

# Anatomical Comparison of Platysmal Tightening Using Superficial Musculoaponeurotic System Plication vs Deep-Plane Rhytidectomy Techniques

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**Objectives:** To quantify the degree of submental platysmal tightening that can be accomplished with superficial musculoaponeurotic system (SMAS) plication vs deep-plane rhytidectomy techniques in a cadaveric anatomical study to help dictate the need for midline platysmal surgery when using different rhytidectomy techniques.

**Methods:** The lateral distraction of the medial edge of the platysma muscle was measured during tightening of the SMAS-platysmal complex on 5 cadaver heads. The measurements were taken after the following 3 rhytidectomy techniques: SMAS-platysmal plication, deep-plane rhytidectomy, and extended deep-plane rhytidectomy continuing the flap below the angle of the mandible into the neck with release of the platysma and cervical retaining ligaments.

**Results:** The medial edge of the platysma muscle was distracted laterally 427% more with deep-plane rhytidectomy compared with SMAS-platysmal plication ( $P < .001$ ). Extending the deep-plane rhytidectomy flap

into the neck to release the cervical retaining ligaments resulted in 554% greater lateral distraction of the medial edge of the platysma muscle compared with SMAS-platysmal plication ( $P < .001$ ). This represents 30% greater advancement compared with the traditional deep-plane technique ( $P = .05$ ).

**Conclusions:** Extending a traditional deep-plane rhytidectomy inferiorly to release the lateral platysma and cervical retaining ligaments to the sternocleidomastoid muscle achieves the greatest lateral motion of the midline platysma, theoretically obviating the need for midline platysmal plication except in cases of severe platysmal laxity and banding. Because of the limited platysmal motion during SMAS plication, midline platysmal plication should routinely be used as an adjunct procedure except in cases of no or minimal platysmal laxity.

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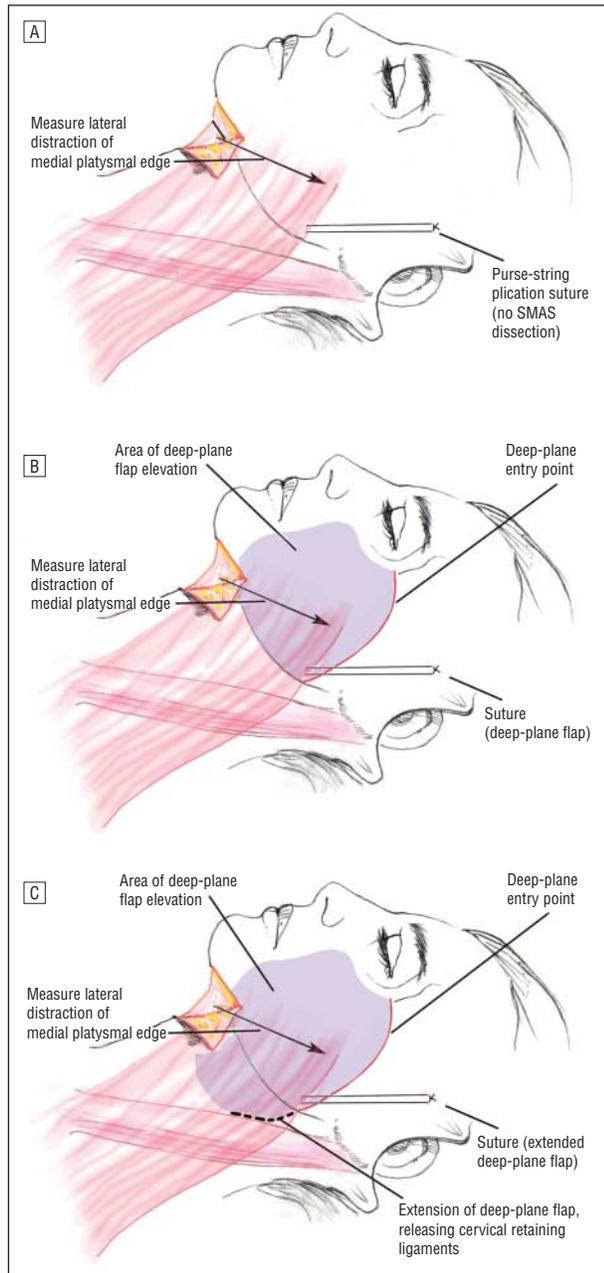
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**F**ACE-LIFTING SURGERY HAS evolved from a limited skin elevation and no treatment of the superficial musculoaponeurotic system (SMAS) to more extended techniques involving sub-SMAS and platysmal dissections. In 1974, Skoog<sup>1</sup> was the first to perform an extended elevation of the skin and platysma dissected as a single unit. In 1976, Mitz and Peyronie<sup>2</sup> published the hallmark study that described the SMAS. This work gave rise to the sub-SMAS elevation rhytidectomy, in which a skin flap is first elevated, followed by an elevation of the SMAS over the lower face. These modifications from a traditional subcutaneous face-lift to the lifting of deeper structural elements allowed for more substantial long-term results to the neck and jawline and created minimal skin tension at the closure, enabling optimal healing of the incisions.<sup>1,3</sup>

