A Long-term Evaluation: Deep Plane versus High SMAS Face Lift

Marta Mariani, MD[1] Mariachiara Fabbri, MD[1] Pietro Luciano Serra, MD[2] Vittoria Murone, MD[3] Benedetta Scucchi, MD[4] Chiara Botti, MD[5] Giovanni Botti, MD[5]

[1] Department of Plastic and Reconstructive Surgery, Catholic University of Sacro Cuore, University Hospital A. Gemelli, Rome, Italy
[2] Plastic Surgery Unit, Department of Medical, Surgical and Experimental Sciences, University of Sassari, Sassari University Hospital Trust, Sassari, Italy
[3] Residency Program in Plastic Surgery, Azienda Ospedaliera Universitaria Federico II di Napoli, Napoli, Italy
[4] Residency Program in Plastic Surgery, Azienda Ospedaliera Universitaria di Padova, Padova, Italy
[5] Villa Bella Clinic, Salò, Italy

Address for correspondence Marta Mariani, MD, Department of Plastic and Reconstructive Surgery, Catholic University of Sacro Cuore, University Hospital A. Gemelli, Largo A. Gemelli 8, 00168, Rome, Italy (e-mail: martamariani37@gmail.com).

Facial Plast Surg

Abstract

In the last few years, the Deep Plane Face Lift (DPFL) has gained great popularity among plastic surgeons, even if its origins are traced back to the 1970s. Certainly, it could have some advantages but based on our experience, it can reveal some unpleasant features in the long term. For this reason, the senior authors have adopted the high superficial musculoaponeurotic system (SMAS) Face Lift for many years in their surgical practice. The goal of our study is to analyze the DPFL critical aspects in the long term and show how the High SMAS Face Lift (HSFL) technique can help to improve them.

Keywords

- facial rejuvenation
- cervicofacial lift
- high smas face lift
- deep plane face lift
- SMAS dissection

Since the beginning of the 20th century, the cervicofacial lift has consistently been a topic of major interest as a powerful rejuvenation tool, where the goal mirrored Webster's definition of rejuvenation, which is "to make young again."[1]

facial aging occurs through two main processes over the years: changes in skin texture (skin atrophy and its consequent "expansion," pigmentation, elastosis, etc.) and the progressive loss of tissue volume (fat pads and bone atrophy, fat ptosis, etc.).[2] Although in the early stages of aging and for limited defects, aesthetic medicine, and fat grafting can be useful tools to improve skin texture and soft and hard tissue atrophy, they alone are not capable of addressing the consequences of the passage of time.

The cervicofacial lift, potentially combined with ancillary procedures, has the power to restore a harmonious and tight skin envelope and reposition fat pads with satisfying results. Although there have been various modifications over the years, this procedure has ancient origins, and it is possible to identify two main categories of face lifts: superficial musculoaponeurotic system (SMAS) manipulation and SMAS dissection and elevation.[3] The aim of our study is to examine and compare the advantages, disadvantages, and long-term limitations of two of the main techniques belonging to this latter group: the Deep Plane Face Lift (DPFL) and the High SMAS Face Lift (HSFL).

History

The history of rhytidectomy begins in Europe with Eugene von Hollander, who is considered to have been the first to perform a face surgical "lift" on a Polish aristocrat in 1901, describing the procedure in 1912.[4] Since the 1960s, surgeons began to treat deeper tissues to improve their results.

In 1974, Skoog, a talented surgeon from Sweden, had the idea to lift the platysma muscle en bloc with the skin of the lower face, continuing the elevation into the neck. It is commonly believed that this is the birth of the Deep Plane rhytidectomy.[5]

In 1976, Mitz and Peyronie introduced and described the SMAS as a result of their anatomical studies on cadavers, validating Skoog's approach.[6] From that moment, many

Thieme Medical Publishers, Inc., 333 Seventh Avenue, 18th Floor, New York, NY 10001, USA

DOI https://doi.org/10.1055/a-2510-6495.
ISSN 0736-6825.

surgeons began exploring SMAS plication and imbrication techniques.[7,8] In 1989, Furnas outlined the ligaments of the midface, providing a deeper understanding of the supportive tissues of the face.[9]

