Barbed Sutures for Aesthetic Facial Plastic Surgery: Indications and Techniques

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KEYWORDS

• Barbed sutures • Brow-lifting • Midface-lifting
• Lower face-lifting • Neck-lifting

Techniques in rejuvenating the aging face have evolved from skin tension–based procedures to a variety of planes of dissection. For each technique, maintaining the position of elevated soft tissues is essential. An understanding of the vectors that needed to be applied to obtain the optimal position of elevated tissues was essential in repositioning ptotic soft tissues in a logical direction. Adding volumetric enhancement to repositioned soft tissues and to soft tissues that were not elevated, but did require augmentation, added the ''third dimension'' to facial rejuvenation. The use of sutures—nonabsorbable or absorbable—has certainly been the mainstay of supporting repositioned soft tissues. The introduction of barbed sutures provided an opportunity to explore the use of this technology to approximate soft tissues. Originally used with minimal or no soft tissue dissection, with suture placement at the subcutaneous level,[1] this method of anchoring soft tissue to itself or to a fixed point has been modified to allow placement of barbed sutures at various planes of dissection to accomplish secure soft tissue approximation. The latest generation of barbed sutures designed for soft tissue approximation is available in both absorbable and nonabsorbable materials with various suture lengths and needles attached. There is a nonbarbed segment between the two limbs of the suture with barbs in opposite directions as well as a nonbarbed segment at the end of each barbed segment. My early experience with nonabsorbable unidirectional barbed sutures and bidirectional barbed sutures placed in the subcutaneous plane was disappointing in terms of long-term maintenance of repositioned soft tissue and often resulted in visible threads, extruded threads, broken threads, or traction lines at rest or with animation. Early in my learning curve, I felt that most anatomic areas required soft tissue dissection at various planes using the sutures to maintain the soft tissues in their new position. These sutures can be placed more superficially, such as in the superficial musculoaponeurotic system (SMAS), or as deep as the subperiosteal plane. The use of the barbed sutures for repositioning nondissected soft tissue was largely a failure except in cases involving the jawline and upper neck. In some patients, typically younger individuals with good skin quality, the mandibular border could be reliably recontoured with a combination of suction-assisted lipectomy alone or in combination with ultrasonic energy to stimulate retraction of the dermis. Placing barbed sutures in the subcutaneous plane after liposuction produced a well-defined mandibular border and subjaw area (**Fig. 1**).

The principle applications for barbed sutures in facial aesthetic plastic surgery are those involving lifts of the brow, midface, and the lower-face and neck. Usually all three areas require surgical maneuvers to create a harmonious rejuvenation. Regardless of where in the face bidirectional barbed sutures are planned, five essential steps are needed: (1) making the incision or incisions,

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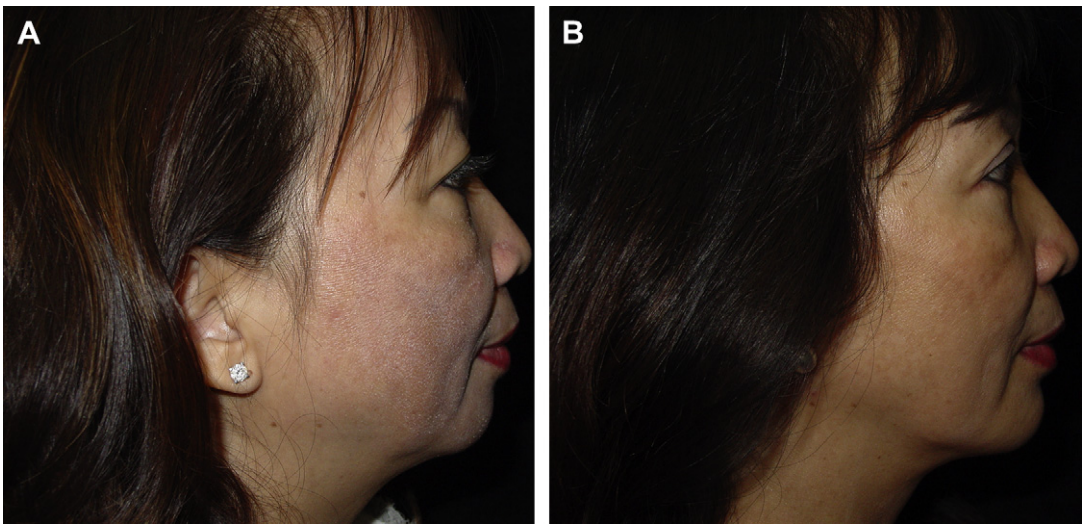

Fig. 1. Patient before (*A*) and after (*B*) a chin implant and neck contouring.

(2) dissecting soft tissue, (3) deploying threads, (4) proximal anchoring, and (5) molding soft tissue. Inherent in the descriptions that follow are these five components for providing soft tissue suspension with equal tension along the length of the barbed segments. All patients receive pre- and postoperative cephalosporin antibiotic coverage as well as intraoperative and postoperative steroids for 1 week. Generous use of ice masks reduces edema and improves patient comfort.

