

Original Investigation

The Effect of Midline Corset Platysmaplasty on Degree of Face-lift Flap Elevation During Concomitant Deep-Plane Face-lift

A Cadaveric Study

Andrew A. Jacono, MD; Melanie H. Malone, MD

IMPORTANCE The evaluation of the effects of midline platysmaplasty concomitant with rhytidectomy.

OBJECTIVE To determine whether midline platysmaplasty limits the degree of lift during deep-plane face-lift.

DESIGN, SETTING, AND PARTICIPANTS Deep-plane rhytidectomy was performed on 10 cadaveric hemifaces. The redundant skin for excision after performing the face-lift was measured with and without midline platysmaplasty.

EXPOSURES Deep-plane rhytidectomy.

MAIN OUTCOMES AND MEASURES The redundant skin was measured preauricularly in the vertical and horizontal dimension, and postauricularly after deep-plane face-lift and after adding a midline platysmaplasty.

RESULTS Concomitant midline platysmaplasty significantly reduced the amount of lift during concomitant deep-plane rhytidectomy preauricularly in the vertical dimension by 40.5% (from 37.0 mm excess skin redraped to 22.0 mm) and postauricularly by 23.9% (from 40.6 mm excess skin redraped to 30.9 mm) ($P < .001$ and $P < .001$, respectively). The 19.7% reduction in the horizontal skin redraping after midline platysmaplasty (from 14.7 mm excess skin redraped to 11.8 mm) did not reach statistical significance ($P = .15$)

CONCLUSIONS AND RELEVANCE Concomitant midline corset platysmaplasty significantly limits the ability to lift the neck as well as the jawline and midface during rhytidectomy.

LEVEL OF EVIDENCE NA.

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Author Affiliations: Section of Head, Facial Plastic, and Reconstructive Surgery, North Shore University Hospital Manhasset, New York, New York (Jacono); Department of Facial Plastic Surgery, New York Eye and Ear Infirmary & Albert Einstein College of Medicine, New York, New York (Jacono); New York Center for Facial Plastic and Laser Surgery, New York (Jacono, Malone).

Corresponding Author: Andrew A. Jacono, MD, Department of Facial Plastic Surgery, New York Eye and Ear Infirmary & Albert Einstein College of Medicine, 990 Fifth Ave, New York, NY 10075 (drjacono@gmail.com).

Patients identify the loosening neck and jawline as the anlage in the progression toward an aged appearance. The attributes of a youthful neck have been defined as a distinct inferior mandibular border, subhyoid depression, visible thyroid cartilage bulge, visible sternocleidomastoid muscle border, and a cervicomental angle of 105° to 120°.¹ Refining our skillset to restore these youthful ideals remains an important topic of investigation.

The superficial muscular aponeurotic system (SMAS) is the investing fascia of the face, and extends inferiorly as the platysma muscle. Since the initial description of platysma dissection in rhytidectomy by Skoog² in 1974, the platysma has

become the axis around which many rhytidectomy dissections are described and performed. A force applied to the platysma is transmitted directly to the SMAS because of their continuity. For every action there is an equal and opposite reaction. Therefore, a tug of war inherently exists between the lateral lift of the face-lift flap and midline platysma fixation. Understanding this cooperative agency of the SMAS-platysma complex is cardinal to rhytidectomy.

Numerous techniques have been proposed to treat the neck by addressing different structural components, ranging from skin and subcutaneous tissues to deeper muscular and glandular structures. The corset platysmaplasty, pioneered in 1990,³

has been widely adapted by facial rejuvenation surgeons and is ubiquitous in treating the neck. Hamra⁴ introduced the deep-plane rhytidectomy contemporaneously, and also advocated addressing the neck with direct midline platysma plication. Platysmaplasty has undergone only minor adaptations in the past several decades, and remains conceptually unfettered since its inception.

