Surgical Approach to the Thick Nasolabial Folds, Jowls and Heavy Neck—How to Approach and Suspend the Facial Ligaments

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Abstract

Patients with thick skin typically present with a redundant, baggy, lax skin envelope together with prominent nasolabial folds, jowls, and a heavy neck. Durable and natural-appearing rejuvenation is not possible unless the deformities are addressed adequately and harmoniously in these patients. Traditional superficial musculoaponeurotic system techniques do not include surgical release of the zygomatic cutaneous ligaments and repositioning of descendent malar fat pad, and may lead to an unbalanced, unnatural appearance and the lateral sweep phenomenon. Additional attempts to improve unopposed nasolabial folds such as fat grafting to malar region are more likely to result with a "stuffed" look, far from a natural and rejuvenated appearance, and must therefore be avoided. The facelift techniques including true release of the anchoring ligaments of the midface and allowing adequate repositioning of saggy tissues are ideal for these patients to obtain harmonious, natural result. Despite the extensive dissections, maximal release, and maximal lateral pull, additional maneuvers, e.g., platysmaplasty, subplatysmal fat removal, or partial resection of submandibular glands may be required for satisfying result in patients with heavy neck. In this article, the authors outline the relevant anatomy of the facial retaining ligaments and their implications to surgical management of patients with heavy skin are discussed.

Keywords
- facelift
- neck lift
- nasolabial fold
- thick skin
- heavy neck

The ultimate goal in facelifting is to create a harmonious, natural, and younger looking face. To achieve this, the surgeon must address each and every aspect of the face separately while envisaging it as a whole. Every patient has unique facial features; therefore, patient-customized techniques tailored according to the needs of each patient must be applied. Thick-skinned patients typically present with heavy faces that include a redundant, baggy, lax skin envelope together with prominent nasolabial folds, jowls, and a heavy neck. These are the signs of bad prognosis for facelift surgery with suboptimal results and less durability over time and are prone to revision tuck-up surgeries. Informing the patient on the limitations of the surgeries due to their specific condition, offering more aggressive techniques with additional maneuvers, and providing realistic expectations are extremely important. Durable and natural-appearing rejuvenation is not possible unless the deformities are addressed adequately and harmoniously in these patients.

To achieve long-term successful results in facelifting, the surgeon should understand facial soft tissue anatomy and the changes associated with aging. Comprehending the anatomy and relationship of the ligaments to neighboring vital structures is of upmost importance for adequate release and unopposed repositioning of descended tissues with natural result

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for the patients with thick skin. In this article, we outline the relevant anatomy of the facial retaining ligaments, the aging process and its implications for surgical management of patients with heavy skin.

Relevant Anatomy of Facial Retaining Ligaments

Facial retaining ligaments are structures that anchor the dermis and all structures in between (including the superficial musculoaponeurotic system [SMAS] and subcutaneous fat) to the underlying bony periosteum or deep fascia. The zygomatic cutaneous, mandibular cutaneous, and orbitomalar ligaments are examples of osteocutaneous ligaments that originate from periosteum and insert directly into the dermis. The masseteric cutaneous ligaments and parotid cutaneous ligaments are formed as a condensation between the superficial and deep fascia. The role of these ligaments is to support facial soft tissue against forces of gravity. The attenuation of support of these ligaments leads to the downward displacement of facial fat compartments into the plane between the superficial and deep facial tissues of the face responsible for many of the stigmata that occur with aging (►**Fig. 1**). These strong attachments (e.g., zygomatic cutaneous and masseteric cutaneous ligaments) prevent the transmission of traction to the malar portion of the dissection during traditional low SMAS facelift techniques.[1–5]

The strongest of these ligaments are the zygomaticocutaneous ligaments, which are horizontally located between the junction of the zygomatic arch with the body of the zygoma and medial to the medial border of the zygomaticus minor muscle and adhere the overlying malar soft tissue to the zygomatic bone. The major concern in the midface is the inferior displacement of the malar fat pad, which leads to formation of the nasolabial fold (►**Fig. 1**). The position of the malar fat pad is strongly linked to the strength of these ligaments. Laxity during the aging process contributes to the heaviness of the nasolabial groove and the ligament acts as a counter-traction vector during rejuvenation surgery.[5–9]

