Chapter 45
Nasolabial Fold: Options of Treatment Concerning Aesthetic Facial Contour

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45.1 Introduction

The nasolabial sulcus is tenuous or even absent in the newborn, disappears in facial paralysis, but is usually defined and constant in adult life. Microscopic studies show dense fibrous tissues in the sulcus region and muscle fibers that are superficialized toward this fibrous thickening and which come from the levator of the upper lip and orbicularis of the mouth muscles [1–4].

The nasolabial sulcus is a physical sign of aging, and the minimization of this aspect has become one of the goals of cosmetic plastic surgery. Three factors are imputed in this process: redundant skin in the malar region, ptosis of adipose tissue of the cheek and visibility in the skin with the increase of the age, and retraction caused by the lip lift muscles [5].

The entanglement of muscle fibers in the subcutaneous groove densification favors changes in the dynamic aspect of the lip with the aging process. Absorption of tissue and falling of the cheek, during the act of speaking and smiling, makes the groove deeper, and similarly other folds and pits are created.

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J. M. Avelar (ed.), *Aesthetic Facial Surgery*,
https://doi.org/10.1007/978-3-030-57973-9_45

The effects of the aging process are similar in the lower lip and labiomentonian groove. The involved muscles are the lip's depressor, lowering of the mouth's angle, mentalis, and the platysma.

Treatment involving the nasolabial and nasomental sulcus may be by surgery or by cosmetic procedures. Cosmetic methods are summarized in fillers, with alloplastic substances or autotransplantation of adipose tissue and the use of botulinum toxin for the paralysis of the involved muscles [6, 7].

45.2 Surgical Treatment

The experience gained in aesthetic surgery correcting the face and the neck shows that there is a need for a strategy not only focusing on the traction or tissue tension but rather on recreating the forms and angles that were previously pleasant and jovial. Often good judgment and the observation of dynamic facial expressions become as important as theories, standardized measures, or calculations.

Most facial procedures are combined, where improvement of the affected grooves and cervical region is the main goal. Surgical management can be directed to an isolated or multiple anatomical areas, depending on the needs of each patient and the diagnosis of the surgeon.

The smoothness of the tissues, the naturality of the expression, and the harmony of facial structures as a whole should be observed in each patient considering the visual change associated with age, gender, and race.

The knowledge of the superficial and deep anatomical structures of the face is extremely important to program the surgical procedure. The superficial musculoaponeurotic system (SMAS), the retentive ligaments pointed out by Mendelson and the submental deep structures (Feldman) [1].

Conceptually, we divide the face into two areas, the lateral that is more motionless and the medial and anterior, located around the face's natural orifices, where the signs of aging are more noticeable (Fig. 45.1).

It is important to know the different facial structures, the anatomical levels, and location of the retentive ligaments, which must be released in association with large detachments. The application of the five vectors will provide good results and long duration.

The concept of mobilizing deeper facial structures began in the 1970s with the use of SMAS which, once triggered, resulted in the repositioning of altered facial anatomy structures, especially peri-buccal areas and grooves with long-lasting effects [8]. The SMAS was initially submitted to its plication without its detachment. In the 1980s, SMAS started to be displaced, pulled, and resected [2, 4].

Dissection, selective resection, and SMAS repositioning in the cranial or lateral region may cause temporary or permanent facial nerve damage. Other intercurrences and complications were reported with longer physical changes, preventing a rapid return to routine. We have used plication of SMAS for 13 years in five sectors

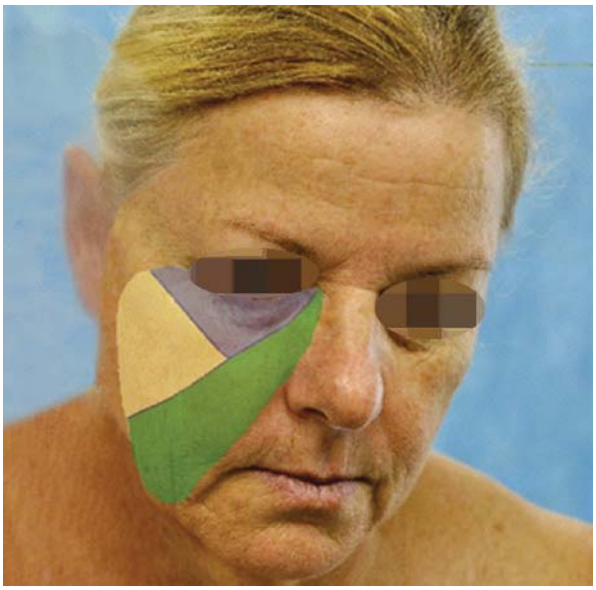

Fig. 45.1 The face's movable regions are more susceptible to signs of aging

following vectors with specific orientations, without their dissection, that is, maintaining their anatomical integrity [9]. The technique reduces more extensive manipulations, avoiding injuries of nerves and other important structures of the face (Fig. 45.2).

