Facial Nerve Considerations for the Deep Plane Facelift and Neck Lift

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Abstract

The surgical approach to facial rejuvenation has evolved significantly over the last century. As surgeons have deepened their understanding of facial anatomy over the last half century, so have their surgical approaches to the rhytidectomy, with increasingly extensive manipulation of the underlying soft tissue in the face. While these procedures have become more comprehensive and natural in their approach, the risk of temporary facial palsy also appears to be on the rise. In this text, we review the technique for deep plane facelifts and neck contouring with an emphasis on the facial nerve anatomy and methods to preserve the intricate facial nerve network during tissue dissection and modification. Careful execution of the surgical steps involved, including deep neck contouring, SMAS (superficial musculoaponeurotic system) suspension, and skin management, is essential to achieve the authentic aesthetic outcomes that patients desire while ensuring patient safety.

Keywords
- deep plane facelift
- rhytidectomy
- facelift
- neck lift
- facial nerve

Face and neck lift surgery serve as a key component of aesthetic facial rejuvenation, aiming to address the visible signs of aging and to restore a more youthful appearance. As individuals age, various factors such as gravity, loss of skin elasticity, bony resorption, buccal fat and submandibular gland (SMG) ptosis, facial fat atrophy, and volume depletion contribute to the development of sagging skin, deepening wrinkles, jowls, and change in the overall shape of the face.[1] The purpose of the rhytidectomy and its adjunctive procedures is to reverse these effects by repositioning the underlying facial tissues, removing excess skin, and enhancing facial contours.

As surgeons have deepened their understanding of facial anatomy over the last half century, so have their surgical approaches to the rhytidectomy, with increasingly extensive manipulation of the underlying soft tissue in the face that is intimately associated with facial nerve anatomy. The original facelift techniques involved skin-only lifts of the face that were associated with minimal risk to the facial nerve.[2–5] In the 1970s, Skoog performed the first sub-SMAS facelift, using the skin and platysma as a musculocutaneous advancement flap, thus entering an area just adjacent to the midface and lower branches of the facial nerve.[6] In the 1990s, Hamra first described the deep plane facelift (DPFL), which extended the Skoog dissection superiorly over the zygomaticus muscles and medially beyond the nasolabial folds.[7] Marten further refined the facelift by incorporating deep neck contouring techniques, such as removal of the SMGs and digastric muscles, which are located near the marginal mandibular and cervical branches of the facial nerve.[8,9]

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The successful outcome of any facelift technique depends on both achieving the desired aesthetic results and on preserving the intricate facial nerve network. Facial nerve injury is perhaps the most critical concern during facelift surgery, as it can lead to undesirable functional and cosmetic outcomes. The facial nerve exits the stylomastoid foramen and enters the body of the parotid gland before bifurcating into an upper and lower division, ultimately separating into multiple branches that innervate the various facial muscles (►**Fig. 1**). A 2019 meta-analysis examining 183 studies spanning four decades found the overall risk of temporary facial nerve injury in the rhytidectomy to be between 0.69 and 1.85% depending on the surgical technique, with resolution in a large majority of cases.[10] However, the exact rates of facial nerve injury in the modern era may be greater as more surgeons adopt the use of DPFLs and aggressive nerve contouring with subplatysmal dissection and SMG modification. Benslimane et al showed that transient weakness of the marginal mandibular nerve (4.7%) was the most commonly reported complication in a systematic review of 6 studies and 602 patients who underwent SMG resections.[11] While there were no significant issues reported, such as enduring motor nerve damage or persistent dry mouth, it is worth noting that SMG resection does elevate the short-term postoperative complication risk. While this might not be a concern for certain patients and surgeons, it could exceed the acceptable level of risk for others considering an elective aesthetic procedure. In our practice, we are routinely referred patients who have permanent facial nerve injuries secondary to rhytidectomy by experienced and well-trained surgeons. Understanding facial anatomy and employing appropriate surgical approaches is therefore crucial to minimize the risk of facial nerve injury.

