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# Subplatysmal Necklift: A Retrospective Analysis of 504 Patients

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## Abstract

**Background:** Improvement of neck contour is a primary goal of patients who seek rejuvenation of the face and neck. Subplatysmal structures, including fat, the digastric muscle, and the submandibular salivary glands (SMSGs), may contribute to the appearance of a disproportionately large neck.

**Objectives:** The authors sought to evaluate the safety, effectiveness, and predictability of necklift combined with reshaping and repositioning of the subplatysmal structures.

**Methods:** The records of 504 patients were reviewed retrospectively. Surgical maneuvers for subplatysmal necklift were described comprehensively and supplemented with videos. The subplatysmal anatomy was detailed by means of 2 cadaver dissections.

**Results:** A total of 430 patients (85.3%) underwent subplatysmal necklift. The most commonly treated structures were fat (423 patients [83.9%]), the SMSGs (307 patients [60.9%]), and the digastric muscle (91 patients [18.1%]). The most common complications were weakness of the lower lip depressor (29 patients [5.7%]), followed by sialoma of the parotid gland (10 patients [2%]). No patients experienced subplatysmal hematoma.

**Conclusions:** Subplatysmal necklift is a safe, effective, and reliable option for patients who desire improved cervical contour.

**Level of Evidence: 4**


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Patients who seek facial rejuvenation frequently indicate improvement of neck contour as a primary goal of treatment.[1-4] Patients often regard neck sagginess as exclusively attributable to skin flaccidity. However, a saggy appearance of the neck usually results from imbalances in the volumes and positions of the subplatysmal structures, including fat, the digastric muscle, the submandibular salivary glands (SMSGs), the mylohyoid muscle, and the hyoid.[5-7]

Castro et al[8] advocated against aesthetic surgery of the subplatysmal region, citing potential complications such as fluid accumulation (blood, serum, and/or saliva) and damage to the marginal mandibular nerve or the cervical branch of the facial nerve.

Surgical procedures to treat structures deep within the neck have been refined by many surgeons in an effort to develop safe, straightforward, and reproducible methods.[2,3,5-7,9,10] We previously described surgical maneuvers to avoid complications in patients who undergo necklift with partial resection of the SMSGs.[11] Herein, we provide an update of our experience with subplatysmal necklift and describe a novel strategy for repositioning the hyoid.

## METHODS

The records of 504 consecutive patients (461 women [91.5%], 43 men [8.5%]) who underwent necklift performed by the same team of surgeons and anesthesiologists

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from September 2011 to June 2015 were evaluated in a retrospective review. Information regarding the surgical procedure and its potential benefits and risks was distributed to patients, and all patients provided informed consent. This study was conducted in accordance with guiding principles set forth in the Declaration of Helsinki.

Necklift was performed through a submental incision, with the platysma, the supraplatysmal area, and the subplatysmal area treated successively to improve cervical contour. Necklift was performed alone or in combination with lifting of the middle third of the face. For some patients, blepharoplasty or endoscopic browlift also was performed in the same surgical session.

## Cadaver Dissections

Two fresh cadavers, a 75-year-old female and an 18-year-old male, were dissected in May 2015 and September 2015, respectively. The female cadaver was dissected at the Laboratory of the Morphological Sciences Department at the Federal University of Rio Grande do Sul (Porto Alegre, Brazil). The male cadaver was dissected at the Forensic Laboratory of Rio de Janeiro (Brazil). Both dissections were performed with written authorization of the institution coordinator. Video 1 depicts these dissections as well as the relationships among the subplatysmal structures, especially the subplatysmal fat, the digastric muscle, and the SMSGs; this video may be viewed at www.aestheticsurgeryjournal.com.

## Surgical Techniques

All patients received general anesthesia, as described previously.[12] Briefly, anesthesia was induced with propofol, fentanyl, and pancuronium bromide, and was maintained with isoflurane, oxygen, nitrous oxide, and propofol. To facilitate the dissection and improve pain control intraoperatively, local anesthesia was delivered by the tumescent technique (1 L of saline, 40 mL of 2% lidocaine, 20 mL of 1% ropivacaine, and epinephrine [1:1,000,000]). For patients who underwent facelift and necklift in the same surgical session, each side of the face was infiltrated with approximately 450 mL of the solution. For patients who underwent necklift alone, each side of the neck was infiltrated with approximately 250 mL.

### *Preoperative Planning*

Although a thorough preoperative examination of the neck was helpful for planning the surgical procedure, many decisions were based on intraoperative assessments. We conducted a step-by-step approach to treatment of the skin, subcutaneous fat, interplatysmal fat, platysma, and subplatysmal structures (ie, the subplatysmal fat, the digastric and mylohyoid muscles, the SMSGs, and the hyoid).[13] All patients underwent surgery by the open submental approach, which allowed for direct visualization.

When necklift was carried out in combination with facelift, superior and inferior blepharoplasties were performed first, followed by endoscopic browlift, necklift, and rhytidoplasty of the middle third of the face. Rhytidoplasty maneuvers proceeded from the right side to the left side of the face and included plication of the superficial musculoaponeurotic system (SMAS), application of skin traction, and removal of skin excess. Suturing of the middle third of the face and submental incision also proceeded in this order. The neck was treated before the middle third of the face for 2 main reasons. First, when the middle third is treated before the neck, the Trendelemburg position that is needed to approach the cervical region usually causes the dissected middle third to have an increase in venous pressure, leading to more intraoperatory bleeding. Also, tractioning skin of the middle third of the face transfers tension to the neck skin before it is treated, thereby limiting submental access to the subplatysmal structures. Finally, when necklift was combined with blepharoplasty and endoscopic browlift only, the neck was treated last.

