Facial Assessment

2

Amir Tadros, Mohammad Banki, and Elie M. Ferneini

Introduction

Facial cosmetic surgery is becoming increasingly popular and more acceptable in society today. The concept of beauty has its cultural and generational differences, however certain facial proportions and balancing anatomic contours are universally accepted as aesthetically attractive. It is critical that a cosmetic surgeon understands the patient's cosmetic goals, along with the tools available to analyze facial symmetry, proportions, and anatomy to have a successful result through surgical or nonsurgical procedures. The surgeon must also be able to recognize preoperatively the deviations from accepted proportions of beauty and communicate to the patient the limitations related to the facial anatomy and available therapeutic modalities. Due to the vast surgical and nonsurgical therapies available today, the surgeon should also be able to recognize which therapy can be employed to obtain the desired changes, along with their limitations and risks. Having a mutual understanding of what cosmetic changes can be achieved predictably and safely between the surgeon and patient is paramount to a successful result.

A. Tadros
Division of Oral and Maxillofacial Surgery, School of Dental Medicine, University of Connecticut, Farmington, CT, USA
e-mail: atadros@uchc.edu

M. Banki (✉)
Artistic Contours, Warwick, RI, USA

E. M. Ferneini
Beau Visage Med Spa, Greater Waterbury OMS, Cheshire, CT, USA

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Anatomic Landmarks

- Frankfort Horizontal plane—imaginary horizontal line extending from the external auditory meatus through the inferior orbital rim. The Frankfort line is important in the analysis of the lateral profile as it provides a frame of reference for measurements to be recorded (Fig. 2.1).
- Trichion—anterior hairline in the midline of the forehead
- Orbitale—the most inferior point on the infraorbital rim
- Glabella—the most prominent point of the forehead above and between the eyebrows
- Nasion—the depression point at the bridge of the nose where the frontal and nasal bones meet
- Radix—depression at the root of the nose that corresponds to the nasofrontal suture
- Sellion—junction where bone and cartilage meet on the nasal dorsum
- Rhinion—soft tissue landmark that correlates to the sellion
- Nasal Tip—most anterior projection of the nose on the profile
- Subnasale—junction of the columella and upper lip.
- Stomion—central portion of the interlabial gap
- Stomion superius—lowest point of the vermilion of the upper lip
- Stomion inferius—highest point of the vermilion of the lower lip
- Labrale superius—vermilion border of the upper lip
- Labrale inferius—vermilion border of the lower lip
- Pogonion—most anterior point on the chin
- Menton—most inferior soft tissue point on the chin
- Gnathion—the point between the pogonion and the menton
- Gonion—the angle of the mandible where the ascending ramus becomes the body of the mandible

Facial Proportions

When evaluating the face, it is helpful to divide it into segments in order to assess the individual components. One method is to divide into three horizontal segments: the upper facial third extends from the trichion to the glabella, the middle third is from the glabella to the subnasale, and the lower third is from the subnasale to the menton (Fig. 2.2b). This is called the Da Vinci method and it allows to evaluate facial height [1].

Another method allows us to evaluate facial width and that is to divide the face into vertical fifths: lateral projection of the helix to the lateral canthus, lateral canthus to medial canthus, and the intercanthal distance (Fig. 2.2a). The segments should all be equal in distance.