The masseteric cutaneous ligament is a vertically orientated structure that is located around the anterior edge of the masseteric muscle. This—along with zygomatic ligaments—form the shape of an inverted L. Vertical distance between these two ligaments is approximately 1 cm and the fact that the upper zygomatic subbranch of the facial nerve passes between the major zygomatic cutaneous ligament (ZCL) and upper masseteric cutaneous ligament (MCL) makes it a dangerous location during surgery for the surgeon. The upper zygomatic nerve is immediately inferomedial to the zygomatic ligament and immediately caudal to the lower border of the zygoma while the lower zygomatic nerve is immediately inferomedial to the upper masseteric retaining ligament [1,10,11] (►**Fig. 2**).The weakening of masseteric ligaments attributes to the inferior descent of the platysma, subcutaneous jowl fat, and skin over the inferior mandibular border leading to jowling[5–9] (►**Fig. 1**).

The mandibular cutaneous ligament is a true osteocutaneous ligament that arises from the inferior border of the anterior mandible. Especially important to this ligament is its close

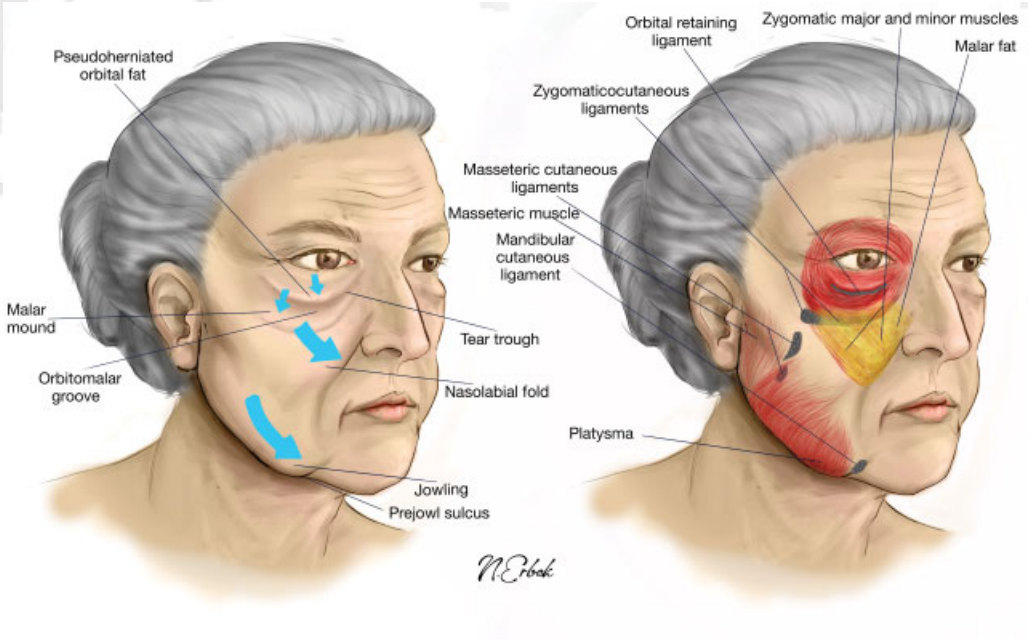

Fig. 1 (**a**) Vectors of aging: Aging-related changes and the vectors in which they move are depicted—jowls, the midface along with the malar fat pad move inferomedially and form the nasolabial folds whereas periorbital aging vectors occur in a mostly inferior or inferolateral vector. (**b**) Underlying anatomy: Attenuation of the retaining ligaments in this figure lead to the age-related changes shown in (**a**). The periorbital orbicularis oculi fibers, orbital retaining ligament, and zygomatic ligament are marked. These two ligaments—anteriorly bounded by orbicular fibers—form the prezygomatic space. Inferiormost fibers of the MOO cover the origin of the zygomatic muscles. Superiormost part of the malar fat pat is the triangular-shaped thickening of soft tissue, which is anchored by the zygomatic ligaments. During aging the malar fat pat descends inferomedially along with the midface and accentuates the nasolabial folds. The weakening of masseteric ligaments attributes to jowling formation. Jowling occurs posterior to the mandibular ligament. (Illustrated by Nurbike Erbek).