For most patients, a submental incision was made 2 to 3 cm posterior to the natural crease of the chin.[2] This incision placement allowed for closer access to the subplatysmal region and facilitated the eventual dissection and resection of the SMSGs (Figure 1). Moreover, placing the incision at this site facilitated undermining of the natural crease of the chin for patients who underwent treatment of the so-called witch's chin. Connell[2] noted that anterior incision placement, especially along this natural crease, should be avoided because these incisions can result in a witch's chin over time. Video 2 depicts surgical planning, subcutaneous dissection, the identification of subplatysmal structures and fat, and dissection of the SMSGs, and may be viewed at www.aestheticsurgeryjournal.com.

### *Subcutaneous Dissection*

Careful subcutaneous dissection was performed to ensure adequate skin thickness and prepare a well-vascularized flap. Blunt dissection (such as the one performed in liposuction) was avoided to protect flap integrity and prevent overtreatment of the subcutaneous fat. The flap was undermined with Metzenbaum scissors (Marina Medical, Sunrise, FL) for all patients, including those with a heavy, full, or obtuse neck. After dissection, fat was trimmed with scissors. Open liposuction and aggressive removal of subcutaneous fat were avoided.

### *Inventory of the Subplatysmal Structures*

Subplatysmal structures were identified as routine practice. Interplatysmal fat was removed when necessary, and the margins of the platysma were lifted. The platysma and the

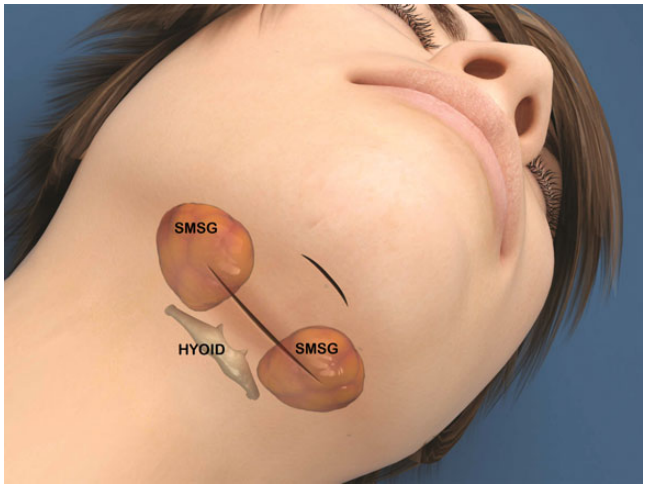


**Figure 1.** Posterior placement of the submental incision facilitated visualization of structures in the deep neck, especially the submandibular salivary glands (SMSG), compared with conventional placement of the incision on the submental crease.

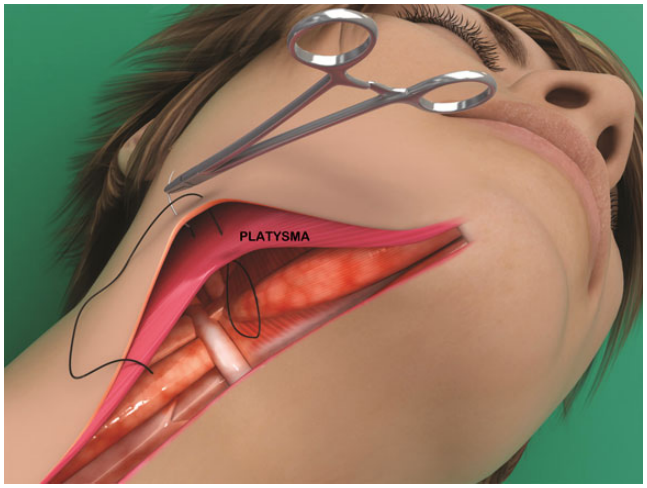


**Figure 2.** The platysma was secured away from the operating field by means of a suture that spanned the muscle and skin.

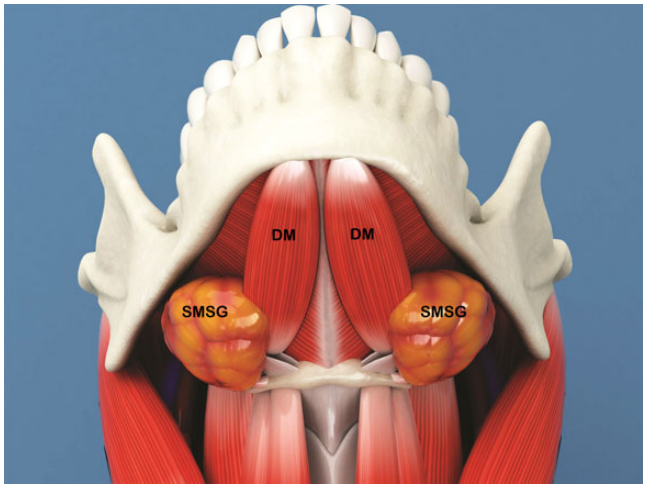


**Figure 3.** The submandibular salivary glands (SMSGs) were located lateral to the most posterior aspect of the anterior belly of the digastric muscle (DM).