A few years later, Hamra proposed a variation of Skoog's technique, describing his triplane rhytidectomy: a dissection of the upper face in the subcutaneous plane, the lower face in the sub-SMAS plane, and the neck in the preplatysmal plane.[10] However, he was not satisfied with the treatment of the melolabial folds, so he added the releasing of the SMAS from the zygomatic ligament, calling this technique the Extended Deep Plane Rhytidectomy.[11] To achieve a better result in the midface and avoid the lateral sweep, Hamra proposed the dissection of the orbicularis oculi, cheek fat, and SMAS en bloc from the malar eminence as a bipedicled flap, describing his Composite Rhytidectomy.[12–14] He realized that the superolateral vector along which the relaxed soft tissues of the anterior face were repositioned was inadequate to satisfactorily correct the midface and prevent the formation of unnatural folds in the lower cheek over time. In 1998, he further emphasized the importance of a vertical midface lift.[15,16]

A few years later, F. Barton, T. Marten, and R. Warren proposed a further evolution of the Deep Plane that allowed for tangible improvement in the malar region without necessarily requiring a more complex transpalpebral approach: the High SMAS technique, which is today one of the fundamental pillars of cervicofacial lifting techniques.[17,18]

High Superficial Musculoaponeurotic System versus Deep Plane Face Lift: Technical Considerations

It is therefore clear that the origins of the face lift can be traced back in time, and except for some variations and advancements, the main concepts remain the same. Nowadays, plastic surgeons around the world perform face lifts using two principal techniques: without SMAS dissection and with SMAS dissection. In our study, the two principal approaches of the latter group are taken in exam: High SMAS and Deep Plane Face Lift.

First, it should be noted that these two techniques are similar to each other, partially overlapping. In fact, the anterior part of the undermining is almost the same, in the "deep plane" under the SMAS, left partially attached to the fat and the skin of the medial part of the face. The SMAS incision in the HSFL is made at the level of the zygomatic arch, curving caudally in front of the tragus, and down into the neck. Then, the undermining is performed medially. It is necessary to specify how the temporofrontal branch of the facial nerve, after losing the protection of the parotid gland, crosses the zygomatic arch while remaining closely adhered to the periosteum. Then, it runs for a short distance between the periosteum and the superficial temporal fascia until it fully penetrates the fascial plane to innervate the frontalis muscle and the corrugator muscle. Based on these anatomical features, in the HSFL technique, it is possible to safely incise the SMAS flap at the level of the zygomatic arch without the risk of damaging the branch of the facial nerve that runs deeper. It is still preferable to perform the SMAS incision while holding the fascial tissue elevated with a forcep, to detach it from the underlying planes.

The Deep Plane enters the sub-SMAS plane at the level of a line that runs from the angle of the mandible to the lateral canthus or the malar prominence, which theoretically represents the transition zone between the fixed and the mobile SMAS, carrying out the dissection toward the nasolabial fold.[19] It is possible to observe how the SMAS incision in the DPFL is much more anterior compared with that of the HSFL. The difference between the two techniques lies in a triangle of SMAS (►**Fig. 1**), whose three sides are represented by:

1. The Deep Plane sub-SMAS access, previously described,
2. The High SMAS incision at the level of the zygomatic arch,

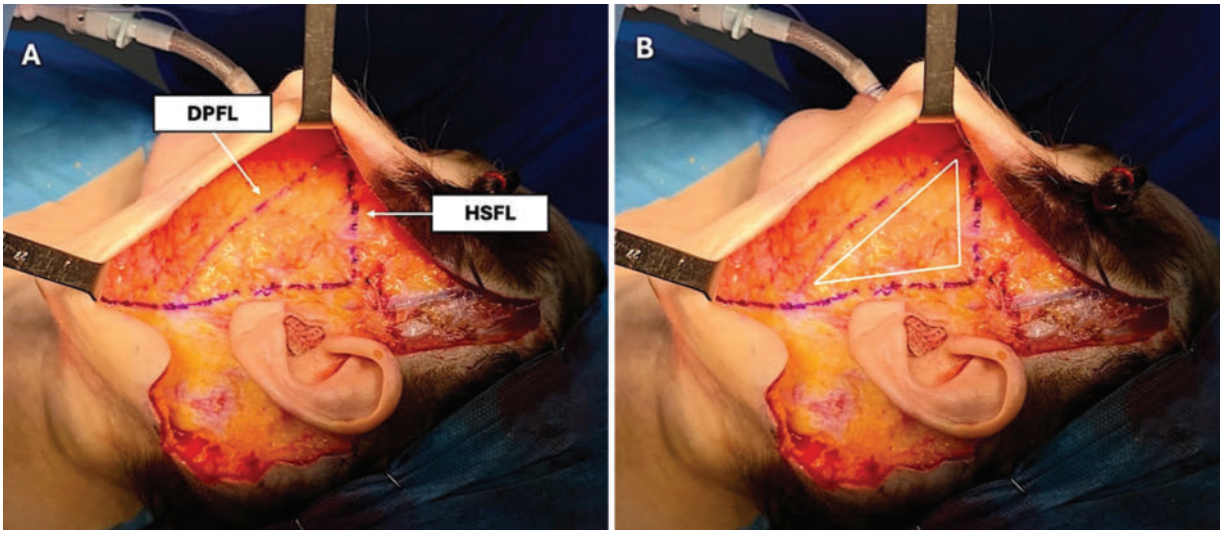

Fig. 1 (**A**) The HSFL entry point and the DPFL entry point in the sub-SMAS plane. The Deep Plane entry point is much more anterior compared with the High SMAS technique. (**B**) The typical SMAS triangle of the HSFL (in white), which allows for a longer SMAS flap with a greater effect on the midfacial tissues. DPFL, Deep Plane Face Lift; HSFL, high superficial musculoaponeurotic system face lift.

3. The High SMAS incision in front of the tragus.

This precious SMAS triangle, a peculiarity of the HSFL, acts in various ways:

1. It is a longer suspension structure for the anterior flap, and allows for the repositioning of tissues to solid anchor points (i.e., the deep temporal fascia) along a purely vertical vector, having a significant impact on the midface (**video 1)**[19]**;**
2. It ensures a wider area of adhesion;
3. The spare SMAS can be used to fill the temporal hollowness or to better define mandibular line and zygomatic arch;
4. The posterior incision runs in a completely safe area and the dissection on the parotid gland is easier for beginners.

Video 1

Note how the tension applied to the SMAS flap in the HSFL has an effective action on the midface. HSFL, high superficial musculoaponeurotic system face lift; SMAS, superficial musculoaponeurotic system. Online content including video sequences viewable at: https://www.thieme-connect.com/products/ejournals/html/10.1055/a-2510-6495.

In DPFL, the SMAS flap is shorter and more anterior, and the repositioning vector has a superolateral direction, therefore it can have a minimal effect on the midface. Additionally, being so short, it is not possible to anchor it to solid and stable points of fixation like the deep temporal fascia or the periosteum of the posterior third of the zygomatic arch through direct suturing; theoretically the only way to get a kind of midface lift is to use cable sutures, which are less effective and reliable.

Hooke's law has also been considered. It states that the force needed to extend or compress a spring by some distance is proportional to that distance. Many surgeons state that this law applies to the SMAS flap, where "the spring" is represented by the flap itself and "the force" is the stretching force applied during the lifting procedure.

In DPFL, the suspension points of the SMAS are near the drooping soft tissues in the anterior face and neck, which would imply, according to Hooke's law, a greater lifting action on those tissues if compared with the suspension points of the HSFL.[20] However, this part of the SMAS is not an extensible and compressible structure, so it does not behave like a spring. Therefore, this law cannot be applied in this circumstance and, regardless of whether the traction force is exerted in front of or behind a rigid tissue, the effect is the same.

Discussion

As mentioned before, the cervicofacial lift has ancient roots. In the last few years, a deep knowledge of face anatomy and some technical improvements have led to an increased popularization and practice of this surgical procedure. particularly, in recent times, the DPFL has gained good reputation among plastic surgeons, but it must be clear that this is not a late innovation, since Skoog began discussing it in 1974.[5]

For approximately 20 years, the senior authors have standardized their High SMAS face lift technique, which includes some fundamental steps and others that can vary based on the specific clinical case.

