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Comparison of Efficacy and Complication Rates of Face-Lift Techniques

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ABSTRACT

Background: Facelift surgery is a primary method for facial rejuvenation, employing various techniques to address age-related changes. The selection of a specific surgical approach is influenced by patient attributes, desired aesthetic outcomes, and the surgeon's expertise.

Objective: To compare the efficacy and complication rates of three distinct facelift techniques: SMAS (superficial musculoaponeurotic system) plication, deep-plane facelift, and endoscopic facelift.

Patients and Methods: This prospective and retrospective study included 20 patients who underwent facelift surgery at the Plastic Surgery Department of Menoufia University Hospitals. The participants were divided into three groups: SMAS plication (n=7), deep-plane facelift (n=8), and endoscopic facelift (n=5). All patients underwent standardized clinical assessment and postoperative follow-up. patient satisfaction was assessed using a 5-point numerical rating scale (1=very dissatisfied,5=very satisfied). assessments were carried out at 2-week postoperative visit and during subsequent follow up appointments.

Results: The mean age was significantly lower in the endoscopic group (45 ± 4.64 years) compared to the SMAS (53.14 ± 4.78) and deep-plane groups (54.88 ± 7.32) (p=0.026). The mean operative time was significantly longer for the deep-plane group (216.9 ± 24.34 minutes) compared to the SMAS (128.6 ± 17.49) and endoscopic groups (88.0 ± 15.25) (p<0.001). Overall patient satisfaction was high (90%), with SMAS achieving 100%, deep-plane 87.5%, and endoscopic 80%.

Conclusion: All three facelift techniques demonstrated a high degree of patient satisfaction and a favorable safety profile with low complication rates. The deep-plane facelift provided more extensive rejuvenation but was associated with a longer operative duration. Conversely, the endoscopic facelift was particularly effective for younger patients, offering a shorter recovery period. The choice of technique should be determined by the individual patient's age, specific anatomical requirements, and aesthetic goals.

Keywords: Facelift, SMAS plication, deep-plane facelift, endoscopic facelift, facial rejuvenation, patient satisfaction.

INTRODUCTION

Facial aging represents a significant aesthetic concern, as it is characterized by a combination of skin laxity, loss of volume, and the deepening of wrinkles due to repeated muscle contractions and gravitational effects. Common manifestations include forehead lines, glabellar frown lines, crow's feet, nasolabial folds, and loss of jawline definition and neck contour. When non-surgical interventions such as LASER therapy, radiofrequency treatments, fillers, or minimally invasive procedures fail to achieve the desired rejuvenation, rhytidectomy, or face-lift surgery, remains the gold standard for effective facial rejuvenation [(1)].

The evolution of face-lift techniques over the past century has been marked by significant anatomical and surgical advances. Initial procedures focused solely on skin excision without addressing underlying structures. The introduction of deeper dissection planes, including subfascial and SMAS (superficial musculoaponeurotic system) manipulation, enhanced outcomes and durability [(2)]**.** Modern surgical approaches now account for three-dimensional facial anatomy, including retaining ligaments, deep fat compartments, and muscle layers, enabling more natural and lasting results [(3,4)].

Among contemporary techniques, SMAS plication, introduced by Skoog and later refined by Hamra, Barton, and others, has become a cornerstone in face-lift procedures. This technique suspends and repositions facial tissues by manipulating the SMAS layer, improving both midface and jawline contours [(3,5)].

Alternatively, the lateral SMASectomy technique, popularized by Baker, focuses on excising a strip of SMAS at the junction of its mobile and fixed components, offering effective rejuvenation with a defined vector of pull and minimal risk of nerve injury [(6)]. Despite these advancements, facial nerve injury remains a critical concern in rhytidectomy. While the incidence is reported to be below 1% in most experienced hands, transient or permanent nerve dysfunction can significantly affect patient satisfaction and function [(7)].

Moreover, adjunctive techniques such as autologous fat grafting have gained prominence, although there is limited data regarding their long-term efficacy and safety when combined with surgical lifting procedures [(2)].

Minimally invasive technologies, including ultrasound and radiofrequency-based devices, have recently gained traction for patients seeking non-surgical options. However, the degree of improvement remains modest, and such techniques are best reserved for mild to moderate skin laxity. Consequently, surgical face-lifting continues to be the most effective method

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for significant rejuvenation in appropriately selected patients [8].