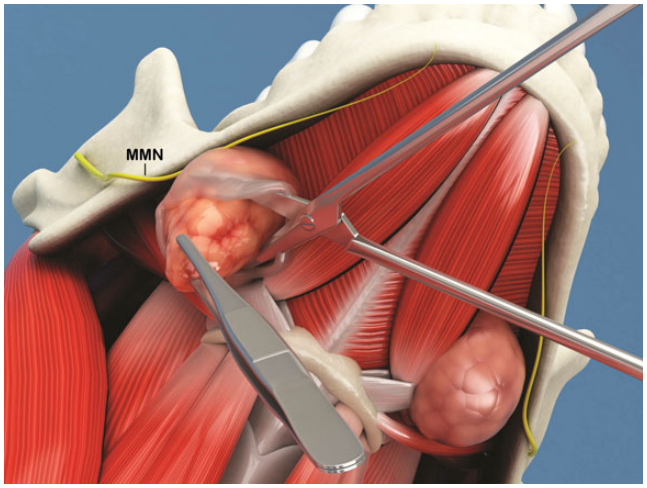


**Figure 4.** Separation and blunt dissection of the capsule was carried out to liberate the SMSG. The marginal mandibular nerve (MMN) is indicated.

accompanying branches of the marginal mandibular nerve then were secured away from the operating field by placing a suture that spanned the muscle and the overlying skin (Figure 2).[11]

### *Subplatysmal Fat*

The subplatysmal fat was trimmed with Metzenbaum scissors and electrocautery (Force FX, Covidien, Mansfield, MA) as needed to reduce neck volume and to allow for identification of the digastric muscle, the mylohyoid, and the SMSGs.

### *Submandibular Salivary Glands*

The SMSGs were localized by following the anterior belly of the digastric muscle to the hyoid. The SMSGs were consistently located lateral to the junction of the digastric muscle and the hyoid (Figure 3). The fibrous tissue overlying the medial aspect of each SMSG was carefully pulled away to expose the gland and its capsule. The capsule is a continuation of the deep fascia that splits into 2 sheets, enveloping the gland.[14] The capsule was opened by blunt dissection with Metzenbaum scissors, enabling intracapsular mobilization of the gland (Figure 4). The resection volume then was determined; the area medial to the SMSGs was

considered safe for dissection because it is devoid of significant vascular and nervous structures (Figure 5).

Figure 5 depicts our process for determining the volume of SMSG resection. After opening the capsule, a virtual line was drawn at a 10° to 20° angle from the horizontal plane passing under the body of the mandible. Gland tissue below this virtual line corresponded to the approximate resection volume. Gland resection with electrocautery was carried out by the surgeon and 3 assistants (Figure 6). One assistant stood to the right of the patient and held a light retractor in the right hand and a hook in the left hand to maintain upward tension on the chin. Another assistant stood to the right of the first assistant and performed perioperative nursing duties. A third assistant stood to the left of the patient and provided blood suctioning with a Yankauer suction tip and additional tissue retraction with a Farabeuf retractor.

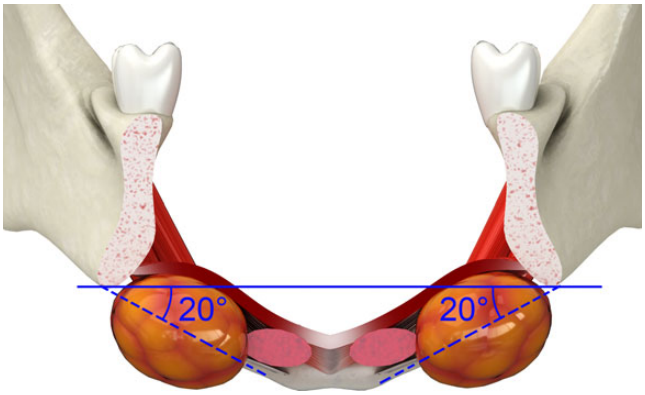


**Figure 5.** Prominent SMSGs usually bulged beyond a line (dashed blue lines) drawn at an angle 10° to 20° from a horizontal plane passing just below the mandible (solid blue line).

For dissection and resection of the superficial lobe of the SMSG, care was taken to control bleeding from the facial artery and vein.[5,6,14,15] The facial vein usually is located between the deep and superficial lobes of the gland. However, it is eventually seen in a medial position, requiring dissection, retraction or ligation before the next surgical procedure can be performed.

The facial artery is located posterior to the SMSG or between the superficial and deep lobes of the gland. Toward the inferior margin of the mandible, the submental artery arises from the facial artery and subsequently branches to irrigate the lateral and inferior aspects of the SMSG. A perforator artery, which originates from the facial or lingual artery, is located in the posterior portion of the superficial lobe, usually in a central position, as described previously.[5,6] Several techniques were performed to control bleeding from this vessel. First, blood was aspirated with 1 hand, and the vessel was cauterized with the other hand. If bleeding continued, the gland was pulled upward with forceps and retained in the bleeding area with one 4-0 gluconate monofilament suture placed with a 17-mm cylindrical needle (Monosyn, B. Braun, Melsungen AG, Germany). Alternatively, 1 or 2 pieces of gauze were packed into the gland area, and external pressure was applied for a few minutes before cauterization.

After partial removal, 5 to 10 U of botulinum toxin type A (Botox, Allergan, Ireland) were injected into the raw surface of each gland. Drains were not placed in the residual space of the SMSG because of accessibility constraints.

Next, it is important to ensure efficient closure of the gland and of its capsule. The authors have previously demonstrated a tactic in which the platysma is brought in close contact to the raw surface of the remaining gland through an absorbable stitch.[11] Recently, an alternative method has

