between January 2010 and December 2023 for aesthetic reasons. None of them suffered from any anatomical and/or functional damage to the muscle due to traumatic or congenital causes.

All patients underwent intramuscular gluteoplasty, and 80 of them also underwent liposuction of the hips, thighs, and/or flanks as a complementary procedure. Nano-textured "anatomical" implants with volumes between 200 cc and 450 cc were used.

To accurately establish the boundaries of the GM muscle and its correspondence with the skin surface, 60 patients underwent preoperative ultrasound evaluation between January 2018 and December 2023, at the time of marking. In this way, the ultrasound corroborates the anatomical clinical evaluation indicated by our marking in order to determine the surface of the gluteal area that will receive the implant.

Anatomical landmarks

The GM is the largest and most superficial muscle of the gluteal region. It is a wide and thick muscle, and its neurovascular pedicles penetrate its deep surface. It extends from the caudal part of the iliac crest and the lateral border of the sacrum to the linea aspera of the femur, its fibers following an oblique direction from cephalic to caudal and from medial to lateral. Its thickness is not uniform along its entire length, being more voluminous at its superior and medial origins, gradually decreasing laterally and caudally until its smallest expression at its inferior insertions [13-15].

The bony structures that serve as a reference for drawing the rhombus on the skin are (Figure 2a and 2b):

- Point 1: On the lateral border of the sacrum at the level of its articulation with the coccyx.
- Point 2: On the iliac crest, two fingerbreadths (approximately 4 cm) lateral to the posterior superior iliac spine (PSIS).
- Point 3: The greater trochanter.

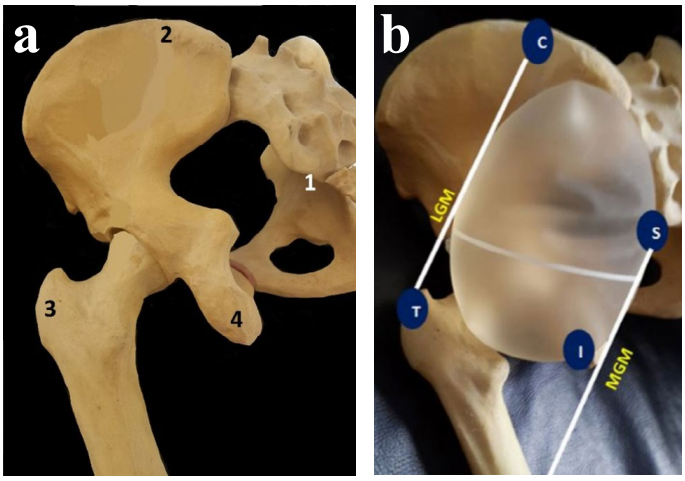

Figure 2: a) The bony landmarks to be determined are: the lateral border of the sacrum (1); the iliac crest, 4 cm from the PSIS (2); the greater trochanter (3) and the ischial tuberosity (4). **b)** The line joining the iliac crest (C) with the greater trochanter (T) marks the lateral border of the GM. The line joining the sacrum (S) with the ischium (I) marks its medial border.

- Point 4: The ischial tuberosity.

The line connecting point 2 (superior and lateral) to point 3 (inferior and lateral) corresponds to the lateral border of the muscle; and the line connecting point 1 (superior and medial) to point 4 (inferior and medial) defines its medial border. This marking provides information about the clinical anatomy of the patient undergoing surgery.

Skin marking

The photographs accompanying the patient's physical examination should include the following views: anterior three-quarter profile; posterior three-quarter profile; full profile of both sides; and posterior view.

We perform the marking the day before the procedure. With the patient standing, the upper end of the intergluteal cleft is marked. Next, the patient is placed in the prone position, and, following the technique we learned from Raúl González [16], the surgical approach and the pre-muscular dissection area, which takes the shape of an "inverted heart" [16], are marked. Then, points 1, 2, 3, and 4 are identified and marked, resulting in a rhomboid shape with a vertical axis (Figure 3 and figure 4).

