Submuscular Breast Augmentation

The author’s breast augmentation technique preserves the sternal origin of the pectoralis major, shaping the breast by stretching the muscle. The inframammary crease is adjusted to center the implant behind the nipple. (Aesthetic Surg J 2003;23:293-299.)

When performing submuscular breast augmentation, it is essential to follow a plan that will result in an attractive, natural-looking augmented breast while minimizing the potential for complications. Here, I present my approach, which emphasizes shaping the pectoralis major muscle and adjusting the inframammary crease to optimally position the implant.

Preoperative Markings

On the day of surgery, with the patient fully awake and either sitting or standing, mark the current location of the inframammary crease (IMC), then draw an oval pattern extending from the lateral sternal border to the anterior axillary line and from the inframammary crease to a point 2 cm below the clavicle (Figure 1, A).

After the induction of general anesthesia using a laryngeal mask airway, but before skin preparation, mark the new or adjusted IMC. This location varies with implant size but is typically 9 cm from the center of the nipple when the nipple/areola is pulled gently upward between the nondominant thumb and index finger (Figure 1, B). This allows a 300- to 340-cc implant to be centered properly behind the nipple-areolar complex and avoids excessive upper-pole fullness. If you use an implant larger than 340 cc, measure the new IMC at 9.5 to 10.0 cm; if you use an implant smaller than 300 cc, measure the new IMC-to-nipple distance at 8.5 cm or less.

If you choose an inframammary incision, mark a 2.5-cm incision, 1.0 to 1.5 cm above the new (lower) IMC. If you use an areolar incision, extend it along the inferior areolar margin from 3 o’clock to 9 o’clock.

Implant Selection

I prefer smooth, round implants to anatomically shaped implants because implant rotation is not an issue with smooth implants, and the appearance of smooth implants is similar to that of anatomically shaped implants when placement is submuscular.

Virtually all of the implant deflation that I have seen occurs in patients with textured implants. Moreover, I have observed a higher incidence of rippling/wrinkling and capsule contracture with textured implants. Smooth implants have greater mobility and assume a more natural motion when the patient walks or runs. Capsule-expansion exercises are more effective with smooth implants because the implants are mobile (not adherent to the capsule).

Technique

If one breast is clearly larger, operate first on the smaller side because the limiting factor is the maximal volume the smaller side can accommodate. Then size the larger breast to match the volume of the smaller breast. If you plan a unilateral mastopexy, position the implant first and customize the mastopexy to match the size and location of the areola of the smaller breast.

Choice of incision

I prefer an inframammary or periareolar incision to an axillary incision because these provide better visualization of the retromuscular space, particularly in the lateral portion of the dissection. This facilitates improved hemostasis and protection of intercostal sensory nerves. Moreover, I am better able to adjust the IMC with my fingertips and stretch out or obliterate the old IMC, even after the implant has been fully inflated.

Anesthesia administration

I administer supplemental local anesthesia with a blunt semirigid lipoplasty infusion needle by way of a 2- to 3-mm skin puncture at the lateral end of the future inframammary incision. The blunt needle glides over the rib cage, delivering a dilute bupivacaine-adrenaline solu-
tion into the entire retropectoral space (Figure 2, A). If you use an areolar incision, this small skin opening will be used later as the exit point for a suction drain.

I prefer this method to a sharp flexible spinal needle because it avoids multiple skin punctures, prevents accidental entry into the pleural cavity, and avoids unintended injection into the muscle, which could result in increased bleeding.

**Surgical Steps**

After making the skin incision, incise the breast with a scalpel, scissors, or both. Next, locate the inferior and medial edge of the pectoralis major muscle. When you locate the muscle edge, initiate the submuscular-pocket dissection with spreading scissors and cautery. Confirm the correct plane by means of direct inspection and digital palpation (Figures 2, B, and 3, A). Introduce a Reynolds breast dissector into the pocket, using it to enlarge the pocket by stretching and contouring the pectoralis major muscle.

**Superior and medial dissection**

First, dissect the medial area of the pocket. Sweep the dissector from medial to lateral to remain above the pectoralis minor muscle (Figure 3, B). Superiorly, progress with submuscular dissection to about 2 cm from the inferior edge of the clavicle. Medially, elevate the muscle to its sternal origin. Stretch the muscle with a breast dissector, but do not incise or release the sternal attachment. The goal is to obtain a gradual transition or “flow” so that after implant placement, the upper edge of the implant is not visible. (If the sternal origin of the pec-
toralis major were partially or completely transected medially, muscle stretching/contouring would not be recommended because the weakened sternal attachment would be likely to separate further or avulse."

**Lateral dissection**

In the lateral portion of the dissection, use spreading scissor dissection under direct vision to avoid injury to intercostal nerves, which are preserved intact because they can be seen.

