Facial Aesthetic Analysis

67

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67.1 Introduction

Human beauty standards, although might vary from culture to another and between times, reflect our evolutionary past and emphasize the role of health assessment in mate choice, where beautiful facial features are indicators of health and fertility.

Aesthetic facial proportions have been used in art since the ancient Egyptians; however, it was the Greek philosophers that made it a formal discipline, where beauty is synonymous to symmetry, harmony, and geometry. In his drawing on the Vitruvian man, Leo da Vinci formulated the ideal human proportion according to Vitruvius, and with this da Vinci formulated the ideal facial proportions by dividing the face into three equal parts. On the other hand, the German printmaker Albrecht Durer divided the face into four equal fourths, and noticed that the length of the nose is equal to that of the ear. From arts to medicine, facial aesthetic analysis plays an important role in the preoperative preparation of patients seeking facial cosmetic and enhancing procedures to get the best result.

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67.2 Skin Classification [1]

Physiologic Changes of the Aging Face

- 1% per year thinning of the papillary dermis
- Decrease of elastin production
- Photodamage
- Increased skin wrinkling and laxity
- Ptosis is of the soft tissue
- Atrophy of the dermis
- Decrease subcutaneous fat and loss of soft tissue volume

Fitzpatrick Skin Classification

- Helps to predict the possible sun damage and the risk of skin cancer (Table 67.1)

The patient fills a questionnaire on genetic disposition, reaction to sun exposure, and tanning habits; a score is formulated that correspond to a fitzpatrick skin phototype.

Dermatone skin analyser is a portable easy to use device that accurately analyzes the skin tone based on the concentration of melanin, Hb, and skin reflection properties of the skin, where the readings have a scale that correspond to various Fitzpatrick skin types.

Glogau Classification of Photoaging

- Photoaging is the premature aging of the skin due to primarily UV light exposure (Table 67.2)

A. Al-Qahtani et al. (eds.), *Textbook of Clinical Otolaryngology*,
https://doi.org/10.1007/978-3-030-54088-3_67

Table 67.1 Fitzpatrick's skin phototypes

Phototype	Sunburn and tanning history (defines the phototype)	Immediate pigment darkening	Delayed tanning	Constitutive color (unexposed buttock skin)
I	Burns easily, never tans	None (−)	None (−)	Ivory white
II	Burns easily, tans minimally with difficulty	Weak (± to +)	Minimal to weak (± to +)	White
III	Burns moderately, tans moderately and uniformly	Definite +	Low +	White
IV	Burns minimally, tans moderately and easily	Moderate ++	Moderate ++	Beige-olive, lightly tanned
V	Rarely burns, tans profusely	Intense (brown) +++	Strong, intense brown +++	Moderate brown or tanned
VI	Never bums, tans profusely	Intense (dark brown) +++	Strong intense brown +++	Dark brown or black

Adapted from Fitzpatrick's Dermatology in General Medicine. McGraw-Hill Professional; fifth edition [2]

Table 67.2 Glogau classification of photoaging

Group	Classification	Typical age	Description	Skin characteristics
I	Mild	28–35	No wrinkles	Early photoaging: mild pigment changes, no keratosis, minimal wrinkles, minimal or no makeup
II	**Moderate**	**35–50**	**Wrinkles in motion**	**Early to moderate photoaging: early brown spots visible, keratosis palpable but not visible, parallel smile lines begin to appear, wears some foundation**
III	**Advanced**	**50–65**	**Wrinkles at rest**	**Advanced photoaging: obvious discolorations, visible capillaries (telangiectasia), visible keratosis, wears heavier foundation always**
IV	**Severe**	**60–75**	**Only wrinkles**	**Severe photoaging: yellow-gray skin color, prior skin malignancies, wrinkles throughout: no normal skin, cannot wear makeup because it cakes and cracks**