Fig. 2 Locations of facial retaining ligaments and their relation with facial nerve branches: Origins of the retaining ligaments have been marked with ink during dissection and circled on the photo for demonstration. Parotidomasseteric fascia is elevated to show the nerves. Zygomatic ligaments (circled in red) are located along the inferior edge of the zygomatic bone. Masseteric ligaments (circled in blue) are positioned vertically along the anterior border of the masseteric muscle. These two structures form an inverted L-resembling structure. Purple pin shows inferiormost fibers of orbicularis oculi muscle, and white pin shows zygomatic major muscle (also colored with blue ink). Yellow-colored structures are the facial nerve subbranches: The upper zygomatic nerve is inferomedial to the zygomatic ligament and immediately caudal to the lower border of the zygoma lying between the zygomatic and uppermost masseteric ligaments. The lower zygomatic nerve is immediately inferomedial to the upper masseteric ligament. Another facial subbranch resides just above the buccal (Bichat's) fat pad (black asterisk). The route of the marginal nerve—the inferiormost facial subbranch located on the cadaver face—follows the facial artery (red colored) and facial vein (blue colored) and is in close proximity to the mandibular ligament (green colored).

proximity to marginal mandibular nerve (►**Fig. 2**). According to Huettner et al, [12] the mandibular ligament is located in the parasymphyseal area 67.8 ± 3.3 mm from the horizontal line constructed from the gonial angle along the inferior border of the mandible and the marginal mandibular nerve is consistently 9.7 ± 1.2 mm superior to the ligament.[12] Attenuation of mandibular cutaneous ligaments contributes to the formation of jowls, prejowl sulcus, and marionette lines (►**Fig. 1**).[10,12]

The orbicularis retaining (orbitomalar) ligament is an osteocutaneous structure that originates at the inferior orbital rim and inserts into the dermis of the skin at the anatomic junction of the lid and cheek. It anchors the orbicularis oculi to the inferior orbital rim. As the aging process continues, the weakening of this ligament leads to the downward displacement of midcheek soft tissue and exposes the inferior bony orbital rim leading to the orbitomalar groove referred to as the orbital hollow[10,13](►**Fig. 1**).

The cervical retaining ligaments support the platysma by tethering this muscle to underlying structures. Three cervical retaining ligaments have been described: one along the posterior border of the SMAS, one along the posterosuperior aspect of the platysma attached to the mandible, and one along the inferomedial border of the parotid gland. Weakening is associated with redundancy of the platysma muscle and diastasis of the medial platysmal edges leading to platysmal band formation.[14,15]

Addressing the Thick Nasolabial Folds and Jowls

The characteristic features of patients with thick skin are a redundant, baggy, lax skin envelope together with thick nasolabial folds and jowls. One of the major concerns of these patients is having prominent nasolabial folds. The attenuation of the zygomaticocutaneous ligaments with aging leads to malar fat descent inferomedially that make the nasolabial folds more prominent (►**Fig. 1**). The correction of nasolabial fold is only possible with complete release of the ZCLs, en bloc elevation of midfacial descendent tissues, and unopposed traction in a vertical vector. Inadequate release of these ligamentous attachments may lead to an unbalanced, unnatural appearance, and may potentially result in the lateral sweep phenomena especially in patients with thick skin. SMAS techniques (e.g., plication and imbrication) can improve jowling and mandible contours. However, they do not include surgical release of the areas of ligamentous fixations (e.g., zygomatic cutaneous ligaments), and the repositioning of descendent malar fat pad. With a more defined and straighter jaw line (SMAS), the radial expansion of cheek fat and unimproved nasolabial fold becomes relatively even more obvious. Additional attempts to improve unopposed nasolabial folds such as fat grafting to malar region are more likely to result with a "stuffed" look, far from a natural and rejuvenated appearance, and therefore must be avoided.[1–5,16–20]

We strongly suggest avoiding traditional SMAS techniques alone that do not include repositioning of malar fat for this group of patients. Traditional facelift techniques can be combined with an endoscopic subperiosteal mid facelift in such cases for a natural and harmonious rejuvenation (►**Fig. 3**). The endoscopic subperiosteal mid facelift is typically performed through a temporal approach, involves the full release of middle face structures from the underlying bone, and fixation to the deep temporal fascia with a vertical pulling vector, and effectively improves nasolabial folds and malar volume (augmentation affect).[21,22] However, this operation alone cannot deal enough with excess skin, jowling, and neck problems, and requires combining with traditional facelift techniques in older patients with greater facial laxity.

