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Gluteoplasty: Anatomic Basis and Technique

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Abstract

Background: Although the placement of implants for gluteal augmentation is becoming more common, the procedure still faces strong resistance from patients and some surgeons as a result of unsatisfactory outcomes in the past.
Objective: The authors describe easily-identifiable anatomic reference points that can assist the surgeon in the performance of gluteoplasty, making the procedure simpler and safer.
Methods: Based on a literature review, an anatomic study was performed of dissections of the gluteal region in seven formalinized and fresh cadavers. This study allowed the authors to observe anatomic details and propose bony reference points to guide gluteoplastic surgery. Between July 2006 and February 2009, 105 patients underwent gluteoplasty according to the guidelines resulting from the cadaveric study.
Results: All patients were female, ages 22 to 50 years. The surgical procedure, once refined, resulted in a low complication rate. In the final 50 patients in the series, there was only one seroma, one wound infection, and no cases of dehiscence. Bruising on the side of the thigh was encountered in four of the total 105 cases (3.8%). The clinical photos demonstrate the positive aesthetic results of this technique.
Conclusions: When gluteoplasty is performed utilizing a systematic strategy based on bone anatomy references, it can be a predictable procedure with reproducible results and minimal complications.

Keywords

gluteoplasty, implants, fat grafting, buttocks

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Historically, various implants have been placed to augment the gluteal region. Bartels et al,[1] in 1969, were the first authors to describe gluteal reconstruction with breast implants. The procedure gained increased acceptance after Cocke and Ricketson described the placement of a silastic pancake prosthesis for correcting lateral gluteal depression in the 1970s, after González-Ulloa popularized and refined the technique as a cosmetic procedure with a subcutaneous pocket in 1991, and after implants were developed specifically for the gluteal area.[1-6] Since then, several techniques for gluteal implantation have been proposed, differing mainly with respect to implant location. González-Ulloa[4,7] described augmentation under the subcutaneous layer. De la Peña[7,8] employed a subfascial approach, Vergara and Marcos[7,9] an intramuscular approach, and Robles et al[7,10] a submuscular placement (Figure 1). Nevertheless, many plastic surgeons are reluctant to perform gluteal augmentation with implants because of the risk of problems and complications such as sciatic nerve injury.

To resolve these difficulties, we propose a surgical technique based on fixed anatomic reference points that simplify the operation and provide predictable and highly reproducible results while avoiding the most common complications.

ANATOMY

The gluteus maximus muscle is the thickest muscle in the human body, ranging from 4 to 7 cm. It originates in the

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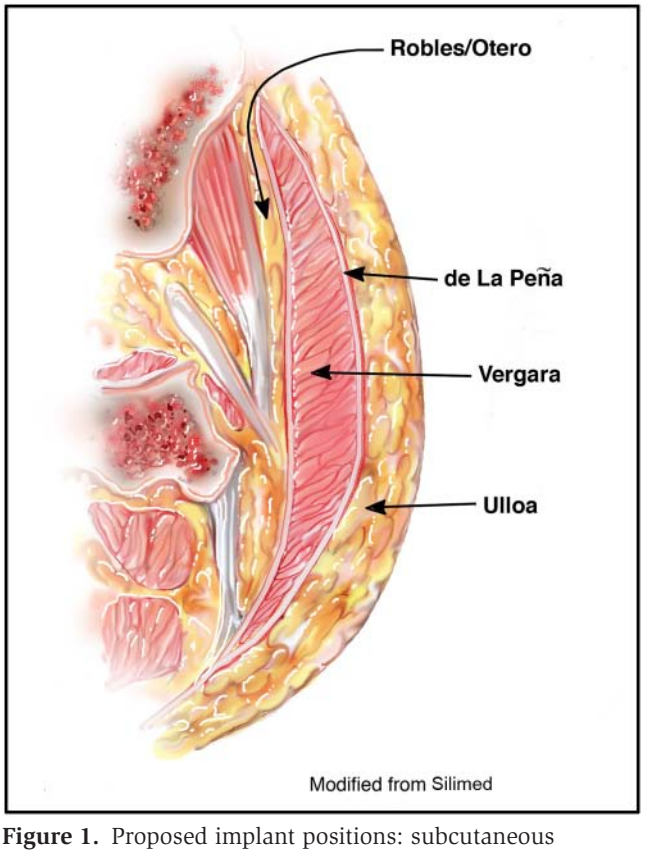

Figure 1. Proposed implant positions: subcutaneous (González-Ulloa), subfascial (De la Peña), intramuscular (Vergara), and submuscular (Robles).

iliac crest, ileum, sacrum, coccyx, and sacrum tuberal ligament, with insertions in the rough line and gluteal tuberosity of the femur and the ileotibial tract of fascia lata.[11-16] The muscle acts as a powerful extensor of the thigh and stabilizes the pelvis during movements where strength is required, such as sitting up and running.[5,12] It is vascularized by two major pedicles (type III, according to Mathes and Nahai), the upper and lower gluteus arteries (Figure 2).[13,14] The piriform muscle originates from the sacrum and sacrotuberal ligament and inserts on the top edge of the greater trochanter of the femur.[12,14,15] It is highly important because it splits the higher sciatic foramen, with the sciatic nerve passing inferiorly (Figure 2B).[12,15,16]

Sciatic Nerve

The sciatic nerve is the largest nerve of the human body, comprising the tibial and fibular nerve, exiting the pelvis below the piriform muscle (Figure 3). Anatomic variations are found in about 30% of cases, as when the nerve is located above or through the piriform muscle or passage of the fibular and tibial nerves separately above and below the muscle. However, with the intramuscular technique, the nerve will always be protected by a muscular layer, even in cases of anatomic variations (Figure 4).[12,14,15]