Regarding surgical options and ongoing refinements in technique, this study aims to compare the efficacy and complication rates of different face-lift methods, with the goal of identifying optimal strategies for facial rejuvenation based on clinical outcomes and patient safety.

METHODS

Study Design and Setting

This study was designed as a combined prospective and retrospective clinical investigation conducted in the Department of Plastic Surgery at Menoufia University Hospitals, Egypt. The study included patients who underwent facelift surgery between May 2023 and May 2024.

Participants

A total of 20 adult patients seeking facial rejuvenation via surgical facelift were included. Patients were evaluated in the outpatient clinic and admitted for surgery after full clinical and laboratory assessment.

Inclusion Criteria

- Patients seeking facelift surgery at Menoufia University Hospital between May 2023 and May 2024
- Age ≥ 30 years
- Clinical evidence of facial aging (e.g., sagging skin, jowling, deep nasolabial folds)
- Fit for general anesthesia and surgery.

Exclusion Criteria

- History of autoimmune or vascular diseases
- History of diabetes mellitus
- Presence of bleeding disorders
- Heavy smokers (>10 cigarettes/day)
- Previous facelift surgery
- Tendency for hypertrophic scarring or keloids.

Preoperative Assessment

All patients underwent a comprehensive clinical evaluation including personal history (age, sex, smoking status), relevant medical history (e.g., diabetes, hypertension, vascular and autoimmune diseases), and physical examination. Facial aging signs were assessed across the upper, middle, and lower facial thirds. Standard laboratory investigations (CBC, coagulation profile, liver function tests, electrolytes, urea, creatinine) were performed preoperatively.

Preoperative markings were done with patients in the upright position. Surgical incision lines, flap dissection areas, SMAS manipulation zones, and tissue vector directions were marked to guide operative planning. Particular attention was given to symmetry, hairline preservation, and scar concealment.

Surgical Techniques

Patients underwent one of the following facelift techniques based on individual assessment.

1. SMAS Plication Facelift

This technique involved standard skin incisions in the temporal, preauricular, and postauricular regions. Subcutaneous skin flaps were elevated to expose the SMAS layer. The SMAS was folded and sutured using 2-0 or 3-0 non-absorbable PDS sutures in an upward and posterior direction, with the neck platysmal plication anchored to the mastoid fascia. The skin was then redraped, excess skin was trimmed, and incisions closed in layers. Drains were placed as needed.

2. Deep Plane Facelift

Following flap elevation, the zygomatic ligament was released to allow mobility of the SMAS layer. A 1–2 cm strip of SMAS was excised, typically from the anterior border of the parotid gland toward the nasolabial fold and jawline. The remaining SMAS edges were sutured and anchored to deep fixation points such as the mastoid fascia. The skin was redraped and closed in layers with optional drain placement.

3. Endoscopic Facelift

A minimally invasive approach was employed using 1–2 cm incisions placed in the temporal hairline and, when needed, intraorally. Subperiosteal dissection was performed with endoscopic visualization. Soft tissue ligaments including the zygomatic and temporal ligaments were released. Repositioned tissues were secured using Ethibond 2 sutures with periosteal or plate and screw fixation. Small incisions were closed using fine sutures or glue.

Postoperative Care and Follow-up

Postoperatively, patients received intravenous fluids, analgesia, and prophylactic antibiotics. Drains, if placed, were typically removed within 24–48 hours. Sutures were removed between the 7th and 10th postoperative day. Patients were evaluated for early and late complications including hematoma, infection, nerve injury, scarring, and asymmetry. Follow-up assessments were conducted at 2 weeks postoperatively and during subsequent scheduled clinic visits **(Figure 1).**

Figure 1: Showing the preoperative pictures versus postoperative pictures of a patient.

Ethical approval:

Approval (Number 9/2023 SURG3) was obtained from the institutional ethics committee of Menoufia University, and informed written consent was secured from all participants prior to surgery. The Helsinki Declaration was followed throughout the study's conduct.

Statistical analysis

Statistical analyses were conducted using the IBM SPSS software package, version 20.0 (Armonk, NY: IBM Corp, 2011). Qualitative data were summarized with numbers and percentages, while quantitative data were described using range, mean, standard deviation, median, and interquartile range (IQR). The Kolmogorov-Smirnov test was employed to confirm the normality of data distribution. A 5% significance level was adopted for all statistical tests. For comparing quantitative variables, the F-test (one-way ANOVA) was utilized, followed by a Tukey post hoc test for pairwise comparisons. The Chi-square test was used for categorical data, with a Monte Carlo correction applied when more than 20% of the cells had an expected count less than five. This systematic approach ensured the robustness and validity of the research findings.