Table 67.3 Classification of Facial Wrinkles

Facial wrinkle	Class	Description
Horizontal forehead lines		
Glabellar frown lines		
Periorbital lines		
Preauricular lines	0	No wrinkles
Cheek lines	1	Just perceptible wrinkle
Nasolabial folds	2	Shallow wrinkles
Radial upper lip lines	3	Moderately deep wrinkle
Radial lower lip lines	4	Deep wrinkle, well-defined edges
Corner of the mouth lines	5	Very deep wrinkle, redundant fold
Marionette lines		
Labiomental crease		
Horizontal neck folds		

67.3 Facial Wrinkles [3]

- Superficial wrinkles: texture changes due to photoaging of the typographically defined areas, limited superficial dermal creases
- Mimetic wrinkles: deep dermal creasing, caused by repeated facial movements and dermal elastosis
- Lines (partial thickness)
- Furrows (full thickness) (Fig. 67.1 and Table 67.3)

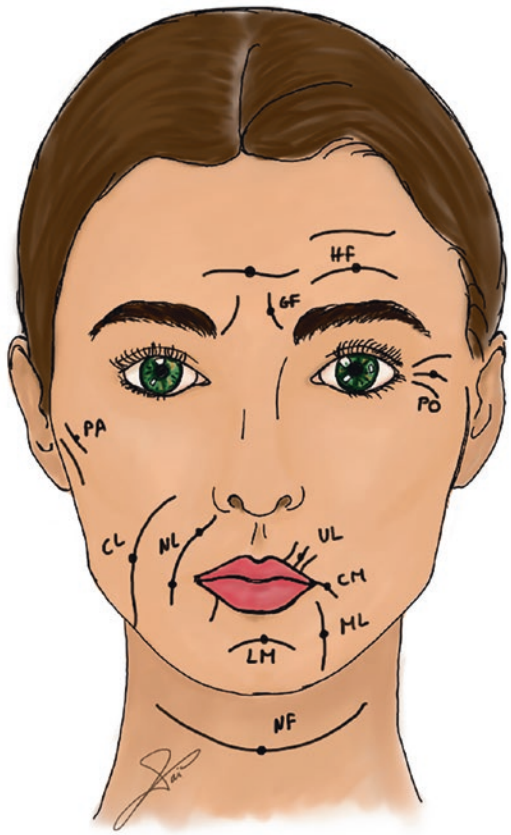

Fig. 67.1 Frontal view showing the facial wrinkles. *HF* horizontal forehead lines, *GF* glabellar frown lines, *PO* periorbital lines, *PA* preauricular lines, *NL* nasalabial lines, *CL* cheek lines, *UL* upper lip lines, *CM* corner of the mouth lines, *LB* labiomental crease, *NF* neck fold, *ML* marionette lines