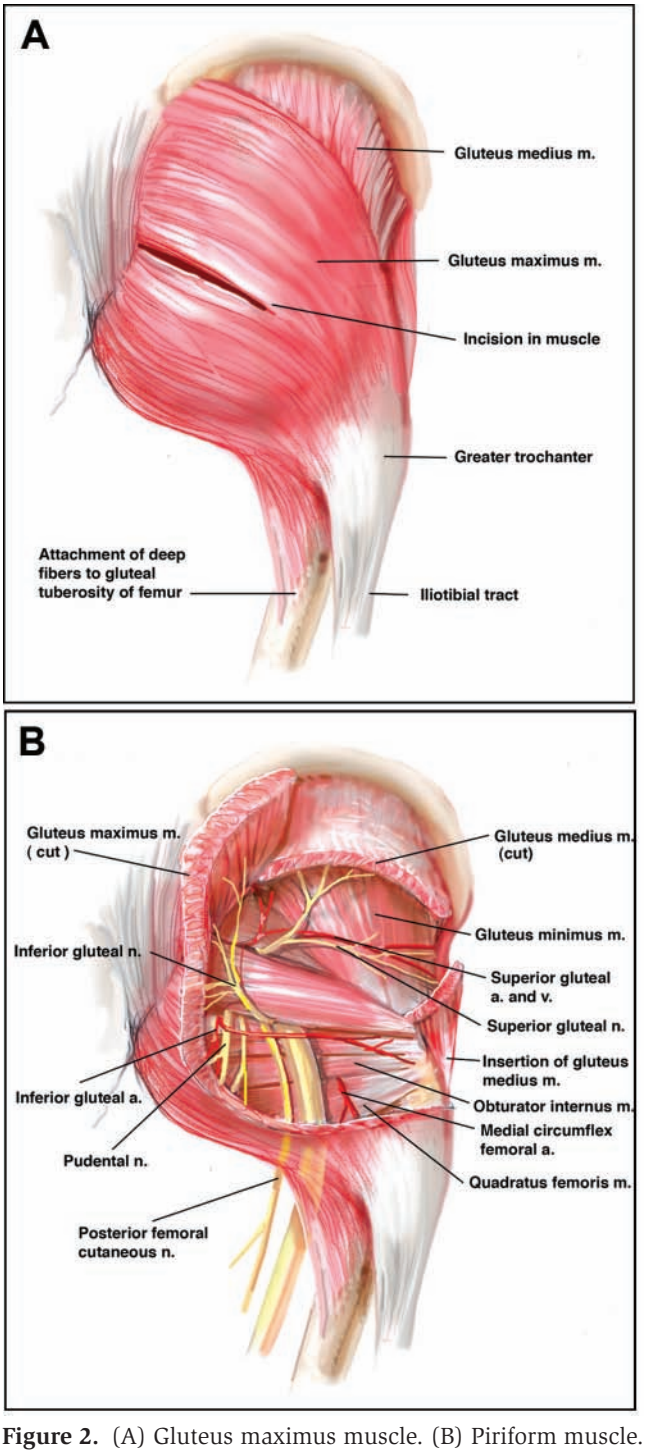

Figure 2. (A) Gluteus maximus muscle. (B) Piriform muscle.

ANATOMIC REFERENCE POINT MARKING

Through dissection of seven fresh and formalinized cadavers and a review of previously published work,[4,5,7-10,13,17,18] we developed the following based on bone reference points that could be fixed and were easily identifiable: sacrum, coccyx, posterior inferior iliac spine, iliac crest, and greater femoral trochanter. We have observed that the lateral limit of the gluteus maximus can be identified by a

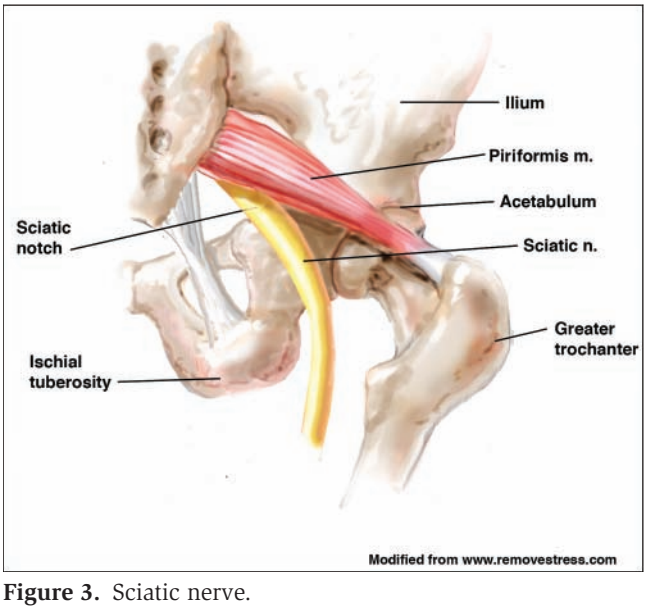

Figure 3. Sciatic nerve.

line linking the medial third of the iliac crest and femoral great trochanter. It can be palpated during voluntary contraction (Figure 5). The middle third of the distance between the posterior superior iliac spine and the coccyx corresponds to the upper and lower limits of the piriform muscle (insertion in the femoral great trochanter). The sciatic nerve emerges right below this muscle, at the midline of the thigh at the coccyx level (Figures 5 and 6).

IMPLANTS

Over the years, different types of implants have been utilized for gluteal augmentation, with either a round or anatomic base and a smooth or textured surface, such as the implants proposed by Hidalgo, Vergara, and De la Peña.[5] We have used cohesive gel gluteal implants with either a spherical or anatomic base (quartz model/ Silimed, Rio de Janeiro, Brazil) and with a smooth surface because of the low risk of capsular contracture with intramuscular placement (Figure 7). We employed photographic analysis to determine the implant size and type that would obtain the best buttocks projection for each case.[7,19,20]

TECHNIQUE

The subcutaneous layer was infiltrated with 1:200,000 epinephrine solution. A 6-cm skin incision was made positioned within the 5-mm wide zone in the intergluteal groove. Subcutaneous dissection was performed at 45 degrees, thus preserving the sacral ligament and extending to the gluteus maximum muscle aponeurosis. Above this plane, the dissection proceeded along muscle fibers, measuring 6 cm in length.

Through blunt dissection, an intramuscular placement site was opened at a depth of 3 cm and 1 cm wider than the base of the implant, to ensure that the implant would be fully covered by the gluteal maximus muscle, thus avoiding injury to the sciatic nerve that is below and protected by the muscle. The depth of the intramuscular pocket is a critical issue because of the risk of implant herniation and sciatic nerve injury if the dissection is too superficial or too deep, respectively. This dissection was begun cranially to avoid inadvertent rupture of the muscle and subsequent herniation of the implant (Figure 8).

After introducing the implant in the position most suitable for each individual case, such that the implant was covered by the gluteus maximus muscle surface (Figure 9), muscle closure was performed with mononylon 2-0, fascia included. A surgical suture was placed in the subcutaneous detachment, linking it to the fascia of the gluteus maximus muscle so as to avoid seroma. The intergluteal groove was reconstituted with a 3-0 mononylon suture attaching the deep subcutaneous cellular layer to the sacral ligament, followed by a subdermal suture (including the decorticated dermis) and finally an intradermal suture (Figure 10). A video of the author's technique can be found at www.aestheticsurgeryjournal.com.

POSTOPERATIVE CARE

Patients were advised to rest in the prone position for seven days postoperatively. They were directed to avoid sitting and, if sitting were necessary, to do it by flexing the trunk. The dressing was changed daily and a girdle was kept in place for one month.

We believe that the described technique offers the optimal choice for primary aesthetic augmentation. In some secondary cases and poliomyelitis sequelae, muscle thickness may be insufficient to support the implant, necessitating an alternative technique such as a submuscular or subfascial implant placement.

RESULTS

Between July 2006 and February 2009, 105 patients received gluteal implants. All patients were female; ages ranged from 22 to 50 years. Follow-up ranged from three months to three years, with an average of one year. During this period, no implant changed position, probably because the intramuscular pocket provided good stability (Figures 11-15). The scar was hidden in the intergluteal fold in all cases. Even in those cases where limited dehiscence occurred, the scar was difficult to see without spreading the buttocks. Before learning to close the dead space, we treated 55 patients and encountered five cases (9.09%) of seroma and three cases (5.45%) of partial dehiscence. After beginning to close the undermined area, we treated 50 patients, encountering only one case (2%) seroma and no cases of dehiscence. Wound dehiscence secondary to seromas was