With the collaboration of a physician specializing in diagnostic imaging, we use ultrasound to compare the dimensions of the GM muscle with the skin marking. This assessment of the clinical anatomy of the gluteal region allows the selection of the size and shape of the prosthesis according to each patient and reduces possible complications.

Surgical technique

Through a fusiform incision in the intergluteal cleft, preserving the sacrocutaneous ligament [16], the gluteal fascia is accessed in the pre-muscular dissection zone.

Once this fascia is identified, starting from point 1, at the level of the lateral border of the sacrum at the sacrococcygeal junction, it is incised in the same direction as the muscle fibers, and the creation of the "pocket" begins by inserting a dissecting tool to the mid-thickness of the GM.

First, the dissecting tool is directed toward the iliac crest, lateral to the PSIS (point 2). It is then immediately descended using a pivoting

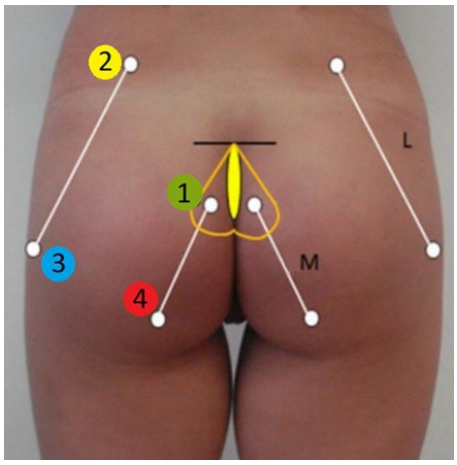

Figure 3: In prone position, the inter-gluteal approach is traced, the sub-cutaneous dissection zone in the shape of an inverted heart and the area of the intramuscular "pocket" in a rhomboidal shape.

Figure 4: Skin marking completed with the patient in surgical position.

motion toward the greater trochanter (point 3). Finally, it is oriented toward the ischial tuberosity (point 4), completing the rhomboidal dissection (Figure 5 to figure 7). After verifying hemostasis, the prosthesis is inserted with the bulkier end facing downwards. The space created to accommodate the prosthesis must be of adequate dimensions, avoiding excessive dissection to prevent implant rotation [17]. A continuous suction drainage tube is placed in the periprosthetic bed and brought to the exterior through a counter-opening in the most dependent portion. Muscle closure should be performed without tension and with numerous sutures to avoid leaving any dead space. For the same purpose, absorbable sutures are placed in the subcutaneous tissue.

Finally, for skin closure, non-absorbable suture material is used, anchoring it to the sacrocutaneous ligament, which has been previously preserved for this purpose. A Micropore® splint is applied to support the gluteal region for 30 days to immobilize the operated area and promote healing of the dissected tissues.

In the postoperative period, the patient is kept in the prone position for four days, and antibiotics (ciprofloxacin and trimethoprim-sulfamethoxazole), analgesics, and muscle relaxants are prescribed. A depot corticosteroid provides greater comfort by reducing edema in the sciatic area and minimizing seroma formation. The skin sutures are removed after 20 days.

Results

For this intramuscular technique, 170 patients were treated,

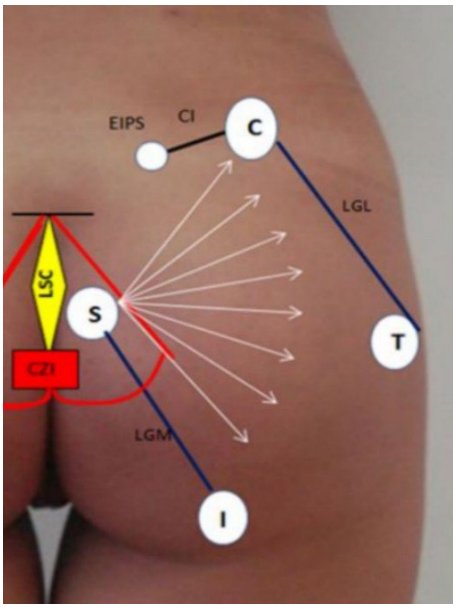

Figure 5: Starting from point 1, the creation of the "pocket" in the thickness of the GM (intramuscular technique) begins, using a radially shaped dissector.