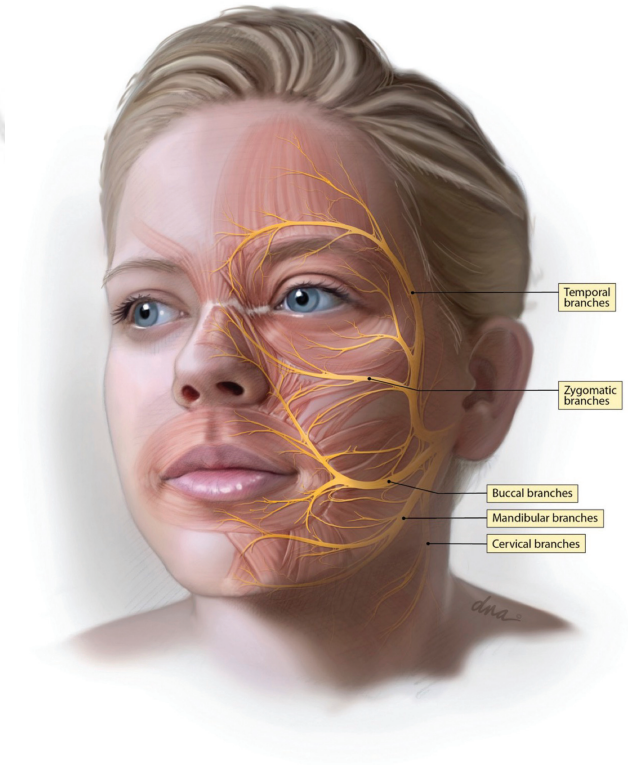

Fig. 1 Facial nerve anatomy with an initial upper and lower division bifurcation and downstream branches that innervate the facial muscles.

In this text, we explore the various facial nerve safety pearls uncovered by the senior author (B.A.) in his experience with DPFL and neck contouring. In particular, his experience with the modified selective neurectomy, which was developed as a treatment for patients with post-facial paralysis synkinesis, has given tremendous insight into the peripheral branches of the facial nerve and their neural relationships to facial musculature.[12]

Preoperative Evaluation

A thorough analysis of the face and neck, including examination of the patient's prior facial and periorbital surgical history, is crucial. The revelation of any of these relevant previous procedures, including facelifts or eyelid surgeries, provides vital insights into any anatomical variations and potential challenges we may encounter during the DPFL. Revisional surgery in particular adds an additional level of complexity to the surgical procedure. One of the primary difficulties associated with revision rhytidectomy lies in the potential additional risk of facial nerve injury due to alteration of the facial skin, SMAS, and facial nerve landmarks. In revision procedures, it is common for the facial nerve branches to deviate from their normal anatomical position. Because the SMAS is often thinner or even absent, the facial nerve is left more exposed and situated in a shallower layer. Additionally, the presence of scar tissue can obscure dissection planes, making the surgical procedure more challenging. Extra precautions need to be taken when performing revision rhytidectomy (particularly in the deep plane approach) to prevent the devastating sequelae of facial palsy. Noninvasive treatments such as energy-based tightening devices and fillers can also add complexity to the surgical dissection.

While liposuction of the submental subcutaneous fat has long been a focal point for facelift surgeons, in recent years, the deep neck subplatysmal fat compartment has emerged as a crucial region for ensuring a more youthful neck contour. Furthermore, the platysma muscle is not only a source of aging changes via banding and laxity, but also a critical component in managing the neck and deep neck as it separates the subcutaneous fat layer and deep neck components. Lastly, the SMGs have emerged as critical structures that may require modification to address the neck contours. The SMG and its intimate association with the facial nerve has become one of the most controversial topics in facial rejuvenation.

Surgical Technique

Surgical Preparation

On the day of surgery, we mark the relevant incisions and surgical landmarks prior to local infiltration. This is done with the patient in an upright position to prevent distortion. The incisions are reviewed with the patient prior to proceeding to ensure an appropriate understanding of the procedure.

In our practice, the majority of rhytidectomies are performed under general anesthesia at an ambulatory surgery center. Although twilight sedation is an excellent and safe approach to performing facial surgery, we typically do not use lidocaine in our local anesthesia injections for most primary and revision rhytidectomy procedures. This ensures precise control of facial nerve stimulation during surgery. In revision rhytidectomy and patients with extremely thin emaciated face, we utilize facial nerve monitors and have facial nerve stimulators available for an added level of safety.

