A harmonious and youthful appearing neck-line is arguably the most vital aspect of a successful facial rejuvenation. We strive for perfection in our neck lifts according to the sound principles outlined by Ellenbogen and Karlin¹ in 1980. These principles include a distinct mandibular border, subhyoid depression, thyroid bulge, a distinct border to the sternocleidomastoid muscle, and a cervicomental angle of 105 to 120 degrees. Also important in this analysis is chin position, with the ideal as designed by Byrd and Burt to be 3 mm posterior to the nose-lip-chin plane.² It is these aesthetic ideals that we have sought to attain.

Theories on the anatomy of facial aging have evolved, and the approach to neck lift has in turn changed accordingly. Although addressing the superficial musculoaponeurotic system (SMAS) has been well-established, early methods involved subcutaneous lifting with plication or imbrication of the SMAS/platysma complex.³ Feldman pioneered the corset platysmaplasty, which coapts the midline decussation of the platysma.⁴ This technique helps define the neck-jaw angle. No platysmal excision is involved. Removal of subplatysmal fat has also been used as a technique to contour, and this technique is effective. However, as Lambros points out, overresection of the central platysmal fat can create contour irregularities.⁵ Alternatively, Guyuron et al. use a vest-over-pants technique to redistribute prominent platysmal bands and eliminate their palpability.⁶

Disclosure: The authors have no commercial associations or financial disclosures that might pose or create a conflict of interest with information presented in this article. No funding was received for the work presented in this article.
Indeed, a balance in technique is needed to provide a neck rejuvenation patient with a natural-appearing and youthful neck. Without sound principles, the neck appears skeletonized, tethered, and hollow. Our approach modifies the classic techniques of the past, and seeks a nuanced and algorithmic approach to each patient by resuspension and reshaping of deeper neck elements. Wide medial and lateral undermining of skin, platysmal release medially and laterally, and platysmal resuspension and techniques are used. When indicated, transection of the muscle and submental defatting are used.7

In the neck region anatomical studies on jowling, the anatomy of the great auricular nerve, subauricular band, and subplatysmal fat layers has influenced our techniques and ensured their safety. In this article, we describe these techniques and the methods we use to avoid pitfalls in neck rejuvenation.

Stuzin,8,9 a senior author of this article, describes the aging face and neck with regard to descent of facial fat, volume loss and facial deflation, and radial expansion of fat and skin lateral to the nasolabial fold. In addition, with the anatomical studies on facial aging and fat compartments by Rohrich and Pessa, we also sought to devise a systematic method to rejuvenate the neck.10

Fat in the area of the jowls and neck is highly compartmentalized. As in other areas of the body, during face and neck lifting, we encounter fascial barriers between different zones of fat. From lateral to medial, these areas of adherence are vascular and occur in transition between the compartments. Studies by Rohrich et al.11 have shown histologically that these zones are membranes that originate on the superficial fascia and insert into the dermis of the skin.

The main tenets of our approach have evolved into a sequence that helps ensure consistency in our results. It involves skin undermining over the neck and cheek, midline plication of the platysma with release of the muscle inferiorly, precise release of the mandibular septum and ligament if needed, platysmal window suspension laterally, and redraping of the SMAS by plication or SMASectomy.

In this article, we analyze the aging process and the anatomy of the aging neck. We demonstrate how these basic science principles are integrated into the practice of one of our senior authors (R.J.R.) by outlining the steps we used in our neck lift.

ANATOMY OF THE AGING JAWLINE

Anatomical studies have elucidated some proposed mechanisms for the aging jawline. Cadaver studies using dye injection have demonstrated superior and inferior subcutaneous fat compartments of the mandible.12 The superior jowl compartment appears as an inferior extension of the nasolabial fold and is bounded anteriorly by the oral commissure. The inferior jowl fat compartment is posterior and inferior to its superior counterpart. The submandibular fat compartment anteriorly relates to the submental region, and below it lies the fat over the sternocleidomastoid muscle. A fascial barrier that separates the inferior jowl from the submandibular fat compartment is known as the mandibular septum. It inserts 1 cm superior to the mandibular border and extends between the subcutaneous fat compartments to the skin. Its extent laterally is the angle of the mandible (Fig. 1).

