Correction of the Lower Face and Neck

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Abstract
Rejuvenation of the lower face and neck strives to reverse signs of aging while optimizing the patient’s natural anatomy. Common features of an aesthetically pleasing lower face include a well-defined and appropriately balanced mandible and an acute cervicomental angle. Correction of the aging lower face and neck is accomplished through multiple surgical interventions, performed either alone or in combination. Determination of appropriate procedures is based on individual anatomic pathology. Intimate knowledge of facial anatomy and the complexity of the aging process is paramount to achieve a natural and aesthetic result. Thorough patient evaluation and counseling should precede any intervention. Specifically, the surgeon should be cognizant of the patient’s skeletal structure, soft tissue distribution, muscular anatomy, and skin quality. Appropriate postoperative care and management of complications are vital to success.

Keywords
► facial rejuvenation
► rhytidectomy
► platysmaplasty
► submental liposuction
► chin augmentation

The demand for facial rejuvenation procedures is driven by societal ideals of youth and beauty. Aging of the lower face and neck is multifactorial and attributed to both hereditary and environmental factors. Low Fitzpatrick skin types, excess sun exposure, smoking history, under projection of the mandible, submental adipose accumulation, and a low-lying hyoid bone all contribute to the appearance of an aged lower face and neck.1 Facial structure is altered as skin elasticity decreases, soft tissue descends, fat atrophies, and bone resorbs.2 The goal of rejuvenation in this area is to restore a youthful shape and create smooth transitions from the midface to the mandible and into the neck.

Anatomy and Aesthetics
The ideal profile includes a distinct jaw line, no jowl, appropriate chin projection, and a well-defined cervicomental angle. On frontal view, there is absence of horizontal rhytids in the neck and one can appreciate a subhyoid depression, the thyroid notch, and the anterior borders of the sternocleidomastoid muscle bilaterally3 (► Fig. 1).

Skin quality can significantly impact the presumed age of a patient. Glogau developed a systematic classification for photoaging of the skin. Type 1 is that of a youthful patient with no wrinkles and mild pigmented changes. Type 2 patients are usually in their 30s to 40s and demonstrate “wrinkles in motion” with moderate photoaging and early brown spots. Type 3 patients are older than 50 years with wrinkles as rest, advanced sun damage, visible keratosis, and telangiectasias. Type 4 patients are older than 60 years and demonstrate severe wrinkles, with yellow/gray skin color, and have a history of prior malignancy.4 A patient’s Glogau score may be completely independent of their age and dictated by social history, genetic traits, and previous surgical and noninvasive interventions.

Aesthetic ideals of the lower face differ between genders but remain fairly consistent across ethnicities. The mandibular angle in attractive males is more prominent with increased lateral projection compared with the narrower mandible in females. Similarly, males should have a more projected mental subunit (► Fig. 2). A youthful female face is heart-shaped rather than square. Jowls form with weakening of the fasciocutaneous ligament over the anterior border of the masseter. The ptotic contents of the premasseteric space get “hung up” laterally by the strong mandibular osteocutaneous ligament. Jowls in men and women appear more prominent with ptosis of the buccal fat pad or in patients with poor chin projection (► Fig. 3).
Sagging skin or soft tissue deficiencies appear more severe in an individual with a smaller mandible or underprojected chin.

Classification of neck abnormalities that contributing to aging was proposed by Dedo in 1980. Classification is based on increasing severity of cosmetic deformity and resulting more challenging surgical obstacles. This system helps guide the surgeon to the most effective surgical technique for correction. Class I is defined as an essentially normal patient with good skin elasticity and platysmal tone, a cervicomental angle between 90° and 105°, and little submental fat\(^5\) (\(\text{Fig. 4}\)). Class II patients demonstrate cervical skin laxity without fat deposition or muscle pathology (\(\text{Fig. 5}\)). This type can be managed through rhytidectomy approach and rarely requires a submental incision. In Class III patients, the neck contains excess subcutaneous fat which can be genetic or acquired (\(\text{Fig. 6}\)). Suction-assisted lipectomy is the best treatment option for these patients. Class IV patients show anterior platysma cords or banding, which requires platysma myotomy or platysmaplasty (\(\text{Fig. 7}\)). Class V patients suffer from suboptimal chin projection from either microgenia or retrognathia corrected by chin augmentation or mandibular advancement (\(\text{Fig. 8}\)). A low-lying hyoid bone defines Class VI patients (\(\text{Fig. 9}\)). Identification of these patients is critical as success of lower face and neck surgery is limited by this deformity.\(^6\)

The superficial musculoaponeurotic system (SMAS) is a fibromuscular layer that encompasses the mimetic muscles of the face. It is continuous with the platysma muscle inferiorly. The platysma originates from the soft tissue of the upper thorax and ascends upward to insert onto the soft
tissue of the cheek skin and cutaneous oral musculature. The aging platysma tends to shorten and thin leading to cosmetic deformities including banding and midline decussation.  