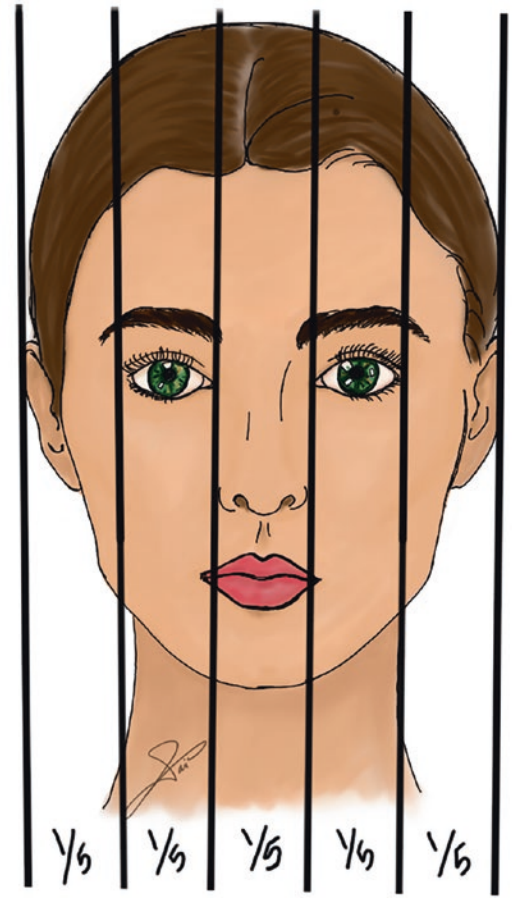

Fig. 67.2 Frontal facial view showing the facial fifths

67.4 Poor Candidates for Cosmetic Facial Plastic Surgeries

The selection of a patient suitable for cosmetic facial surgery is very important to get the best result that meets with the patients expectations; hence a patient with unrealistic expectations is a poor candidate. A patient with multiple physician visits also makes him/her a poor candidate. The physician should always check for any patterns in the patient's personality that shows any signs of psychiatric instabilities such as depression and anxiety. Finally smoking decreases the healing process, hence the patient should stop smoking to allow proper healing and less skin scarring after the surgery, hence a patient unwilling to stop smoking is a poor candidate for any cosmetic facial plastic surgeries.

67.5 Proportions [4]

67.5.1 The Frankfurt Horizontal Plane (FHP)

- Line drawn from superior aspect of external auditory canal to most inferior point of the orbital rim
- This is line used in the preoperative photos

67.5.2 Vertical Fifths (Fig. 67.2)

67.5.3 Horizontal Facial Thirds (Fig. 67.3)

- The lower third can be subdivided into upper 1/3 and lower 2/3

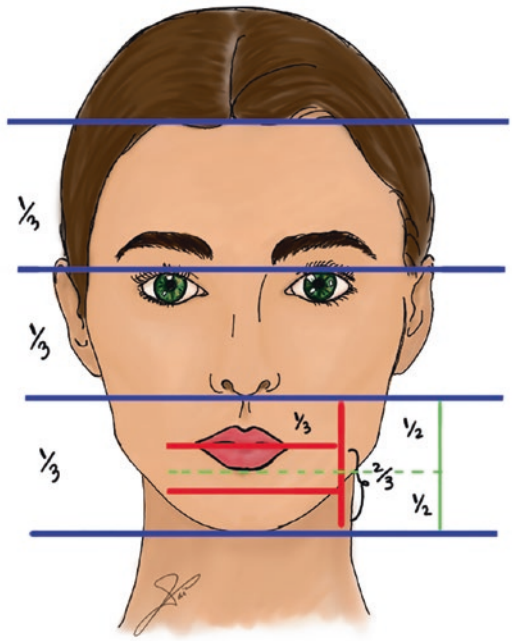

Fig. 67.3 Frontal facial view showing the horizontal facial thirds, with the lower third being also divided into thirds

- The lower third can be also subdivided into three 1/3
- The lower third can be again subdivided into 2 half

67.5.4 Lateral View (Fig. 67.4)

- The distance from the mentor to mandibular angle is half the distance from mention to hairline