45.2.1 Technique

The surgical experience is based on 1476 patients submitted to surgery between 2006 and 2019 and with a postoperative follow-up of at least 1 year, 128 males and 1348 females, ranging in age from 35 to 84 years. All the surgeries followed the same SMAS plication systematization in five directions, three on the face and two on the cervical region.

45.2.1.1 Marking

Prior marking is required with the patient in the orthostatic position. *Vector I* is positioned vertically in the cervical midline for treatment of the platysma muscle bands (Fig. 45.3).

It consists of two lines, each positioned on the cutaneous projection of the two bands of the platysma muscle.

In patients with a single apparent band, the first demarcation falls on it and the second, parallel and about 3–5 cm from each other. In the absence of the two flanges,

Fig. 45.2 The vectors must overcome the retentive ligaments described by Mendelson, to achieve the necessary effectiveness

Fig. 45.3 Demarcation of vector I follows the principles of Feldman

Fig. 45.4 The grips of vector II are fixed to the mastoid and those of vectors III and IV are fixed in the zygomatic arch

but with tissue flaccidity that compromises the mandibulocervical angle, vector I is routinely applied.

Vector II is positioned parallel to and about 1–2 cm below the jaw line, distant about 1.5 cm from the cutaneous projection of the sublingual salivary gland.

The three facial vectors have the same upper base positioned closely to the projection of the zygomatic arch with the root of the helix and the chop, when naturally implanted in women.

Vector III, in the highest position on the face, is directed in the midline of the nasogenian sulcus. Vector IV is more inclined, following a midline between the corner of the mouth and the edge of the jaw. Vector V is vertical and located 1–2 cm from the anterior implant line of the ear, extended in the direction of the jaw angle. With the exception of vectors I and V, the others delineate the shape of a rectangle variable in length and with an average width of 2 cm (Fig. 45.4). The distance between the two vertical lines of vector I varies with the two bands of the platysma muscle.

In case of a single platysma band, the homologous and parallel demarcation to the first one varies from 3 to 5 cm. In the absence of muscle bands, but with flaccidity in the submental cervical region, the two lines are demarcated, and the platysma

is sutured following vector I. Vectors I and V vary with the degree of flaccidity, because they are of the containment type, and vector V varies according to the effectiveness of the traction straps of vectors II, III, and IV.

45.2.1.2 Surgical Technique

Patients undergo general anesthesia or sedation in the horizontal dorsal decubitus, with the chest and head elevated by about 30 degrees. Local infiltration with 2% lidocaine and 1:250,000 epinephrine is performed. The limits of cutaneous dissection are initially demarcated at the root of the helix with the zygomatic arch, following medially along the malar bone. The demarcation continues in the lower direction to the outer border of the nasolabial groove, reaching the jaw flange, to join with the opposite side. The lower cervical border follows a transverse line about 2–3 cm below the hyoid bone. Posteriorly, from the earlobe, the demarcation ascends in the line of the implantation of the ear up to 2 cm from the root of the helix, curving 90 degrees horizontally in the direction of the scalp, in an extension that varies from 8 to 10 cm (Fig. 45.5).

After the demarcation of the areas to be treated, lipospirations in the submental, genian, and paranasal regions are performed, as ancillary procedures for the improvement of the facial contour.

