

# The Use of Multifilament Suture for SMAS Plication in Rhytidectomy

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**Background:** In the public's mind, rhytidectomy, better known as a facelift procedure, is the technique most closely associated with plastic surgery. When done correctly, it yields highly satisfactory results. The aim of our study was to retrospectively review results of our patients whose procedures were performed using the superficial musculoaponeurotic system (SMAS) plication technique. Plication was performed with multifilament braided sutures, which provided a sustainable lift and satisfactory results.

**Methods:** This study involves a retrospective review of 137 patients who underwent primary or secondary facelift procedures over a period of 46 months. The average patient age was 59 years, with ages ranging from 30 to 77. Patients were reviewed at 6 and 12 months postoperatively. Subjective evaluation based on photographic analysis was performed pre- and postoperatively.

**Results:** All cases included in this study indicated satisfaction with postoperative results on 1 year postoperative review for both the patients and performing surgeons. Four patients presented with a postoperative hematoma that required surgical intervention. One patient developed skin infection that was followed by skin necrosis. Another patient presented with wound infection that resulted in partial wound dehiscence. Both cases were managed conservatively.

**Conclusions:** With the abundance of techniques directed toward the SMAS layer, it has become a pivot point for facelift procedures. This expansion in approaches places emphasis on the SMAS layer and its manipulations. The type of suture material utilized in SMAS plication is, therefore, undoubtedly essential. Our use of braided multifilament sutures for SMAS plication provided satisfactory results at 1-year postoperative review. (*Plast Reconstr Surg Glob Open* 2023; 11:e5199; doi: 10.1097/GOX.00000000000005199; Published online 16 August 2023.)

## INTRODUCTION

Forestalling the effects of aging is an age-old human desire. Despite the fact that the history of facelift surgery is over a century old, only in recent decades has its popularity seen a noticeable increase. This may be due to an increase in demands in looking more youthful,<sup>1</sup> or a decrease in the stigma associated with what was in the early 20th century termed “vanity surgery”<sup>2</sup> and its negative public perceptions. This stigma of alteration of the natural aging process has resulted in debatable historical documentation of the exact origins of facelift surgery.<sup>1-4</sup>

Regardless of this controversy, the first facelift surgery was credited to Eugene Von Hollander, wherein he placed elliptical cutaneous excisions followed by re-approximation of excess skin in the natural crease lines.<sup>5</sup>

Although the term superficial musculoaponeurotic system (SMAS) was first coined by Mitz and Peronie under the supervision of Tessier in 1976,<sup>6-8</sup> the layer is believed to have been originally described by Sir Charles Bell as early as 1799.<sup>8</sup> Attention to this layer and its handling by Skoog is what resulted in a paradigm shift for facelift surgery. Addressing this deeper ptotic soft tissue layer and its suspension instead of simply excising the skin has been the turning point in moving facelift surgery to the next level. The anchoring of this strong fascia maximizes pull on the deeper layers and minimizes tension on the skin resulting in increased longevity and improvement of incision line

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appearance. This has brought forth numerous modifications in manipulations of SMAS, including suspension, plication, and imbrication to compensate for limitations of the subcutaneous lift.<sup>1-4,7,9</sup>

Plication of the excess SMAS tissue along vectors relocates it to areas of volume loss, facilitating volume replacement.<sup>10</sup> Recently, an improvement in inert suture materials has become a determinant in the surgical technique,<sup>11</sup> and consideration of long-term tissue response to suture material used is essential.<sup>12</sup>

With the ideal facelift being one that can offer a long-lasting result and fewer complications while delivering the highest patient satisfaction,<sup>9</sup> the goal of our study was to retrospectively review our facelift procedures that were performed using the SMAS plication technique with the application of a nonabsorbable braided multifilament suture as a means for a strong suspension. Assessment of the patient satisfaction with the results was performed at the 1-year postoperative mark.