Figure 6: Detail of the inter-gluteal incision respecting the sacrocutaneous ligament.

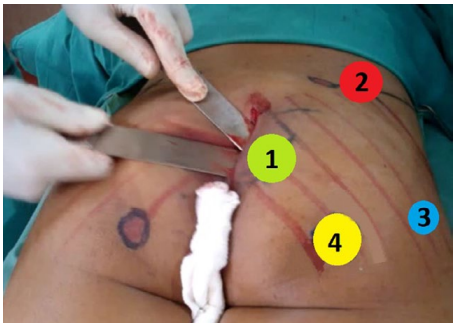

Figure 7: To complete the dissection maneuver, two decollators can be used in a divergent manner.

ranging in age from 20 to 65 years, with a mean age of 32 years. 90% were women (n = 154) and the remaining 10% were men (n = 16).

All procedures were performed under general anesthesia. The operating time ranged from 1.20 to 2 h, with a mean of 1.40 h. The hospital stay was 24 h. Prone positioning was maintained for 4 days, with the exception of 12 patients who also received breast implants.

These patients rested in a modified fowler's position, supine, with pillows placed under the thighs and waist to avoid direct pressure on the gluteal implants. The suction drain was removed between 1 and 3 days, with a mean of 2 days. The Micropore® compression splint was maintained for 30 days.

Preoperative ultrasound monitoring showed that, in all cases (n = 60), the skin marking was within the limits of the GM muscle.

Postoperative evaluation revealed a homogeneous distribution of gluteal volume in all four quadrants, with a fuller lower pole. Patients under 40 years of age reported a higher degree of satisfaction due to their physical improvement (Figure 8 and figure 9).

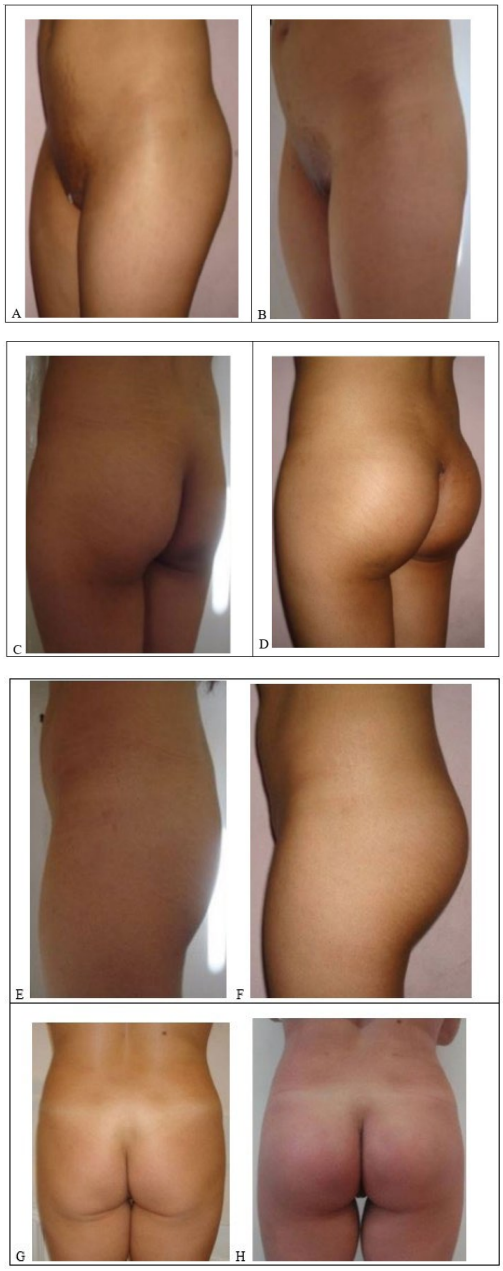

Figure 8: A, C, E and **G)** Preoperative view of a 32-year-old woman with gluteal hypoplasia and slight ptosis, in ¾ anterior, ¾ posterior, left lateral and posterior views; **B, D, F** and **H)** Postoperative view of the same patient, ten months later, in the same views. The homogeneous increase in all four quadrants can be seen, and the posterior view reveals the shortening of the subgluteal fold and the lengthening of the intergluteal fold.