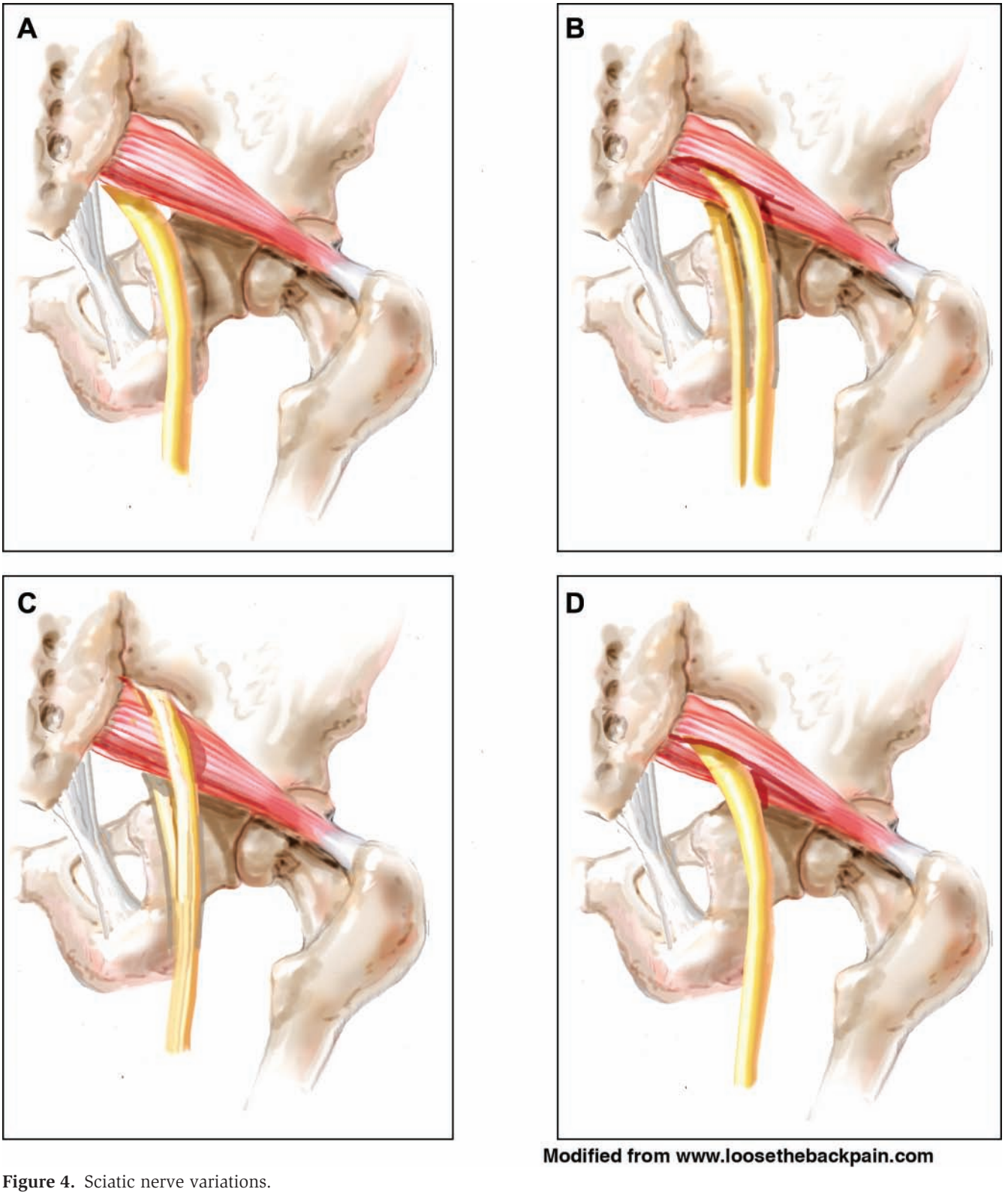

Figure 4. Sciatic nerve variations.

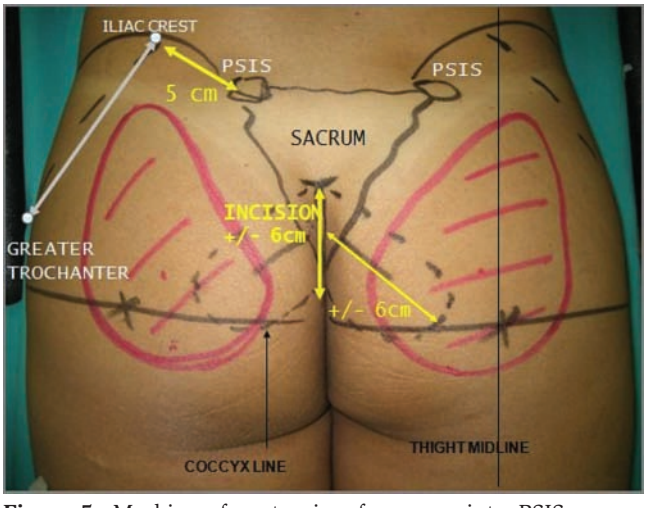

Figure 5. Marking of anatomic reference points. PSIS, posterior superior iliac spine.

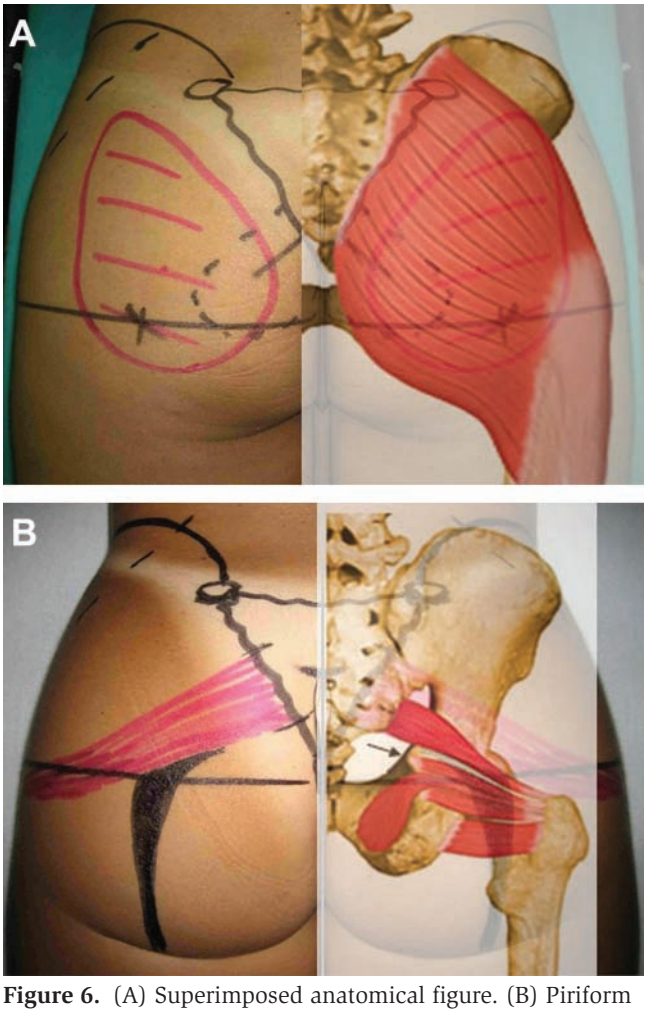

Figure 6. (A) Superimposed anatomical figure. (B) Piriform muscle and sciatic nerve illustration.