**Inferior dissection and IMC adjustment**

Inferiorly, the IMC usually requires adjustment (lowering) to allow the implant to be centered behind the nipple-areola complex. If the IMC is too high, the upper breast pole will be too prominent and the nipple will point downward. Perform this dissection using scissors, blunt dissection, or both, stopping at the level of the new (lower) IMC markings. If necessary, the original IMC is stretched out (eliminated) with the use of blunt fingertip dissection or a breast dissector to avoid the creation of a double IMC. Perform hemostasis with a coated monopolar forceps activated by a foot pedal. Bring out a suction drain through the lateral portion of the inframammary incision if that incision site is selected. If an areolar incision is used, bring out the suction drain inferolaterally through the same small incision above the IMC that was previously used for administration of supplemental local anesthesia. Prepare the implant by removing all of its air and rolling both edges toward the center to form a tubular shape. For insertion, slide the implant between 2 retractor blades that have been moistened with bacitracin solution to make them slippery (Figure 4). Implant contact with skin is avoided to prevent contamination with skin organisms.

Next, inflate the implant with saline solution in 25-mL increments using a closed system with an autorefill syringe (Figure 5). Adjust the volume within the parameters established before surgery until you have achieved optimal size and contour. After the implant has been

*Figure 2. A, The entire retropectoral space can be accessed with a blunt lipoplasty infiltration needle by way of a single 3-mm stab incision, which will later be incorporated into the lateral end of the inframammary incision. If an areolar incision is selected, the infiltration incision will be used later as the exit location for a suction drain. B, Once the thin layer of subcutaneous tissue beneath the breast, but above the new IMC is incised, the inferior-lateral or free border of the pectoralis major muscle is identified visually."*
filled to the desired volume, evaluate the upper-pole contour. If there is a depression above the superior edge of the implant, reinsert the breast dissector between the implant and the overlying muscle and move the implant medially, laterally, or both while exerting strong upward lift on the instrument blade to further stretch the muscle and breast (Figure 6). On the second side, a different volume may be required to compensate for breast or ribcage asymmetry.

After 3-layer closure of the incision, instill 15 mL of 1/4% Marcaine around each implant by way of the drain itself. Suction is restored in 5 to 10 minutes. Unless a
greater-than-average amount of bleeding occurs, administer 10 to 15 mg of ketorolac intravenously. I have found that this small dose is sufficient to provide comfort in the recovery room and on the trip home for most patients, but not enough to cause a problem with increased bleeding when a suction drain has been used.

After dressings have been placed, apply a surgical or conventional stretch bra and a breast band to complete the procedure.

**Suction drainage**

Remove the drains when the overnight volume is less than 20 mL. This is usually between 2 and 5 days after the procedure.

**Postoperative Care**

Patients usually return to desk work within 1 week and gradually resume full physical activity over the course of 3 weeks.

Instruct patients in the appropriate technique to begin manual capsule-expansion exercises at the time of suture removal (5 to 7 days) and continuing thereafter, gradually decreasing frequency from 5 times daily to twice daily. The upward and medial compression exercises are intended to maintain a larger space within the scar capsule than the diameter of the implant. If the patient is successful in maintaining a scar-capsule space larger than the implant (extra space superiorly), capsule contracture does not occur and the natural flow or contour transition in the upper pole of the breast is maintained.
Final contouring is achieved after the implant is fully inflated and the fill tube has been removed. In some patients, further stretching of the muscle is indicated to ensure a natural flow superiorly. In other patients, further adjustment (lowering) of the IMC is performed with finger-tip dissection, scissors, or cautery. The breasts are compared to ensure maximal symmetry. In a lateral view, the nipples are typically aligned like the sights on a rifle. 

The implant is partially submuscular because it is not covered by the pectoralis major in its most inferior-lateral segment.

**Figure 6.**

- **A.** Final contouring is achieved after the implant is fully inflated and the fill tube has been removed. In some patients, further stretching of the muscle is indicated to ensure a natural flow superiorly. In other patients, further adjustment (lowering) of the IMC is performed with finger-tip dissection, scissors, or cautery. The breasts are compared to ensure maximal symmetry. In a lateral view, the nipples are typically aligned like the sights on a rifle. 
- **B.** The implant is partially submuscular because it is not covered by the pectoralis major in its most inferior-lateral segment.

**Figure 7.**

- **A, C.** Preoperative views of a 23-year-old woman with a 32 A bra size. 
- **B, D.** Postoperative views after augmentation with 275-cc implants by means of an inframammary incision.
I ask patients to wear an underwire exercise bra during vigorous physical activity, indefinitely, to prevent lateral implant displacement by the intact pectoral muscle. I also ask patients to avoid exercises that specifically target the pectoralis major muscle, such as bench presses, pectoral flies, and push-ups.

**Summary**

I have reviewed my technique for submuscular breast augmentation, which typically produces a soft, natural-appearing breast with sensation intact (Figures 7 and 8). The sternal origin of the pectoralis major is preserved and the breast is shaped by stretching the muscle. This contrasts with the medial release approach in which the muscle is weakened in proportion to the extent that it is cut, and in which the possibility of rippling or implant-edge visibility at the sternal border is increased. The inframammary crease is adjusted, as described, to center the implant behind the nipple. I advocate the routine use of suction drains to prevent fluid collection around the implants and minimize bruising while preventing complications such as infection and capsule contracture that may occur as a result of hematoma.

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1090-820X/2003/$30.00 + 0