The percentage of observed complications was 9.1% (n = 16). All of these cases presented with serous effusion (bloody and/or lymphatic) combined with varying degrees of wound dehiscence (n = 16). This was because dissection typically damages local blood and lymphatic vessels, leading to seroma formation. When the seroma is excessive, the body is unable to absorb it, and suction drainage is necessary. In 1.2% (n = 2) of the total, we were forced to remove the implants. In one patient, lymphorrhea progressed to the intergluteal cleft, draining through the surgical wound; and in the other patient, it progressed to the lateral border of the buttock, draining through a fistula and leaving a noticeable depression as a sequela, 0.6% (n = 1) (Figure 10a and 10b). We had no infections, hematomas, chronic sciatic pain, implant displacement, capsular contractures, or development of striae (Table 1).

Table 1: Description of the complications observed.

Complications	Number	Percentage
Seroma	16	9.1
Wound dehiscence	16	9.1
Extrusion	2	1.2
Fistula	1	0.6
Hematoma, infection, chronic pain, dislocation, capsular contracture	0	0
Total	170	100

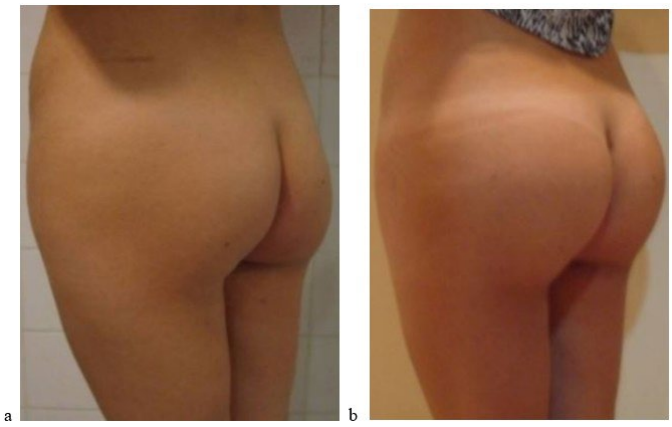

Figure 9: a) Preoperative image of a 27-year-old woman with hypoplasia and gluteal ptosis, left posterior ¾ profile. **b)** Postoperative image of the same patient at 12 months.

Figure 10: a) Persistent lymphorrhea progresses toward the skin surface, seeking natural drainage. **b)** Opening on the lateral aspect of the buttock, resulting from the spontaneous drainage of the seroma, through which the prosthesis is visible. This led to the removal of the prosthesis.

Discussion

The advantages and disadvantages of gluteoplasty are summarized in this statement: "The gluteal implant is an excellent procedure that not only corrects hypoplasia but also reshapes, restoring round buttocks with a highly sensual appearance… however, the dissection to insert the implant is performed without direct vision, which makes it difficult to obtain a safe and symmetrical plane, potentially leading to an unpleasant result" [5].

These concepts, expressed by a master of gluteal cosmetic surgery, highlight the difficulty of the procedure. To overcome this difficulty, we believe that a prudent learning period for the surgical technique and a thorough understanding of surface anatomy are helpful.

The gluteal region comprises the soft tissues located on the dorsal surface of the ilium and the hip joint, whose superior limit is formed by the iliac crest; caudally, it extends to the gluteal fold; medially, it is defined by the intergluteal cleft, and laterally, it is limited by a vertical line extending from the anterior superior iliac spine to the infragluteal fold, passing through the greater trochanter. The GM muscle alone occupies a large part of the region [18].

The surface anatomy of the GM muscle area will give us greater certainty that the dissection will be performed within its boundaries. To this end, it is important to compare its dimensions with the skin markings using the indicated bony landmarks of the region, as determined by ultrasound. The study of 60 patients who underwent preoperative ultrasound confirmed that there was agreement between the skin markings and the muscle area, demonstrating that our proposed markings are reliable.