Hamra in 1990[16] described the deep plane rhytidectomy with release of these ligaments allowing extensive mobilization of the malar fat pad and repositioning them vertically to their native position of youth, enhancing mid facial volume, and diminishing the nasolabial fold. The original impetus of

Fig. 3 Preoperative (left) and 5 year postoperative (right) photos of a patient with extremely thick skin who had undergone combined lateral SMASectomy and endoscopic subperiosteal midface lift.

Fig. 4 Preoperative (left) and 1 year postoperative (right) photos of a patient with ptotic cheeks, prominent nasolabial folds, and jowling after modified composite plane rhytidectomy with the FAME technique.

the deep plane facelift was to improve nasolabial folds. However, Hamra later states that the "deep-plane facelift" patients did not yield long-term satisfaction for the nasolabial folds contrary to a defined jawline, which maintained its results.[17]

In 1992, Hamra revised his technique to incorporate the orbicularis oculi muscle in his article entitled Composite Rhytidectomy.[18] This modification entailed undermining of the orbicularis oculi muscle via a medial transblepharoplasty approach and joining this with the facelift dissection as a composite flap of the orbicularis oculi, SMAS, cheek fat, and platysma muscle. Superolateral traction of the composite flap and especially anchoring the midcheek to the periosteum of the zygoma in a superomedial vector lifts the midface, supports the lower lid, and narrows the lid–cheek distance. Hamra[23] states that his "composite facelift" mandatorily entails adjunctive maneuvers including a transcutaneous lower blepharoplasty, arcus marginalis release, lateral cantopexy, zygoorbicular dissection, septal reset, orbicularis muscle suspension, orbicularis muscle repositioning, and a forehead lift for harmonious result. According to Hamra,[18,19,23] all other facelift techniques are "conventional," "lateral vector" facelifts that fall short of accomplishing these goals.

In our perspective, true release of anchoring ligaments of the midface along with the lower face and adequate repositioning of tissues as a composite flap is ideal for patients with thick skin. However the course of the facial nerves zygomatic branches and their close relationship with ligamentous structures in mid facial dissection is a hassle for the novice surgeon for all extended techniques such as deep plane,[16] high SMAS,[20] extended sub-SMAS techniques,[1] and composite plane rhytidectomies.[18] We use finger-assisted malar elevation (FAME) as described by Aston[24,25] in our modified composite flap rhytidectomy to safely transect the ZCLs from the prezygomatic space, allowing entrance into the right plane under direct vision leaving all malar fat attached to the skin without requiring the transblepharoplasty approach. Our modified technique enables effective reposition of an en bloc composite flap consisting of the orbicularis oculi muscle, malar fat, SMAS (platysma), and skin in a vertical vector to their native position of youth, enhancing mid facial volume, diminishing the nasolabial fold, and decreasing the lower lid cheek junction during rhytidectomy (►**Fig. 4**). Facelift skin flap elevation and the sub-SMAS entry incision are performed as depicted by Hamra's deep plane[16] and composite plan[17] rhytidectomies. Sub-SMAS dissection with blunt tipped scissors in the avascular sub-SMAS gliding plane are performed up to the vertically orientated strong ligamentous attachments (zygomaticocutaneous and upper massseteric ligaments). We use FAME maneuver during this riskiest step. Aston[24,25] described FAME as a technique where the surgeon inserts the index finger under the suborbicularis oculi pocket and performs blunt dissection medially. This avascular plane is the prezygomatic space, which was later described by Mendelson et al.[11] The prezygomatic space is bounded by the orbital retaining ligament superiorly, the zygomaticocutaneous ligament inferiorly (►**Fig. 1a**), and sub-orbicularis oculi fat and orbicularis oculi muscle (OOM) superficially. On the floor of this space lie the preperiosteal fat and the periosteum of the zygoma and origins of the zygomaticus major, minor, and levator labii superior muscles.[11]