Relating this anatomy to our discussion of the aging neck, jowling occurs either by laxity or by dehiscence of the mandibular septum and deflation of the fat compartments, which can change the position of the septum. This septum ultimately sets the level of the jowls by its adherence to the

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Fig. 1. Stylistic drawing of jowl fat compartments and submandibular fat showing the superior (purple) and inferior (red) jowl fat compartments. The mandibular septum is shown as the superior boundary of the submandibular fat compartment (green). (Reprinted from Reece EM, Pessa JE, Rohrich RJ. The mandibular septum: Anatomical observations of the jowls in aging. Implications for facial rejuvenation. Plast Reconstr Surg. 2008;121:1414–1420.)
mandible and its ability to prevent mobilization of fat over the mandible (Figs. 2 and 3).

With the anatomical relationships of the fat compartments in mind, surgical correction of mandibular contour may involve a combination of SMAS manipulation, medial and lateral platysmal plications and refinements, and jowl excision under direct vision. Indeed, our analysis of 60 patients found that 42 percent had atrophy of tissue, 30 percent had compartment ptosis, and 28 percent had septal dehiscence.13,14

Radial expansion, as Stuzin describes, is also an important concept of the aging face and neck. In young patients, skin and subcutaneous fat are densely attached to the fascia of the face and neck by retinacular fibers that traverse skin, fat, and superficial fascia. These retinacular attachments are attenuated over time in the region lateral to the nasolabial fold, resulting in expansion of soft tissue radially. In fact, jowling can partially be explained by radial expansion of fat compartments lateral to the oral commissure and marionette lines. Stuzin points out that despite immense effects, this phenomenon is technically difficult to correct.15

MAINTENANCE OF THE CENTRAL COMPARTMENT OF NECK FAT

Further work has elucidated the subplatysmal fat compartments of the neck.16 Subplatysmal fat exists in discrete anatomical compartments—central fat adjacent to the digastric muscles, medial fat underlying the platysma, and lateral fat adjacent to the medial fat. The mylohyoid represents the posterior boundary of these compartments. The central compartment is yellow, whereas the medial and lateral compartments

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**Fig. 2.** Descent of superior and inferior jowl compartments. (Used with permission from Reece E, Rohrich RJ. The aesthetic jaw line: Management of the aging jowl. *Aesthet Surg J.* 2008;28:668–674.)

**Fig. 3.** Laxity of descent of the mandibular septum leading to the formation of jowls. (Used with permission from Reece E, Rohrich RJ. The aesthetic jaw line: Management of the aging jowl. *Aesthet Surg J.* 2008;28:668–674.)
are a more pale color (Fig. 4). Although anatomically in a cadaver this may be the case, clinically the color difference is very difficult to discern during surgery.

In addition, the anatomical studies show that aggressive removal through cervical liposuction of the central fat subplatysmal fat is not recommended. It gives the neck a rounded, concave shape, and distorts the contour of the neck and strays from Ellenbogen’s ideal 105- to 120-degree angle. Surgery in this region requires meticulous attention to technique because the fascia separating the supraplatysmal and subplatysmal fat is so thin. In removing supraplatysmal fat, identifying platysma and then defatting toward the midline is one maneuver that helps prevent inadvertent subplatysmal dissection.

However, we do acknowledge that sometimes subplatysmal tissue modifications and fat excision are necessary. Although we do recommend judicious removal of subplatysmal fat, often intraoperatively it is clear that patients’ submental fat deposits are in this region. Indeed, as Feldman points out, sometimes the difference between a good result and a great result depends on how subplatysmal tissues are addressed. However, proper surgical technique is necessary to prevent unnatural shape. We could not agree more. His approach includes peeling off thin layers until he arrives at an ideal and flat submental plane. Our approach to fat removal here is similar to the technique he describes, in which fat is peeled off the platysmal edges with electrocautery. For further study, we refer the reader to Feldman’s innovative book for an excellent reference on subplatysmal surgery.17

**SUBAURICULAR MEMBRANE RELEASE AND THE PLATYSMAL WINDOW TECHNIQUE**

Further anatomical analyses have elucidated the relation between the great auricular nerve and the adipose compartments to the preauricular region.17 Five periauricular fat compartments abut one another and form an interlocking group of adipose regions in the neck. They include the superior, middle, inferior, subauricular, and preauricular compartments. The transition zone between the subauricular and inferior periauricular compartments is called the subauricular membrane and is associated with the great auricular nerve (Fig. 4). It also acts as a tethering zone in the lateral neck. Indeed, inadequate division of the subauricular membrane leads to a subauricular band phenomenon, where a tethering band appears postoperatively. In addition, it

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Fig. 4. Skin removed from the neck of a 75-year-old female specimen reveals an abundant subcutaneous fat layer (white arrows). Platysma is a wafer-thin structure that decussates at or near the menton. It has been lifted here. Central subplatysmal fat (C) is noted beneath the midline superficial fascia and below the edges of platysma muscle. Subplatysmal fat also has medial (M) and lateral (L) compartments. (Reprinted from Rohrich RJ, Pessa JE. Subplatysmal supramylohyoid fat. Plast Reconstr Surg. 2010;126:589–595.)