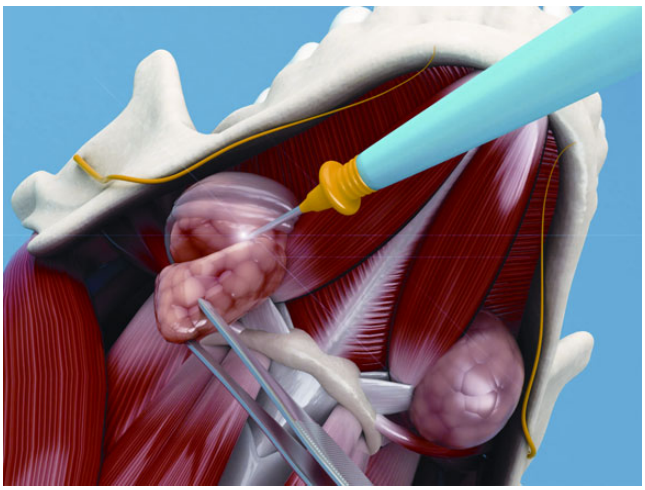

**Figure 6.** Partial removal of the SMSG was achieved with electrocautery.

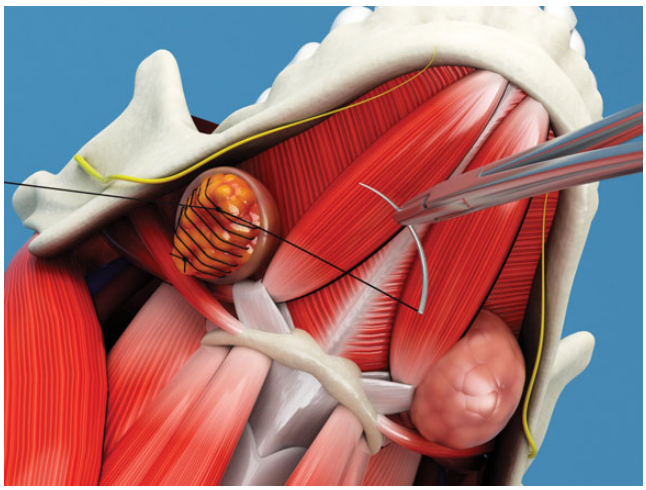

**Figure 7.** Hemostasis was achieved by suturing the resected SMSG with absorbable thread. Note that each loop of the thread was placed close to the previous loop, facilitating hemostasis.

been used. It consists of continuous stitches to close both the gland and the capsule with a 4-0 gluconate monofilament suture (Monosyn, 17 mm cylindric needle, B. Braun, Germany) (Figures 7-9). This maneuver promoted hemostatic stability and approximated the residual edges of the SMSG. Because the gland is friable, each passage of the needle encompassed approximately 0.8 to 1.0 cm of tissue. To prevent needle passage from inducing bleeding, the thread was continuously held taut by the assistant. Video 3 depicts resection of the SMSGs, injection of botulinum toxin, suturing of the SMSGs, and closure of the capsule; this video may be viewed at www.aestheticsurgeryjournal.com.

### *Partial Resection of the Anterior Belly of the Digastric Muscle*

Strong, bulky muscles were identified preoperatively at physical examination (Figure 10). Intraoperatively, they often bulged upon retraction of the platysma, indicating the need for treatment. Weak, thin muscles tended to be less visible and did not warrant treatment.

The anterior belly of the digastric muscle was transected by 30% to 40% with Mixter forceps and electrocautery. The transected muscle then was removed to further reduce submandibular volume (Figure 11).

### *Hyoid Repositioning*

Plication of the deep investing fascia is a very efficient method to push the hyoid bone upwards, helping in redefining the cervical contour (Figure 12). Recognizing the deep investing fascia is possible after the interplatysmal and the subplatysmal fat is appropriately removed. It is seen over the hyoid bone between the digastric muscles. It extends posteriorly, connecting to the cervical spine after enclosing the sternocleidomastoid and the trapezius muscle. Applying one to two stiches to plicate this peri-hyoid fascia at the level of the pulleys of the digastric muscles forces the hyoid bone into an upper position, improving the neck angle (Monosyn 3-0, cylindric 26 mm needle, B. Braun, Germany).

Video 4 demonstrates resection of the digastric muscle and repositioning of the hyoid; this video may be viewed at www.aestheticsurgeryjournal.com.

### *Corset Platysmaplasty*

After treatment of the deep neck, corset platysmaplasty was performed. Usually, this technique was performed without tension because the underlying structures, which would normally resist pulling of the medial edges, had been resected. Separate 3-0 gluconate monofilament sutures were placed with a 26-mm cylindrical needle. This technique allowed for better neck extension than would continuous suturing.

### *Treatment of the Chin Fat*

After platysmaplasty, any remaining fat excess over the chin was trimmed until it was level with the platysma. Special attention is needed in order to reach this fat. This exiguous adipose layer is located over the danger zone of the mandibular branch of the facial nerve, which runs right under the plastysma m. One way of facilitating dissection, and therefore avoiding injury to the nerve, is by additional subcutaneous tumescent infiltration.[5] The fat is then removed and eventually 2 to 3 extra stitches are placed on the underlying platysma muscle.

### *Rhytidoplasty of the Middle Third of the Face*

Rhytidoplasty was performed after necklift, as described previously.[12] An incision was made anteriorly from the

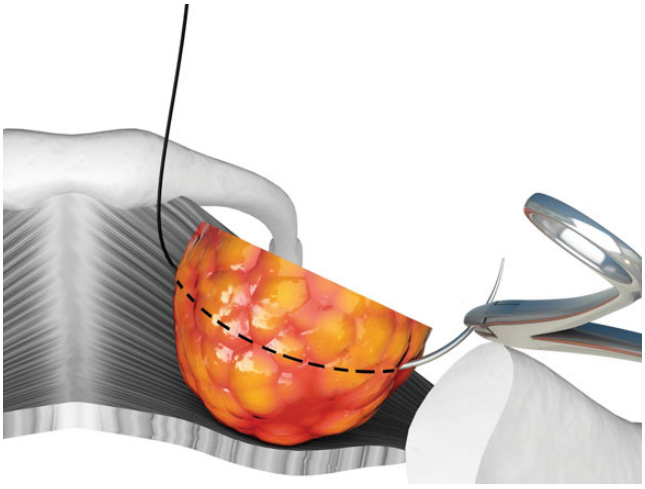

**Figure 8.** The SMSG capsule was closed by continuous placement of an absorbable suture. The depth of needle passage through the gland was approximately 8 mm to minimize tearing and bleeding.