## MATERIALS AND METHODS

We performed a retrospective review of 137 patients who underwent primary or secondary facelift procedures between October 2017 and August 2021. The patients were reviewed postoperatively at 6 and 12 months with photographic documentation performed preoperatively and at each postoperative visit. Primary facelift was performed for 120 patients, and secondary facelift was performed for 17 patients. Indications included patients with an aging face and an interest in rejuvenation, reasonable expectations for outcomes, and patients with no weight fluctuations within the study year. The contraindications were as follows:

1. Unreasonable expectations;
2. Weight fluctuations;
3. Psychiatric dysfunctions;
4. Uncontrolled diabetes;
5. Bleeding diathesis or patients unable to discontinue anticoagulants preoperatively.

Of the 17 patients who presented for a secondary facelift, four were primarily operated on by our team, and 13 were operated on elsewhere. Subjective evaluation based on photographic analysis was used pre- and postoperatively. Two sets of images were obtained for each patient in the anterior and bilateral positions preoperatively and 1-year postoperatively. Patients were provided with the two sets of images at the 1-year postoperative visit and asked to score their satisfaction on a questionnaire marked 1 to 5, with 1 being the least satisfied and 5 being the most satisfied. The patients were asked to focus on the general appearance of the face and then specific facial regions, namely the mid-face, jowls, marionette lines, and neck, and make a response based on their opinion of the general improvement.

The questionnaire was as follows:

- How satisfied are you with the result of your surgery?
- Very satisfied (5)
- Satisfied (4)
- Neither satisfied nor dissatisfied (3)

## Takeaways

**Question:** Is a multifilament suture for SMAS plication facelift surgery an acceptable option in providing agreeable and lasting results?

**Findings:** The cases included in this study indicated satisfaction with results at 1-year postoperative review.

**Meaning:** Facelift surgery includes numerous adjustments and management techniques aimed at the SMAS layer. The selection of suture material is an important element that needs to be considered while using the SMAS plication procedure, as suture choice affects immediate and late results.

- Dissatisfied (2)
- Very dissatisfied (1)

## Operative Technique

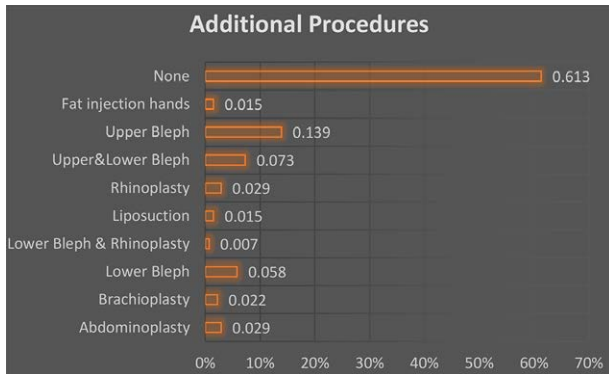
### Preoperative Preparation

The patients were instructed to shower the night before the surgery or the morning of the surgery and shampoo their hair. No food or drink was allowed at least 6 hours preoperatively; however, hypertensive patients were permitted to take their medication with a sip of water the morning of the surgery. The markings to be incised were outlined with a fine tip surgical pen with the patient in a sitting position, and any additional inquiries the patient may have were discussed. Patient preoperative photographs were taken either in the clinic before the hospital visit or the morning of the procedure (Figs. 1 and 2).

## INTRAOPERATIVE

Our cases were performed with local anesthetic infiltration by the senior surgeon and intravenous sedation by the anesthesiologist. The anesthetic was present throughout the duration of the procedure. The solution used for infiltration before dissection is composed of 50 mL 1% lidocaine, 1 mL adrenaline 1:100,000, and 250 mL saline. Injection of the face is done one side at a time. Incisions are designed in a manner that eludes distortion of the face and produces scars that are as inconspicuous as possible. In the temple, the incision is placed within the hairline. The incision proceeds caudally anterior to the ear, then along the tragal edge. The incision then continues 2 mm under the cleft of the ear lobule. A retro-auricular sulcus incision is then made, and this continues into the occipital skin and curves posteriorly into the hair bearing portion of the scalp. Undermining of the facial skin is commenced in a supra-SMAS plane after the incisions are complete. A fiberoptic retractor and Langenbek retractors are alternatively used, and dissection is commenced with a scalpel but continued using a scissor. This is under direct visualization superficial to the SMAS layer. The extent of dissection depends on the degree of laxity and the degree of required skin re-draping. The facelift flap is raised in a single subcutaneous plane. (See Video 1 [online], which shows the undermining of the facial skin in a supra-SMAS plane.)