In our opinion, this technique has numerous advantages, particularly when compared with the DPFL. As highlighted in the previous paragraph, these two procedures have similar aspects, primarily accessing the deep plane (the sub-SMAS plane). However, there are also fundamental differences that must be considered to predict the final result and its longevity.

First of all, in the face, the DPFL accesses the sub-SMAS plane more anteriorly than the HSFL. This has various consequences: the effect on the midface is poor because the suspension of the SMAS flap is performed along a superolateral vector; furthermore, it is impossible to anchor this flap directly to rigid and solid tissues, like the deep temporal fascia.

Over the years, these last two factors combined can lead to the generation of unpleasant deformities, as the lateral sweep, turning a satisfactory result into a poor one for both the patient and the surgeon. For this reason, as early as 1992, Hamra described his "composite rhytidectomy" to avoid the lateral sweep and achieve a better result on the midface.[15] To avoid this type of problem more easily, it is possible to resort to the HSFL, which allows the SMAS flap to be lifted along a purely vertical vector.

In the neck, the HSFL is usually performed with a limited skin undermining, while the deep dissection, under the platysma, is extended till the midline, joining the two contralateral sides (►**Fig. 2**). This gives rise to a single large flap, which is composite in the anterior portion, consisting of muscle, supraplatysmal fat, and skin. The dissection under the platysma muscle is performed using the Trepsat dissector, a blunt instrument that allows for gentle and delicate undermining, preserving the cervical branches of the facial nerve. Despite the extensive dissection performed by the authors, only two cases of temporary paresis of the platysma muscle have been reported in the last 10 years out of 827 face lift surgeries. The observed symptoms were mild and resolved spontaneously within 3 months following surgery. This procedure can be combined with an anterior approach, through which the treatment of the medial edges of the platysma can be performed (the senior authors' preferred technique is Z-plasty), as well as the so-called "deep neck surgery" (treatment of the submandibular glands, digastric muscles, retroplatysmal and interdigastric fat, perihyoid fascia, etc.).

So, in our view, the SMAS flap of the HSFL must be composed of a wide cervicofacial adipo–fascio–muscular layer of soft tissues, including the dense adipose tissue covering the lip elevators, the fascial tissue of the lower cheek, and the platysma muscle.[21] The flap is then anchored to solid and stable points:

- The lower part (the muscular one, often the same in the DPFL) is repositioned in a superolateral direction, fixing it

Fig. 2 The High SMAS flap. (1.) Melo Fat Pad undermined with the SMAS. (2.) Connective–fascial zone. (3.) Transition zone between the connective–fascial part and the platysma muscle. SMAS, superficial musculoaponeurotic system.

to the mastoid periosteum, to the aponeurosis of the sternocleidomastoid muscle, and to the Loré fascia;

- The upper part (adipose–fascial) is attached to the periosteum of the posterior third of the zygomatic arch, the deep temporal fascia, and the paracantal periosteum, with a vertical repositioning vector. In the DPFL instead, the upper part of the SMAS flap is anchored to the "fixed" SMAS of the parotid region, thus to a less solid and stable structure, and eventually to the deep temporal fascia through cable sutures along a wrong superolateral vector.

It is therefore crucial that the suspension vector of the face SMAS flap in the HSFL must be vertical and that the soft tissues are firmly anchored to solid points to prevent tissue sagging over time and the stigmata of the performed procedure. The High SMAS technique ensures these two factors, in addition to having an effective action on the midface thanks to the well-known SMAS triangle, previously examined, thus guaranteeing a stable, predictable, and long-lasting result (►**Figs. 3**–**5**). For these reasons, it has become the technique of choice for the senior authors.

Conclusion

Face lift surgery has always been considered one of the most interesting and effective surgical procedures. Several techniques have followed over the years, the HSFL and the DPFL

Fig. 3 (**A**, **C**) Preoperative and (**B**, **D**) 1-month postoperative views of a 64-year-old woman who underwent an HSFL. Notice the effect on the midface and nasolabial fold. HSFL, high superficial musculoaponeurotic system face lift.

are two of the main ones. In our study, their characteristics and the resulting long-term outcomes have been evaluated, stating that to avoid sequelae such as the lateral sweep, HSFL represents the most suitable technique.