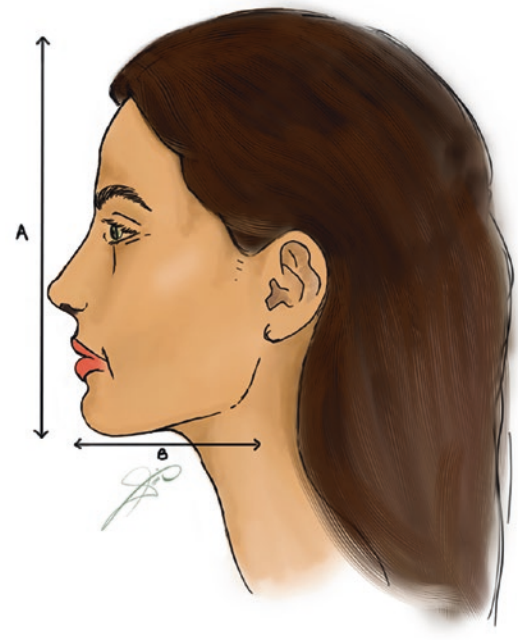

Fig. 67.4 Lateral facial view with A = 2B

67.6 Soft Tissue Anatomic Reference Points (Fig. 67.5) [5]

- *Trichion*: hairline in the midsagittal plane
- *Glabella*: most prominent portion of forehead in midsagittal plane, above root of the nose
- *Nasion*: deepest point in the nasofrontal angle, corresponds to nasofrontal suture
- *Radix*: root of nose
- *Rhinion*: junction of bony and cartilaginous nasal dorsum; thinnest skin of the nose
- *Tip*: most anterior projection of nasal tip
- *Nasal b*ase: includes the tip in addition to the columella, alar side walls, and nasal sill
- *Subnasale*: the point at which the nasal columella merges with the upper cutaneous lip
- *Pogonion*: most prominent anterior projection of chin
- *Menton*: inferior border of chin
- *Cervical point*: innermost area between the submental region and the neck
- *Sellion*: osseocartilaginous junction on the dorsum of the nose
- *Labrale superius*: vermilion border of upper lip
- *Labrale inferius*: vermilion border of lower lip
- *Mentolabial sulcus*: most posterior point between lower lip and chin

67.7 On Cephalometric Reference Point [6]

Anthropometry: standardized measuring technique that expresses the quantitative dimensions of the human body.

Cephalometry: the discipline of anthropometry that deals with the measurement of the head

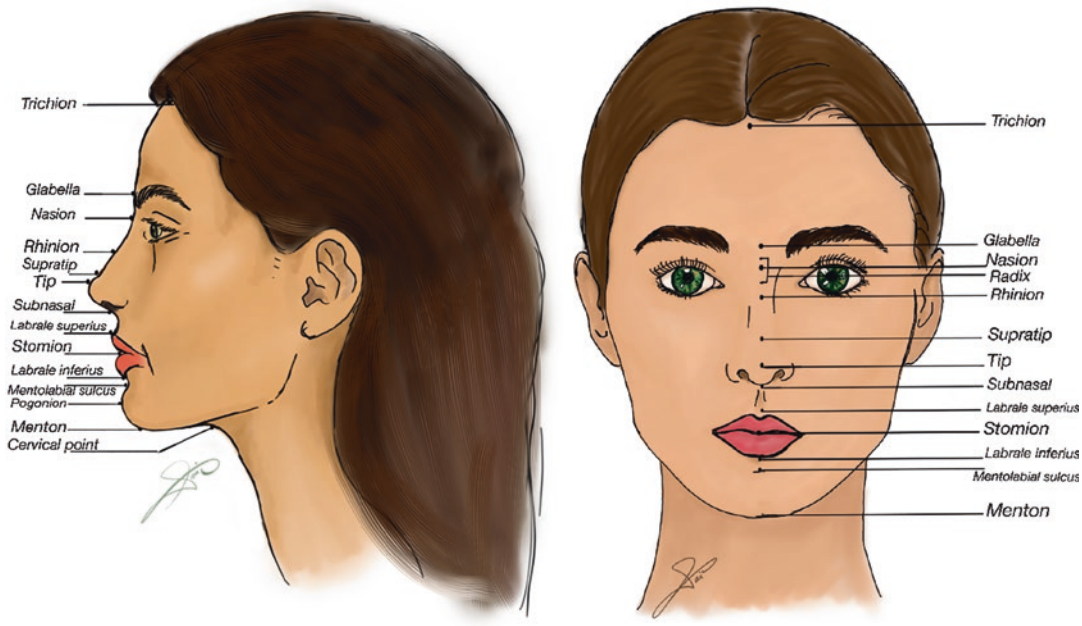

Fig. 67.5 Frontal and lateral facial view showing the major soft tissue anatomic reference points

and face bony landmarks taken directly or by radiograph using specific reference points. Cephalometry is used in forensic studies, orthodontic treatment, orthognathic surgery, and facial/ reconstructive evaluation.