**Fig. 1.** Graph depiction of additional procedures performed at the same setting as that of facelift surgery.

SMAS plication is then performed along an oblique line between the angle of the mandible and the lateral canthus of the ipsilateral eye, using interrupted multifilament braided polyester 2-0 sutures. These are usually four or five inverted sutures on each side according to tissue flaccidity, and implemented at the level of the malar prominence. The use of inverted sutures prevents the knots from being visible or palpable through the skin. This vector allows for malar augmentation by means of the excess SMAS using a robust suture material. (See Video 2 [online], which shows a demonstration of the effect produced with SMAS and platysma plication.) (See Video 3 [online], which shows an application of Inverted 2-0 multifilament sutures along the required vectors.) The platysmal laxity is plicated in a vertical and lateral vector at a level directly below the mandible with approximately two



**Fig. 2.** Preoperative and postoperative patient photographs. The preoperative (A–C) and 1-year postoperative (D–F) photographs of a 54-year-old female patient who presented for primary facelift surgery. The patient had no comorbidities and was not a smoker. No postoperative complications were encountered.





**Fig. 3.** Preoperative and postoperative patient photographs. The preoperative (A–C) and 1-year postoperative (D–F) photographs of a 51-year-old female patient who presented for primary facelift surgery. The patient had no comorbidities and was not a smoker. Postoperative ecchymosis was encountered but was self-limited and resolved within 1 week.

or three inverted sutures on each side according to the degree of neck redundancy. The undermined skin flap was re-draped in a cephalo-posterior direction anteriorly and parallel to the mandible posteriorly. After meticulous hemostasis suction drains were inserted, any excess skin is trimmed with attention for no tension on closure. Ear in-setting was performed. Closure was achieved with 5-0 subcutaneous Vicryl sutures and a running 5-0 Prolene. Finally, light dressings were applied.

#### Postoperative

Patients were instructed to rest in a semi-sitting position for the first postoperative period. Strict blood pressure control was maintained to avoid hematoma formation. Dressings were usually removed on the first postoperative day. Drains were removed 48 hours postoperatively. Preauricular sutures are removed 5 days postoperatively, and

postauricular sutures were removed 10 days postoperatively. Showering and shampooing were permitted after 48 hours when the drains were removed. Postoperative photographs were taken in the first postoperative visit, then at 6 and 12 months (Figs. 2D–F and 3D–F) postoperative.

#### RESULTS

Data were coded and entered using the statistical package for the Social Sciences (SPSS), version 28 (IBM Corp., Armonk, N.Y.). Data were summarized using mean, SD, minimum and maximum in quantitative data, and using frequency (count) and relative frequency (percentage) for categorical data.

A total of 137 patients were included in this study. They were operated on between October 2017 and August 2021. The mean patient age was 59 years, with the youngest presenting patient being 30 years old, and the

oldest presenting patient being 77 years old. One hundred twenty-five patients were women, and 12 patients were men. The average operative time was 4.8 hours. One hundred twenty (87.6%) patients presented for primary facelift and 17 (12.4%) patients presented for secondary facelifts. Of the 17 patients who presented for a secondary facelift, four were primarily operated on by our team, and 13 were operated on elsewhere. Of the total patients, 16.1% were hypertensive, 14.6% were diabetic, and 27% were smokers. Fifty-three patients had additional procedures performed simultaneously in the same setting as that of the facelift surgery. These patients were divided as follows: 19 patients had upper blepharoplasty, 10 had upper and lower blepharoplasty, eight had lower blepharoplasty, four had rhinoplasties, another four patients had abdominoplasties, three had brachioplasty, one had lower blepharoplasty and rhinoplasty, two had liposuction, and two had fat injection for the hands (Fig. 3).