Fig. 5. The positions of the five periauricular adipose compartments are shown (blue): superior (A), middle (B), inferior (C), subauricular (D), and preauricular (E). The transition zone between the subauricular and inferior periauricular compartments is the subauricular membrane associated with the great auricular nerve (yellow). (Reprinted from Rohrich RJ, Taylor NS, Ahmad J, Lu A, Pessa JE. Great auricular nerve injury, the “subauricular band” phenomenon, and the periauricular adipose compartments. Plast Reconstr Surg. 2011;127:835–843.)
is important to understand that the great auricular nerve transitions planes from the inferior fat to the subauricular fat compartments when performing neck lift.

The platysma window technique applies the anatomical principles thus mentioned to safely tighten the neck and avoid damage to the great auricular nerve. Using this technique, the platysma is approached at a key safety point, uses a smaller advancement flap, and improves neck contour. Following skin incision and undermining, the platysmal window is made anterior to the lobule, one fingerbreadth below the angle of the mandible and one fingerbreadth in front of the anterior sternocleidomastoid muscle. Using our anatomical knowledge, this becomes a safe spot for incision because the great auricular nerve is typically posterior. Undermining of the platysma is performed and a 2-cm window is created. Two figure-of-eight Mersilene sutures (Ethicon, Inc., Somerville, N.J.) are used to secure our window to the posterior mastoid fascia (Figs. 6 and 7).

Fig. 6. Schematic drawing of the platysma window. A 2-cm platysma window (gray shaded box) is created with incisions one fingerbreadth below the angle of the mandible and one fingerbreadth in front of the anterior border of the sternocleidomastoid muscle. Green area indicates mastoid fascia where platysma is secured. Arrows indicate platysma and great auricular nerve. Black stitches are shown spanning the region between the mastoid fascia. (Reprinted from Cruz RS, O’Reilly EB, Rohrich RJ. The platysma window: An anatomically safe, efficient, and easily reproducible approach to neck contour in the face lift. Plast Reconstr Surg. 2012;129:1169–1172.)

Fig. 7. Platysma window secured. The two figure-of-eight 4-0 Mersilene sutures (black) are secured. Improvement in jowl, neck contour, and silhouette is evident. (Reprinted from Cruz RS, O’Reilly EB, Rohrich RJ. The platysma window: An anatomically safe, efficient, and easily reproducible approach to neck contour in the face lift. Plast Reconstr Surg. 2012;129:1169–1172.)

The platysma window avoids creation of a large SMAS-platysma flap and also relies on dividing the subauricular membrane in the upper neck, to avoid platysmal banding. We believe this technique is a reliable and anatomically safe method for improving neck contour.

CASE REPORTS

Case 1

The patient in case 1 was a 51-year-old woman with prominent jowling, excess skin, and prominent platysmal bands. She was most unhappy with the contour of her neck. Midface and neck lift, upper and lower lid blepharoplasty, fat injection to the nasolabial folds, open rhinoplasty, and perioral chemical peel were performed. Preoperative and 2-year postoperative photographs are shown (Figs. 8 through 10).

Case 2

The patient in case 2 was a 79-year-old man with prominent jowling, and skin laxity and platysmal banding in the midline. He desired facial rejuvenation procedures, specifically, midface and neck lift. Using the principles outlined, we performed a SMAS-plication to elevate the midface and correct the jawline, and a platysmal imbrication with transverse release with platysma window technique to address the neck. In addition, a submental stitch was used to help refine the jowl region. Preoperative and 2.5-year postoperative photographs are shown (Figs. 11 through 13).
DISCUSSION: RESTORING HARMONY IN NECK REJUVENATION

The aging neck demonstrates several distinct qualities, including excessive skin laxity, lipodystrophy, prominence of the jowls, and platysmal banding. We have in turn attempted to understand the anatomical changes responsible for the aging neck, which should include a detailed grasp of the fat compartments. As we age, we develop dehiscence and laxity that occurs to the fibrous septa intervening between these compartments.

Fig. 8. Case 1. The patient is shown preoperatively (left) and at follow-up 2 years postoperatively (right), showing prominent jowling, banding of platysma, and skin excess. In addition, she demonstrates medial cheek fat deflation and perioral fine rhytides. Midface lift and neck lift, upper and lower blepharoplasty, chemical peel, fat injection, and open rhinoplasty were performed.