There are, however, some downsides to direct midline treatment of the platysma. It necessitates an additional skin incision and entails increased operative and recovery times. Midline fixation pulls the redundant platysma muscle into the suprahyoid submentum. This adds bulk that can minimize the desired definition of the neck at the cervicomental angle¹ and also introduces the possibility of submental irregularities. Persistent fullness and irregularity in the submentum are just some of the well-understood pitfalls inherent to midline platysmaplasty.

Platysmal fixation in the midline creates a downward trajectory of pull that counteracts and is in direct opposition to the force applied to the lateral rhytidectomy flap. This reduces the amount of upward mobility of the jawline and neck tissues, and therefore decreases the effectiveness of treatment.⁵ These undesirable outcomes perpetuate a substantial revision rate⁶ and remain difficult to correct, warranting a thoughtful reevaluation of our indications for midline platysmaplasty to optimize our outcomes in the neck.

The objective of this study is to quantify the degree to which midline platysmaplasty inhibits lift during rhytidectomy. We will evaluate the degree to which it limits lift along the jawline and midface by measuring how it decreases redraping of the preauricular face-lift flap, and how it limits lifting of the neck by measuring the change in postauricular neck flap redraping. With these data we hope to define indications for including or excluding platysmaplasty in rhytidectomy surgery.

Methods

This anatomical study was performed on 5 fresh cadaver heads, yielding 10 hemifaces for data collection. The study was conducted in accordance with the Declaration of Helsinki.⁷ First the rhytidectomy procedure was performed. The surgical technique used in this study was a deep-plane rhytidectomy dissection as described by Hamra,⁴ but with the modifications of a vertical vector of the composite flap redraping as well as extension of the deep-plane below the angle of the mandible into the neck.^{6,8-10} Briefly, after subcutaneous elevation of the face-lift skin flap from the auricular incision to a line drawn from the lateral canthus to the angle of the mandible, the deep plane is entered sharply with a 10 blade followed by blunt dissection. In the inferior cheek the skin and SMAS are elevated as a composite unit in the sub-SMAS plane. In the superior cheek the flap is dissected superficial to the orbicularis oculi and zygomaticus musculature, elevating the skin and the cheek fat compartments as a composite unit. This leaves the dense attachments of the zygomatic ligament and the medial aspect of the zygomaticus major muscle. Blunt dissection is then performed from the superior pocket through the ligament in an

inferior direction. This permits release of the zygomatic ligament and the dense fibrous attachments from the zygomaticus major muscle to the skin while ensuring that the facial nerve is protected. The facial nerve branches enter the deep surfaces of the mimetic musculature, therefore dissecting in this direction on the surface of the mimetic musculature protects the nerves from injury. Inferiorly, the extended deep-plane face-lift lifts the skin and SMAS platysma complex as a composite unit to redrape the cervicomental laxity vertically onto the face rather than laterally and postauricularly. This is termed *extended* because it lengthens the deep-plane flap from the angle of the mandible, as originally described by Hamra,⁴ into the neck to release the cervical retaining ligaments that limit platysmal redraping.

Measurements were then taken to quantify the amount of excess skin that was available to be excised in the preauricular face-lift flap in the vertical and horizontal dimensions, and the amount of excess neck skin that was available to be excised in the postauricular flap (Figure). Vertical preauricular skin excess was measured from the apex of the preauricular incision at the root of the helix to the most superior extent of the skin excess. Horizontal preauricular skin excess was measured from the apex of the preauricular incision at the root of the helix to the lateral-most extent of the preauricular skin excess that was encountered after redraping. The postauricular skin excess was measured from the midpoint of the occipital hairline incision to the most-lateral extent of the skin excess.

After these measurements were taken, the midline platysmaplasty was performed. Midline platysmaplasty, as described by Feldman,³ was executed with the following modifications: a smaller 2-cm submental incision, manual excision of intraplatysmal fat, removal of subplatysmal fat, and elevation of subplatysmal flaps lateral to the anterior edge of the submandibular gland. After measurements of the preauricular and postauricular skin flap excess were completed, the face-lift flap elevation was reversed into its prelift state and the platysmaplasty was released in the midline. At this time the face-lift elevation was performed on the opposite side of the cadaver head and then the platysmaplasty was repeated. After completion of the platysmaplasty, preauricular and postauricular flaps were redraped and the amount of excess skin available for removal was remeasured.