Of the total amount of facelift cases, 97.1% required a 1-day hospital stay, and 2.9% required a 2-day hospital stay (Tables 1–3). Complications presented in 29.9% of cases, ecchymosis and wound infection being the most

**Table 1. Patient Demographics, Comorbidities, and Whether Primary or Secondary Procedures Were Performed**

	Mean	SD	Minimum	Maximum
Age	59.01	6.77	30.00	77.00
Operative time (h)	4.80	1.09	3.50	8.00
			Count	%
Gender	Masculine		12	8.8%
	Feminine		125	91.2%
HTN	Yes		22	16.1%
	No		115	83.9%
Diabetes	Yes		20	14.6%
	No		117	85.4%
Smoking	Yes		37	27.0%
	No		100	73.0%
Primary facelift	Yes		120	87.6%
	No		17	12.4%
Secondary facelift	Yes		17	12.4%
	No		120	87.6%

**Table 2. Additional Procedures Performed and Hospital Stay**

		Count	%
Additional procedure	Abdominoplasty	4	2.9%
	Brachioplasty	3	2.2%
	Lower blepharoplasty	8	5.8%
	Lower blepharoplasty and rhinoplasty	1	0.7%
	Liposuction	2	1.5%
	Rhinoplasty	4	2.9%
	Upper and lower blepharoplasty	10	7.3%
	Upper blepharoplasty	19	13.9%
	Fat injection for hands	2	1.5%
	No extra procedures	84	61.3%
Hospital stay (d)	1	133	97.1%
	2	4	2.9%

**Table 3. Complications Associated with Facelift Surgery**

		Count	%
Complications	Yes	41	29.9%
	No	96	70.1%
Complication details	Wound dehiscence	1	0.7%
	Ecchymosis	12	8.8%
	Hematoma treated conservatively	2	1.5%
	Evacuated hematoma + partial wound dehiscence	1	0.7%
	Hematoma requiring exploration	4	2.9%
	Mild hematoma treated conservatively	1	0.7%
	Seroma	2	1.5%
	Skin necrosis and partial dehiscence	1	0.7%
	Wound infection and skin necrosis	1	0.7%
	Wound infection	12	8.8%
	Great auricular nerve neuropraxia	4	2.9%
	None	96	70.1%

prevalent, each with an 8.8% rate. This was followed by great auricular nerve neuropraxia at 2.9%. Four patients presented with a postoperative hematoma that required surgical intervention for evacuation. Two patients presented with seromas, and two patients presented with hematomas that were managed conservatively (these were each 1.5% of the cases). One patient developed a skin infection that was followed by skin necrosis. This was managed conservatively by obtaining a wound swab and antibiotics according to culture and sensitivity. Another patient presented with skin necrosis retro-auricular that resulted in partial wound dehiscence. Repeated dressings were sufficient for management. The patients were given a paper patient satisfaction survey scale to fill out on their 1 year postoperative clinic visit. Of the 137 patients included in this study zero were very dissatisfied, zero were dissatisfied, zero were neither satisfied nor unsatisfied, 26 were satisfied and 111 were very satisfied (Table 4).