Deep-plane face-lifting evolved to reduce subcutaneous dissections. Hamra<sup>4,5</sup> popularized the traditional deep-plane technique, lifting the SMAS and skin as a compound unit

with a thicker well-vascularized flap. This flap is elevated in a sub-SMAS dissection in the inferior cheek and superiorly, transitioning to a supra-SMAS plane just superficial to the zygomaticus muscles in the superomedial cheek. This large compound cheek flap of skin, muscle, and fat is then advanced and resuspended to address the jowl and smooth the nasolabial fold. The inferior limit of the sub-SMAS dissection of the deep-plane face-lift is the inferior border of the mandible to protect the marginal mandibular branch of the facial nerve. Inferior to the angle of the mandible, the face is lifted in a preplatysmal dissection extending 8 to 10 cm below the mandible. Following a preplatysmal dissection, redundant anterior platysma is excised and closed via a submental incision, creating countertension in the neck compared with the lower face. There is a limited subplatysmal dissection in the lateral neck from the standard face-lift incision.

The objective of this study was to quantify the degree of submental platysmal tightening that can be accomplished with SMAS plication and deep-plane rhytidec-



**Figure.** The lateral distraction of the medial edge of the platysma muscle was measured after superficial musculoaponeurotic system (SMAS)-platysmal plication (A), deep-plane rhytidectomy (B), and extended deep-plane rhytidectomy with inferior release of the platysma and cervical retaining ligaments 3 cm below the angle of the mandible (C).

tomy techniques. After cadaveric anatomical dissection, the lateral distraction of the medial edge of the platysma muscle was measured after the following 3 rhytidectomy techniques: SMAS-platysmal plication, deep-plane rhytidectomy, and extended deep-plane rhytidectomy continuing the flap below the angle of the mandible into the neck with release of the platysma and cervical retaining ligaments. These data will be useful as a guide to help dictate the need for midline platysmal tightening by analyzing the amount of lateral motion of the medial edge of the platysma muscle accomplished with more extensive subplatysmal dissections in the neck.

Cadaveric head dissection and measurements on 5 specimens were performed after 3 different rhytidectomy techniques (**Figure**). After each dissection, measurements were taken of the lateral distraction of the medial edge of the platysma muscle during lateral tightening of the SMAS-platysmal complex. Dissection was performed in the following sequence: (1) SMAS-platysmal plication, (2) deep-plane rhytidectomy, and (3) extended deep-plane rhytidectomy continuing the flap below the angle of the mandible into the neck with release of the platysma and cervical retaining ligaments. The purpose of the last technique is to release the fascial attachments at the interface of the SMAS, platysma, and anterior border of the sternocleidomastoid (SCM) muscle, which limit lateral motion of the platysma.

This dissection sequence proceeded as follows: The deep-plane entry point was marked on the skin before dissection. This point extends from the angle of the mandible to the lateral canthus. A T-like incision was made over the submental region, and the skin was elevated off the platysma to expose the medial edge of the platysma muscle. A standard S-shaped rhytidectomy incision was then performed, and the lateral skin was elevated to the deep-plane entry point cutaneous marking. Three SMAS-platysmal plication sutures were then placed in a superolateral vector using a 3-0 nylon suture on a PS-2 needle (Ethicon, Inc, San Angelo, Texas). Measurements of the lateral distraction of the medial edge of the platysma muscle were recorded. The plication sutures were then removed.

The deep plane was entered, and a sub-SMAS dissection was performed as described by Hamra,<sup>4,5</sup> including release of the zygomaticocutaneous ligaments and exposing the zygomaticus muscle complex. The inferior dissection of the deep-plane flap ended at the angle of the mandible. Three 3-0 nylon suspension sutures were placed along the leading edge of the composite flap at the deep-plane entry point flap and suspended in a superolateral vector to the deep temporal fascia of the preauricular region. Measurements of the lateral distraction of the medial edge of the platysma muscle were then recorded.

On the same facial half, dissection of the deep-plane flap was continued from the angle of the mandible inferiorly along the anterior aspect of the SCM, 3 cm into the neck. The SCM-platysma interface was dissected, and the cervical retaining ligaments were released. This released the fascial attachments between the platysma and the SCM. This subplatysmal dissection is continued for 3 cm below the angle of the mandible. The deep-plane flap was suspended in a superolateral direction to the preauricular deep temporal fascia using three 3-0 nylon sutures. Measurements of the lateral distraction of the medial edge of the platysma muscle were then recorded.