Cephalometric reference points (Fig. 67.6):

- (*N*) nasion
- (*S*) Sella: midpoint of the hypophyseal fossa
- (*Or*) Orbitale: most inferior point on the infra-orbital rim
- (*P*) Porion: most superior point on the external auditory meatus
- (*Cd*) Condylion: most superior point on the head of the mandibular condyle
- (*ANS*) Anterior nasal spine
- (*PNS*) Posterior nasal spine
- (*A*) Point A, subspinale: deepest point in the concavity of the premaxilla
- (*Pr*) Prosthion: lowest most anterior point on the alveolar portion of the premaxilla
- (*Id*) Infradentale: highest most anterior point on the alveolar portion of the mandible
- (*Pg*) Pogonion: Most anterior point on the bony chin in the midline

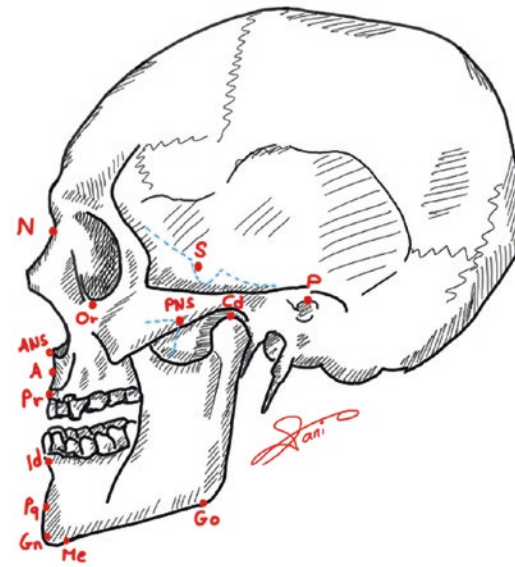

Fig. 67.6 Cephalometric reference points

- (*Gn*) Gnathion: point between (Pg) and (Me)
- (*Me*) Menton: lowest point on the mandible
- (*Go*) Gonion: midpoint at the angle of the mandible

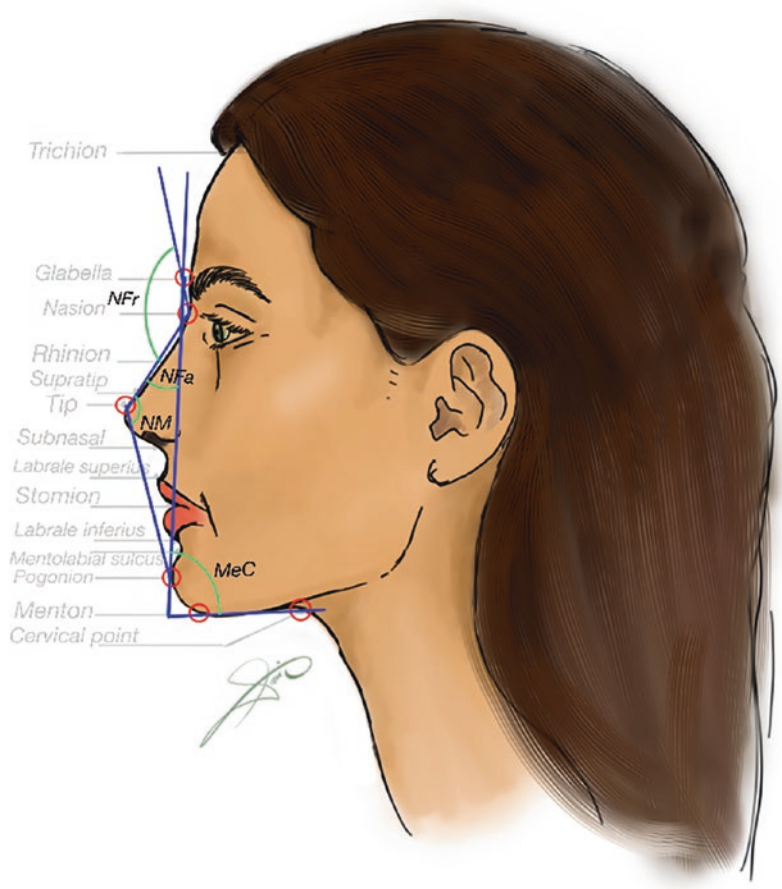

Fig. 67.7 Lateral facial view showing the facial angles according to Powell and Humphrey

67.8 Facial Angles [5]

67.8.1 According to Powell and Humphrey (Fig. 67.7)

Nasofacial angle (*NFa*): angle between the plane of the face (glabella to pogonion) and the nasal dorsum; normally 30–40°.