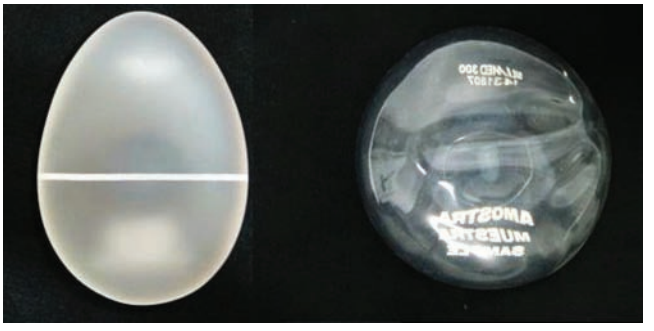

Figure 7. Gluteal implants: anatomic (quartzo) (*left*); round (*right*).

conservatively treated without sequelae and with good aesthetic results. Wound infection occurred in one case (0.9%), but it was unrelated to other complications, did not affect muscle, and was treated on an outpatient basis with good results. Bruising on the side of the thigh was encountered in four cases (3.8%). There were no postoperative hematomas.

DISCUSSION

Although implant gluteoplasty is now a frequently performed procedure, it still meets some resistance from surgeons and patients because of poor results in the past, such as an unnatural appearance and ptosis. With our technique, we were able to achieve a natural appearance and pleasing aesthetic results with intramuscular implantation.[9,17,18,21] This technique has replaced submuscular placement[10] in our own practice. With submuscular placement, the implants should not exceed the lower limit of the piriform muscle,[6,10,22,23] but with the intramuscular technique, it is possible to exceed this limit because the sciatic nerve is well protected by a thick layer of gluteal muscle. We can thereby achieve a better contour to the buttocks.[24] The gluteal fascia is a thin structure, especially at the center of the muscle surface, as was quite noticeable in our dissection. Despite our lack of experience with the subfascial technique, we believe that if this technique is employed, a palpable or visible implant could result, as could ptosis, especially in the long term.[19,22,25,26] We do not employ subcutaneous placement because laxity resulting from the superficial fascia system incision leads to ptosis, visible margins, and displacement of the implant.[6,22,27,28]

Some authors associate wound dehiscence with placement of larger implants.[22] In our series, this complication always occurred after development of seromas. We consider the preservation of sacral ligament as described previously[18] to be a major advance, in that it isolates each operated side and hides the scar. Some authors also

Figure 8. (A) Decortication. (B) Subcutaneous detachment. (C) Intramuscular blunt dissection.

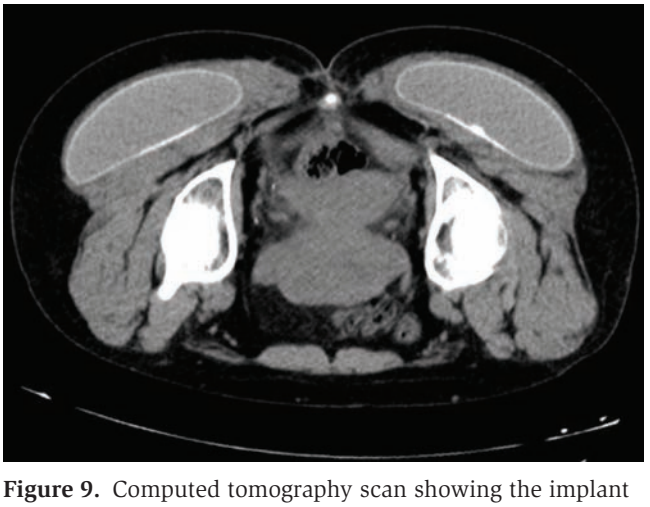

Figure 9. Computed tomography scan showing the implant completely covered by muscle.

employ closed-drainage aspiration.[7,17,18,24] We elect not to do so because we believe that muscle tissue has a high absorption capacity; furthermore, there was no dead space left after suturing the subcutaneous detachment. There were no instances of hematoma in our series and we achieved seroma resolution from the closure of the subcutaneous detachment.

CONCLUSIONS

The study of various surgical techniques employed in the past—not always successfully—to increase augment the gluteal region, as well the results of a cadaver dissection study, allowed us to develop a surgical technique based on fixed and easily identifiable anatomic reference points. This technique provides safer surgery and more reproducible and predictable results with negligible complication rates.

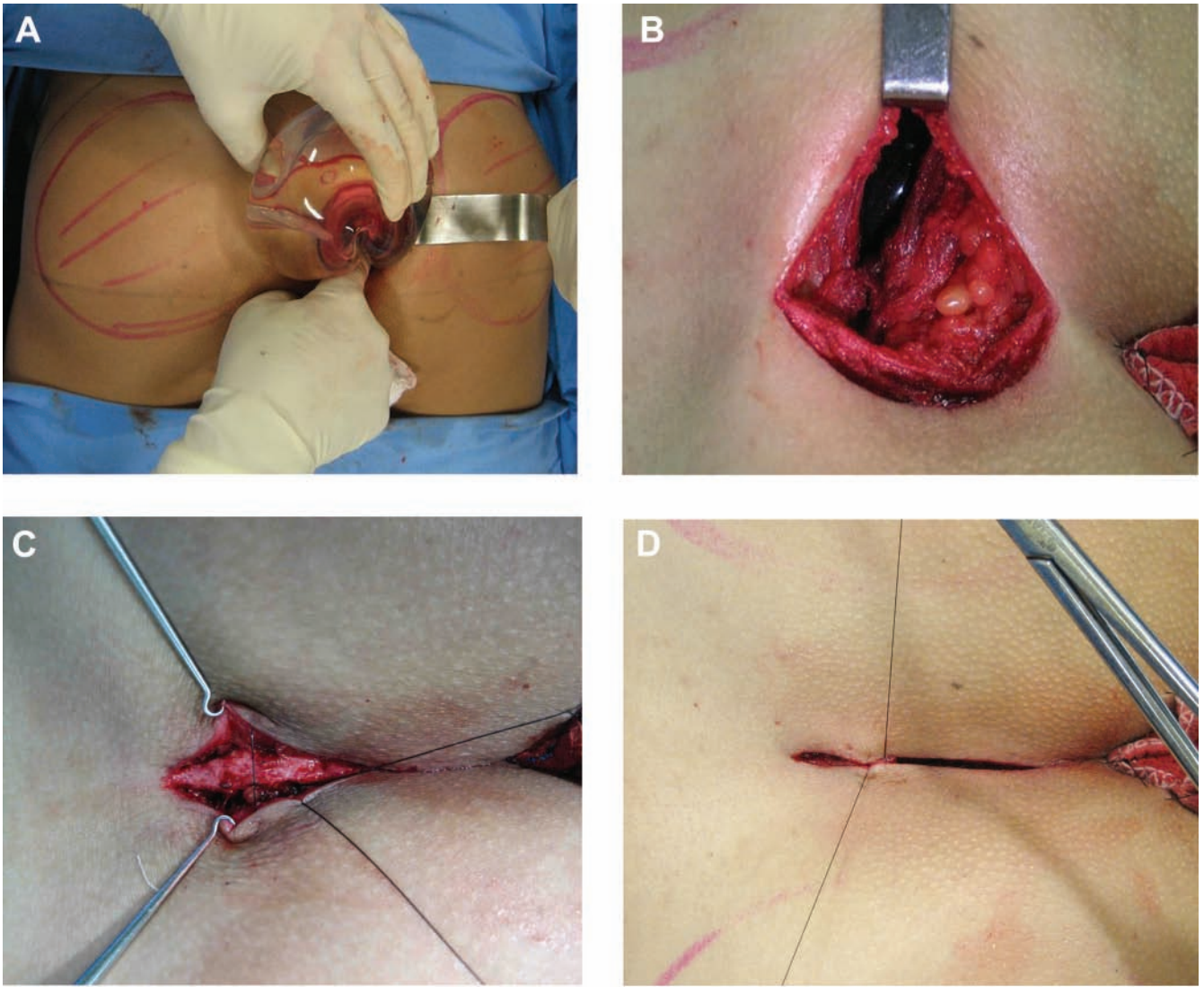

Figure 10. (A, B) Implant insertion. (C, D) Subdermal suture, including the decorticated dermis.