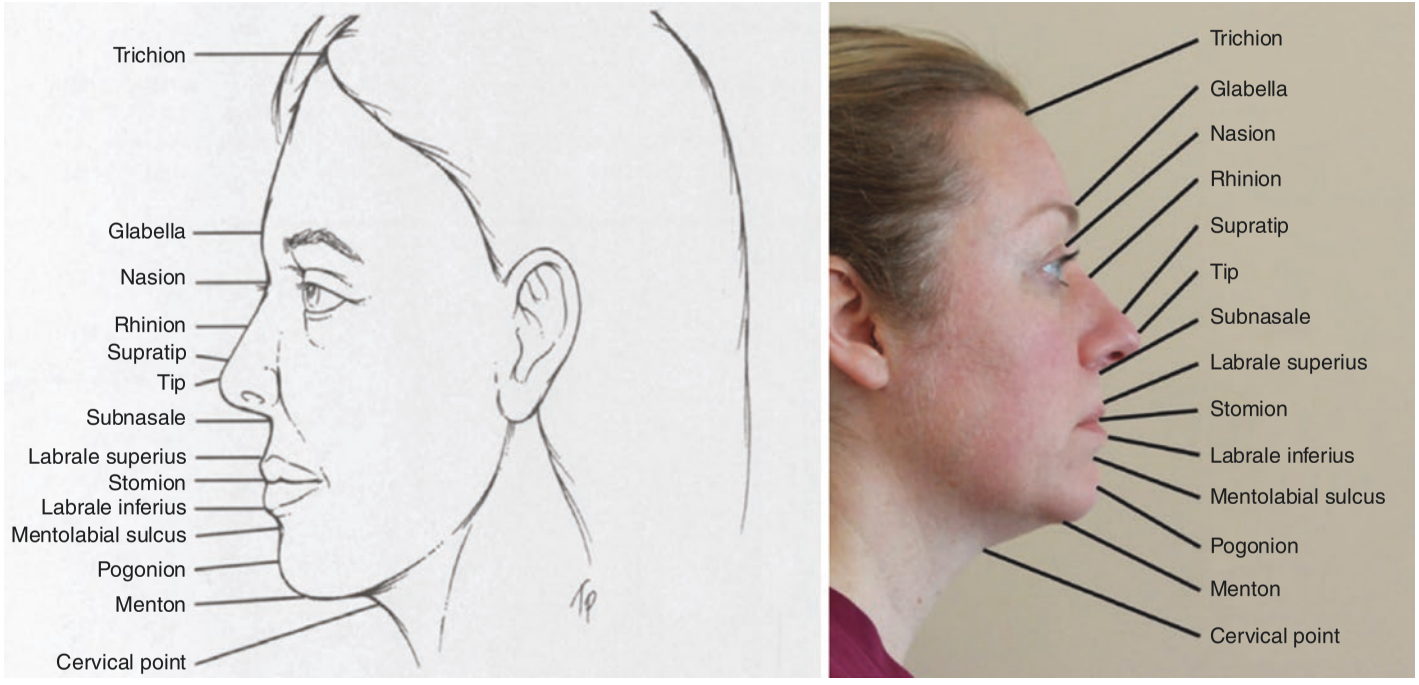

Fig. 2.1 Soft tissue anatomic landmarks on a profile view. Images citation: Ferneini, E., Bennett, J. Perioperative Assessment of the Maxillofacial Surgery Patient (p. 491–492). Cham, Switzerland: Springer 2018

Fig. 2.2 (**a**) Vertical lines passing through the medial canthus, lateral canthus, and helix divide the face into vertical fifths. (**b**) Horizontal lines passing through the hairline, glabella, subnasale, and menton divide the face in horizontal thirds: Images citation: Ferneini, E., Bennett, J. Perioperative Assessment of the Maxillofacial Surgery Patient (p. 492). Cham, Switzerland: Springer 2018

Forehead

The forehead can significantly affect the appearance of other facial structure such as the eyes and nose and thus plays a huge role in esthetics. It constitutes the upper third of the face and the boundaries extend from the trichion down to the glabella. It should have a gentle convexity when viewed from the lateral profile with an ideal nasofrontal angle of 115–135° [2]. The nasofrontal angle is created by the intersection of lines tangent to the glabella and the nasal dorsum (Fig. 2.3).

A receding hairline can lead to the appearance of an elongated forehead, while loss of collagen and connective tissues will lead to rhytid (wrinkle) formation. Horizontal rhytids will form in a pattern that is perpendicular to the vertical fibers of the frontalis muscle [3].