## RESULTS

The 3 different dissections were performed on 5 cadaver heads. Measurements of the lateral distraction of the medial edge of the platysma muscle were taken after each subsequent technique. The results were 2.2 mm after SMAS-platysmal plication, 9.4 mm after deep-plane rhytidectomy, and 12.2 mm after extended deep-plane rhytidectomy. Deep-plane rhytidectomy allowed for 427% (2.2 vs 9.4 mm,  $P < .001$ ) greater lateral distraction of the medial edge of the platysma muscle compared with SMAS-platysmal plication. Extending the deep-plane rhytidectomy flap into the neck to release the cervical retaining ligaments resulted in 554% (2.2 vs 12.2 mm,  $P < .001$ ) greater lateral distraction of the medial edge of the platysma muscle compared with

SMAS-platysmal plication. Extended lateral platysmal release and dissection of the cervical retaining ligaments contributed an additional 30% (9.4 vs 12.2 mm,  $P=.05$ ) lateral distraction of the medial edge of the platysma muscle.

## COMMENT

This study was initiated to determine the efficacy of 3 different face-lift techniques on cervicomental laxity by quantitatively analyzing the lateral distraction of the medial edge of the platysma muscle. The extended deep-plane rhytidectomy continuing the flap below the angle of the mandible into the neck with release of the platysma and cervical retaining ligaments allows for further release and redraping of the midline platysma compared with SMAS-platysmal plication or deep-plane rhytidectomy alone. Several authors<sup>6-8</sup> have advocated a lateral subplatysmal dissection with myotomy; however, limited platysmal release from the cervical retaining ligaments to the SCM can restrict the degree of neck mobilization, leading to the recurrence of platysmal banding. Releasing these ligaments allows for greater advancement of the platysma laterally, obviating the need for midline platysmal plication in cases of mild to moderate platysmal banding. Corset platysmaplasty is indicated in cases of severe platysmal laxity and banding.

We prefer limiting the degree of midline platysmal surgery because one of the most common problems with anterior corset platysmaplasty is submental fullness related to transferring the lateral volume of the aged platysma to the midline of the neck. By achieving adequate lateral distraction of the platysma, a submental incision and anterior corset platysmaplasty can be eliminated when rejuvenating the neck. We have calculated that the platysma advances 1.2 cm on each side of the neck; therefore, platysma dehiscence exceeding 2 cm is an indication for a submental approach with midline platysmal surgery. Based on these cadaveric data, we believe that the possibility of platysmal band correction owing to lateral advancement of the platysma is significant. A clinical study<sup>9</sup> was performed among 153 consecutive patients who underwent extended deep-plane rhytidectomy continuing the flap below the angle of the mandible into the neck with release of the platysma and cervical retaining ligaments. The study showed a less than 3% tuck-up rate necessary to correct recurrent platysmal banding at 1 year for patients with moderate platysmal laxity.

Our data suggest a limited 2.2-mm motion of the midline platysma with lateral SMAS-platysmal plication. This indicates that, with limited release of the SMAS-platysmal complex, midline platysmal plication should routinely be used as an adjunct procedure except in cases of no or minimal platysmal laxity. This need for midline platysmal surgery would translate to techniques like the minimal access cranial suspension lift, which is a vertical plication lift, as was executed in this cadaveric study. Other investigators have similarly noted the limitation of suture plication rhytidectomy for the treatment of platysmal banding.<sup>10</sup>

In rhytidectomy, there are 2 primary tissue layers treated, the skin and the underlying musculature (SMAS and platysma). This study evaluates treatment of the underlying musculature of the face with different rhytidectomy techniques. Redundancy of the skin that exists is treated by skin

flap elevation and excision. Sometimes, this requires through-and-through submental skin elevation. Skin treatment can be combined with plication or deep-plane techniques and should be addressed on a case-by-case basis.

There are other anatomical variants that may predispose to failures in the submental region if anterior platysmaplasty is not performed. These include patients with retrognathia, low anterior hyoid, and short vertical height of the neck. Additional procedures that address unfavorable cervicomental contour issues are submental liposuction, platysmal plication, subplatysmal fat excision, or anterior digastric plication.

In conclusion, current SMAS plication techniques do not adequately release the fascial attachments of the platysma to allow for redraping and lateral motion of the midline platysma in the aging neck, requiring midline platysmal plication except in cases of no or minimal platysmal laxity. The traditional deep-plane face-lifting techniques allow for significantly greater redraping and lateral motion of the midline platysma and can obviate the need for concomitant midline platysmal plication in primary rhytidectomy except in cases of severe platysmal laxity and banding. Extending the traditional deep-plane face-lift flap by connecting it to a lateral platysmal flap and dissecting the cervical retaining ligament, allows for additional redraping and lateral motion of the midline platysma. This technique may be especially useful in the more advanced aged neck with more severe platysmal banding.

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