BROW-LIFTING

Fundamental to effective brow-lifting is adequate mobilization of the forehead soft tissues whether by limited incision,[2] full open coronal lift, transpalpebral approach,[3] or subperiosteal approach.[4–6] In all methods, with one exception, the incision is a significant distance from the eyebrow. The exception is the transpalpebral approach, where the orbicularis oculi muscle is sutured to the orbital rim periosteum or the orbicularis oculi muscle is suspended to the temporalis fascia. An access incision superior to the brow requires at least a 5:1 ratio of proximal movement to distal movement. Barbed sutures can be passed from the paramedian or temporal access incision, exiting below the brow. In this way, the brow can be sequentially elevated by engaging the barbs. This technique is valuable in correcting asymmetric brows (**Figs. 2–4**). In addition, the distal end of the suture may be left outside of the skin for a length of 1 cm, covered with antibacterial ointment and a nonadherent dressing. Final adjustment of brow position may be obtained in the office 2 to 3 days later, at which time the distal end of the suture is removed flush with the skin. Of course, an open coronal or anterior hairline brow-lift can produce significant brow elevation and differential elevation of the body and the tail of the eyebrow with varying amounts of skin excision alone or with a full-thickness scalp flap excision. However, these procedures carry their own trade-offs, including the potential for hypesthesia, alopecia, pruritis, unacceptable hairline retrodisplacement, and wide scars.

MIDFACE-LIFTING

Although some younger patients with good skin quality may benefit from subcutaneous placement of threads, most patients benefit from barbed sutures used to support dissected midface soft tissue. I have found the approach that combines the subfascial and the subperiosteal planes to be

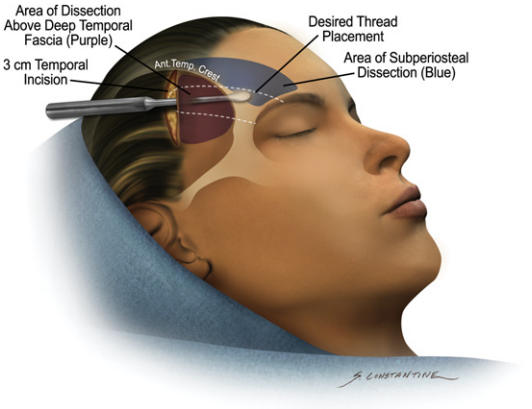

Fig. 2. Brow-lift procedure showing area of dissection.

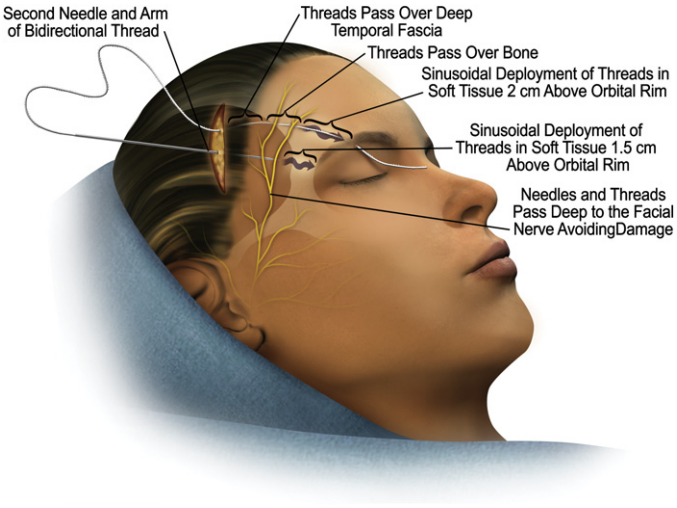

Fig. 3. Brow-lift procedure showing placement of threads.

quite favorable for the use of this technology. Previously[7] I would dissect the midface from combined temporal and intraoral access incisions joined through a tunnel lateral to the orbital rim. After I elevated the soft tissue, I would place a suture intraorally, engage the anterior flap and retrieve it through the temporal pocket. This required a larger intraoral incision for access and presented a higher risk for an intraoral midface infection. When performing the procedure today, I pass an absorbable barbed suture on a long straight needle (Quill SRS, Reading, Pennsylvania) from the temporal pocket exiting lateral to the nasolabial crease. This allows me to produce a ''shish kebob'' effect by incorporating the periosteum, SMAS, sub–orbicularis oculi fat (SOOF), malar fat pad, and skin on the barbs. (If the soft tissue cannot be elevated with traction applied to the proximal end of the barbed suture, either the barbs are engaging nondissected deep temporal fascia above the orbital rim or the dissection was inadequate to release the composite flap.) Typically two sutures (or both limbs of an articulating suture) are required per side (**Figs. 5–9**) When two sutures are used, the proximal ends are anchored to the deep temporal fascia reinforced with an absorbable Vicryl figure-eight suture (Ethicon, Somerville, New Jersey) to prevent ''cheese wiring'' (**Fig. 10**). As with the brow-lift, the distal ends of the sutures may be left outside of the skin, covered in a similar way, allowing a final adjustment to be made in the clinic 2 to 3 days postoperatively. This is valuable in patients who demonstrate asymmetric midface morphology. In some cases, a third suture may be necessary to