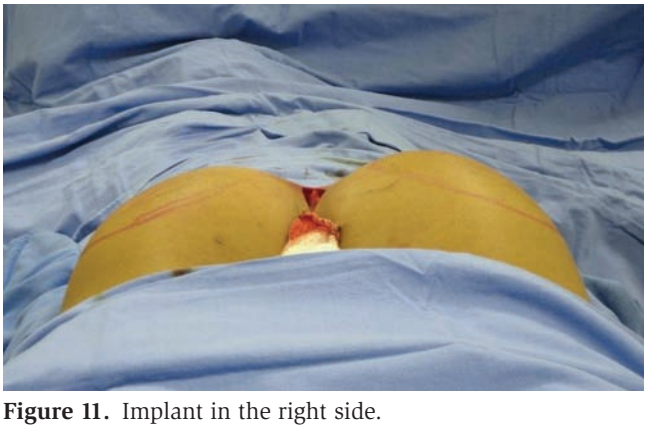

Figure 11. Implant in the right side.

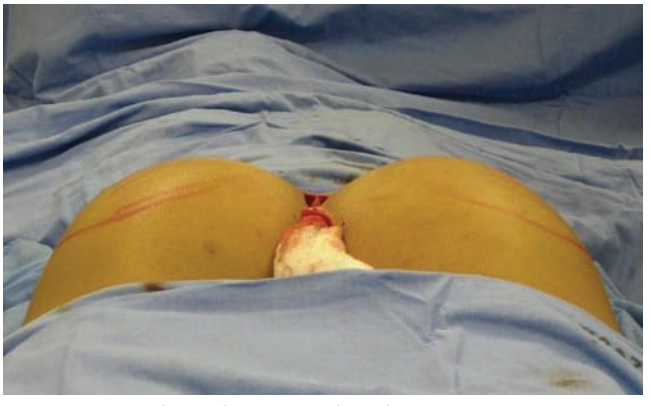

Figure 12. Both implants introduced.

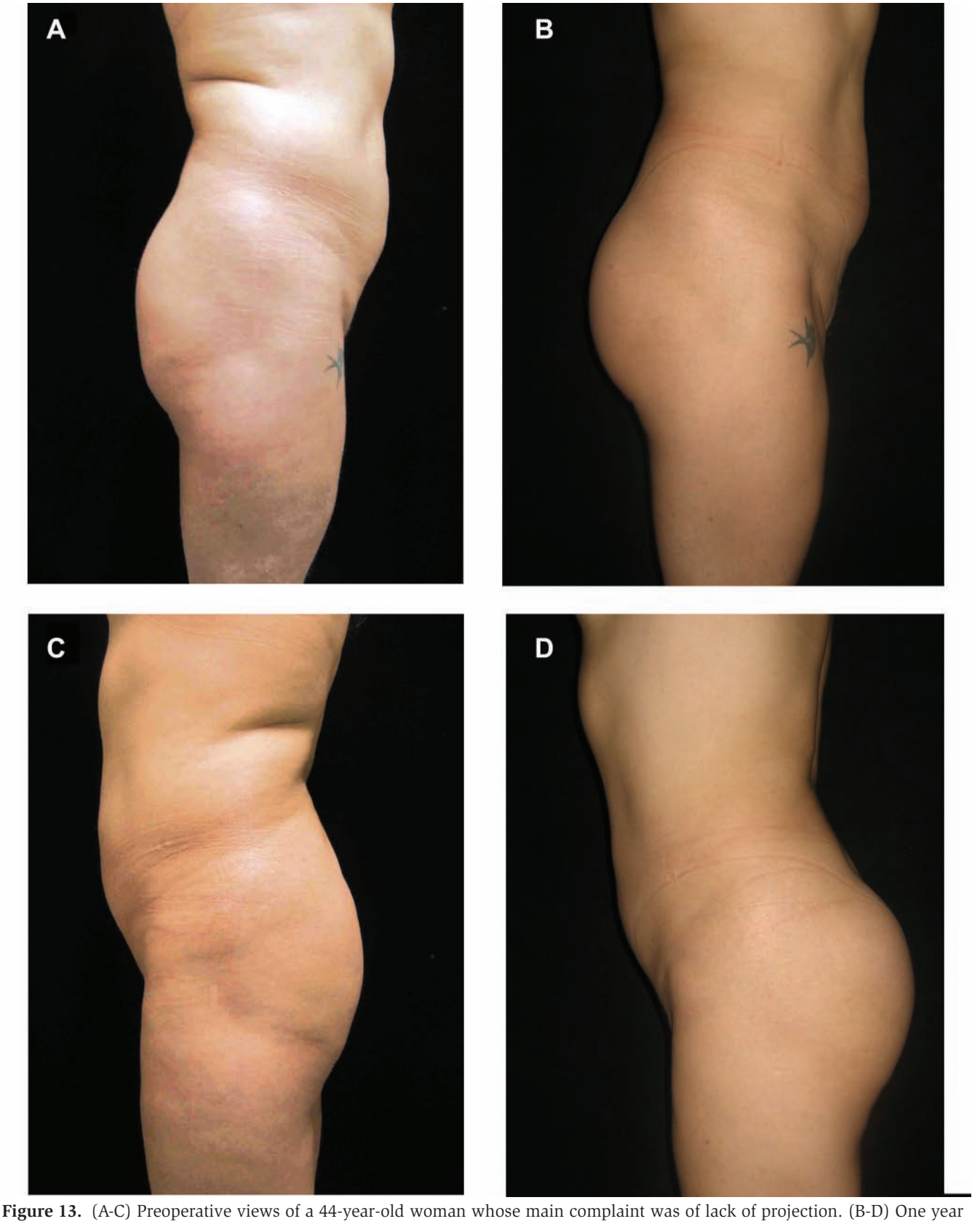

Figure 13. (A-C) Preoperative views of a 44-year-old woman whose main complaint was of lack of projection. (B-D) One year after placement of 300-mL anatomical base implants.