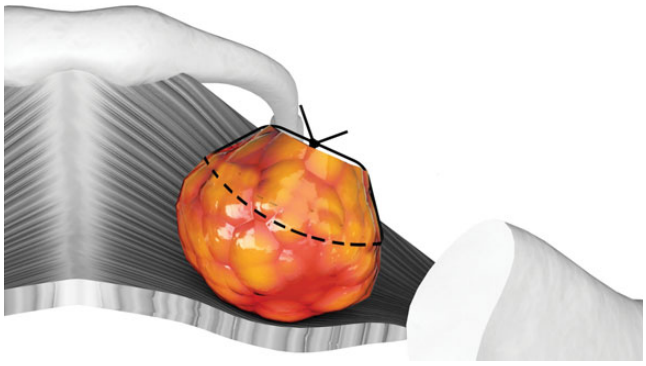

**Figure 9.** Final knot of the hemostatic suture of the SMSG after its partial removal using an absorbable thread. Keeping some tension in the suture avoids eventual bleeding from the gland.

preauricular area to just above the line of hair implantation and posteriorly to the retroauricular region. For most patients, the SMAS of the middle third of the face was treated with vertical and lateral plication by means of absorbable continuous sutures (Monosyn 3-0, 26-mm cylindrical needle). Specifically, the SMAS was pulled upward to align with a horizontal plane just over the parotid gland, from the earlobe to the cheek. This position allowed for direct management of the jowls. A few patients underwent SMASectomy, but no SMAS flaps were utilized.

Wide dissection of the middle third of the face was carried out with Metzenbaum scissors. Treatment of this area proceeded from right to left, and the limit of dissection was approximated by a longitudinal line that passed through the outer corner of the eye. This approach ensured that dermal ligaments were adequately released. Hemostasis of larger vessels was achieved with electrocautery, and cauterization of the skin flap was avoided. Video 5 depicts corset platysmaplasty, treatment of the chin fat, and rhytidoplasty of the middle third of the face; this video may be viewed at www.aestheticsurgeryjournal.com.

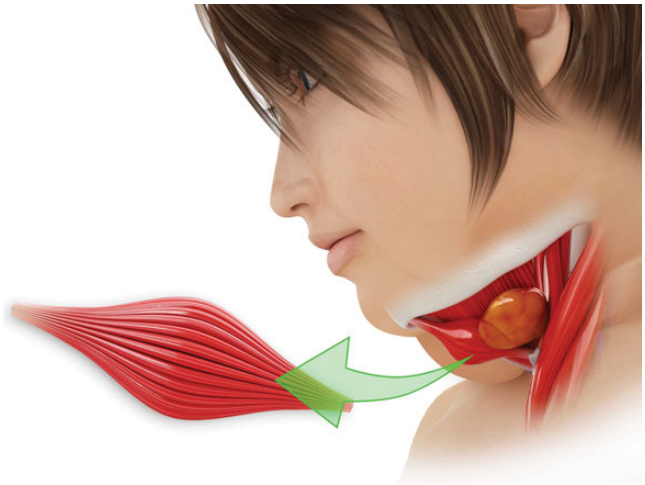

**Figure 10.** Preoperative diagnosis of a bulky neck supports that subplatysmal structures, such as the SMSG and the digastric muscle, may require treatment during necklift.

### *Prevention of Hematoma: The Hemostatic Net*

To reposition the skin and prevent hematoma, we placed a hemostatic net: a series of quilting sutures over the SMAS and platysma that enclosed all dissected spaces.[12] After traction and fixation of the skin-fat flap, several continuous sutures were placed to close the space created during dissection of the skin in the middle third of the face and the neck. Mononylon 5-0 or 6-0 sutures were utilized for most of the dissected area; 5-0 sutures were placed with a 26-mm triangular needle, and 6-0 sutures were placed with a 19-mm triangular needle (Ethicon, São José dos Campos, SP, Brazil). Mononylon 4-0 sutures (Ethicon) were placed with a 30-mm triangular needle in areas of thicker skin, notably in the retroauricular region.

Suturing began at the most inferior and medial dissected area of the neck and proceeded uniformly. The needle was passed perpendicular to the skin and entered and exited the SMAS and platysma at an angle of 45°, with a spacing of 0.8 to 1 cm. Suturing was performed with sufficient tension to close the spaces without impairing blood circulation. The first line of suturing ended at the most posterior site of the retroauricular incision. The second line of suturing was initiated approximately 1 cm above the first line and proceeded parallel to the first line. This pattern was continued with subsequent lines of suturing until all the dissected areas were covered by the hemostatic net. After