Each hemiface therefore had 6 measurements; the amount of excess skin in the preauricular vertical and horizontal dimensions, and postauricular, with and without platysmaplasty.

Statistical analysis was performed using Microsoft Excel. The amount of redundant skin excised in each incisional region was compared with platysmaplasty and without platysmaplasty. The differences were each compared using a *t* test assuming unequal variance.

Results

Five cadaveric heads, yielding 10 hemifaces, were analyzed for the effect of midline platysmaplasty on the ability to redrape the extended deep-plane rhytidectomy flap. The preauricular vertical and horizontal, and post auricular redundant skin

Figure. Schematic Representation of Where the Excess Skin Was Measured After Deep-Plane Rhytidectomy With and Without Midline Platysmaplasty

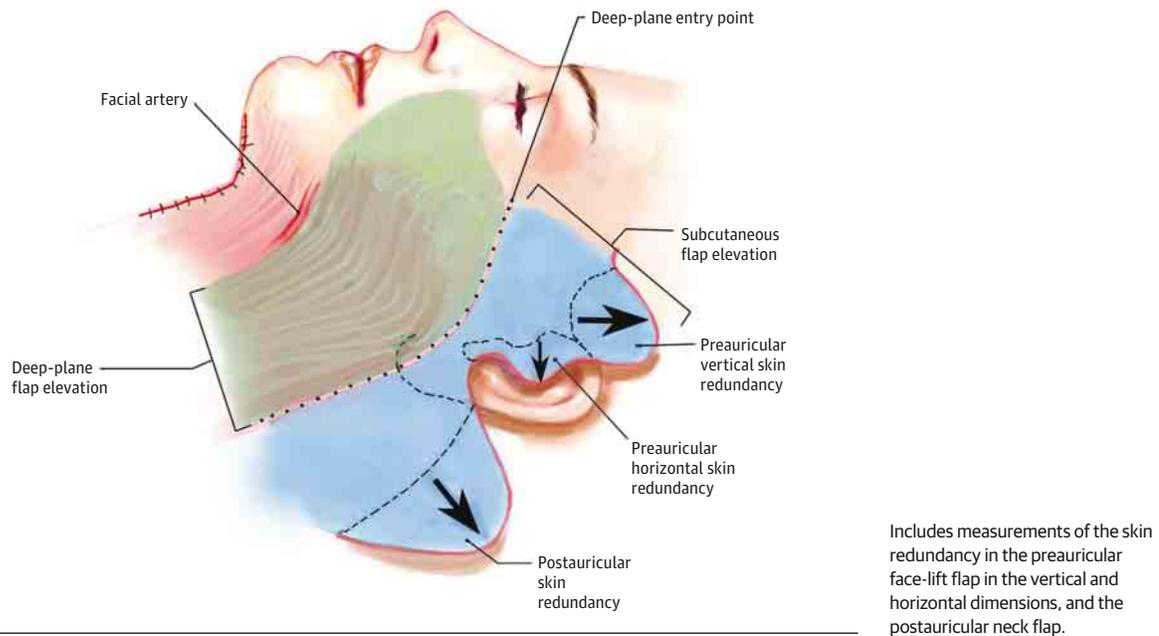


Table 1. Measurements of Excess Skin Redraped When Deep-Plane Rhytidectomy Was Performed Alone and With Concomitant Midline Corset Platysmaplasty on 10 Cadaveric Facial Halves

Cadaver	Excess Skin Redraped, mm					
	Without Platysmaplasty			With Platysmaplasty		
	Preauricular Vertical	Preauricular Horizontal	Postauricular	Preauricular Vertical	Preauricular Horizontal	Postauricular
Head 1						
Left	47	17	40	25	12	35
Right	26	12	33	14	12	19
Head 2						
Left	42	11	44	15	10	30
Right	37	15	38	23	17	34
Head 3						
Left	31	13	42	27	8	31
Right	35	10	40	22	10	32
Head 4						
Left	32	11	42	18	8	29
Right	38	12	48	18	9	34
Head 5						
Left	42	23	39	32	18	30
Right	40	23	40	26	14	35

for excision was measured from each hemiface after extended deep-plane rhytidectomy with platysmaplasty and without platysmaplasty (Table 1).