## DISCUSSION

One of the most gratifying plastic surgery procedures performed is facelift surgery.<sup>4</sup> Even with an increase in nonsurgical facial aging treatments, a surgical facelift remains accompanied by a high degree of patient satisfaction.<sup>13</sup> An evolution of techniques and their modifications is on the rise with a myriad of new incisions and applications as the demands to look youthful and more refreshed continue to surge.<sup>4</sup> However, all modifications of methods are based on SMAS and platysma techniques described in the early literature.<sup>14</sup> Regardless of the surplus of techniques, dissection above the SMAS layer remains safe because it decreases chances of facial nerve injury, and the procedure itself remains associated with good recovery.<sup>4</sup>

Since its development by the Swedish plastic surgeon Tord Skoog in the 1970s, SMAS plication facelift has progressively proved its efficiency as a facelift technique that



**Table 4. Example of Scale on Which Patients Marked Their Satisfaction**

1	2	3	4	5
Very dissatisfied	Dissatisfied	Neither dissatisfied nor satisfied	Satisfied	Very satisfied

suspends soft tissues as opposed to simple skin tightening. This is also accompanied by a low rate of adverse effects and a high rate of patient satisfaction.<sup>3</sup>

When choosing a suture material, the main factors to be considered include tensile strength, durability, tissue reactivity, and the intrinsic material characteristics, which determine ease of use and knot tying as well as the long-term response to the sutures used.<sup>15</sup>

Similar to how there are numerous modifications for SMAS manipulation in rhytidectomy, there are also several suture types that are used for these adjustments. According to Huq and Nakhooda,<sup>16</sup> Vicryl does not suspend the SMAS sufficiently for long lasting results. They also noted that Mersilene has the tendency to stick out of the skin, which on occasion require its removal. Furthermore, it was mentioned that, during revision facelifts, nylon has become loose and was no longer holding the tension by that point. Huq goes on to describe his preference for 3-0 PDS, and deems it a suture that not only is strong enough for long-lasting suspension, but also avoids skin protrusion. Nonetheless, he mentions that occasionally he augments it with 4-0 nylon for a longer lasting suspension.

In another study, the senior author's preference was Mersilene. The study mentions that when compared with Prolene, it showed greater stiffness and less elongation at loads of 20 to 30N. It also showed less creep overtime and sustained suspension until the securing scar had matured.<sup>17</sup> Berry and Davies reported highly satisfactory and reproducible results when they performed plication of the anterior SMAS with 2/0 PDS and plication of the infralobular SMAS lesion and platysma below the mandible with 3/0 Vicryl.<sup>18</sup> In our practice, we prefer the use of braided multifilament sutures coated with polybutylate. This coating improves tissue glide and provides easier handling.

In a comparative study performed by Huggins et al,<sup>12</sup> nonabsorbable monofilament and braided sutures retrieved from cases undergoing secondary facelift surgery were studied under light and transmission electron microscopes for histological evaluation. Both sutures revealed enclosure with dense collagen and elastin. This enclosure was thicker around braided sutures and showed not only infiltration between individual suture filaments, but also an appearance of integration with the surrounding tissue. This picture of enclosure and infiltration shares characteristics of a ligament. Braided sutures also showed a higher level of tissue reaction which exhibited richer and more lasting tissue fixation and it has been hypothesized that this neo-ligamentous arrangement may be the cause of a witnessed retention of suture strength after 2 years in situ.

To decrease the risk of infection and wound complications, we have now added active smokers to our exclusion criteria and started administering IV antibiotics on induction of anesthesia.

## CONCLUSIONS

As surgeons continue to pursue improved outcomes, facelift techniques will continue to evolve. The plethora of modifications and management directed toward the SMAS layer have become a recognizable part in any facelift procedure. This report describes the authors' experience performing supra-SMAS facelifts with SMAS and platysma muscle plication. The suture material of choice is nonabsorbable braided multifilament sutures, and plication is performed in two vectors. The first vector is along an oblique line between the angle of the mandible and the lateral canthus and results in malar projection additional to the plication that addresses the SMAS laxity. The second vector is vertical and lateral just inferior to the mandible and results in decreased laxity of the neck. This retrospective review demonstrated patient satisfaction upon evaluation at the 1-year mark, which is in agreement with the goal of our study.

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## DISCLOSURE

*The authors have no financial interest to declare in relation to the content of this article.*

## PATIENT CONSENT

*Patients provided written consent for the use of their images.*

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