RESULTS

Out of the 20 patients included in the study, 7 patients (35.0%) underwent facelift using the SMAS plication technique, 8 patients (40.0%) underwent the deep plane facelift technique, and 5 patients (25.0%) underwent the endoscopic facelift.

Among the 20 patients, the majority were females (85.0%), with no statistically significant difference in gender distribution across the three facelift groups. The mean age of patients showed a statistically significant difference between the groups, with the deep plane group being the oldest, followed by the SMAS group, and the endoscopic group being the youngest. Pairwise comparisons revealed a significant age difference between the deep plane and endoscopic groups. Regarding smoking status, five patients (25.0%) were smokers, with no significant difference among the 3 groups (Table 1).

Table (1): Comparison between the Three Studied Techniques According to Demographic Data

	Total (n = 20)		SMAS plication (n = 7)		Deep plane facelift (n = 8)		Endoscopic facelift (n = 5)	
	No.	%	No.	%	No.	%	No.	%
Gender								
Male	3	15.0	2	28.6	1	12.5	0	0.0
Female	17	85.0	5	71.4	7	87.5	5	100.0
Age (years)								
Min. – Max.	37.0 – 62.0		45.0 – 60.0		41.0 – 62.0		37.0 – 49.0	
Mean ± SD.	51.80 ± 6.95		53.14 ± 4.78		54.88 ± 7.32		45.0 ± 4.64	
Median (IQR)	51.50(46.50–56.50)		54.0(51.0 – 55.50)		56.0 (50.5–61.50)		46.0 (46.0 – 47.0)	
Sig. bet. grps.	p1=0.841, p2= 0.076, p3=0.025*							
Smoking	5	25.0	2	28.6	2	25.0	1	20.0

min-max=minimum-maximum, SD=standard deviation, IQR=interquartile range, sig.bet, grps=significance between groups, p=probability value, p1=comparison between group1 and group 2, p2=comparison between group 1and group 3, p3=comparison between group2 and group 3.

Fat grafting was performed in 60.0% of all patients with the highest usage in the SMAS plication group (85.7%). Although the SMAS plication group showed the highest rate of fat grafting, this difference was not statistically significant. Operative time showed a highly significant difference between the 3 techniques. The longest operative time was recorded in the deep plane facelift group, followed by the SMAS plication group, and the shortest was in the endoscopic group. Pairwise comparisons showed significant differences between all technique groups, indicating that deep plane facelift required the most time while endoscopic facelift was the quickest (Table 2)

Table (2): Comparison of the Three Studied Facelift Techniques Regarding Fat Grafting and Operative Time

	Total (n = 20)		SMAS plication (n = 7)		Deep plane facelift (n = 8)		Endoscopic facelift (n = 5)	
	No.	%	No.	%	No.	%	No.	%
Fat grafting								
No	8	40.0	1	14.3	4	50.0	3	60.0
Yes	12	60.0	6	85.7	4	50.0	2	40.0
Operative time (min)								
Min. – Max.	70.0 – 250.0		105.0 – 160.0		180.0 – 250.0		70.0 – 110.0	
Mean ± SD.	153.8 ± 58.4		128.6 ± 17.49		216.9 ± 24.34		88.0 ± 15.25	
Median (IQR)	135.0 (107.0 – 205.0)		125.0 (120.0 – 135.0)		220.0 (197.50 – 235.0)		85.0 (80.0 – 95.0)	
Sig. bet. grps.			p1<0.001*, p2=0.008*, p3<0.001*					

p=probability value, p1=comparison between group1 and group2, p2=comparison between group 1and group 3, p3=comparison between group2 and group 3.

Most patients reported being satisfied with their outcomes, with an overall satisfaction rate of 90.0%. Satisfaction was 100.0% in the SMAS plication group, with no significant difference among the 3 groups. Regarding complications, hematoma and ugly scar were each reported in one patient (12.5%) in the deep plane group, while in the endoscopic group, one patient (20.0%) developed scar alopecia and (20.0%) had a localized infection. Ear malposition occurred in one patient (14.3%) in the SMAS group. There were no reported cases of nerve injury, contour deformity, or systemic complications in any group. These differences in complication rates were not statistically significant. According to the Strasser evaluation score, 80.0% of patients achieved “perfect” results, with the remaining 20.0% rated as “good”. Distribution of perfect outcomes was similar across groups with no statistically significant difference (Table 3).