Eyebrows

The medial aspect of the eyebrow should not extend past a vertical lined drawn from the lateral nasal ala through the medial canthus of the eye (Fig. 2.4), while the lateral brow is limited by an oblique line drawn from the nasal ala to the lateral canthus [4] (Fig. 2.5a). The medial and lateral ends should also be in the same plane [4]. Brow apex in women lies superior to the lateral limbus (Fig. 2.5b).

Fig. 2.3 The nasofrontal angle is created by the intersection of lines tangent to the glabella and the nasal dorsum. Image Citation: Ferneini, E., Castiglione, C., Banki, M. Complications in Maxillofacial Cosmetic Surgery (p. 28). Cham, Switzerland: Springer 2018

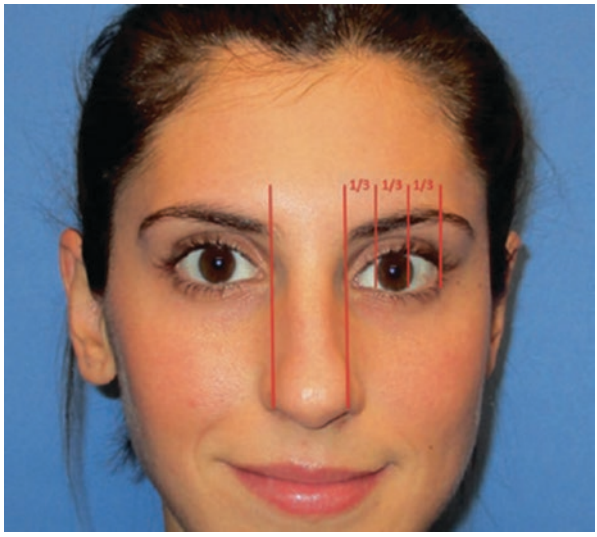

Fig. 2.4 The eye is divided into three vertical regions by vertical lines through the lateral canthus, lateral limbus, medial limbus, and medial canthus. Vertical lines drawn through the lateral nasal tip and medial canthi create the medial border of the eyebrow. Image Citation: Ferneini, E., Castiglione, C., Banki, M. Complications in Maxillofacial Cosmetic Surgery (p. 30). Cham, Switzerland: Springer 2018

There are gender differences with regard to eyebrow shape and position that surgeons must take into consideration. In males, eyebrows are ideally at the level of the superior orbital rim and have a much gentler curve [5]. In contrast, female eyebrows are 1 cm above the superior orbital rim and have a steeper upward curvature with the apex corresponding to the lateral limbus [5].

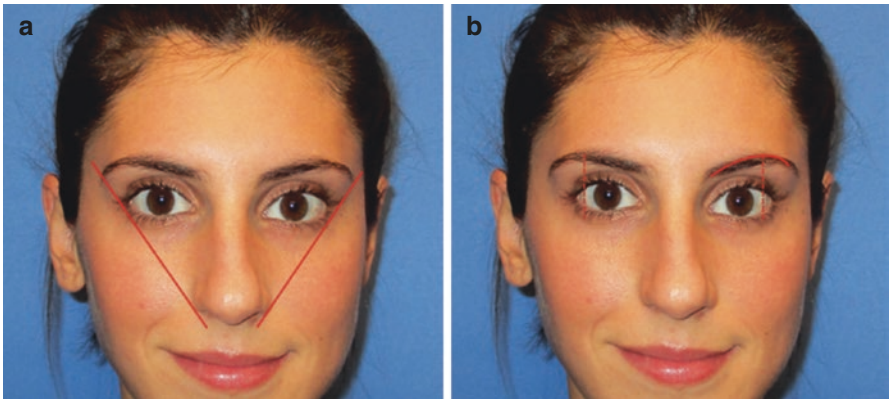

Fig. 2.5 (**a**) An oblique line drawn from the nasal ala to the lateral canthus outlines the lateral border of the brow. (**b**) Brow apex lies superior to the lateral limbus. Image Citation: Ferneini, E., Castiglione, C., Banki, M. Complications in Maxillofacial Cosmetic Surgery (p. 29). Cham, Switzerland: Springer 2018