Nasolabial angle (*NL*): angle between a line from the upper lip mucocutaneous border to the subnasale and a line from the subnasale to the most anterior point on the columella; ideal range is 90–105° in men, and 95–120° in women.

Nasofrontal angle (*NFr*): angle between the nasal dorsum and a tangent passing through the nasion and the glabella; ideal range is 115–130°.

Nasomental angle (*NM*): angle between the nasal dorsum and the nasomental line (nasal tip to pogonion); ideal range is 120–132°.

Cervicomental angle (*MeC*): angle between a line from the glabella to the pogonion and a line from the menton to the cervical point; ideal range is 80–90°.

67.8.2 According to Peck and Peck (Fig. 67.8)

Facial angle (*F*): angle created by intersection of a line drawn from tragion to subnasal and line from nasion to pogonion; the mean angle is 102.5.

Maxillofacial angle (*MF*): angle created by intersection of line drawn from nasion to labium

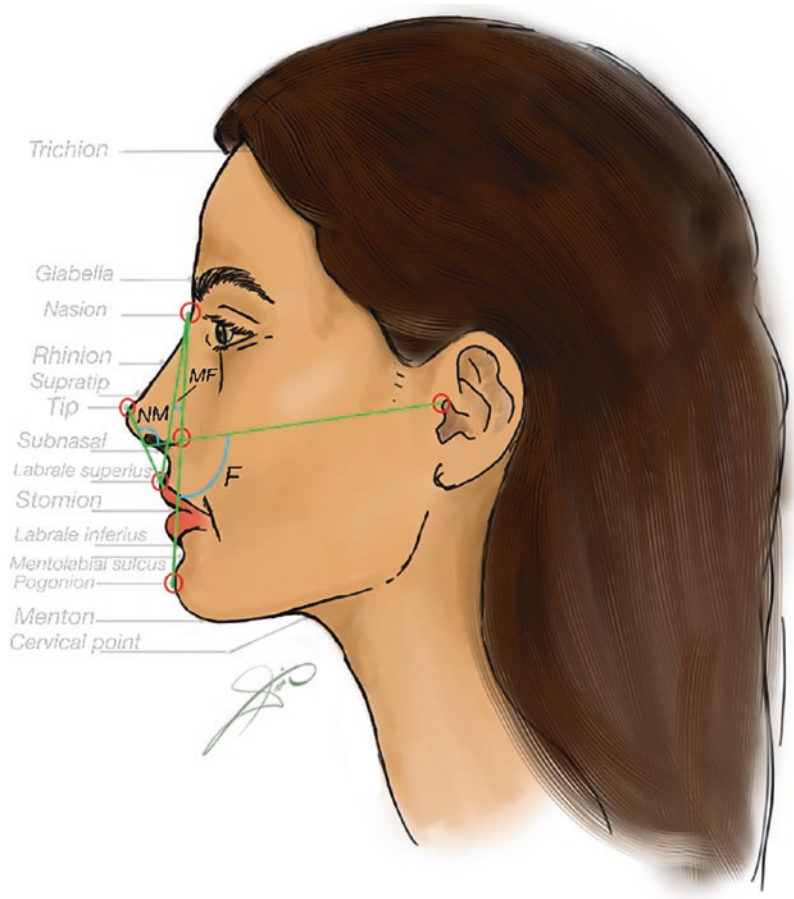

Fig. 67.8 Lateral facial view showing the facial angles according to peck and peck

superior and line from nasion to pogonion; the mean angle is 5.9°.

Nasomaxillary angle (*NM*): angle created by intersection of line drawn from nose tip to superior labium and line from tragion to subnasal; the mean angle is 106.1.

67.9 Forehead [5, 7]

- Height: from the hair line to the glabella
- Nasofrontal angle: 115–130 as described above (Fig. 67.7).
- Position of the eyebrow (Fig. 67.9):
- Medial brow is a clublike shaped start from a point on the vertical line passing from the medial canthus of the eye to the Lateral most of the nasal ala.
- Lateral brow is a point on the line passing from the nasal ala to the lateral canthus of the eye.
- In men: the eyebrow sits on the superior orbital rim with a roughly horizontal shape.
- In women: the eyebrow has a more arc shaped and usually sits above the superior orbital rim with the lateral brow slightly superior to the medial brow.
- The apex which is the highest point of the arc is usually found between the lateral limbus and the lateral canthus of the eye.