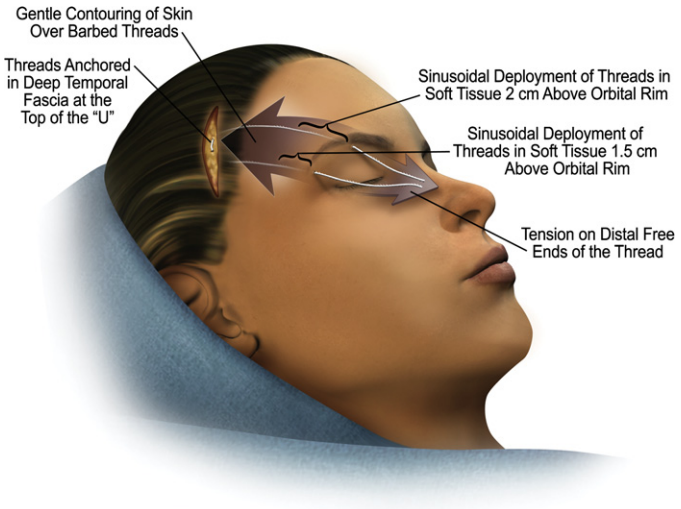

Fig. 4. Brow-lift procedure showing anchoring of threads.

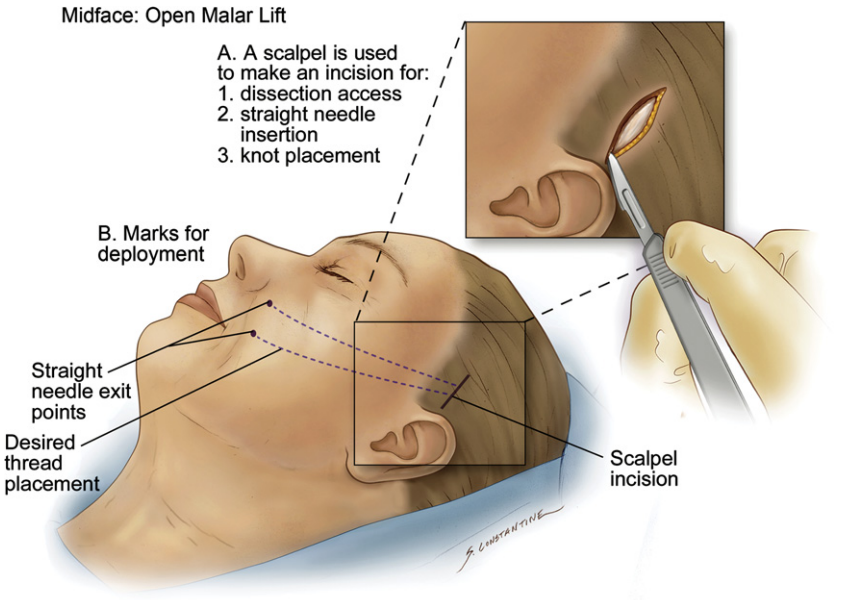

Fig. 5. Midface open malar lift showing incision.

achieve adequate elevation and symmetry. The elevated malar soft tissue is further supported with 0.5-in ''stretchy'' Steri-strips (3M, St. Paul, Minnesota) for 5 days (**Figs. 11–14**). Lower lid options depend upon the morphology and the appearance after midface elevation. Frequently no lower lid procedure is required or only a ''skin-pinch'' blepharoplasty needs to be performed because the subseptal fat is repositioned behind the globe with elevation of the soft tissue of the midface. An excessive amount of subseptal fat or a prominent arcus marginalis may dictate more aggressive maneuvers to rejuvenate the lower lid–upper cheek complex.

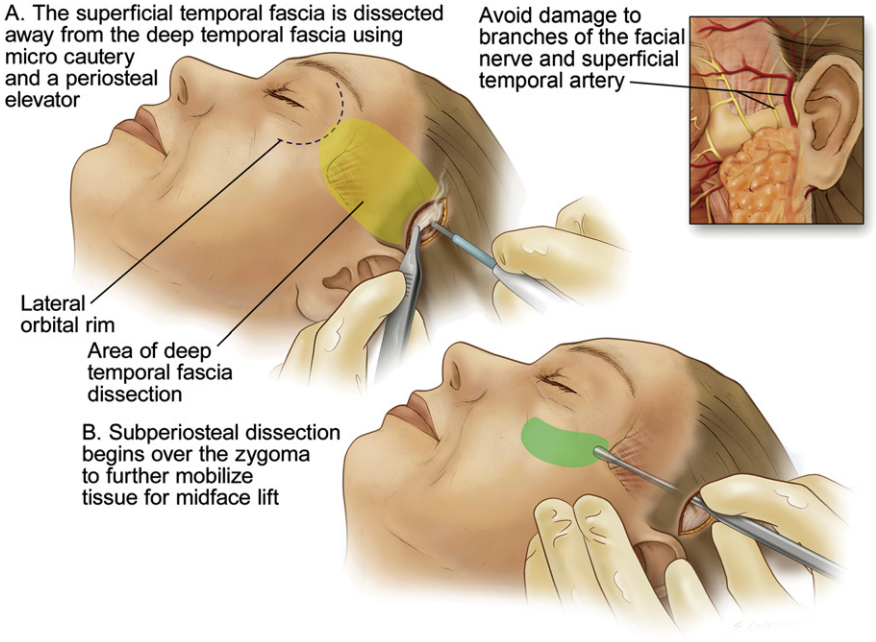

Fig. 6. Midface open malar lift showing dissection.