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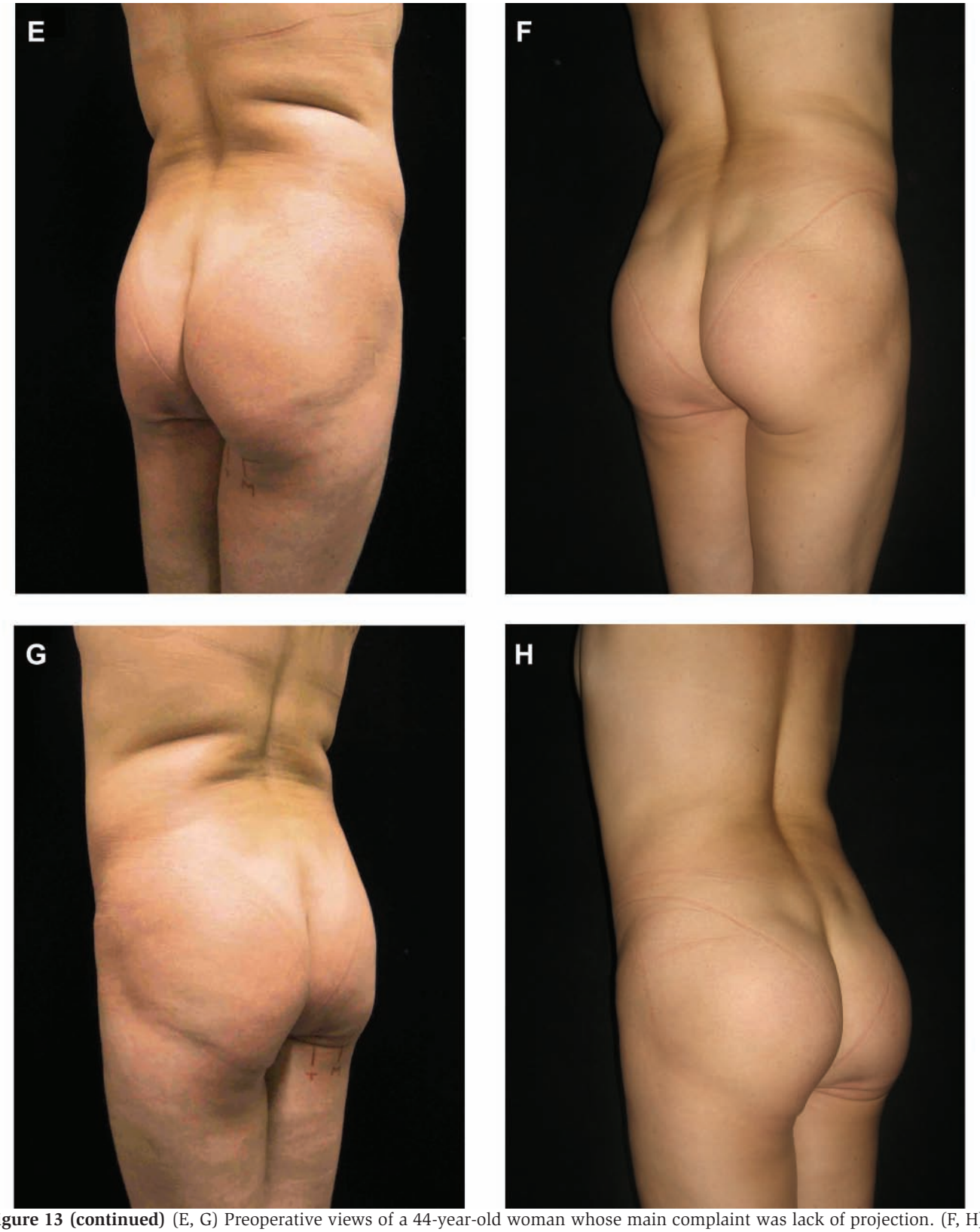

Figure 13 (continued) (E, G) Preoperative views of a 44-year-old woman whose main complaint was lack of projection. (F, H) One year after placement of 300-mL anatomical base implants.

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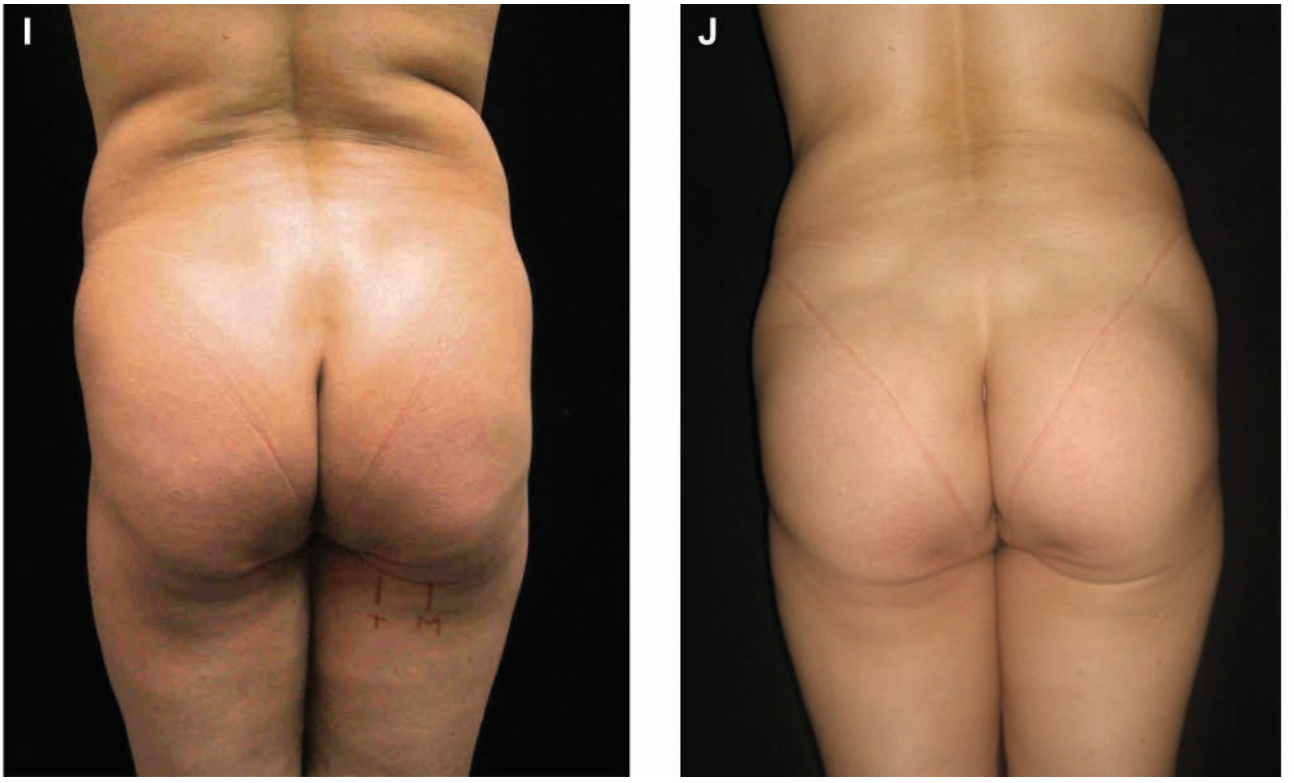

Figure 13 (continued). (I) Preoperative views of a 44-year-old woman whose main complaint was lack of projection. (J) One year after placement of 300-mL anatomical base implants.