Technical Considerations for Facial Nerve Safety

Deep Neck Modification

When performed in the appropriate plane, suction-assisted lipectomy does not pose any risk to the facial nerve. For deep neck modification, a submental incision (3–6 cm) is almost always utilized for access. In primary rhytidectomy cases where patients exhibit medium to thick skin, a standard subcutaneous sharp dissection is feasible. However, in revision cases where the skin and soft tissue envelope may be compromised or irregular, blunt dissection at the junction of the platysma and skin is performed to create a robust skin flap. After achieving broad exposure of the bilateral medial platysmal borders, subplatysmal undermining can be safely performed using blunt dissection or hot cautery to approximately 4 to 5 cm inferior to the mandible and to the SMG.

It is critical to know the course of the nerves that innervate the depressor labii inferioris (DLI) when performing any type of deep neck surgery or DPFL. The DLI is responsible for depressing the lower lip and is critical for both full denture smile and facial expressions when people are conversing. While conventional anatomy teachings have emphasized the "marginal mandibular nerve" as the primary source of innervation for DLI activity, our experience has revealed the involvement of two nerves. This includes a branch of the marginal mandibular nerve, responsible for lateral depression of the lower lip along the lower border of the mandible, and a more dominant nerve that takes off from the cervical branch. The latter occasionally adheres closely to the platysma muscle, particularly in its lateral aspect as the nerve exits the parotid gland. This branch ascends into the DLI near the midportion of the body of the mandible. The facial nerve is protected anterior and medial to the SMG.

Conducting supraplatysmal dissection in the submental neck and lateral neck mitigates any risk to the lower branches of the facial nerve. If subplastymal dissection is performed, hot cautery should be avoided laterally given the intimate adherence of the nerve to the platysma. The deep subplatysmal fat compartment can be reduced as needed using hot cautery to the digastric muscle, down to the hyoid and laterally to the SMG. SMG modification can be safely done in cases of severe gland ptosis via an intracapsular dissection with little risk to the facial nerve. Digastric muscles should be modified judiciously, and in our experience required in only a minority of patients. Following these adjustments to the deep neck fat compartment and SMG, a 3-cm platysma myotomy is executed at the level of the desired cervical mental angle. After addressing the deep neck fat compartment, a platysma hammock suspension is created with a midline corset platysmaplasty and suspension of the platysma to the mastoid region. This improves the cervicomental angle and provides support to the SMGs. Importantly, this technique addresses ptotic SMGs without increasing the risk of sialocele or facial nerve injury.

Deep Plane Facial Dissection

After planning the appropriate incision tailored to patient factors, the facial skin flap is elevated in a subcutaneous plane, extending approximately 4 to 6 cm in the facial and lateral cervical regions. This elevation length is minimized to maximize skin vascularity and reduce the risk of skin necrosis. To mark the SMAS entry plane, a path is traced from the lateral canthus to the angle of the mandible, staying anterior to the anticipated path of the frontal nerve (►**Fig. 2**). This demarcation also signifies the initiation of the more mobile medial SMAS. Some aging patients or those with prior surgeries may have particularly thin or absent SMAS, and subcutaneous dissection may inadvertently breach the deeper layers. Awareness of the dissection plane is essential to avoid unintended facial nerve transection, as the entry point could intersect with the facial nerve if the surgeon is unaware of SMAS thickness. By positioning the incision anterior to the SMAS incision along the level of the zygomatic arch, typically at the level of the orbicularis oculi muscle, surgeons can create a safe corridor that avoids the frontal branch. A "low SMAS" entry point below the zygomatic arch can also be done safely; however, this is not ideal since it is not in the mobile portion of the SMAS. A "high SMAS" should be avoided as the frontal branch to the frontalis and corrugator can easily be injured if the plane of dissection is mismanaged.