Adverse surgical outcomes include over-depression or over-elevation of the eyebrows. Over-depression of the brow can lead the patient to appear tired or sleepy while an over-elevation can make them appear overly surprised [2]. Aging can also lead to brow ptosis causing a "grumpy" look by crowding the eyes.

Eyes

When looking at a face, humans spend more time looking at the person's eyes than any other facial structure. Therefore, the eyes can contribute a great deal to the overall esthetics of the face. The eye can be divided into three regions: medial canthus to medial limbus, medial limbus to lateral limbus, and lateral limbus to lateral canthus [3]. These three regions should be equal in width.

Furthermore, the width of an individual eye as measured from the medial canthus to the lateral canthus should constitute one-fifth of the overall facial width. The intercanthal distance should also make up another one-fifth of the distance. Average intercanthal distance is about 30 mm [5]. Increased (hypertelorism) or decreased (hypotelorism) intercanthal distance can distract from the esthetics of the rest of the face.

The periorbital features can greatly affect the appearance of the eye. A canthal tilt where the lateral tilt is superior to the medial canthus exudes youthfulness and vibrance while a superior medial canthus is a sign of aging and fatigue. The lateral canthus should generally be 2–4 mm superior to the medial canthus [1, 3].

The upper eyelid should cover 1–2 mm of the iris superiorly, while the lower eyelid should be at the level of the inferior limbus [6]. The upper eyelid should have an acute medial angle with a gentle curve laterally. Ptosis of the upper eyelid can occur due to a variety of reasons (trauma, aging, etc.) and can give the appearance

of being tired and sleepy. In situation like these, a blepharoplasty can be performed where excess skin is removed from the upper eyelid in order to create more tension in the eyelid and prevent it from drooping over the eye.

The lower eyelid is continuous with cheek. With the descending of the malar fat that is common with aging, the demarcation becomes more apparent as the facial bone is more pronounced [5]. Fat grafting or cheek fat pad elevation are surgical options to blend the junction and create a once again smooth transition [6].

Nose

The central location of a nose on the face makes it a critical part of facial esthetics. The esthetic ideals of a nose are influenced by a patient's facial anatomy, age, own desires, ethnicity, and cultural values. Generally, the nose should be positioned in the middle third of the face length. Nasal length, nasal tip position, and rotation are some of the aspects analyzed in nasal esthetics.

From the lateral profile view, the radix is the deepest part of the nose and marks the transition point from the glabella to the dorsum of the nose [2]. The dorsum of the nose, referred to as the bridge of the nose, runs from the radix to the nasal tip. From the frontal view, the dorsum should draw an aesthetic line that narrows in from the medial border of the eyebrows along the lateral nose bone, before curving out along the nasal tip [3, 7]. In the lateral view, the dorsum should follow a smooth continuous line from the glabella to the nasal tip (Fig. 2.6a, b). Keeping the anatomy of the nose and adjacent structures in mind, the average measurements of an ideal nose are as follows: nasofrontal angle is 115–135°, nasolabial angle is 95–110° for women and 90–95° for men, nasofacial angle is 30–40°, and nasomental angle is 120–132° [1, 2, 4].

Through worm's eye view, the nasal tip and bilateral ala form an equilateral triangle (Fig. 2.7). The ideal width of the nose at the base of the alar margins should be equidistant to the intercanthal distance between two medial canthi. If the triangle is divided into three horizontal columns, the nostrils should occupy two-thirds of the columns at the base of the triangle and the tip of the nose should occupy the top one-third tip of the triangle [7].