Table (3): Comparison of Patient Satisfaction, Complications, and Aesthetic Outcome Among Facelift Techniques

	Total (n = 20)		SMAS plication (n = 7)		Deep plane facelift (n = 8)		Endoscopic facelift (n = 5)	
	No.	%	No.	%	No.	%	No.	%
Patient satisfaction								
No	2	10.0	0	0.0	1	12.5	1	20.0
Yes	18	90.0	7	100.0	7	87.5	4	80.0
Complication								
Hematoma	1	5.0	0	0.0	1	12.5	0	0.0
Ugly scar	1	5.0	0	0.0	1	12.5	0	0.0
Alopecia	1	5.0	0	0.0	0	0.0	1	20.0
Infection	1	5.0	0	0.0	0	0.0	1	20.0
Nerve injury	0	0.0	0	0.0	0	0.0	0	0.0
Contour deformity	0	0.0	0	0.0	0	0.0	0	0.0
Ear malposition	1	5.0	1	14.3	0	0.0	0	0.0
Systemic	0	0.0	0	0.0	0	0.0	0	0.0

DISCUSSION

Facelift procedures remain among the most commonly requested cosmetic surgeries despite fluctuations in their annual procedural volume [9]. Our study included varied sample of 20 patients who underwent one of three facelift techniques: SMAS plication (35 %), deep-plane facelift (40 %), and endoscopic facelift (25 %). This distribution reflects the growing diversification of approaches in facial rejuvenation surgery, as surgeons seek to balance efficacy with complication risk, longevity of results, and recovery time.

Our study found that the majority of patients in all technique groups were females, which aligns with national trends showing that women continue to represent the overwhelming majority of facial cosmetic-surgery candidates [10]. Notably, the mean age was significantly lower in the endoscopic facelift group (45 ± 4.64 years) compared with the SMAS and deep-plane groups. This finding is consistent with the literature suggesting that endoscopic techniques are generally preferred for younger patients with early facial ageing or those desiring less-invasive options [11]. Endoscopic facelifts are often associated with shorter recovery periods and minimal scarring, making them attractive to a younger demographic seeking subtle rejuvenation rather than comprehensive structural correction.

Our study showed that the age difference across groups also reflects clinical selection criteria. Older patients tend to present with more significant skin laxity and mid-face descent, making them better candidates for deep-plane facelifts, which offer more extensive tissue repositioning and longer-lasting results [12]. Similarly, the SMAS plication group fell in between, often chosen for moderate signs of ageing when patients desire balanced improvement with relatively lower risk. These findings reinforce previously established surgical guidelines and highlight the need to individualise technique selection based on patient age and facial-ageing patterns [13].

Our study revealed that smoking prevalence was relatively evenly distributed across all groups, with no statistically significant difference. Although this was not a primary outcome, it remains important because smoking is widely associated with increased surgical risk, impaired wound healing, and higher complication rates in facial procedures [14]. The absence of a significant difference in our small cohort does not eliminate these known risks and underscores the necessity of smoking-cessation counselling in preoperative planning.

Our study performed fat grafting in 60 % of cases, with the highest frequency observed in the SMAS plication group (85.7 %), followed by the deep-plane (50 %) and endoscopic facelift (40 %) groups. While this association was not statistically significant, the trend highlights a growing reliance on fat grafting as a complementary technique in facial rejuvenation. Volume loss is a key component of facial ageing, and fat grafting provides a natural solution to restore facial contours, especially in the mid-face, temples, and periorbital areas. **Bray** emphasised that volumising techniques, including composite flap shifts and fat grafting, can enhance rejuvenation outcomes in deep-plane facelifts, particularly for patients with deflated facial features [15]. Our higher fat-grafting rate in the SMAS group may reflect a compensatory strategy to overcome the more limited lift provided by that technique compared with the deeper dissection of the deep-plane approach.