We perform our finger dissection underneath the orbicularis muscle immediately inferolateral to the outermost fibers of the OOM on the zygoma, and maintain the dissection anteroinferiorly (►**Fig. 5a**). The FAME maneuver does not cause orbicularis oculi muscle denervation, since its plexiform innervation is by the temporal (at 8 and 9 o'clock) and zygomatic branches (at 4, 6, and 8 o'clock) of the facial nerve.[11,26,27] Blunt finger dissection inherently falls into the correct plane on the top of the zygomaticus muscles and below the malar fat pad.

Following FAME, all structures are dissected in the prezygomatic region except for anchoring ligaments which are, contrary to other structures, resistant to blunt dissection. First the strong ZCL that limits blunt dissection inferiorly is sharply transected (►**Fig. 5b**). After weakening of the ligamentous attachments with initial sharp dissection, the dissection of the malar fat pad is easily maintained with a blunt manner in an

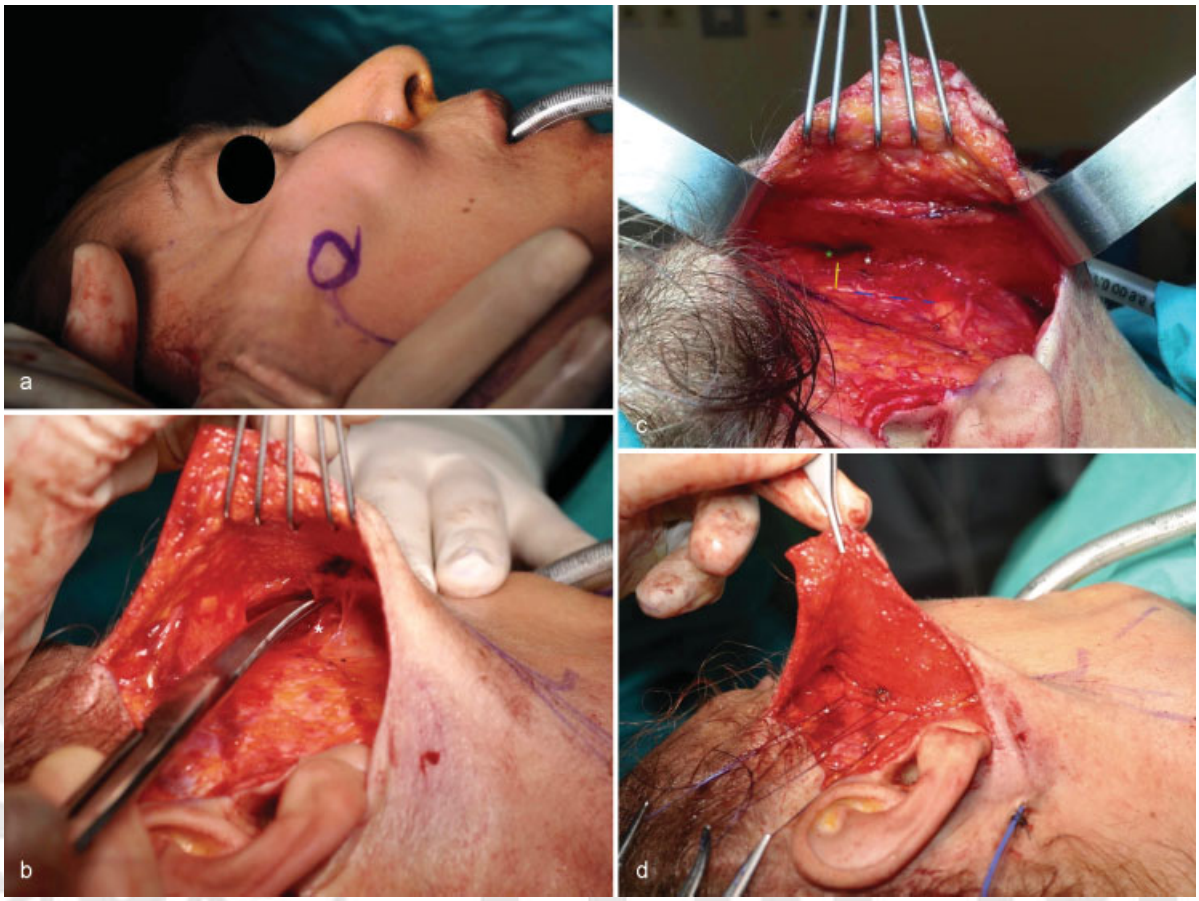

Fig. 5 Intraoperative views for modified composite plane rhytidectomy with the FAME technique. (**a**) FAME maneuver: Via this maneuver blunt suborbicularis dissection is performed in the prezygomatic plane. Dissection is inferiorly limited by the strong zygomatic cutaneous ligament (externally marked). On the floor of this space lie the preperiosteal fat and the periosteum of the zygoma and origins of the zygomaticus major, minor, and levator labii superior muscles. (**b**) Transection of ZCL: The zygomaticocutaneous ligament that limits FAME dissection inferiorly is transected as superficially as possible. This allows safe entry into the right plane on the top of the zygomaticus major muscle leaving all malar fat attached to the skin. White asterisk shows the zygomaticus major muscle. (**c**) Extended dissection: Operative view following wide sub-SMAS dissection with complete release of zygomatic and masseteric ligaments allowing effective reposition of an en bloc composite flap consisting of the orbicularis oculi muscle, malar fat, SMAS (platysma) and skin. Dark blue ink shows sub-SMAS entry point, interrupted blue line shows the location of masseteric ligaments, yellow line shows the location of zygomatic ligaments, green asterisk shows elevated premasseteric space, and white asterisk shows zigomaticus major muscle. (**d**) The pull of the vector of the composite flap—parallel to the long axis of the zygomaticus major muscle. Only after an extended dissection with fully released anchoring ligaments can the unopposed traction of the composite flap be ensured.