There is no ideal shape of the dorsal aesthetic lines, but it is integral for a graceful appearance that the lines run smoothly parallel through the nasal bridge and slightly taper out as they approach the nasal tip. Even a slight discrepancy or interruption in the tracking of aesthetic lines along the nose can cause the nose to appear asymmetrical and unbalanced [2, 8]. A common correction of the nose is a reduction of the dorsal hump, which is a result of large nasal bones and/or septum. While men might prefer a nose with a small dorsal hump, women tend to prefer a straight dorsum or sometimes even a slightly concave dorsum [8]. Some other common corrections to the nose include narrowing of a widened nasal bridge and septoplasty to address a deviated septum. These corrections involve manipulating the position of the medial and lateral crural and septal cartilages within the base of the nose to create a more narrow, straight nose.

Fig. 2.6 (**a**) The medial margin of the superior orbital rim forms the brow tip aesthetic line as it curves medially along the lateral basal bone. (**b**) The brow tip aesthetic line should frame the eyebrows and follows a smooth curve trajectory before straightening to form the contours of the nasal dorsum. (**c**) The nasofrontal angle from the profile view

Lips

The lips can reflect the age of a person, as more full and luscious lips give a person an appearance of youthfulness while flatter, longer, and less defined lips are telling signs of aging [7]. The lips are located within the lower one-third of the face. The upper lip is measured from the subnasale to stomion, and makes up one-third of the total lip height. The lower lip and chin are measured from stomion to gnathion and make up the second two-thirds of the lip height.

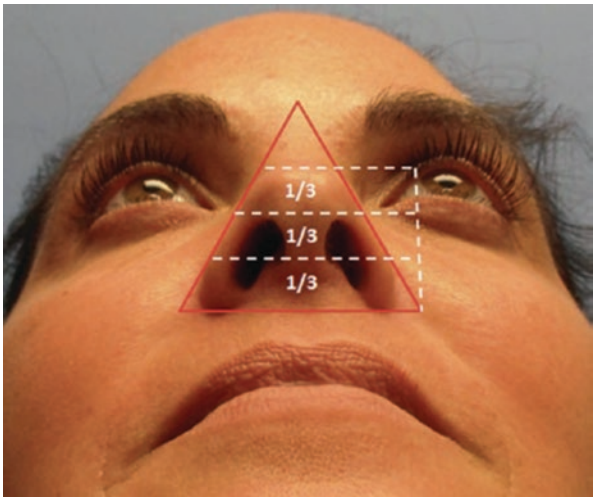

Fig. 2.7 The columella is divided into three equal zones: upper lobular, middle, and basal zones. The nasal tip and bilateral alar rims form a triangle. The nostrils should make up two-thirds of the length of the columella, with the nasal tip making up the final third. The ideal width of the nose corresponds to the intercanthal distance. Image Citation: Ferneini, E., Castiglione, C., Banki, M. Complications in Maxillofacial Cosmetic Surgery (p. 29, 31). Cham, Switzerland: Springer 2018

The ideal width of the lips is determined by drawing a vertical line from the medial limbus down, which should intersect the lateral most edge of the oral commissures. The philtra columns extend from Cupid's bow to the columella (Fig. 2.8a, b).

Lip projection is a common assessment used to determine ideal position of lips by drawing a line from the subnasale to pogonion. The upper lip should be around 3.5 mm anterior to that line and the lower lip should be around 2.2 mm anterior to the same line [5]. Also, the lower lip height should be twice the size of the upper lip [4]. As we age, the projection of the lip decreases due to perioral tissue changes and volume loss in the lips. With age the lips become thin, vermilion border rolls inward, and upper lip lengthens and droops down [7]. Common lip and perioral rejuvenation to restore youthfulness include surgical and nonsurgical procedures that utilize hyaluronic acid, dermal fillers, and nonablative lasers.