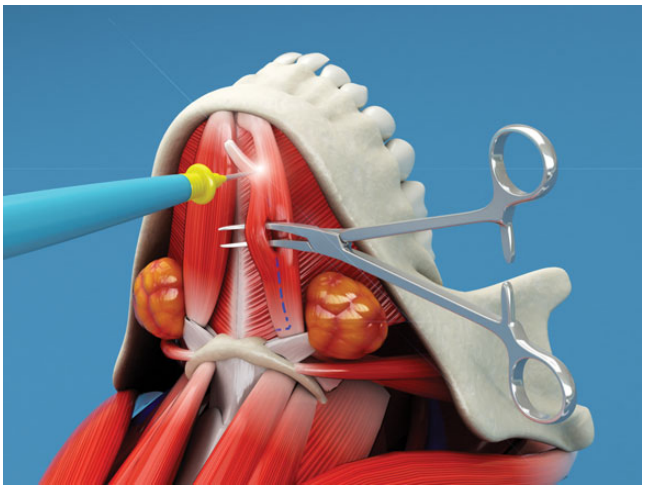

**Figure 11.** The anterior belly of the digastric muscle was partially resected with eletrocautery.

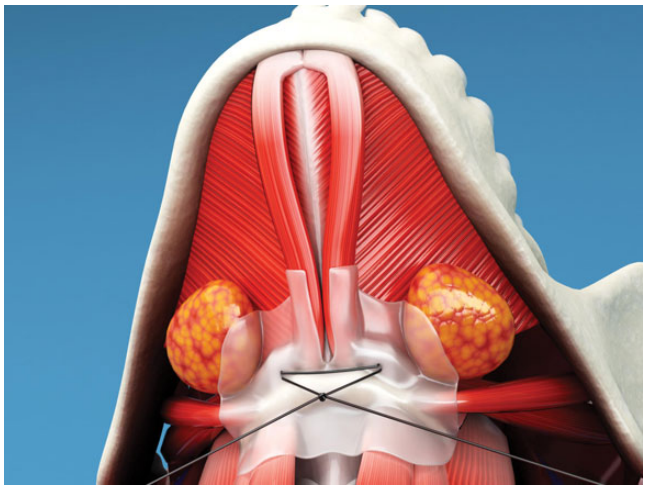

**Figure 12.** The deep fascia at the level of the hyoid was plicated to redefine the cervicomental angle.

completion of the right side of the face, the left side was dissected and treated in the same manner. On the second postoperative day the hemostatic net was removed. Similar to removal of simple skin sutures, each loop of the net was cut and extracted individually. Video 6 depicts placement of a hemostatic net and may be viewed at www.aestheticsurgeryjournal.com.

## RESULTS

Four hundred and sixty-one (91.5%) patients were women and 43 (8.5%) were men. The patients' mean age was 54.3 years (range, 32-81 years). The average follow-up period was 2.8 years (range, 5 months to 5 years + 2 months). This was a primary surgery for 439 of 504 patients (87.1%) (Table 1). All patients underwent corset platysmaplasty. Most patients underwent necklift in combination with an open lift of the middle third of the face (473 patients, 93.8%). The mean operating time for the combined procedure was 4 hours and 55 minutes (range, 4 hours + 18 minutes to 6 hours + 23 minutes). Thirty-one patients (6%) underwent necklift alone; 16 of them received a lateral (postauricular) incision to accommodate the skin, and 15 received a submental incision only. The mean operating time for necklift alone was 2 hours and 39 minutes (range, 2 hours + 10 minutes to 4 hours + 5 minutes).

**Table 1.** Patient Demographics (N = 504)

| | |
|---|---|
| Mean age, y (range) | 54.3 (32-81) |
| No. of women (%) | 461 (91.5) |
| No. of men (%) | 43 (8.5) |
| Primary necklift, no. of patients (%) | 439 (87.1) |
| Secondary necklift, no of patients (%) | 61 (12.1) |
| Tertiary necklift, no. of patients (%) | 4 (0.8) |

The subplatysmal structures were not treated in 74 patients (14.7%). For patients who underwent management of the subplatysmal structures, fat was treated most frequently, followed by the SMSGs and the digastric muscle (Table 2). Endoscopic browlift was performed in 419 patients (83.1%). A total of 240 patients (47.6%) received upper and lower blepharoplasty, 46 patients (9.1%) underwent treatment of the upper lids alone, and 84 patients (16.7%) underwent treatment of the lower lids alone.

The most common complication was transient weakness of the lower lip depressor muscle (29 patients [5.7%]), followed by sialoma of the parotid gland (10 patients [2.0%]) (Table 3). For 6 patients, sialoma of the parotid gland was resolved with needle aspiration and external compressive dressing. For the remaining 4 patients, it was also necessary to inject botulinum toxin (15 U) into the parotid gland to accelerate resolution of sialoma. Two patients experienced sialoma of the SMSGs, which was resolved by a series of needle aspirations. Botulinum toxin type A was injected into the SMSGs immediately after resection to help prevent sialoma; this technique has previously been shown to reduce the incidence of parotid sialoma and salivary fistula.[16] No permanent injuries to the marginal mandibular and/or cervical branches of the facial nerve were recorded. No cases of dry mouth were noted.

Supplemental Figure 1 illustrates a patient who underwent exclusive necklift. Figures 13 and 14 and Supplemental Figure 2 illustrate three cases of patients who underwent necklift associated with middle third facelift. Pre- and postoperative clinical photographs of patients performing neck flexion were essential to our assessments.[2] Recently, we incorporated an "upward view" into the series of photographs obtained pre- and postoperatively. The patient was asked to stand and flex his or her neck as if reading a book. The photograph was obtained with the camera positioned approximately 15 to 20 cm from the xiphoid process. This upward view was essential for predicting which

**Table 2.** Subplatysmal Necklift Procedures Among 504 Patients

| Necklift Procedure | No. of Patients (%) |
|---|---|
| Subplatysmal treatment | 430 (85.3) |
| Subplatysmal lipectomy | 423 (83.9) |
| Partial resection of the SMSGs | 307 (60.9) |
| Partial resection of the SMSGs alone | 176 (34.9) |
| Partial resection of the SMSGs and the digastric muscle | 131 (26.0) |
| Resection of the digastric muscle alone | 91 (18.1) |
| Plication of the deep investing (perihyoid) fascia | 88 (17.5) |

The authors have performed plication of the deep investing (perihyoid) fascia since July 2014. From July 2014 to June 2015, 88 of 132 patients (66%) underwent necklift with this type of plication.