Fig. 45.5 Red lines mark the wide dissection required

Fig. 45.6 Both hands under the fatty dermis show the extent of the dissection

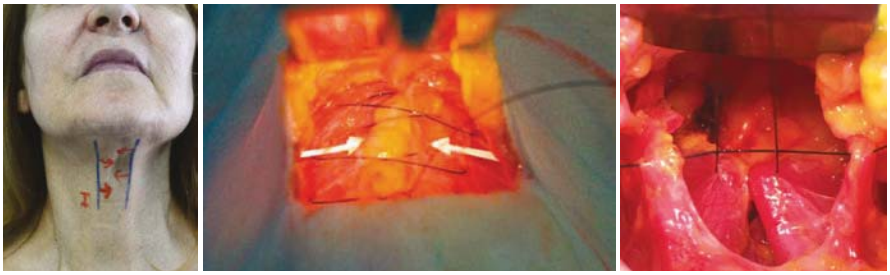

Fig. 45.7 Precise dissection of the platysma muscle, sub-platysmal fat, and digastric muscles when necessary

Cutaneous dissection is performed along the entire extent of the demarcated surface (Fig. 45.6).

A 4 cm submental incision is made near the edge of the mandible. The cutaneous dissection is extended inferiorly to the lower limit previously established in the cervical region. A systematic hemostasis should be performed.

After careful dissection of the submental region, with detailed exposure of platysma muscle's fibers, a dissection begins in the submuscular plane for visualization and resection of exceeding sub-platysmal adipose tissue. In most of the cases, the fat is removed (Fig. 45.7).

After this step, the bands of the digastric muscles are visible, which can be treated according to each need by plication or partial and total resection, in order to improve the submentonian angle.

After that, partial resection of the platysma bands is performed in selected cases, followed by a muscle plication that varies according to each case, always with an inabsorbable thread. It is initiated 1 cm below the cricoid cartilage and continues to the posterior border of the mandible in the midline (vector I). At this point, the submandibular glands can be manipulated.

The plication corresponding to vector II begins with the fixation of the thread near the mastoid region, and the thread is conducted undulating in the platysma

muscle, approximately 1.5 cm below the mandibular border, until it surpasses 1.0–2.0 cm the projection of the submandibular glands. The return of the thread, to the mastoid, is carried out in the form of a strap, when the necessary traction is calculated and executed.

This movement improves the lower contour of the mandible and camouflages the projection of the submandibular glands. The lateral traction of the platysma muscle near the mandibular ridge helps to improve the lip-mentonian groove's appearance, aided by plication of vector IV (Fig. 45.8).

Vector III is anchored in the periosteum of the zygomatic arch and walks through the SMAS toward the midpoint between the nasal wing and the commissure of the lips, and its traction point must overcome the fixation of the retentive ligaments, to guarantee efficacy of result and relieve nasolabial sulcus, and nasomental groove depression (Fig. 45.9).

Vector IV is similar to the previous one and is anchored more posteriorly, followed by the SMAS toward the middle distance between the labial commissure and angle of the mandible, also surpassing the resistance of the retentive ligaments; its traction straps will relieve the jaw lip groove (Fig. 45.10).

Vector V, like Vector I, is not a strap but a vertical plication of SMAS that will intensify the actions of vectors III and IV and will intensify the traction of the face's middle third. It improves the lateral projection of the face harmonizing the appearance. This technique diminishes the area of detachment, reducing the extension of the flap, and relieves the traction. All of this makes the irrigation of the tissue safer. The extent of plication follows from the angle of the mandible to the zygomatic arch (Fig. 45.11).

It is possible to prove the efficacy of the traction with the measure of the detached area, which shows an average reduction of 2 cm after the vector's actions (Fig. 45.12).

After resection of the skin excesses, containment points are made between the flap and SMAS. The skin suture is intradermal with absorbable 4-0 and 5-0 thread. Vertical containment points are made around 6–7 columns in the cervical and

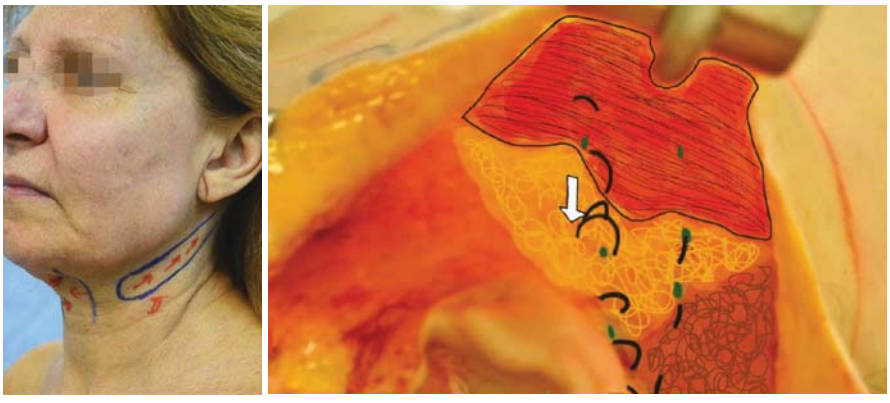

Fig. 45.8 Vector II – the traction loop attaches to the mastoid and should extend beyond the projection of the submandibular gland