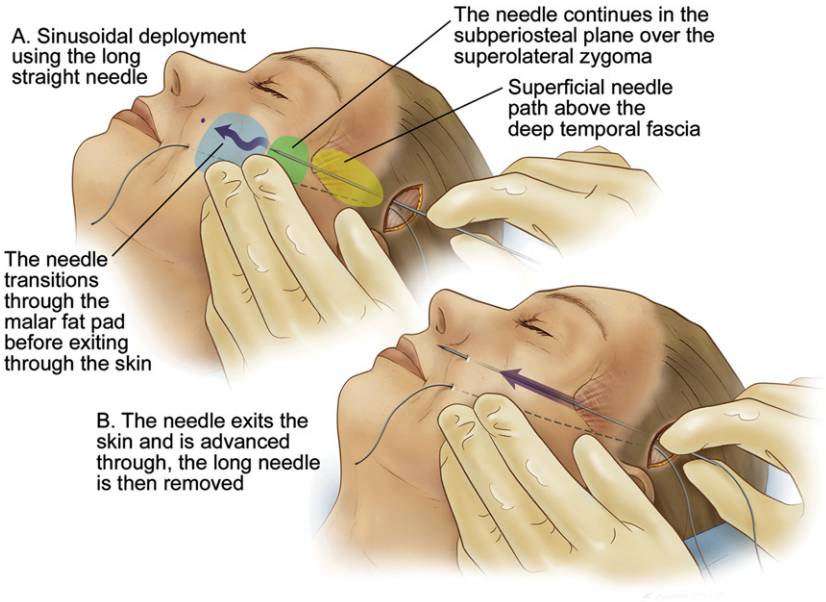

Fig. 7. Midface open malar lift showing sinusoidal deployment.

LOWER FACE- AND NECK-LIFTING

An exciting and recent application of bidirectional barbed suture technology is in repositioning the SMAS, contouring the neck in the anterior to posterior direction from the mastoid fascia along and below the mandibular border, and performing a midline platysmaplasty (corset platysmaplasty).[8] Methods of SMAS plication with or without dissection[9–14] are appropriate applications for bidirectional barbed sutures. Because the sutures evenly distribute tension and do not require a knot to be tied, the soft tissue does not bunch, which can occur with "purse string" techniques. The bidirectional sutures may be placed from the region of the deep temporal fascia above and anterior to the cruz helix and follow the SMAS to the subjaw area. Placement in the SMAS is safe as

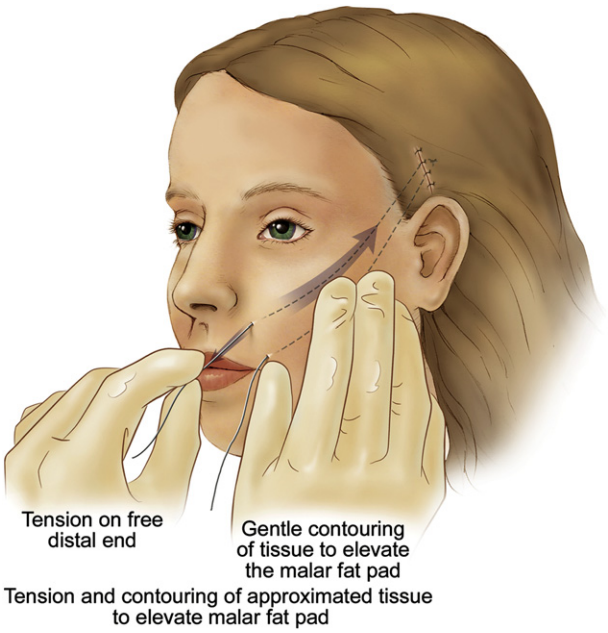

Fig. 8. Approximation of tissue layers.