**Preoperative Evaluation**  
Comprehensive preoperative evaluation is the foundation to a successful physician-patient relationship. To achieve an optimal outcome, the surgeon must carefully examine each patient to assess motivations, expectations, and anatomic deformities. The ideal candidate for lower face and neck rejuvenation is a nonsmoker with realistic expectations,
good skin elasticity, a posterior and superiorly positioned hyoid, minimal submental fat, and strong bony landmarks.

A full history including general health status, comorbidities, medications, prior head and neck operations, allergies, and social habits should be reviewed. Bleeding history, prior radiation, use of supplements, active smoking, and isotretinoin use should be specifically elicited. Smoking should cease at least six weeks prior to surgery and the potential risks should be explicitly outlined. Preoperative medical clearance should be routine for all patients, with cardiac evaluation reserved for older or high-risk individuals. Special attention must be made to patient motivation. Any patient with features concerning for body dysmorphic disorder or one who has experienced a recent life-altering event should be directed to appropriate counseling rather than offered surgery.  

While the aging process is predictable, the degree and rate to which each individual is impacted varies greatly. Precise diagnosis of anatomical pathology is accomplished via physical examination and documented with photographs. A preoperative analysis sheet should be completed on each patient to ensure a thorough evaluation (Fig. 10a, b). The skin color, quality, and elasticity is first evaluated. Facial scarring and areas of hypo/hyperpigmentation are also documented. The height of the hair line and status of the temporal and occipital hair tufts is important for incision planning in rhytidoplasty. The ear lobes are examined for structure and evidence of deformity including pixie ear, which is a tell-tale sign of prior facelift surgery. The degree of jowling and presence of a prejowl sulcus and masseter hypertrophy are noted. Chin projection is measured and if deficient, the distinction between microgenia and retrognathia is made. Dental occlusion is also noted, especially if osseous genioplasty is being considered. Palpation of the submandibular glands is performed and patients are counseled that ptotic glands may appear more prominent after rhytidoplasty. Facial nerve function in all branches and trigeminal nerve sensation are tested and documented. Hyoid position is carefully evaluated. An unfavorable hyoid position precludes dramatic change after surgical intervention as the cervicomental angle will likely remain obtuse (Fig. 11a, b).

**Fig. 10** (a, b) Example of a facial analysis performed at the initial patient consultation.

**Fig. 11** (a) Example of preoperative photograph demonstrating a low hyoid bone. (b) Same patient 11 months postoperative following rhytidectomy.
Photos taken during the consultation should be utilized to enhance communication with the patient and provide objective evidence to demonstrate any pre-existing asymmetries that may be further unmasked with surgery. Photos are obtained of a cleansed face extending from the trichion to the clavicle. All hair is pulled back off the forehead, face, and ears. Standard anterior, oblique, and lateral views are obtained. On lateral view, the Frankfort horizontal plane is parallel to the floor. Photos of the patient grimacing may be helpful in a patient with significant platysmal pathology. Photographs serve as a communication tool but are also necessary for medicolegal purposes. Pre- and postoperative photographs should maintain consistent elements over time including lighting, distance from the patient, head positioning, lack of makeup, and hair style. Once the appropriate information is collected, the surgical plan is carefully devised based on the individual needs of the patient.