The mean preauricular vertical skin excess after extended deep-plane rhytidectomy without midline platysmaplasty was 37 mm (range, 26-47 mm), and without platysmaplasty was 22 mm (range, 14-32 mm). This represents a 40.5% reduction in the degree of lift, which was statistically significant ($P < .001$).

The mean preauricular horizontal skin excess after deep-plane rhytidectomy without platysmaplasty was 14.7 mm (range, 8-18 mm) and with midline platysmaplasty 11.8 mm (range, 8-18 mm). This represents a 19.7% reduction in the amount of horizontal skin redraping when platysmaplasty was added to the deep-plane rhytidectomy procedure, but this difference was not statistically significant ($P = .15$).

The mean postauricular skin excised after extended deep-plane rhytidectomy without midline platysmaplasty was

Table 2. Mean Excess Skin Redraped When Deep-Plane Rhytidectomy Was Performed Alone and With Concomitant Midline Corset Platysmaplasty, % Change With Platysmaplasty, and Statistical Comparison of Groups

Flap Type	Excess Skin, Mean, mm		Change, %	P Value
	Without Platysmaplasty	With Platysmaplasty		
Preauricular vertical	37.0	22.0	-40.50	<.001
Preauricular horizontal	14.7	11.8	-19.70	.15
Postauricular	40.6	30.9	-23.90	<.001

40.6 mm (range, 33.0-48.0 mm). The mean postauricular excess skin with platysmaplasty was 30.9 mm (range, 19.0-35.0 mm). Therefore, concomitant platysmaplasty contributes to a 23.9% reduction in neck flap redraping when platysmaplasty is added to the deep-plane rhytidectomy procedure, which was statistically significant ($P < .001$) (Table 2).

Discussion

Appropriate treatment of the face and neck is a fine-tuned balance to achieve adequate lift while avoiding an overoperated appearance. This study was initiated to quantify if and to what degree platysmaplasty limits the ability to redrape the face and neck flaps during rhytidectomy. This cadaveric study shows that midline platysmal fixation creates oppositional vectors of tension that limit the redraping of the preauricular face-lift flap in the vertical dimension (the vector of "lift") by up to 40.5% during deep-plane rhytidectomy, a statistically significant finding. The amount of horizontal redraping of the preauricular face-lift flap was reduced by 19.7%; this difference did not achieve statistical significance ($P = .15$). We believe that with more data points this difference would be statistically significant (sample size in this study is small: $n = 10$). In addition, platysmaplasty reduced neck flap redraping by 23.9%. These findings are corroborated by data demonstrating similar effects in traditional SMAS plication techniques.⁵

The opposing force created by midline platysmaplasty may compromise the aesthetic outcomes of rhytidectomy in 3 aspects, as represented by our data. First, it prevents vertical restoration of the cheek fat pad to its native youthful position, a hallmark of deep-plane rhytidectomy. This is represented by the reduction of the preauricular flap redraping in the vertical dimension. It limits redraping of the jowl and jawline, also supported by the limitation of the face-lift flap redraping by platysmaplasty. Finally, it reduces the amount of redundant neck skin that can be removed, which predisposes to recurrent neck ptosis, the very thing that platysmaplasty attempts to prevent. It is interesting to note that midline corset platysmaplasty creates a greater limitation in vertical motion of the preauricular face-lift flap than on its limitation in redraping the neck, indicating that platysmaplasty can limit midface and jowl improvement in rhytidectomy more than neck rejuvenation.