Fig. 9. Case 1. Lateral views of the same patient as in Figure 8 obtained preoperatively (left) and postoperatively (right).
As our understanding of facial anatomy has evolved, our techniques of neck rejuvenation have been enhanced and modified as well. This evolution of technique has progressed over the past nearly 25 years (Table 1). In the early years of the senior author’s (R.J.R.) practice, neck liposuctioning prevailed, with limited lateral opening for plication, whereas later techniques involved medial plication with the creation of a midline incision. In the current decade, liposuction was discontinued, and direct fat excision has prevailed. In doing this, the senior author now only modestly, if at all, removes the central subplatysmal fat compartment, to reduce visible deformity. Also, a platysma window technique is used to anchor and tighten the lateral platysma. Our other senior author (J.M.S.) also uses a platysma window.

In the preceding sections, we have anatomically established that harmony in neck rejuvenation involves avoiding aggressive resection of central subplatysmal fat, releasing the subauricular membrane from posterior to anterior, considering use of a platysma window to safely contour the lateral neck, SMAS manipulation, platysmal plications, and jowl excision to create an aesthetic jawline. Our stepwise technique is outlined below.

1. Undermining of the skin must occur in the face, often just lateral to the zygomaticus major to allow access to the SMAS. In the neck, we undermine generously to allow access to the platysma medially and laterally. We join these skin flaps in the midline submental area using straight face-lift scissors (Fig. 14). All dissection is performed under direct vision using a fiberoptic retractor and manual countertraction. We leave at least 3 mm of subcutaneous fat on the skin flaps to prevent noticeable skin irregularities, adhesions, and dimpling. Remember to release the subauricular membrane posteriorly to prevent a banding deformity.7

2. Submental access to the neck. The neck midline is accessed through an incision placed 1 to 2 cm behind the submental crease. Excision and sculpting of submental fat, if necessary, is performed in a conservative manner. Through the submental approach, the supraplatysmal fat can be removed. Fat removal should not be limited solely to the central compartment. Attention to detail is important here, and the fascia is so thin that it is easy to inadvertently penetrate the subplatysmal space. The safest technique is to identify the platysma under direct visualization and defat toward the midline. However, as eloquently articulated in the book by Feldman, subplatysmal fat sculpting may be necessary. It can be performed judiciously until endpoints of submental contour and ideal hyoid angle are reached. Next, if necessary, platysmal bands are plicated in the midline. The inferomedial fibers of the platysma are incised for a distance of 1 to 2 cm.

Fig. 10. Case 1. Oblique views of the same patient as in Figure 8 obtained preoperatively (left) and postoperatively (right).
Release of the inferomedial platysma is especially effective for the patient with moderate to severe skin laxity and wide platysmal bands. Free medial platysmal muscle edges can eventually result in recurrent banding if left untreated. In contrast to surgeons who simply corset the platysmal midline, we choose to resect wedges of inferomedial platysma. Then, the free medial edges are approximated with interrupted 4-0 Mersilene sutures (Fig. 15). No medial platysmal muscle fibers are removed. This medial

Fig. 11. Case 2. Frontal views of the patient preoperatively (left) and at follow-up 2.5 years postoperatively (right), again showing jowling around the mandible, prominent platysmal banding, and skin excess. Using the principles outlined, we performed a SMAS-plication to elevate the midface and correct the jawline, and a platysmal imbrication with transverse release with platysma window technique to address the neck. In addition, a submental stitch was used to help refine the jowl region.

Fig. 12. Case 2. Profile views of the same patient as in Figure 11 obtained preoperatively (left) and postoperatively (right).
imbrication allows for a smooth contour for the submental region. This midline suturing helps tighten the muscular sling and sharpen the cervicomental angle.7

3. Lateral tightening through a platysma window. This is our preferred method for achieving lateral neck contour. It is a safe and reproducible technique. By the initial undermining, in a posterior to anterior dissection, we release the subauricular band that can tether the neck and create a lateral band deformity. The platysma shaping occurs through the window technique, which involves plication to the posterior mastoid fascia from a point one fingerbreadth below the angle and one fingerbreadth anterior to the sternocleidomastoid muscle. Lateral platysmal plication also repositions soft tissue away from the jowls (Fig. 15). In patients with thicker skin, particularly men, a submandibular spanning stitch from the mandibular border to the mastoid fascia is used to help define the neck and cheek. In addition, the stitch reestablishes contour in the fat neck. Usually, we use 3-0 Vicryl (Ethicon) sutures and anchor them from the submental platysma7 (Fig. 16).