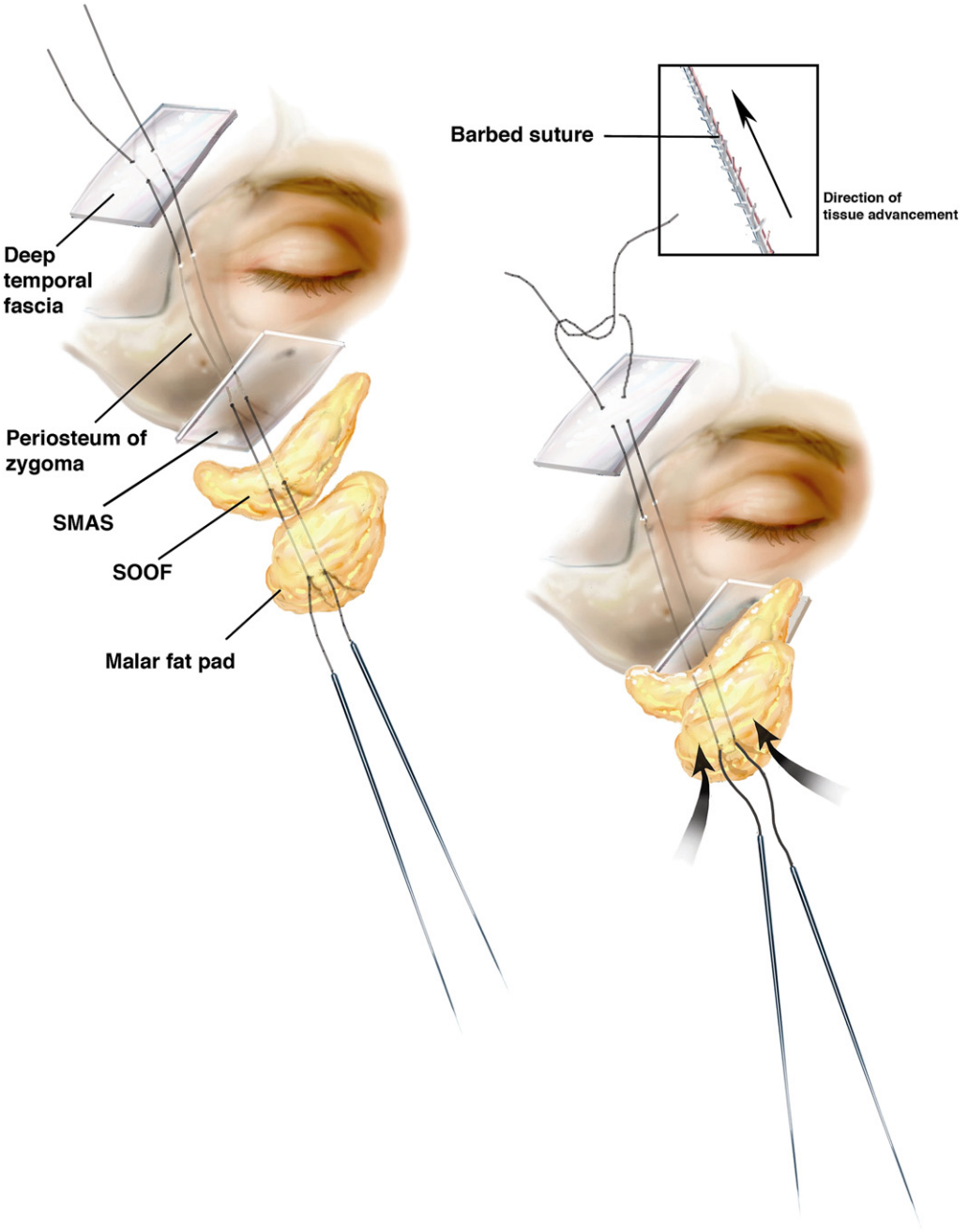

Fig. 9. Volumetric stacking of soft tissue. (*From* Paul MD. Using barbed sutures in open/subperiosteal midface lifting. Aesthetic Surgery Journal 2006;26:729; with permission.)

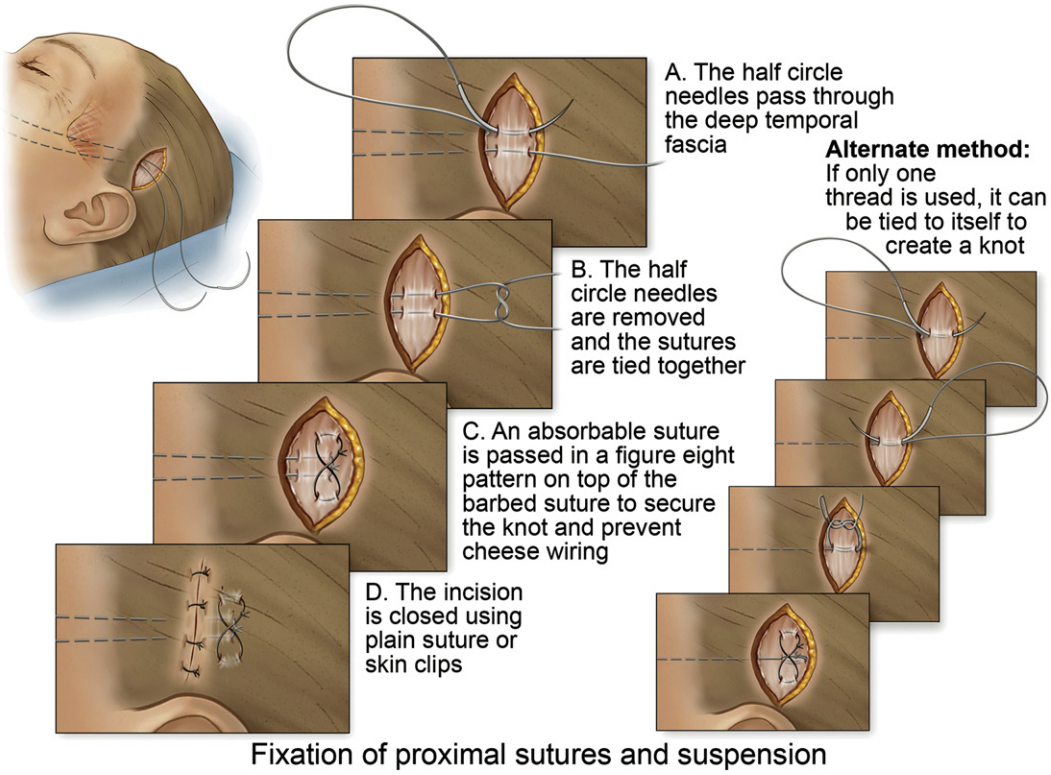

Fig. 10. Temporal anchoring.

long as the deep fascia is not pierced, below which are the branches of the facial nerve (**Figs. 15** and **16**).