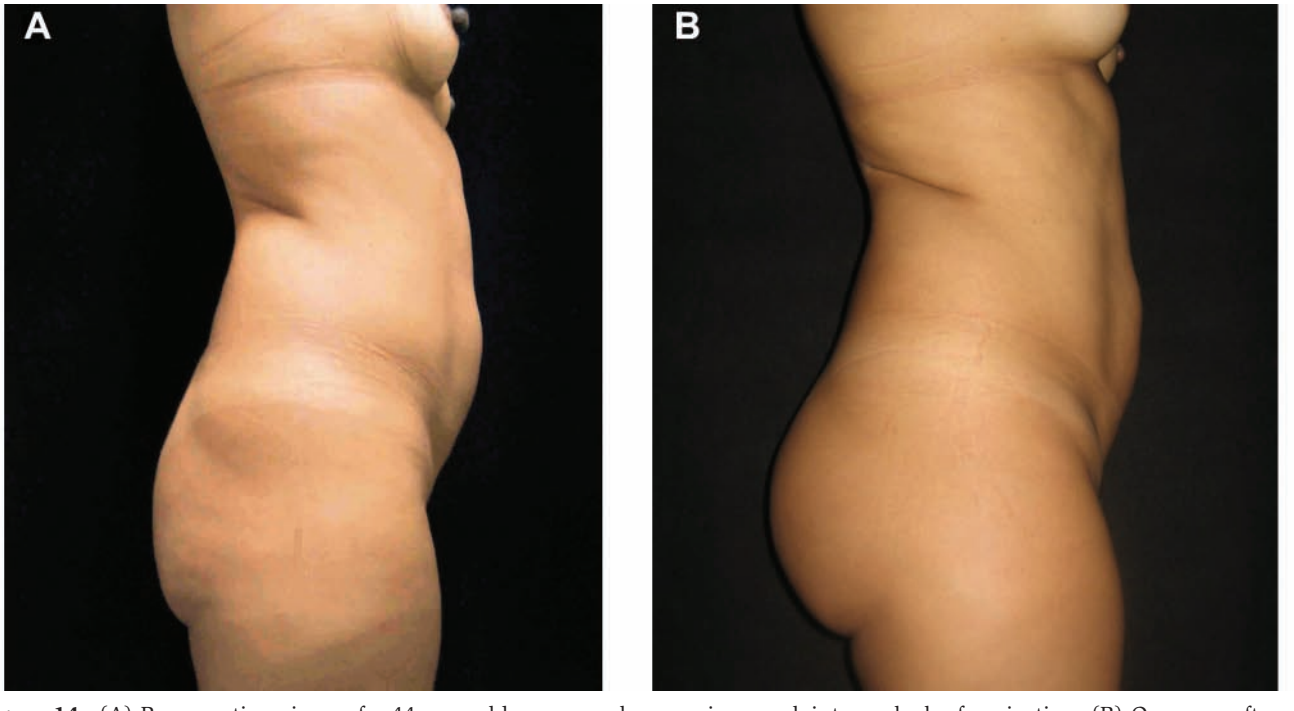

Figure 14. (A) Preoperative views of a 44-year-old woman whose main complaint was lack of projection. (B) One year after placement of 300-mL round base implants.

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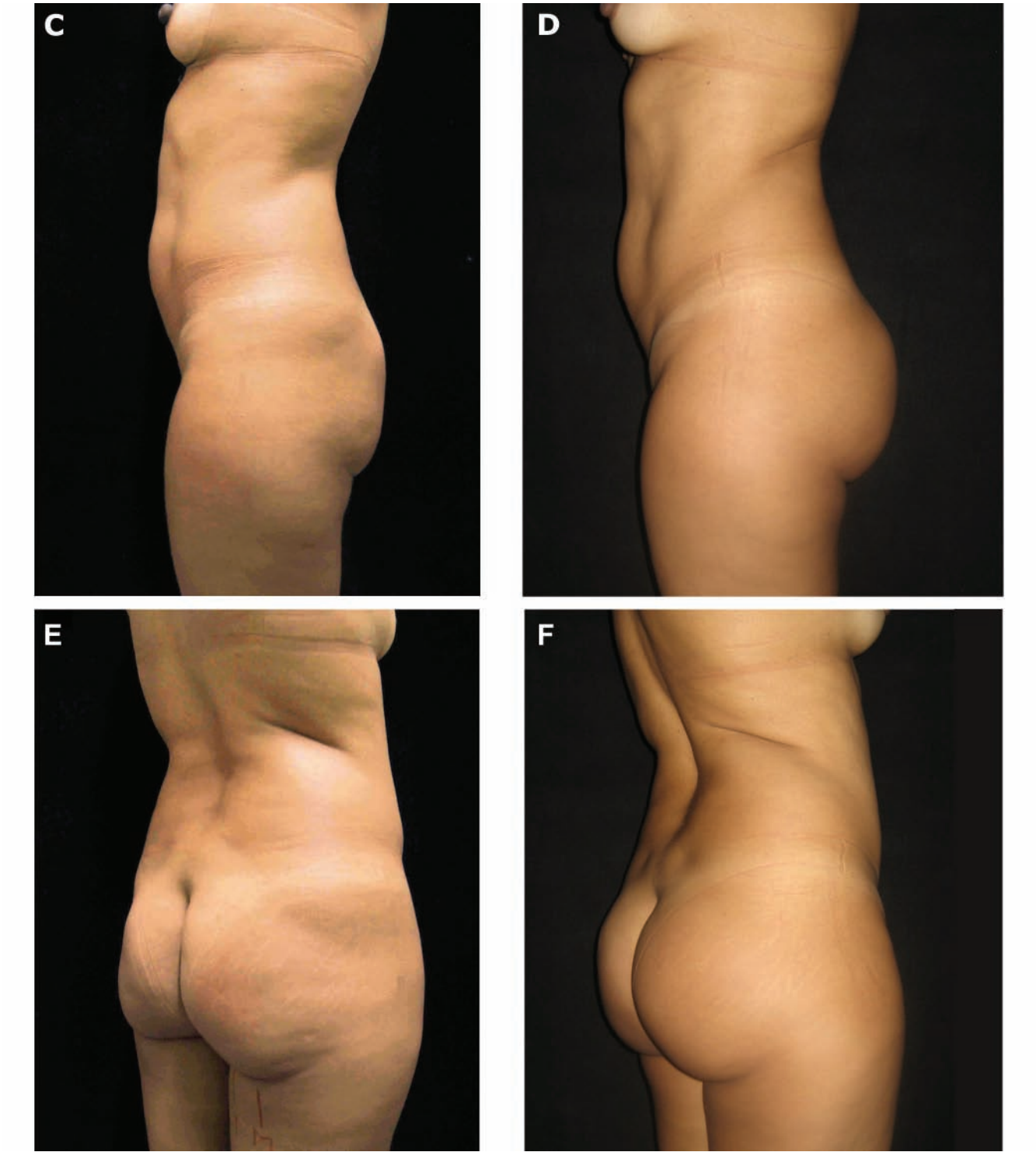

Figure 14 (continued). (C, E) Preoperative views of a 44-year-old woman whose main complaint was lack of projection. (D, F) One year after placement of 300-mL round base implants.