**Table 3.** Complications of Necklift Among 504 Patients

| Type of Complication | | No. of Patients (%) |
|---|---|---|
| Weakness of the lower lip depressor | Resolved in <3 mo | 28 (5.6) |
| | Resolved in 3 to 8 mo | 1 (0.2) |
| Sialoma of parotid gland | | 10 (2.0) |
| Periauricular crusting of the skin | | 7 (1.4) |
| Subcutaneous hematoma after the 2nd postoperative day | <20 mL | 6 (1.2) |
| | >20 mL | 3 (0.6) |
| Sialoma of SMSG | | 2 (0.4) |

There were no instances of subplatysmal hematoma. No subcutaneous hematoma occurred in the first 2 postoperative days.


**Figure 13.** (A, C, E, G) Preoperative frontal, oblique, lateral, and lateral with flexed neck views of this 58-year-old man who underwent combined facelift and necklift. Fat was trimmed in the interplatysmal and subplatysmal regions, and the digastric muscle and SMSGs were partially resected. This patient subsequently had a hair implant 2 years after the facelift and necklift. (B, D, F, H) Three and a half years postoperatively.

submandibular structures will require treatment and for identifying the positions of the submental and mandibular ligaments. Figures 15 demonstrates the upward view in a 40-year-old woman who presented for subplatysmal necklift.

## DISCUSSION

Most patients who undergo consultation for rejuvenation of the face and neck cite the creation of a youthful neck as their primary objective.[2] Geometric criteria for an aesthetically pleasing neck contour have been described previously[17] and include a cervicomental angle ranging from 105° to 120°. Patients typically indicate an unattractive neck contour, excessive neck volume, and skin flaccidity as concerns leading them to seek rejuvenation of the face and neck.

The most widely accepted approach to addressing these concerns involves accessing the neck through a submental incision and plicating the platysma, with or without liposuction. Plication is carried out with the patient in the Trendelenburg position or, less frequently, supine. Much of the downward force exerted by the subplatysmal structures is alleviated in the Trendelenburg position, and surgically repositioning these structures upward is straightforward. However, once the patient resumes standing positions postoperatively, neck bulkiness caused by subplatysmal structures usually reappears. Moreover, the platysma lacks bony insertions and is characteristically weak and fragile. Suture placement to tighten this muscle is unlikely to yield prolonged results because the threads become relaxed over time.

Patients often presume that the early postoperative results of neck rejuvenation will be stable for years. However, achieving this level of durability is a major challenge.[15] Necklift with simple plication of the platysma often leads to recurrence of preoperative concerns and patient dissatisfaction. Procedures to reduce and reshape the subplatysmal structures, especially the SMSGs, have gained popularity and can produce a stable and aesthetically pleasing cervical contour.[14] However, some surgeons believe that the risks of subplatysmal treatments outweigh these benefits. Management of the subplatysmal region involves unique considerations intraoperatively and postoperatively, and requires skill and expertise. The average operating time for subplatysmal necklift exceeds that of conventional


**Figure 14.** (A, C, E, G) Preoperative frontal, oblique, lateral, and lateral with flexed neck views of this 42-year-old woman who underwent combined facelift and necklift. Fat was trimmed in the interplatysmal and subplatysmal regions, and the digastric muscle and SMSGs were partially resected. (B, D, F, H) Four years postoperatively.

necklift by 40 minutes in average (data not shown). The learning curve is longer if compared to other procedures and an experienced team helps to abbreviate it. Postoperatively, patients may undergo a protracted period of neck edema before the improved cervical contour becomes evident.

## Combination Facelift/Necklift vs Necklift Alone

Most patients in this study underwent combined facelift and necklift (93.8%). We attributed this finding, at least in part, to the average age of the patients (54.3 years). Rather than indicating concerns exclusive to neck contour, many patients desired balanced aesthetic results that involved rejuvenation of the neck, eyelids, and middle third of the face. Patients who underwent necklift alone tended to be younger and have better skin elasticity and less skin excess than those who underwent both procedures. Another reason for electing to undergo necklift alone was to avoid around the ear and temporal precapilar scars. Approximately half of the patients who underwent necklift alone received a limited incision around the earlobe, from the tragus to the postauricular region, to allow for skin excision and approximation without a noticeable scar.

## Partial Resection of the SMSGs

A majority of patients (60.9%) underwent partial resection of the SMSGs. Early in this study, patients who underwent this procedure had greater improvement in neck contour than patients with similar preoperative anatomic conditions who underwent simple plication of the platysma. Based on these results, we began routinely inspecting the subplatysmal structures intraoperatively for enlarged SMSGs. We found that the SMSGs bulged in most patients undergoing necklift.

Safe treatment of the SMSGs requires knowledge of the surgical anatomy, which can be developed with cadaver dissections (Video 1), as well as previous experience with plication of the platysma. Intraoperatively, management of the SMSGs requires a highly trained and well-coordinated surgical team to minimize the risks of nerve injury[11] and bleeding.[14] The marginal mandibular branch of the facial nerve can be avoided during SMSG manipulation by pulling the platysma from the operating field and securing it with a suture (Figure 2).[11] Although we observed small accumulations of blood in the residual spaces of the SMSGs in 2 patients treated early in the series (data not shown), no venous or arterial hematoma was recorded for any patient