Choice of technique to address the subjaw area depends on the morphology. My algorithm follows:

Short platysma bands: closed liposuction of the neck with a flat, spatula cannula of only a few millimeters combined with either a midline platysmaplasty or, when there is relaxation along the jawline, a lateral platysma repositioning with barbed sutures

Long platysma bands: closed liposuction of the neck as well as open removal of fat (pre-, inter-, and subplatysmal in location), midline platsmaplasty with or without a "backcut," and lateral platysma support with minimal tension (**Figs. 17–19**)

Fig. 11. Preoperative view of patient.

Fig. 12. Right lateral preoperative view of patient in **Fig. 11**.

Fig. 13. Right lateral view postoperative view of patient in **Fig. 12**.

Fig. 14. Patient in **Fig. 11** after surgery.

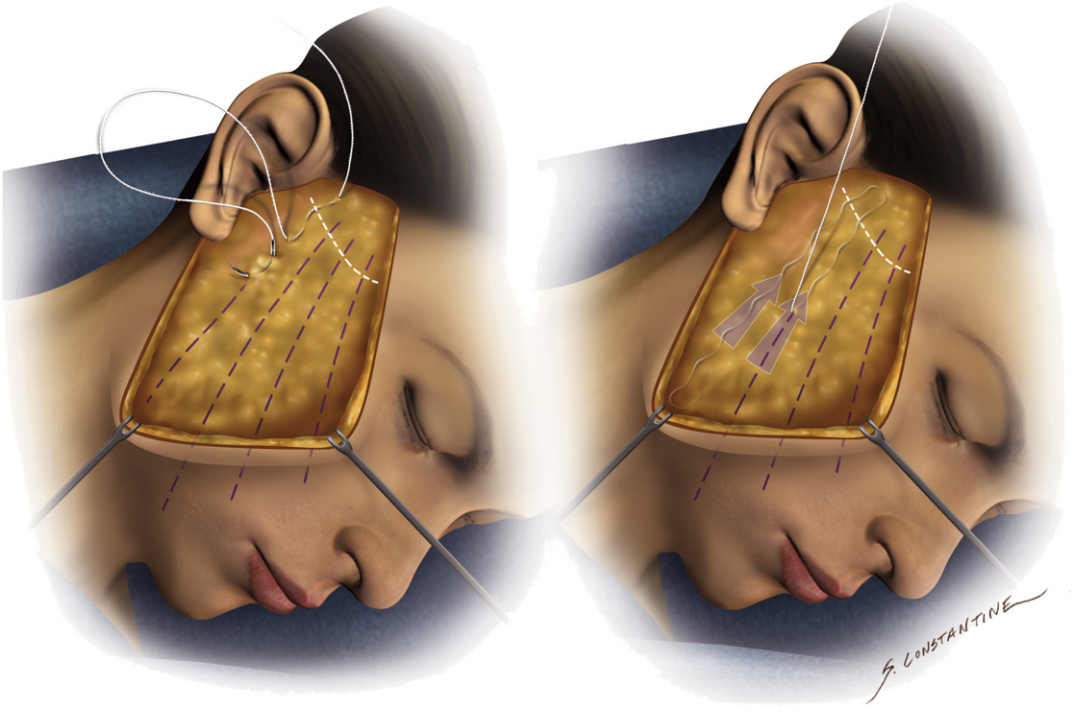

Fig. 15. Minimal access cranial suspension technique.