oblique direction parallel to the zygomatic muscle fibers to leave all of the fat attached to the skin. Finally, the masseteric cutaneous ligaments standing like a vertical strap (in a superior to inferior vector) are dissected superficially via sharp dissection and followed by posterior to anterior blunt motion until unification of the facelift dissection with the anterior pocket. Complete release of these two portions yields two connected pockets and a unibody composite flap (►**Fig. 5c**). After completing the dissection, adequate and unopposed repositioning and anchoring of the composite flap is achieved along a vector parallel to the long axis of the zygomaticus major muscle (superolateral direction) to improve nasolabial fold, and neutralize the inferomedial aging pattern seen within the midface and lower face (►**Fig. 5d**).

If the patient has a prominent prejowl sulcus and/or marionette lines resisting the lifting effect, releasing the mandibular ligament can improve the problem. Since the mandibular ligament has close proximity to the marginal mandibular nerve, it should be performed in the subcutaneous plane through a submental incision.[5,12,28]

Addressing the Heavy Neck

Rejuvenation of the aging neck is an important part of restoring youthful appearance to the face. The loss of acute neck angle and emergence of platysmal bands, excess laxity of the skin coupled with accumulation of submental fat compose the stigmata of the aging neck. With correction of these changes the goal is to create a youthful jawline with a sharp lower mandibular border and a tight looking neck with an acute cervicomental angle. Although the parameters are mostly age related, individual factors such as thick skin, low-lying hyoid bone, ptotic submandibuler glands, digastric hypertrophy, and retrognathia all contribute to the "difficult

neck" and make improving these changes a considerably more challenging task.[29,30] In addition to the aforementioned factors, as obesity has increased in the population, a more frequently accounted problem has been the "heavy neck" with excess adipose tissue. This in turn leads to the challenge of patient selection and which technique is most suitable for the patient. Before performing surgery for the heavy neck, patient and surgeon should have a good understanding of what is possible and the surgeon should elucidate how much a certain area can be rejuvenated.