4. Contour assessment of the jawline and the jowl region. Release of the mandibular septum and mandibular ligament may be required to correct the aging jawline and is performed on an individual basis. The mandibular septum is adherent to the mandible as a unified continuous structure in the subcutaneous layer. Sharp dissection is required to dissect the septum from the angle of the mandible toward the menton, 1 cm above the inferior mandibular

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**Table 1. Evolution of Neck-Lift Techniques over the Past 25 Tears**

<table>
<thead>
<tr>
<th>Period</th>
<th>Medial Neck</th>
<th>Lateral Neck</th>
<th>Fat Lipodystrophy</th>
<th>Comments/New Additions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1986–1991</td>
<td>None</td>
<td>Limited opening and plication</td>
<td>Liposuction-assisted contouring</td>
<td>Limited access does address platysmal fat deposits</td>
</tr>
<tr>
<td>1991–2000</td>
<td>Medial plication with central platysmaplasty</td>
<td>Limited plication</td>
<td>Liposuction-assisted lipocontouring</td>
<td>Addresses medial bands but still limited contouring</td>
</tr>
<tr>
<td>2000–present</td>
<td>Medial plication with release of inferior platysma</td>
<td>Platysma window</td>
<td>Direct excision of fat with retention of subplatysmal fat</td>
<td>Provides most appropriate contour to neck and tightening of bands</td>
</tr>
</tbody>
</table>
5. Redraping of the SMAS and skin in the appropriate vector. As discussed previously, the SMAS is reshaped and elevated to establish the midface ideal for each individual patient. The SMAS-shaping angle is either in a more oblique or horizontal vector based on the midfacial analysis of the patient’s length and width. Furthermore, SMAS elevation reestablishes fat compartment position, rejuvenates the submalar hollow, and defines the jawline. Our preferred technique is based on an individualized component analysis and involves either a SMAS stacking or SMASectomy. A detailed discussion is in the accompanying reference. A detailed discussion is in the accompanying reference. After SMAS shaping, the neck skin is secured in a posterior and superior vector to ensure natural contour, as opposed to the face, which is resuspended superiorly. The steps described are highlighted in the diagram.

Figure 17 demonstrates the sequence of successful neck rejuvenation in five steps. Note optional elements used based on specific anatomy and indications of the patient (Fig. 17).

In this discussion, mention should also be made regarding isolated neck lift without manipulation of the SMAS through plication or resection. Although our sequence involves typically elevation of the cheek elements and by nature the jowl as well, some patients need or desire only an improvement in neck midline platysmal banding, submental fat deposits, or lateral contour. For these patients, all that may be needed is midline plication, fat reshaping, and platysma window. Again, an excellent source for this isolated procedure is...

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**border. Patients with cascading fat along the jawline or tethering of the neck in this region after plication and platysmal window require a combination of septal release, SMAS elevation, lateral SMAS plication, and submandibular fat excision. Septal release is necessary to allow proper redraping of skin and fat at the mandibular border, and removal of submandibular fat allows for mandibular border definition.**

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Feldman’s text, in which he outlines the sequence for skin undermining, platysmal manipulation, and closure, in a methodical and efficient manner.

**CONCLUSIONS**

In this article, we choose to highlight sound principles and techniques to rejuvenate the aging neck. The five-step neck lift has helped us ensure improvement in contour and optimize results. The following points should be considered in any neck-lift procedure:

1. Avoid overaggressive resection of the central subplatysmal fat compartment in the midline.
2. Release the subauricular membrane in a safe transition from posterior to anterior, to prevent a lateral banding deformity.
3. Use a platysmal window to safely contour the neck and avoid damage to the great auricular nerve.
4. Correction of the jowl may involve some combination of SMAS manipulation, medial and lateral platysmal plications and refinements, fat augmentation, and jowl excision under direct vision.

The end result is a well-defined, well-contoured neck, with an approach grounded in sound anatomical principles.

**Fig. 17.** Five-step neck-lifting sequence to optimize results.

**PATIENT CONSENT**

Patients provided written consent for the use of their images.

**ACKNOWLEDGMENTS**

Special appreciation goes to Patricia Aitson and Martha Aceves for their wonderful photographic and illustrative skills. Without them, this article would not be possible.

**REFERENCES**


Evidence-Based Medicine: Questions and Answers

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It makes sense that randomized, controlled, blinded, multicenter trials with hundreds or thousands of patients and years of follow-up would have a higher level of evidence than a single author’s experience in a clinical series. However, given the demands of such studies, it also makes sense that there would be few randomized controlled trials but many single-author series or expert opinions. Such series and expert opinions do have value. PRS welcomes the submission of such papers and will continue to publish them.