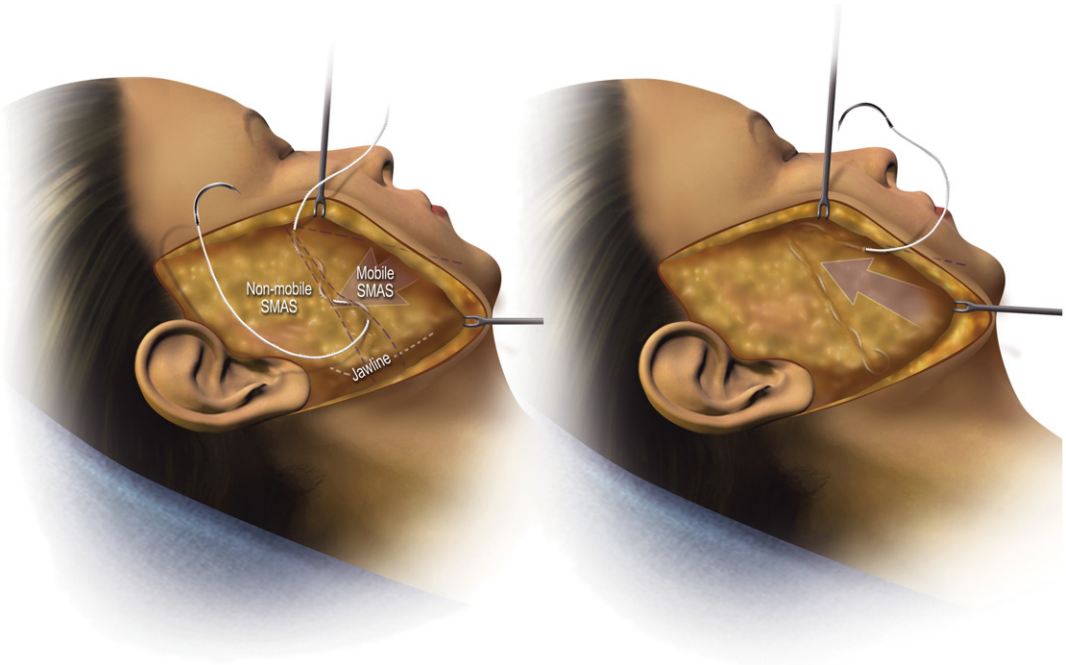

Fig. 16. SMAS-ectomy.

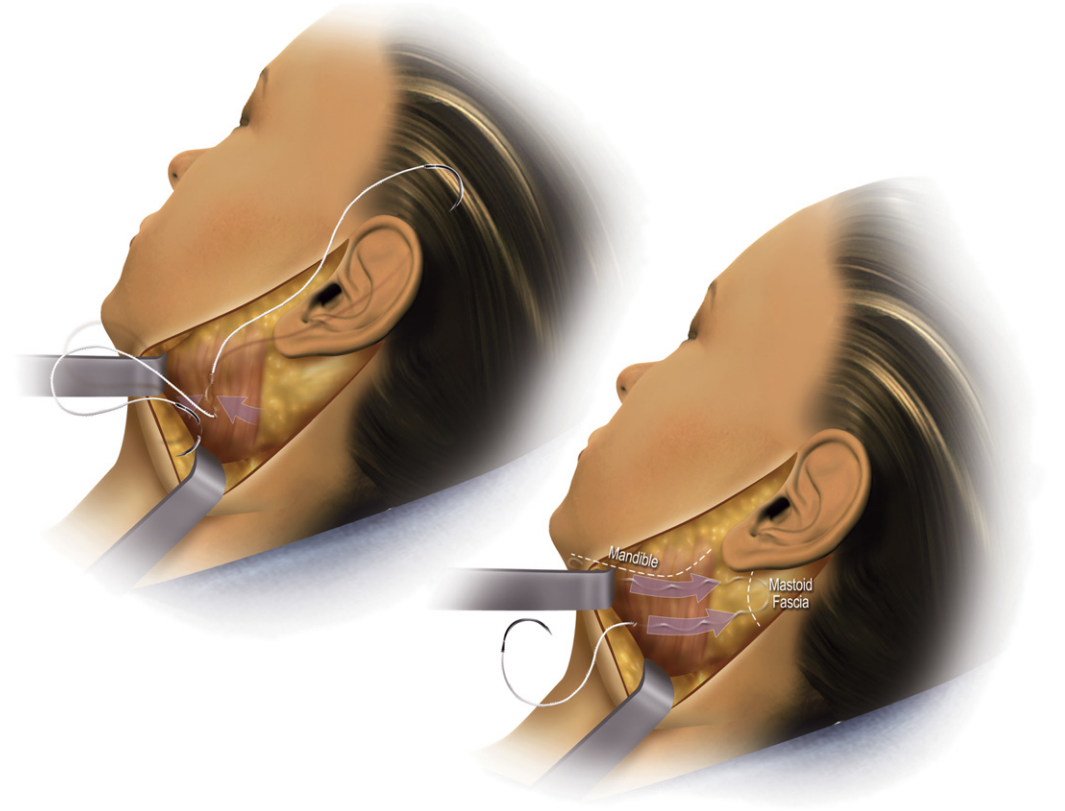

Fig. 17. Lateral placement of Quill sutures.

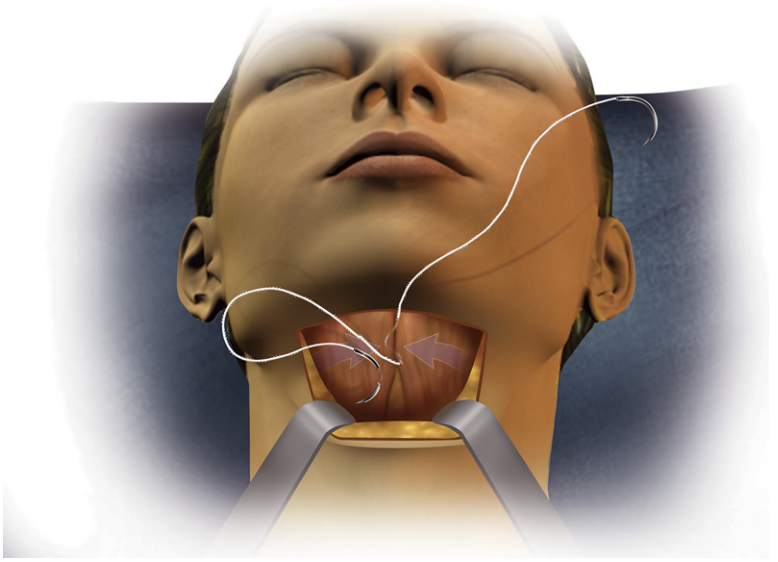

Fig. 18. Midline placement of Quill sutures.