A 10-blade is used to enter the deep plane. Once the SMAS is entered, initial undermining can take place bluntly at the level of the masseteric fascia with the release of the masseteric cutaneous ligaments. The masseteric fascia is the easiest and safest area to enter the deep plane, especially as facial nerve branches run deep to this clearly visible fascia (►**Fig. 3**). Sub-SMAS elevation in this area can proceed medially to the level of the facial artery. Superiorly, the SMAS entry is performed above the orbicularis oculi muscle extending medially over the prezygomatic space to the nasal facial crease. In this region, the zygomatic branch innervates the lower eyelid, with extensive branching beneath the immediate undersurface of the orbicularis oculi muscle. Suborbicularis dissection, while sometimes necessary to release the orbitomalar ligaments, can temporarily or permanently denervate the inferior orbicularis muscle, potentially leading to lower lid malposition, especially when combining DPFL with transcutaneous lower blepharoplasty. At this juncture, the zygomatic ligaments (McGregor's patch) can be released safely by staying superficial to the zygomaticus major muscle. The dissection needs to be performed on top of the zygomatic muscles and then continue down to the previously dissected masseteric region to avoid inadvertently going under the zygomaticus major and injuring the zygomatic facial nerve.

Fig. 2 The SMAS entry plane is traced from the lateral canthus to the angle of the mandible, staying anterior to the anticipated path of the frontal nerve.

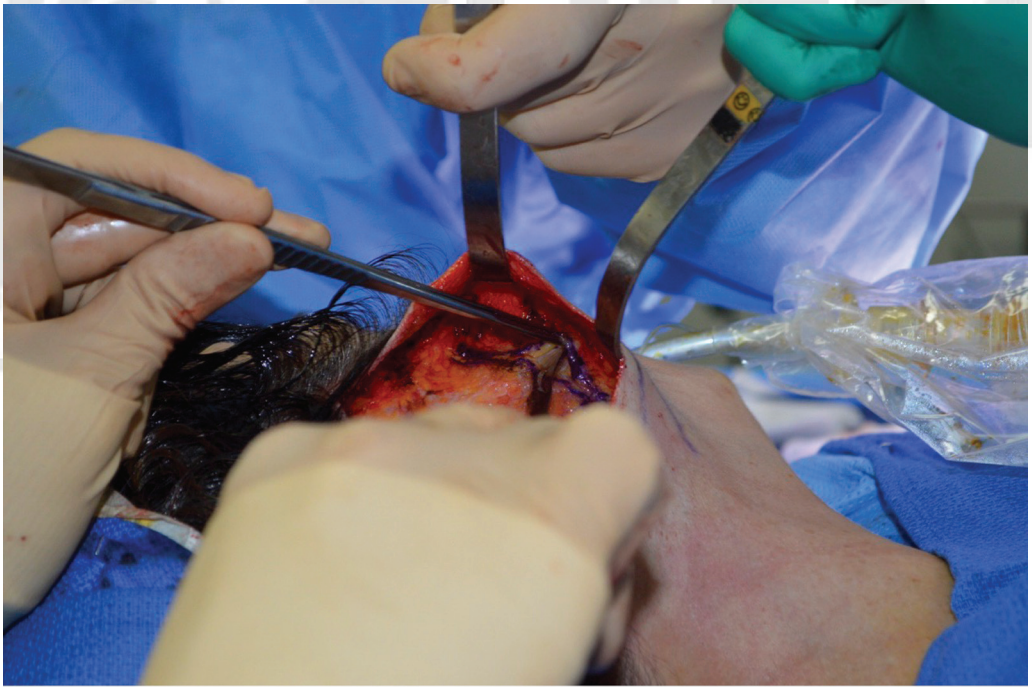

Fig. 3 Entry into the deep plane at mandibular body, ensuring dissection that is superficial to the masseteric fascia to avoid facial nerve branches that run deep.

In the neck, the SMAS/platysma entry incision is extended approximately 5 cm inferiorly to the anterior border of the sternocleidomastoid (SCM) muscle. Subplatysmal dissection commences with the release of cervical retaining ligaments along the anterior aspect of the SCM, facilitating maximal control and mobility of the platysma flap. The dissection then proceeds medially, often extending to our prior submental dissection. The use of blunt dissection is emphasized in this region due to the potential intimate adherence of the facial nerve branches to the deep surface of the platysma; hot cautery is specifically avoided in this area.