The rhomboidal shape of the "pocket" extends caudally. This rhombus is composed of the sum of two triangles. The upper triangle corresponds to the area bounded by the letters X, Y, and Z, taken from Raúl González [5]. The lower triangle-which is our contribution-is delimited by points (1), (3), and (4), where the line descends to the ischial tuberosity [4]. This "extension" that we propose allows for larger prostheses. By placing the largest part of the prosthesis in the lower half, greater projection of the GM is achieved at its lower pole, giving that area the desired roundness (Figure 11). We emphasize that the oblong prosthesis has advantages over the round one, which is used in the submuscular or retromuscular techniques. The possibility of extending the dissection to a lower level, almost reaching the ischial tuberosity, allows us to achieve a homogeneous distribution of the gluteal volume in its four quadrants and, in addition, the asymmetrical shape of the "anatomical" implant achieves a fuller lower pole, by placing the wider end in a distal position.

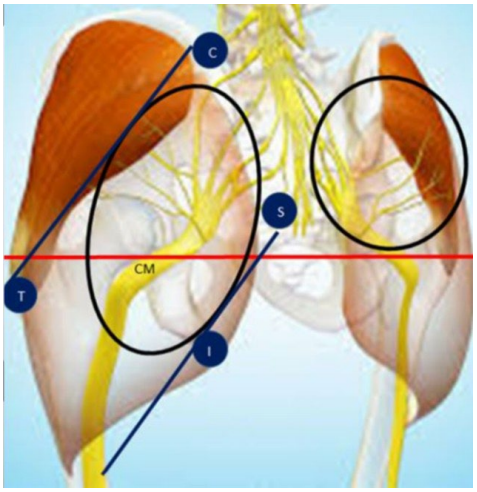

Figure 11: On the right side of the drawing, a smaller, round prosthesis is shown, positioned above the limit imposed by the piriformis muscle in the submuscular or retromuscular technique. On the left side, a larger prosthesis is shown that extends beyond this limit, an advantageous situation offered by the intramuscular technique.

Most patients who underwent the intramuscular technique with a rhomboid pocket presented with varying degrees of gluteal hypoplasia and ptosis, along with a straightening of the lumbosacral curve, resulting in inadequate gluteal projection.

The results obtained were superior in patients under 40 years of age, due to their better muscle tone and greater muscle thickness; while the less satisfactory results were observed in patients over 40 years of age, due to greater skin laxity, laxity of the subcutaneous fat layer, and the natural loss of muscle mass, strength, and function.

The persistence of seroma and/or lymphorrhea, one of the complications we have encountered, causes progressive damage to the surrounding soft tissues, including the muscle. To reduce its incidence, in recent years we have implemented the following preventive procedures:

- Hermetic closure of the muscle dissection plane, which acts as a "case" to house the prosthesis, using non-absorbable material.
- Reduction of the subcutaneous dissection space and placement of numerous sutures during closure to minimize dead space.
- Avoid performing liposuction of the sacral region during the same surgical procedure.
- Do not over-dissect the intramuscular pocket. This measure also prevents dislocation implantation.

To reduce the likelihood of visible and/or palpable implants or prostheses, as well as the possibility of extrusion, complete coverage by a sufficiently long and thick GM muscle should be ensured.

We believe the absence of infections is attributable to the practice of suturing a sterile compress around the anal orifice, as shown in figure 7.

Conclusions

- Satisfactory results are obtained with gluteoplasty using intramuscular implants and rhomboid pocket dissection.
- Projection of the GM muscle onto the skin surface is necessary to reduce complications and improve aesthetic results.
- Preoperative ultrasound is very helpful in confirming our skin markings (surface anatomy) of the GM muscle and thus avoiding insufficient muscle coverage for the implants.
- The rhomboid-shaped intramuscular dissection with its inferior extension allows for the placement of larger implants, optimizing the shape, volume, and projection of the buttocks.
- The best results are obtained in patients under 40 years of age due to the greater tone and thickness of the GM muscle.

Acknowledgments

None.

Conflict of Interest

None.

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