Chin

The chin is demarcated superiorly by the labiomental sulcus, inferiorly by the menton, and should make up two-thirds of the height of the lower facial third. Vertical chin height can be altered by loss of teeth and resorption of the mandibular ridge leading to changes in the appearance of the lower lip as well as the contours of the neck [4].

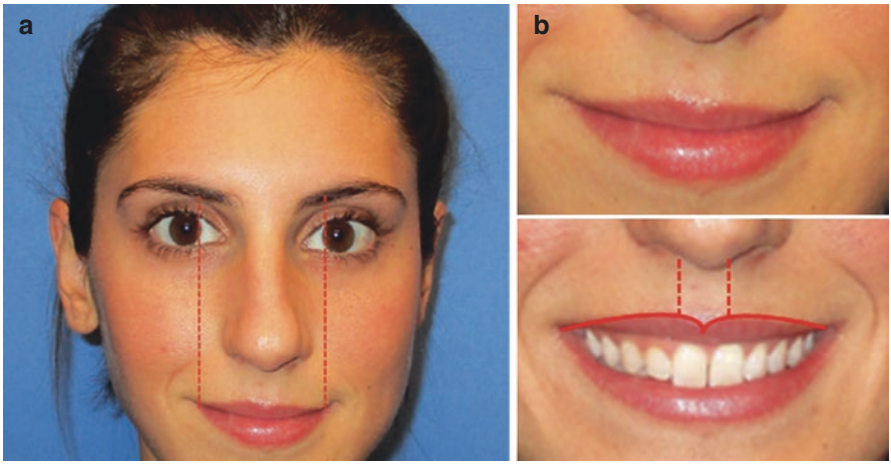

Fig. 2.8 (**a**) A vertical line drawn from the lateral edge of the oral commissure should be in line with the medial limbus. (**b**) The philtra columns extend from Cupid's bow to the columella. Image Citation: Ferneini, E., Castiglione, C., Banki, M. Complications in Maxillofacial Cosmetic Surgery (p. 27, 33). Cham, Switzerland: Springer 2018

Chin projection is evaluated in the lateral profile by the angle formed by a line drawn from glabella and subnasale and a line drawn from subnasale to pogonion. The angle should be 11° [2, 7].

While evaluating a patient for a small or "weak" chin, it is important to differentiate between microgenia and micrognathia. Microgenia can be corrected for with a genioplasty alone. However, micrognathia will generally be associated with malocclusion as well and may require orthognathic surgery to advance the mandible and achieve proper chin projection [2]. Fillers and botulinum injections are other viable options for chin enhancement.

Neck

While technically not part of the face, the neck can still influence facial esthetics by affecting the contours of the chin and lower face. The cervicomental angle is formed by a horizontal line drawn from the menton to the innermost point between the submental area and neck (cervical point) and a vertical line drawn from the pogonion to the glabella [4, 9] (Fig. 2.9). The ideal cervicomental angle is acute and is ideally between 85° and 95° with acceptable ranges of 90–110°. Skin laxity that occurs with aging leads to loss of definition around the mandible and an obtuse cervicomental angle [2, 7]. A SMAS face-lift technique can be used to create a tauter look and restore youthful appearance.

Fig. 2.9 The cervicomental angle is created by two intersecting planes: the horizontal plane from the menton to the cervical point, and the vertical plane parallel to the neck. Image Citation: Ferneini, E., Castiglione, C., Banki, M. Complications in Maxillofacial Cosmetic Surgery (p. 34). Cham, Switzerland: Springer 2018

Ears

The superior aspect of the ear should align with the eyebrow, while the inferior part should be at the level of the nasal ala. Ear width should be 50–60% of the length, and ear length should be approximately the same as the length of the nose. The long axis of the ear should be posteriorly inclined 15–30° and should be parallel to the long axis of the nasal dorsum. The angle between the helix and the mastoid skin is 20–30° and the distance is 15–25 mm. [4, 9].

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