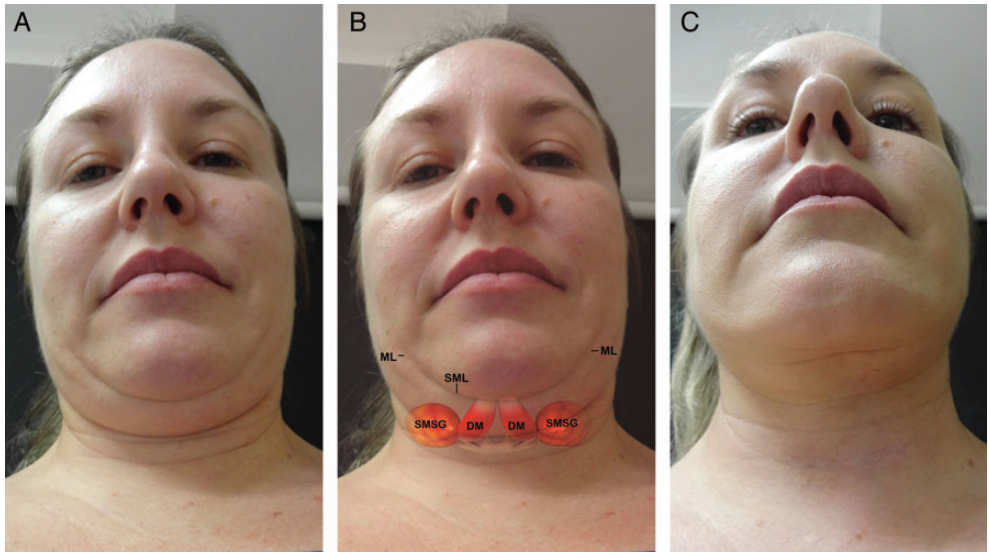


**Figure 15.** (A) Preoperative upward view of the submental region of this 41-year-old woman who underwent necklift without a postauricular incision. (B) This view allows a better visualization of the neck volume and of the submental (SML) and mandibular (ML) ligaments. Fat was trimmed in the interplatysmal and subplatsymal regions, and the digastric muscle (DM) and SMSGs were partially resected. (C) Six months postoperatively.

in the study population. We attribute the absence of hematoma mainly to the placement of continuous sutures along the region of SMSG resection and at the closure site of the capsule (Figures 7-9).

Our preferred method for treating the SMAS involves vertical and lateral plication with absorbable continuous sutures. To ensure that this procedure was effective and durable, the needle was passed relatively deeply through the SMAS and may have superficially torn the capsule of the parotid gland in some patients (Video 5, especially 1:28). In fact, this maneuver may explain the development of sialoma in 10 patients.

## Resection of Subplatysmal Fat and the Digastric Muscle

Subplatysmal fat and the digastric muscle were frequently treated in this series of patients. Simultaneous management of these structures helped to reduce neck volume and define the neck contour. We recommend that surgeons master the procedures for resection of subplatysmal fat and the digastric muscle before attempting SMSG resection. The removal of subplatysmal and subcutaneous fat should be approached judiciously and carefully; aggressive lipectomy or liposuction may result in submental retraction and surgical results that appear unnatural.

Preoperative clinical evaluations may not be reliable for determining the volume of fat to be resected. For patients with heavy or obtuse necks, the assumption that a thick layer of subcutaneous fat will be encountered intraoperatively often is incorrect. Instead, the patient may have a small amount of preplatysmal fat and enlarged or malpositioned subplatysmal structures. In this case, the appropriate treatment is subplatysmal surgery rather than liposuction. For patients who undergo partial removal of the digastric muscle, an approximation of the residual anterior bellies can facilitate refinement of the submental area, especially if the mylohyoid muscle is relaxed and ptotic.

## Hyoid Repositioning

Treating a heavy neck by repositioning an exceedingly low and anteriorly positioned hyoid can be extremely challenging. We advocate plicating the deep investing fascia at the level of the digastric muscle pulleys to elevate the hyoid. The deep fascia is stabilized by attachments with the cervical spine, thereby supporting a strong and durable plication.

In the present study, most patients who underwent plication of the deep investing fascia experienced a transient and well tolerated sensation of tightness, especially while swallowing, but airway obstruction did not occur. This tightness persisted for several days to several weeks after surgery (patients were preoperatively informed about this possibility). Similar discomfort was experienced by patients who underwent necklift with simple plication of the platysma or subplatysmal surgery without plication of the deep investing fascia. We consider plication of the deep investing fascia to be analogous to the management of diastasis recti in abdominoplasty: the suture should have sufficient tension to correct the anatomic deformity but should not be so tight that it restricts respiration.

## Weakness of the Lower Lip Depressor Muscle

The most frequent complication in this series was dysfunction of the lower lip depressor (5.6%). For all patients who

experienced this complication, the impaired movement was transient. Feldman[15] noted that dysfunction of the lower lip depressor occurred in 50 of 522 patients (9.6%) who underwent necklift. He attributed this complication to the application of monopolar electrocautery near the nerves.[15] We agree that electrocautery could damage the marginal mandibular nerve or the cervical branches of the facial nerve. Alternatively, manipulation of the subplatysmal region and the SMSGs may induce nerve injury. The proximity of the nerves during subcutaneous dissection of the chin anteriorly also should be considered. During this dissection, the strong mandibular ligament must be released from the prejowl notch. The marginal mandibular nerve lies immediately posterior to this ligament. Although this nerve is deep within the platysma and the depressor anguli oris, it is vulnerable to damage given the narrow space for dissection (Video 5, especially 0:23).[5]

## Benefits of the Hemostatic Net

We previously described the creation and application of a hemostatic net that prevents hematoma.[12] Among 405 patients who underwent rhytidoplasty with placement of a hemostatic net, there were no instances of hematoma while the net was maintained (48 hours postoperatively).[12] Since the first case of hemostatic net (in 2010), 748 patients have undergone this procedure. In addition, the hemostatic net was essential for repositioning the skin, especially in patients with excess skin laxity and those who underwent exclusive necklift through a single submental incision. The hemostatic net allowed for normal healing, with an inconspicuous scar, and did not increase the rate of ischemia.

## CONCLUSIONS

Subplatysmal necklift yields effective and durable results that include aesthetically pleasing cervical contour. Although this procedure requires additional effort and expertise from the surgical team, the results obtained from the techniques and maneuvers described herein confirm that subplatysmal treatments can be performed safely and predictably.

### Supplementary Material

This article contains supplementary material located online at www.aestheticsurgeryjournal.com.

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