SMAS is contiguous with the platysma muscle in the neck. Effective facelift with sub-SMAS mobilization and resuspension of SMAS/platysma unit in a superior/lateral vector provide the best opportunity for significant and long-lasting neck rejuvenation.[4,28] Extending the sub-SMAS dissection approximately 4–5 cm inferior to mandible to release the cervical retaining ligaments and hammocking the platysma posteriorly/laterally are important to obtain a tight neck.[14,28] Lateral platysma suspension to the mastoid periosteum followed by horizontal myotomy below the ear lobule creates a clean cut appearance at the edge of the mandible.[28,31] Avoiding short-scar techniques and implicating an extended longer retroauricular skin incision and wide subcutaneous undermining should be considered for adequate redistribution, redraping, and repositioning of the deformed and saggy soft tissues of the neck region. Liposuction of supraplatysmal fat and wide subcutaneous undermining of the lax neck skin is essential to create contraction and better stability of the heavy skin.[32] The senior author (O.C.) believes that lateral tension as mentioned above corrects a significant amount of platysma descent and prefers to additionally approach the plastysma anteriorly in only less then 10% of his facelifts. Despite extensive dissections, maximal release, and maximal lateral pull together with liposuction, the presence of additional factors accentuated by the thick overlying skin will result in an unsatisfactory result in patients with heavy neck. Opening the neck through a submental incision to correct platysma bands, and central components of the deeper neck layers, e.g., subplatysmal fat, digastric muscles, and submandibular glands, are more often required in these patients. The midline platysmaplasty techniques are performed for excessive platysmal redundancy or when there is presence of excessive accumulation of submental fat, drooping of redundant skin, excessive platysma banding, or dehiscence present. If required, excess subplatysmal fat, or the anterior digastric muscles are shaped at this stage.[31–34] The senior author (O.C.) prefers Kelly clamp technique as described by Perkins[35] to directly control the medial platysma and create a tight neck to obtain flat submental contour in patients with heavy neck (►**Fig. 6**). The medial fibers of loose medial platysma together with some superficial fat and some subplatysmal fat are grasped, cauterized, cut, and sutured in a sequential manner. After a firm muscular corset is created, a small wedge of platysma muscle is excised at the cervicomental angle to make it sharper.[35] If a ptotic submandibular gland creating bulging is present, its capsule is opened and the superficial (inferolateral) portion is removed through a midline incision (Singer gland). Mendelson and Tutino[36] reported the complication rate of this procedure to be 10.8% and 1.8% for minor and major complications, respectively.

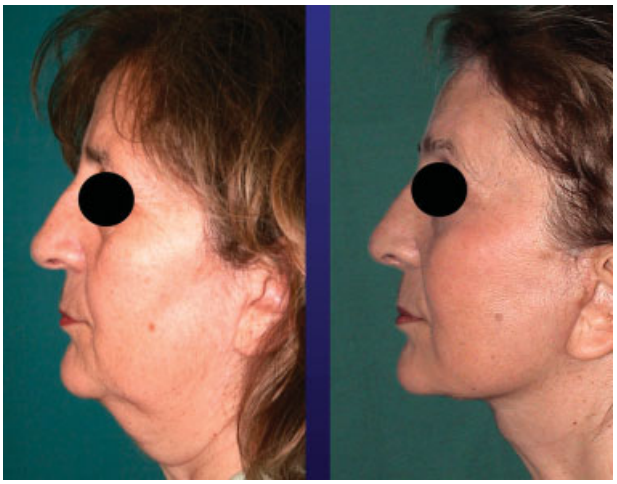

Fig. 6 Preoperative (left) and 1 year postoperative (right) photos of a patient with heavy neck who had a modified extended sub-SMAS facelift, neck liposuction, and midline corset platysmaplasty with horizontal myotome performed.

Conclusion

Durable and natural-appearing rejuvenation is not possible unless the deformities are addressed adequately and harmoniously in patients with thick skin with prominent nasolabial folds and a heavy neck. Our bottom-line solution to this group of patients is extensive and aggressive surgery to avoid undertreatment and eventual requirement of revisions. The patients should be informed that more extensive rejuvenation requires more aggressive surgery, and hence, longer surgical time, longer healing periods, and increased downtime. Patients should also be well informed that thick-skinned patients with a heavy face are more prone to revision tuck-up surgeries compared with others.

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