_platysmaplasty_

Correction of platysma deformity can be accomplished with horizontal platysmal myotomy at the level of cervicomental junction with corset platysmaplasty for patients with anterior banding. The submental crease, midline of the chin, and anterior platysmal bands are marked in the preoperative holding area with the patient in the upright position. A 2-cm horizontal incision is made in the submental crease. A subcutaneous flap is elevated to the thyroid cartilage. If present, midline subplatysmal fat is excised. A judicious amount of submental fat can also be reduced using liposuction with a 2-mm cannula. The cannula is oriented downward so that there is less change of subcutaneous irregularities after submental liposuction. However, at the end of the liposuction, the cannula is then turn toward the skin flap to allow for some skin tightening. Subplatysmal dissection is performed. If needed, a platysmal myotomy is performed at the cervicomental angle using bipolar cautery and scissors. A running 0 PDO quill suture is placed to reapproximate and slightly overlap the medial edges of the platysma muscle. The neck is examined to ensure there are no irregularities. Additional subcutaneous dissection is performed as needed to prevent dimpling of the skin.

_rhytidectomy_

Rhytidectomy is the most effective mechanism to correct cervicomental laxity. It is the main work horse in facial rejuvenation and is often combined with other procedures depending on the patient’s Dedo classification and aesthetic goals. Rhytidectomy restores the presence of the underlying bony skeleton to reveal a defined jaw and sharp cervicomental angle. The incisions are planned for maximal results with minimal visible scarring (Fig. 12). Depending on degree of skin laxity, the temporal incision is created in a curvilinear fashion along the anterior temporal hair tuft, 2–4 cm from the helical root. The incision is planned such that the temporal tuft is not disrupted with the removal of excess skin, yet still allows for sufficient camouflage as the incision extends upward. The incision then follows the curve of the helical root and is camouflaged in the pretragal crease in men and hidden along the edge of the tragus in women. It continues around the ear lobule and onto the concha bowl posteriorly. The incision extends across the postauricular sulcus where the inferior portion of the helix meets the hairline. A small inferiorly based triangular flap in the mastoid area is created to prevent straight-line scar contracture. The incision can then be brought along the occipital hairline inferiorly approximately 4–6 cm depending on degree of anticipated skin excision (Fig. 13). In patients without excessive skin laxity, the incision can end right at the occipital hairline without extension. A subcutaneous flap is elevated approximately 4–6 cm anterior to the tragus and 6–7 cm inferiorly in the neck.

A liposuction cannula not attached to suction is used to create subcutaneous tunnels in the undissected areas that will aid in contraction of the skin to underlying tissue postoperatively. Jowl liposuction can also be performed at this stage. Once adequate hemostasis is achieved, the SMAS is incised approximately 2–3 cm anterior to the tragus in a vertical fashion from the inferior zygomatic boarder to the mandible. The incision then curves around the inferior portion of the lobule and extends vertically through the platysma to allow for a more vertical vector of lift. The subplatysmal plane is entered in the neck and extended to

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_Fig. 12_ Preauricular rhytidectomy incision is barely perceptible 3 months following surgery.
the level of thyroid cartilage. Tonsil forceps and a duckbill dissector are used to elevate the SMAS. Great care is taken to limit cautery and sharp dissection to avoid injury to the underlying facial nerve branches. The zygomaticocutaneous and the mandibulocutaneous ligaments (which are preserved in the subcutaneous dissection) are released in the deep plane to allow for full mobility of this plane. Allis clamps are placed on the edge of the SMAS which is pulled in a suprolateral vector that provides appropriate reshaping of the face. The SMAS is secured superiorly to the deep temporal fascia and the platysma is secured to the mastoid periosteum posteriorly with 2–0 polydioxanone sutures. The SMAS is then imbricated with barbed 0 polydioxanone Quill (Surgical Specialties Corp.) suture in a running fashion. Areas of parotid or masseteric fullness are oversewn with the Quill and reduced with bipolar cautery. A 10 French Jackson-Pratt drain is then placed and the skin flap is redraped and tailored for tension-free closure (►Fig. 14). Special care is taken in the perilobular area to avoid any tension on the lobe. The occipital and temporal hair tufts are maintained. The skin flap is anchored with interrupted 4–0 Prolene sutures and multiple deep buried 5–0 absorbable monofilament sutures. In the temporal tuft, the skin is closed with running 6–0 fast absorbing gut suture. Running 6–0 Prolene is used for the preauricular incision and the postauricular incision is closed with a 4–0 chromic suture in running locking fashion. A deep plane facelift maintains a thicker flap with better vascularity and reduced risk of necrosis while obtaining long-lasting results.