The placement of a double-layered Quill SRS suture system produces a shortening of the platysma as well as an inward and upward rotation of the unified muscle complex. After a midline platysmaplasty is performed, it is counterproductive to exert posterior tension with barbed sutures that pass from the mastoid fascia anteriorly. That maneuver is likely to separate the unified platysma muscle complex with posterior traction. My suture of choice for the facial procedures (SMAS and platysmaplasty) is the Quill Self-Retaining System (SRS), 2-0 polydioxanone (**Figs. 20** and **21**).

SUMMARY

In the evolution of facial rejuvenative procedures, the shift to less-invasive procedures with a reasonable half-life has been a reasonable goal. However, the use of nonabsorbable threads to

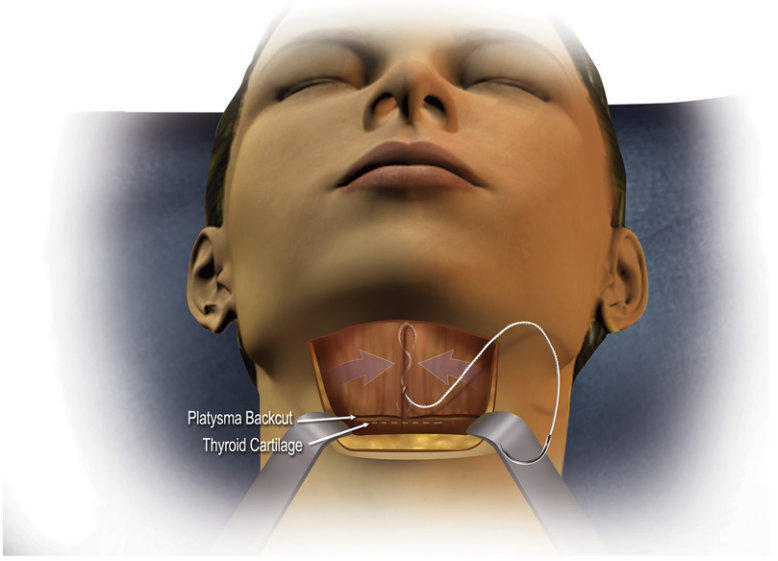

Fig. 19. Midline placement of Quill sutures showing platysma backcut.

Fig. 20. Patient with long platysma bands before surgery.

Fig. 21. Patient in **Fig. 20** after surgery.

achieve this goal met with mixed reviews. Understanding the technical maneuvers in effectively using bidirectional absorbable barbed sutures has allowed faster, secure placement of sutures with even distribution of tension and the ability to artistically support repositioned soft tissue in aesthetically correct vectors. This, of course, required surgical dissection at various planes to ensure an enduring correction. It really is all about vectors and volume, not about pulling the sheet over an unmodified mattress.

REFERENCES

1. Sulamanidze MA, Fournier PF, Padidze TG, et al. Removal of facial soft tissue ptosis with special threads. Dermatol Surg 2000;28:367–71.
2. Knize DM. Limited-incision forehead lift for eyebrow elevation to enhance upper blepharoplasty. Plast Reconstr Surg 1996;97:1334–42.
3. Paul MD. The surgical management of upper eyelid hooding. Aesthetic Plast Surg 1989;13:183–7.
4. Isse NG. Endoscopic facial lift. Presented at the Annual Meeting of the Los Angeles County Society of Plastic Surgeons. Los Angeles, September 12, 1992.
5. Vasconez LO. The use of an endoscope in brow lifting. A video presentation at the Annual Meeting of the American Society of Plastic and Reconstructive Surgeons. Washington, D.C., 1992.
6. Chajchir A. Endoscopic subperiosteal forehead lift. Aesthetic Plast Surg 1994;18:269–74.
7. Paul MD. Morphologic and gender considerations in midface rejuvenation. Aesthetic Surgery Journal 2001;21:349–53.
8. Feldman J. Necklift. St: Louis: Quality Medical Publishing, Inc., 2006.
9. Tonnard P, Verpaele A, Monstrey S, et al. Minimal access cranial suspension lift: a modified S-lift. Plast Reconstr Surg 2002;109:2074–86.
10. Hamra ST. Composite rhytidectomy. Plast Reconstr Surg 1992;90:1–13.
11. Baker DC. Lateral SMASectomy. Plast Reconstr Surg 1997;100:509–13.
12. Aston SJ. FAME facelift. Presented at "Aesthetic and Reconstructive Surgery of the Aging Face" (live surgical demonstration of "Facialplasty (FAME Technique)". New York, November 19–21, 1992.
13. Connell BF, Semalcher RA. Contemporary deep layer facial rejuvenation. Plast Reconstr Surg 1997; 100:1513–23.
14. Stuzin JM, Baker TJ, Gordon HL, et al. Extended SMAS dissection as an approach to midface rejuvenation. Clin Plast Surg 1995;22:295–311.