Fig. 45.9 Vector III – the traction loop is fixed in the periosteum of the zygomatic arch and walks to the mid-segment of the nasogenian sulcus

Fig. 45.10 Vector IV – strap attached more posteriorly in the zygomatic arch will pull the lip-mentonian groove

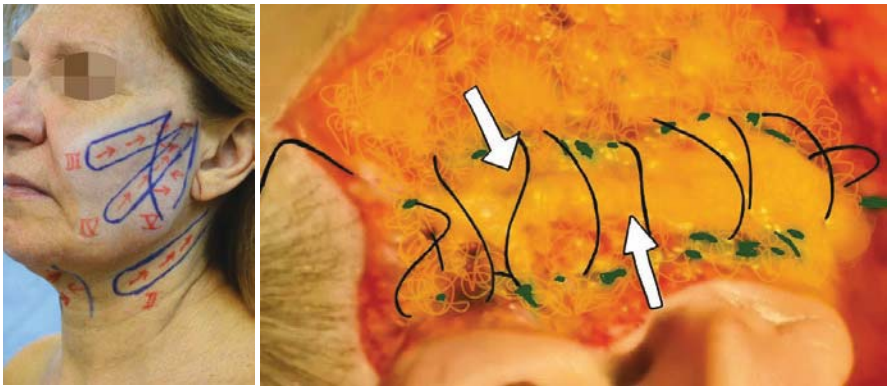

Fig. 45.11 Vector V – vertical plication between the mandible edge and the zygomatic arch

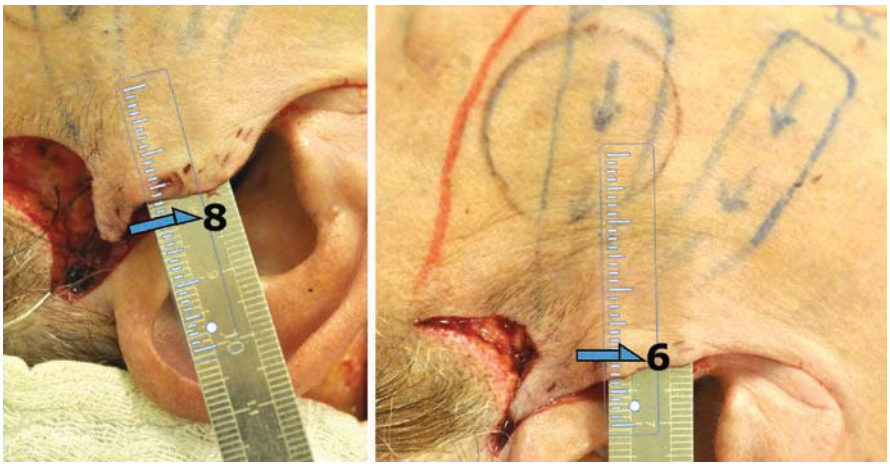

Fig. 45.12 Measurements that proves the effect of the traction of the vectors

submentonian areas from the end of the detached area to the angle of the mandible with 4-0 nylon monofilament threads that are removed after 48 hours.

In most of the cases, fat grafting is used according to the principles described by Colleman, regarding harvesting, preparation, and grafting. The most frequent points of grafting are the nasolabial, nasogenian, and lip-nasomentonian grooves, upper and lower lip, glabella, upper and lower eyelids, and temporal region.

CO_2 laser skin abrasion is employed as an ancillary procedure and may be used pure or in the fractionated mode. It is applied in the orbital regions and around the lips, which improves the quality of the skin and promotes a slight retraction.

The interaction of vector actions, II for the mental lip groove and III, IV, and V for the nasal labial sulcus, with fat grafting at the sites and surgical abrasion with CO_2 laser has provided very satisfactory outcomes in the medium and long-term results (Figs. 45.13, 45.14, 45.15, 45.16, and 45.17).