Patient Consent

The patients provided written consent for the use of their images.

Fig. 4 (**A**, **C**) Preoperative and (**B**, **D**) 12-month postoperative views of a 70-year-old woman who underwent an HSFL. Notice improvement in the jaw line. HSFL, high superficial musculoaponeurotic system face lift.

Fig. 5 (**A**, **C**) Preoperative and (**B**, **D**) 24 months postoperative views of a 61-year-old woman who underwent an HSFL and platysma bands treatment (anterior approach) with Z-plasty. Notice improvement in the anterior neck. HSFL, high superficial musculoaponeurotic system face lift.

Conflict of Interest

None declared.

References

1 Hamra ST. Building the composite face lift: a personal odyssey. Plast Reconstr Surg 2016;138(01):85–96
2 Botti G, Botti C. Midface lift: our current approaches. Handchir Mikrochir Plast Chir 2014;46(04):224–233
3 Avashia YJ, Stuzin JM, Cason RW, Savetsky IL, Rohrich RJ. An evidence-based and case-based comparison of modern face lift techniques. Plast Reconstr Surg 2023;152(01):51e–65e
4 Holländer E. XVII. Die kosmetische Chirurgie. In: Joseph M, ed. Handbuch der Kosmetik. Leipzig: Verlag von Veit; 1912:668
5 Skoog T. Plastic Surgery: New Methods and Refinements. Philadelphia: W.B. Saunders; 1974
6 Mitz V, Peyronie M. The superficial musculo-aponeurotic system (SMAS) in the parotid and cheek area. Plast Reconstr Surg 1976;58 (01):80–88
7 Rees TD, Aston SJ. A clinical evaluation of the results of submusculo-aponeurotic dissection and fixation in face lifts. Plast Reconstr Surg 1977;60(06):851–859
8 Webster RC, Smith RC, Papsidero MJ, Karolow WW, Smith KF. Comparison of SMAS plication with SMAS imbrication in face lifting. Laryngoscope 1982;92(8 Pt 1):901–912
9 Furnas DW. The retaining ligaments of the cheek. Plast Reconstr Surg 1989;83(01):11–16
10 Hamra ST. The tri-plane face lift dissection. Ann Plast Surg 1984; 12(03):268–274
11 Hamra ST. The deep-plane rhytidectomy. Plast Reconstr Surg 1990;86(01):53–61, discussion 62–63
12 Mangat DS, Frankel JK. The history of rhytidectomy. Facial Plast Surg 2017;33(03):247–249
13 Hamra ST. Composite rhytidectomy. Plast Reconstr Surg 1992;90 (01):1–13
14 Hamra ST. Repositioning the orbicularis oculi muscle in the composite rhytidectomy. Plast Reconstr Surg 1992;90(01):14–22
15 Hamra ST. Frequent face lift sequelae: hollow eyes and the lateral sweep: cause and repair. Plast Reconstr Surg 1998;102(05): 1658–1666
16 Hamra ST. The zygorbicular dissection in composite rhytidectomy: an ideal midface plane. Plast Reconstr Surg 1998;102(05): 1646–1657
17 Barton FE Jr. The "high SMAS" face lift technique. Aesthet Surg J 2002;22(05):481–486
18 Marten TJ. High SMAS facelift: combined single flap lifting of the jawline, cheek, and midface. Clin Plast Surg 2008;35(04):569–603, vi–vii
19 Botti C, Botti G. Facelift 2015. Facial Plast Surg 2015;31(05): 491–503
20 Jacono A, Bryant LM. Extended deep plane facelift: incorporating facial retaining ligament release and composite flap shifts to maximize midface, jawline and neck rejuvenation. Clin Plast Surg 2018;45(04):527–554
21 Minelli L, Brown CP, Warren RJ, van der Lei B, Mendelson BC, Little JW. Lifting the anterior midcheek and nasolabial fold: introduction to the melo fat pad anatomy and its role in longevity and recurrence. Aesthet Surg J 2023;43(09):941–954