It is our opinion that midline platysmaplasty can be avoided in cases in which adequate lateral distraction of the platysma is achieved. We demonstrated in cadaveric studies that extended deep-plane rhytidectomy with release of the cervical retaining ligaments result in 55.4% greater lateral distraction of

the platysma as compared with SMAS plication techniques.¹¹ It is our belief that limiting the deep-plane dissection only to the midface and not extending it past the angle of mandible into the neck likely restricts the transmitted degree of deep tissue mobilization¹¹ and provokes a higher recurrence of platysmal banding.¹²⁻¹⁴ Failure to release the platysma from the cervical retaining ligaments in this manner may result in failure in the neck, with need for neck revision.¹⁵⁻¹⁸ We believe that mild to moderate platysmal band correction can be achieved exclusively by lateral advancement of the platysma.

Despite the significant limitation in rhytidectomy flap mobility that has been demonstrated, there remain relative and absolute indications for midline platysmaplasty. We advocate concomitant midline platysmaplasty for patients with excessive redundancy of the platysma, which is determined preoperatively. With the patient standing in an upright position, the surgeon places 3 fingers at the deep-plane entry point on both sides of the face and moves the skin vertically to assess whether the submental and platysmal skin laxity is corrected with this simulation of vertical suspension. If the submental area is corrected with this maneuver, then no platysmal surgery is indicated. If the patient still has platysmal redundancy with this maneuver than a midline platysmaplasty is planned accordingly. Generally, patients with platysmal banding that constitute less than 1.5 cm in depth in the anteroposterior direction will experience adequate redraping from lateral dissection alone. Patients with more redundancy in their platysmal banding will likely not achieve adequate treatment from lateral dissection alone, and these patients are selected preoperatively to undergo concomitant midline platysmaplasty. Despite the extended deep-plane approach, we have documented in a series of 323 patients a 13% rate of required midline platysma plication to address platysmal redundancy that could not be corrected laterally.⁶ In further follow-up of 634 patients, the senior author (AAJ) noted the platysmaplasty rate to stay relatively constant at 16%. The patients who required concomitant midline corset platysmaplasty were most commonly in their late sixth, or in their seventh or eighth decade of life.

There are some absolute indications for midline corset platysmaplasty. Subplatysmal lipectomy is an absolute indication to perform midline platysmaplasty. If the platysma is not plicated following subplatysmal excision, then cobra neck deformity is a certain sequelae. Another absolute indication for platysmaplasty is dictated by the decussation pattern of the platysma. The midline platysmal decussation pattern is variable, and 3 types have been identified: type 1 (75% of patients) with the platysma separated from the midline but in-

tersecting for 2 cm from the chin; type 2 (15% of patients) with the platysma fibers joining completely in the suprahyoid region; and type 3, (10% of patients) in which the fibers are separated at the midline and do not intersect.¹⁹ Those type 3 patients with a naturally wide platysmal dehiscence (>2 to 3 cm) have anatomically inadequate midline muscular decussation and therefore should be identified as cases that are an absolute indication for concomitant platysmaplasty.

Based on the data presented herein that midline platysmaplasty limits the ability to lift the face, we advocate more aggressive face-lift dissection to garner adequate redraping of the lateral face-lift flaps. Because of the significant impediment inherent to midline fixation, the technique of the face-lift must benefit this change. Extending the deep-plane dissection below the angle of the mandible permits platysmal release

from the cervical retaining ligaments, thus allowing for further release and redraping of the midline platysma.¹¹

Conclusions

Deep-plane face-lift surgery has ushered us into an era of refreshed thoughtfulness regarding the need for concomitant platysmaplasty. To consistently achieve better aesthetic outcomes in lifting the face and neck, we advocate minimizing use of midline corset platysmaplasty. However, we recognize its indispensability in the appropriate settings and recommend considering deep-plane dissection with release of the cervical retaining ligaments to best counteract the opposing interest of midline fixation.

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Study concept and design: Jacono.

Acquisition, analysis, or interpretation of data: All authors.

Drafting of the manuscript: All authors.

Critical revision of the manuscript for important intellectual content: Jacono.

Statistical analysis: All authors.

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Study supervision: Jacono.

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Conflict of Interest Disclosures: None reported.

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