Our study demonstrated that operative time varied significantly among the three groups, with the deep-plane facelift showing the longest duration (mean = 216.9 minutes), followed by SMAS plication (128.6 minutes) and endoscopic facelift (88.0 minutes). These differences were statistically significant and reflect the technical demands of each procedure. Deep-plane facelifts involve more extensive dissection and repositioning of deep tissue layers, which inherently extends operative time. Several studies have associated

prolonged surgical duration with increased risks of complications such as venous thrombo-embolism, wound complications, and delayed recovery [10,16,17]. **Hashem *et al.*** specifically reported a higher incidence of deep venous thrombosis following lengthy facelift with other aesthetic procedures [17]. Although our sample did not focus on thrombotic events, the significantly longer operative time for deep-plane facelifts warrants caution and may necessitate preventive measures such as intraoperative sequential-compression devices and postoperative ambulation protocols.

Our study achieved remarkably high patient satisfaction (90 %), with no statistically significant difference between groups. The highest satisfaction rate was reported among SMAS plication patients (100 %), followed by deep-plane (87.5 %) and endoscopic facelift (80 %) groups. These findings align with prior studies showing that a properly executed facelift—regardless of approach—generally yields high levels of patient satisfaction when tailored to patient anatomy and expectations [18,19]. The slightly lower satisfaction in the endoscopic group may reflect more subtle results or patient expectations not fully aligning with the minimally invasive approach. The younger age group undergoing endoscopic facelift might also have higher aesthetic expectations despite their relatively milder ageing signs, which could influence subjective satisfaction ratings.

Our study used the Strasser evaluation score to assess aesthetic outcomes postoperatively, with results showing that 80 % of patients achieved a "perfect" result and 20 % a "good" outcome, with no significant inter-technique differences. This high rate of positive aesthetic results supports the consensus that, when performed skillfully and tailored to the patient, all three techniques can yield satisfactory facial rejuvenation. **Botti *et al.*** similarly found that both SMAS and deep-plane facelifts, when performed with appropriate vector control and tissue handling, achieved high aesthetic satisfaction among patients and independent evaluators [20].

Our results also align with **Gupta *et al.***, who reported that consistent patient assessment, preoperative planning, and individualised surgical technique significantly improved outcomes regardless of the approach used [10].

Our study recorded a low overall complication rate, with only a few minor issues reported: haematoma (5%), ugly scar (5%), alopecia (5%), infection (5%), and ear malposition (5%). Importantly, no nerve injuries, contour deformities, or systemic complications were observed in any of the three groups. These findings reinforce the safety profile of modern facelift techniques when performed by experienced surgeons with attention to anatomical dissection planes and patient selection. Our deep-plane group had a slightly higher rate of hematoma and ugly scar (12.5 %) compared with the other techniques, but these differences were not statistically significant. **Botti *et al.*** and **Maricevich *et al.*** have identified hematoma as the most common complication following facelift surgery, with reported rates ranging from 1 % to 8 % depending on operative duration, patient age, and blood-pressure control [21,22]. The low incidence in our study may be attributed to effective intraoperative hemostasis and postoperative monitoring. Similarly, alopecia and infection were only observed in one case each, both in the endoscopic group. Endoscopic facelifts, while less invasive, may still pose unique risks related to trocar-insertion sites and tissue tension, particularly in the temporal region [14].

Our study notably encountered no facial-nerve injuries, contrasting with earlier reports that associate deep-plane facelifts with increased nerve-injury risk in less-experienced hands [11]. This absence likely reflects surgical proficiency and meticulous technique, suggesting that with appropriate training the deep-plane approach can be performed safely.

The principal strength of this study lies in its direct comparison of three distinct facelift techniques—SMAS plication, deep-plane, and endoscopic—across multiple clinical and aesthetic outcome measures, including operative time, patient satisfaction, adjunctive fat grafting, and complication rates. Furthermore, the follow-up period primarily addressed early postoperative outcomes; thus, longer-term surveillance is needed to assess the durability of results and the incidence of late complications.

CONCLUSION

Our study demonstrated that all three facelift techniques—SMAS plication, deep-plane, and endoscopic—can achieve high patient satisfaction and favorable aesthetic outcomes when appropriately selected based on patient age, facial aging patterns, and surgical goals. While deep-plane facelifts required longer operative times, they offered comprehensive tissue repositioning for older patients with more advanced aging. SMAS plication provided balanced results with minimal complications, and endoscopic facelifts were effective for younger patients seeking less invasive rejuvenation. Complication rates across all techniques were low, reinforcing their safety when performed with proper technique. Further research with larger samples and long-term follow-up is recommended to refine patient selection and optimize outcomes.

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