Facial Suspension and Reshaping

Upon completion of sub-SMAS and subplatysmal dissection, the buccal fat pad and the overlying buccal branches of the facial nerve become obviously visible for modification

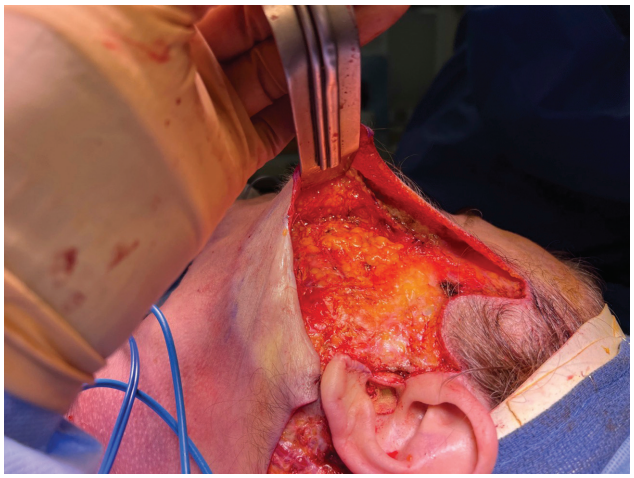

Fig. 4 The buccal fat pad and the overlying buccal branches of the facial nerve become visible upon completion of sub-SMAS and subplatysmal dissection.

(►**Fig. 4**). After the buccal branch has been clearly identified, the buccal fat pad can then be teased out bluntly and modified as needed through reduction and/or repositioning with minimal risk to the facial nerve (►**Fig. 5**). Suture suspension is often used to prevent future postoperative ptosis into the mandibular jowl region. At this point, the SMAS and platysma are suspended. If the platysma requires horizontal transection below the angle of the mandible, care must be taken to avoid small branches of the facial nerve that can innervate the lateral DLI (►**Fig. 6**).

Postoperative Management

The success of facelift surgery extends beyond the operating room and into the postoperative period. Proper postoperative care is crucial to ensure optimal healing, manage complications, and maintain the desired cosmetic results over time (►**Fig. 7**). After facelift surgery, routine follow-up appointments play a crucial role in monitoring the patient's progress and addressing any immediate concerns. While facial nerve injuries during facelift surgery are relatively rare, diligent observation for any signs of nerve dysfunction

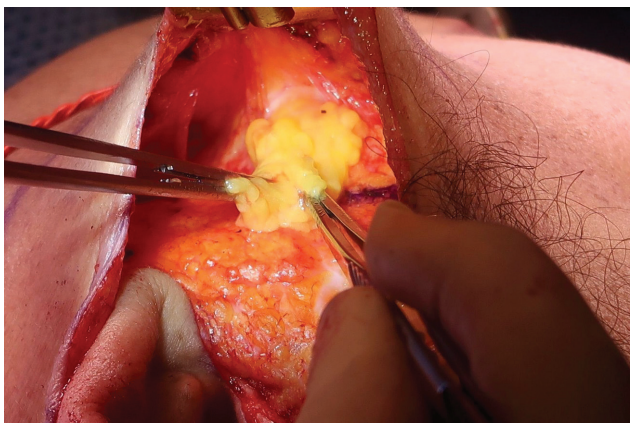

Fig. 5 Modification of the buccal fat pad can occur through reduction, repositioning, or suspension.