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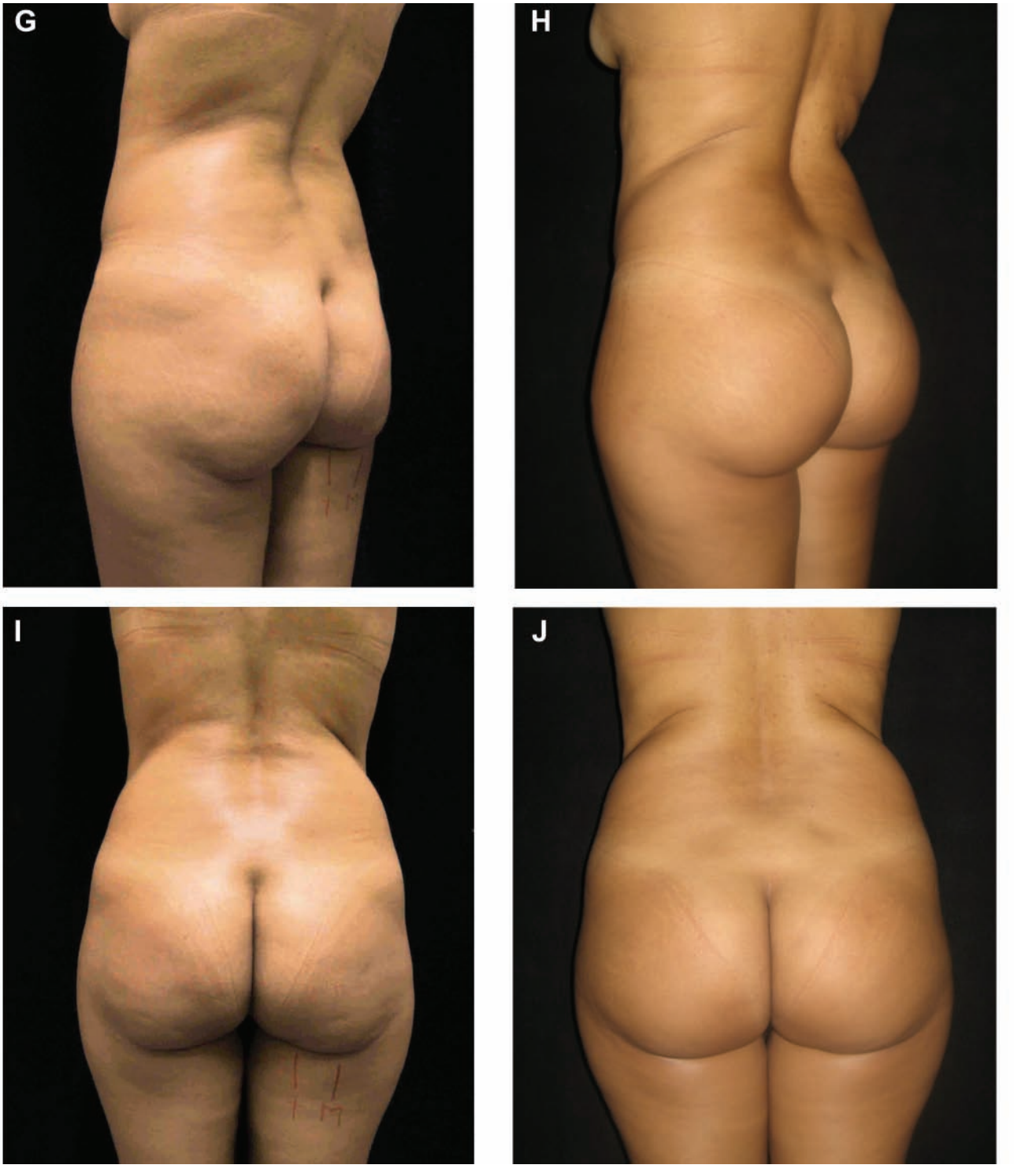

Figure 14 (continued). (G, I) Preoperative views of a 44-year-old woman whose main complaint was lack of projection. (H, J) One year after placement of 300-mL round base implants.

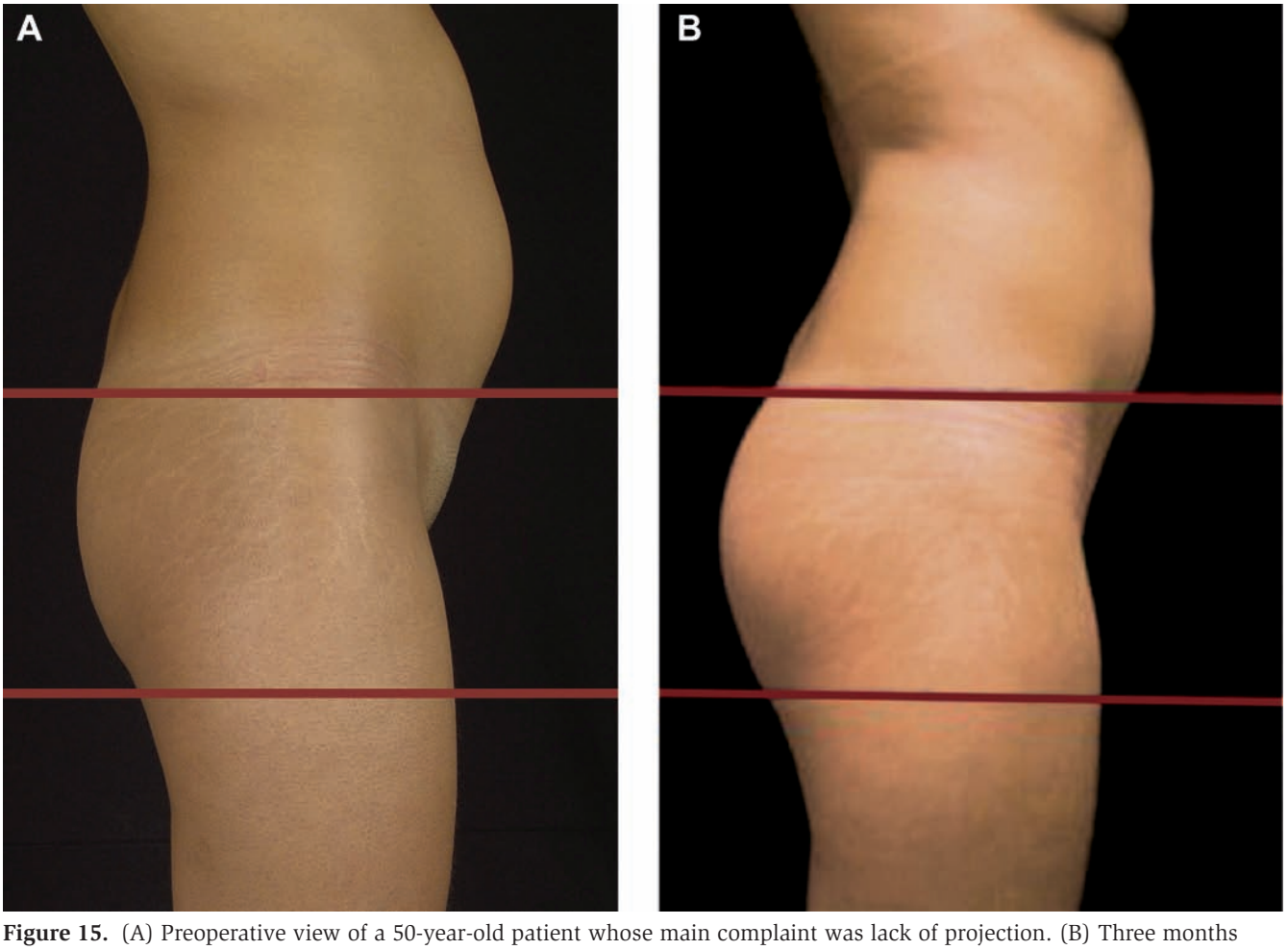

Figure 15. (A) Preoperative view of a 50-year-old patient whose main complaint was lack of projection. (B) Three months after placement of 300-mL anatomic base implants.

Disclosures

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