Postoperatively, patients are sent to an after-care facility with nursing care for the first night. A pressure dressing is placed for 24 hours. Patients are seen in the evening on postoperative day (POD) 0 and in the office on POD 1. The dressing is changed on POD 1 and replaced with a lighter compressive wrap for 7 days. The drains are routinely removed two days after surgery. Oral antibiotics are given for 7 days. The running Prolene sutures are removed on POD 7 and the anchoring Prolene sutures are removed on POD 14. The absorbable sutures are trimmed as needed.

Submental Liposuction

Liposis of the submental area creates an obtuse cervicomental angle, even in a young patient. Liposuction is most effective in patients with normal skin elasticity and good muscle tone. Liposuction has largely replaced direct lipectomy techniques due to its safety and ease of use. Overweight patients have generalized fat deposition in multiple tissue layers which is difficult to correct with liposuction alone. For liposuction candidates, the submental crease and distribution of fat to be removed is marked with the patient in a seated position. Tumescent solution infiltrated throughout the area to be treated. This step provides hydrodissection of the tissue and facilitates fat aspiration. An 8-mm stab incision is made in the midline horizontally along the submental crease. The incision should be larger than the cannula to avoid friction burns to the skin. The cannula is used for pretunneling prior to attachment to suction (►Video 1). Suction tubing is pinched during cannula insertion and removal to avoid skin injury. Liposuction is performed in a smooth, even fashion in a fan-shaped pattern to prevent contour irregularities or asymmetry (►Video 2). Conservative direct excision of subplatsymal fat can be performed as needed. The fenestra of the cannula is kept pointed away from the skin during the procedure. The surgeon may turn
the fenestra toward the skin to create a raw subcutaneous surface for enhanced skin tightening postoperatively. A submental support dressing is left in place for 1 week and used nightly for the second week. Sutures are removed at 7 days postoperatively.

Video 1


Video 2


Genioplasty

Chin position caries an important role in balanced harmony of the face. The goals of chin augmentation include obtaining an appropriate facial height, complementing the nasal projection and defining the mandibular line. The method of correction depends on the bony deficiency. Chin augmentation with an implant is best suited for patients with microgenia (Fig. 15a, b). Alternatively, a retrognathic mandible requires osseous genioplasty and advancement. For placement of alloplastic implant, the midline of the nose, philtrum, and chin is marked in the preoperative holding area. The submental crease is also marked with the patient upright. A 3-cm horizontal submental incision is made. Dissection is carried down to the mentalis muscle, which is incised until the bone is exposed. Subperiosteal pockets are bluntly elevated along the inferior border of the mandible and made just large enough to accommodate the implant. Care is taken to preserve the mental nerves. Sizers are used to determine the appropriate size for the patient. An Implantech conform extended anatomic implant (Implantech) is chosen because it provides a natural transition to the lateral mandible. The wound is irrigated with triple antibiotic solution and the implant is placed in the irrigation prior to placement. The center of the implant is placed in the midline and secured to the surrounding periosteum with three interrupted 5–0 monofilament absorbable sutures. The wound is again irrigated. The mentalis muscle is carefully reapproximated to prevent development of witch’s chin deformity. The subcutaneous tissue and skin is closed.

Complications

The recognition and prompt management of complications is vital for all surgeons. The majority of complications are preventable through knowledge of anatomy and meticulous surgical approach. Preoperative counseling regarding risks and potential complications is imperative. Risks of the above procedures include hematoma, seroma, skin flap necrosis, facial nerve injury, sensory nerve injury, scarring, pixie ear deformity, hairline irregularities, asymmetry, parotid injury, contour irregularities, and infection. It is important to discuss potential for prominent submandibular glands following rhytidectomy in patients with gland ptosis. Patients suffering from complications should be followed closely and reassured until resolution of the problem. In smokers, adjunctive therapies including hyperbaric oxygen treatment and topical nitroglycerin should be used liberally if there is any indication of skin compromise.

Fig. 15 (a) Patient with microgenia. (b) Same patient 2 months following chin augmentation with implant placement.
Conclusion

Many methods exist for the correction of aging in the lower face and neck. These interventions may be performed independently or utilized together. Rhytidectomy addresses the majority of skin laxity of the neck and lower face and platysmaplasty diminishes platysmal banding while improving the cervicomental angle. Suction-assisted lipectomy rids the patient of excess submental fat and chin augmentation provides a more defined jaw line. The surgeon must convey limitations of surgery and manage patient expectations preoperatively.

References