Patients are hospitalized for 1–3 days for routine postoperative care. No tubular drains or Penrose drain type is used, as a consequence of the adhesion points in the dissected areas, in particular around the periauricular region.

45.3 Results

45.4 Complications

Only one case of hematoma required revision in the operating room. No type of nerve injury or need for retouching has been recorded within 2 years after surgery, which is attributed to the anchorage of the five traction and retention vectors. Figures 45.12, 45.13, and 45.14 illustrate cases of some patients included in this study.

Fig. 45.13 A 56-year-old patient

Fig. 45.14 A 63-year-old patient

Fig. 45.15 A 49-year-old patient

Fig. 45.16 A 53-year-old patient

Fig. 45.17 A 54-year-old patient

45.5 Reviews

The suture of SMAS according to the five vectors with different directions has offered a more effective, constant, and satisfactory effects in the long follow-up, motivating its indication and use in the routine of rhytidoplasties. In all patients, there was no segmental dissection or resection of the SMAS with cranial or retroauricular suture.

Nerve injury is possible even having knowledge of the anatomy. The dissection and release of AMS can temporarily or permanently cause nerve damage. Even when the injury is temporary, the recovery time, sometimes a few months, determines great apprehension for the involved parts. Plication reduces surgical trauma, offers greater safety, and may be effective in the long term and should be considered a relevant factor for its indication. The technique with systematization of two vectors used in the cervical region is easily performed and may be reproduced, delaying a possible recurrence of vertical folds in the cervical region, commonly observed when the only maneuver is the cervical middle suture. In our patients followed in the last 5 years, we have not observed recurrence of the vertical bands.

The plication of SMAS through vectors III, IV, and V, presenting different directions, has determined the reduction of its surface, delaying the possible stretching of the skin. Measurements on the dissected surface of the skin in the transverse and longitudinal directions in the middle segment of the face, before and after the plication of SMAS, show a reduction of 1–2 cm of these axes. The effects of these procedures have been better observed in patients older than 60 years, due to the natural factors of aging advanced by progressive sagging of the skin and SMAS (Figs. 45.12, 45.13, and 45.14).

The incidence of edema, ecchymosis, and hematomas is also reduced when compared to surgical tactics with broader dissections. The application of the adhesion points in the dissected areas has guaranteed the limitation of possible bruising. The use of drains of any nature is not required. Based on these aspects, faster recovery has been observed and greater efficacy in the quality of the long-term results when compared to other methods traditionally described in the literature. The literature records multiple sections of platysma bands along its length also with satisfactory results. The search for improvement of the surgical tactics coupled with the technical simplification, the quality, and maintenance of the results has been constant in the history of medicine.

References

1. Pogrel MA, Shariati S, Schmidt B, Faal ZH, Regezi J. The surgical anatomy of the nasolabial fold. Oral Surg Oral Med Oral Pathol Oral Radiol Endod. 1998;86(4):410–5.
2. Barton FE Jr. The SMAS and the nasolabial fold. Plast Reconstr Surg. 1992;89(6):1054–7.
3. Barton FE Jr, Gyimesi IM. Anatomy of the nasolabial fold. Plast Reconstr Surg. 1997;100(5):1276–80.

4. Feldman J. Neck lift. New York: Thieme publishers; 2006.
5. Mendelson BC, Hartley W, Scott M, McNab A, Granzow JW. Age-related changes of the orbit and midcheek and the implications for facial rejuvenation. Aesthet Plast Surg. 2007;31(5):419–23.
6. Mendelson BC. Anatomic study of the retaining ligaments of the face and applications for facial rejuvenation. Aesthet Plast Surg. 2013;37(3):513–5.
7. Wong CH, Mendelson B. Midcheek lift using facial soft-tissue spaces of the midcheek. Plast Reconstr Surg. 2015;136(6):1155–65.
8. Mendelson BC, Freeman ME, Wu W, Huggins RJ. Surgical anatomy of the lower face: the pre-masseter space, the jowl, and the labiomandibular fold. Aesthet Plast Surg. 2008;32(2):185–95.
9. Letizio N, Anger J, Baroudi R. Ritidoplastias: smasplastia cervicofacial mediante sutura de vetores. Rev Soc Bras Cir Plast. 2012;27(2):266–71.