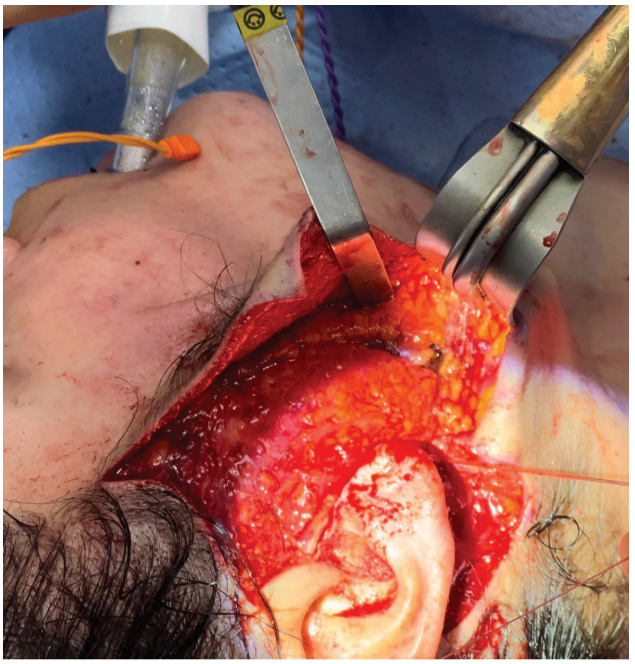

Fig. 6 Transection of the platysma just below the angle of the mandible. This occurs once the facial SMAS is suspended and secured. The inferior aspect of the platysma is secured to the mastoid fascia to create a soft shadow between the mandibular body/angle and neck, while the lateral aspect is suspended to complete the platysmal hammock suspension that addresses ptotic SMGs. SMG, submandibular gland.

postoperatively is paramount. Management of iatrogenic facial palsy typically involves observation and reassurance, as most cases tend to resolve spontaneously within a few weeks or months. The most commonly observed facial nerve issues are weakness of the DLI followed by weakness of the frontalis muscle. Subtle midface weakness can also be observed. These issues are typically secondary to neuropraxia and are usually observed conservatively. Full midface weakness where the nasolabial fold is effaced requires a more diligent evaluation and possible exploration for a true neural transection or suture constriction. Nerve coaptation or release of deep SMAS sutures may be required.[13] Long-term issues such as permanent frontalis and DLI weakness must be managed on a case-by-case basis with contralateral selective neurectomy or neuromodulators that create an optical illusion of symmetry.[12] Long-term midface paralysis or synkinesis may require comprehensive facial reanimation procedures such as modified selective neurectomy, gracilis free tissue transfer, masseteric facial nerve transfer, and/or cross-facial nerve grafts.[12,14–16]

Conclusion

The surgical approach to facial rejuvenation has evolved significantly over the years. Surgeons have deepened their understanding of facial anatomy, leading to advanced face and neck lift techniques that involve more invasive manipulation of underlying soft tissues such as the deep plane rhytidectomy and aggressive neck contouring. While these procedures have become increasingly comprehensive and

Fig. 7 Preoperative oblique (**A**) and lateral (**C**) views with 5-month postoperative oblique (**B**) and lateral (**D**) views of a 57-year-old woman after a revision deep plane facelift with deep neck contouring, submandibular gland excision, buccal fat repositioning, and upper lip lift.

natural in their approach, the risk of temporary facial palsy also appears to be on the rise. Henceforth, a deeper understanding of the facial nerve anatomy pertaining to these newer techniques and the use of appropriate surgical approaches are essential to minimize the risk of facial palsy and to increase patient satisfaction. The following eight pearls of surgical technique summarize the senior author's experience in this area.

1. Consider the use of facial nerve monitoring and avoid the use of lidocaine to precisely assess facial nerve function during DPFL, especially in patients with thin skin or who are undergoing revision surgery.
2. When dissecting the submental neck, a supraplastysmal approach mitigates the risk of injuring the nerve branches innervating the DLI.
3. Subplatysmal submental dissection can be undertaken safely by staying anterior and medial to the SMG. SMG modification must be done within its capsule. Hot cautery is safe for this region.
4. Lateral subplatysmal dissection can be performed safely with blunt dissection (e.g., with a trepsat dissector or vertical spreading with scissors).
5. The most robust area to enter the deep plane is through the masseteric fascia at the level of the mandibular body.
6. Superiorly, the SMAS incision should be initiated typically at the level of the orbicularis oculi muscle to create a safe corridor that avoids the frontal branch.
7. To minimize the risk of damaging the zygomatic branch during facial dissection, it is advised to stay on top of the zygomatic muscles. The sub-SMAS dissection to midface must be performed from superior (at level of orbicularis/zygomaticus major) to inferior (masseteric) to minimize zygomatic branch contact as it courses to the underbelly of the zygomatic major muscle.
8. To mitigate the risk of lower lid malposition in cases with combined DPFL and lower blepharoplasty, we typically avoid suborbicularis dissection.

Altogether, these techniques emphasize tissue dissection and modification, with a special focus on preserving the intricate facial nerve network. Careful execution of these surgical steps, including deep neck contouring, SMAS suspension, and skin management, all play a vital role in safely achieving the authentic aesthetic outcomes that patients desire.

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Conflict of Interest
None declared.

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