67.10 The Eyes

The boundaries of the orbit:

Lower third of the upper face and the upper third of the midface.

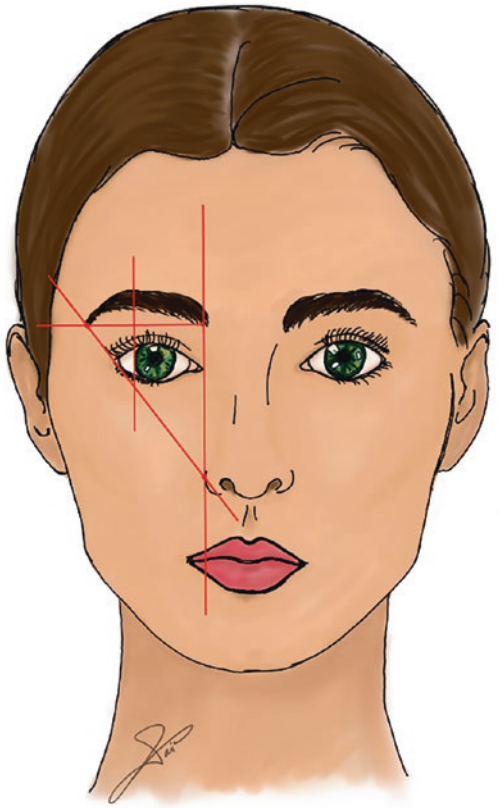

Fig. 67.9 Frontal facial view showing aesthetic analysis of the forehead

Measurements

The intercanthal distance is on average around 31–33 mm and tends to be equivalent to 1/5 the facial width; however, a distance of 33–36 mm is considered attractive.

In men, the intercanthal distance ranges from 26.5 to 38.7 mm while in women it ranges from 25.5 to 37.5 mm.

The intercanthal axis is a bit tilted with the lateral canthus 2° higher.

The upper eyelid crease is usually at the level of the nasion, with the distance from the crease to the lash line being around 8–11 mm.

The average palpebral opening is 10–12 mm, with the upper eyelid covering around 1.5 mm of the limbus while the lower eyelid covers not more than 0.5 mm of it.

The lower eyelid crease should be <5–6 mm from lid margin.

67.11 The Nose [5, 7, 8]

The nose is found in the middle facial third. Starting from the nasion which is usually at the level of the upper eyelid crease down to the subnasale. In the frontal view, a smooth continuous line can be drawn from the eyebrow along the lateral edge of the dorsum up until the nasal tip.

The nose can be divided into thirds:

- Upper third: nasal bone
- Middle third: upper lateral cartilages and septum
- Lower third: lower lateral cartilage and septum

General Measures

- The ideal nasal length from the rhinos to the tip is equal of that from the stomion to the menton, and usually is equal 2/3 of the middle facial third's height
- Dorsal width is equal to the intercanthal distance, which is equal to the 1/5 facial width

General Angles (Fig. 67.7)

- Nasofacial angle: 36°
- Nasofrontal angle: 120°
- Nasomental angle: 120–132°
- Nasolabial angle: male 90–95 female 95–110°
- Columellar-lobular angle: 30–45°
- Formed by the junction of the columella and the infratip lobule, it's usually around 30–45°. In case of prominent caudal septum, there will be increased fullness in this area giving the appearance of increased tip rotation while the nasolabial angle is unchanged

Nasal Symmetry

- An imaginary vertical line passing by the midsagittal plane is used to assess the symmetry of the nose, taking into consideration to assess each nasal third independently in order to correct the underlying cause of the asymmetry according to the deformed structure.

Nasal Tip Projection

- It's the distance of the nasal tip from the coronary plane, and it is determined by the size

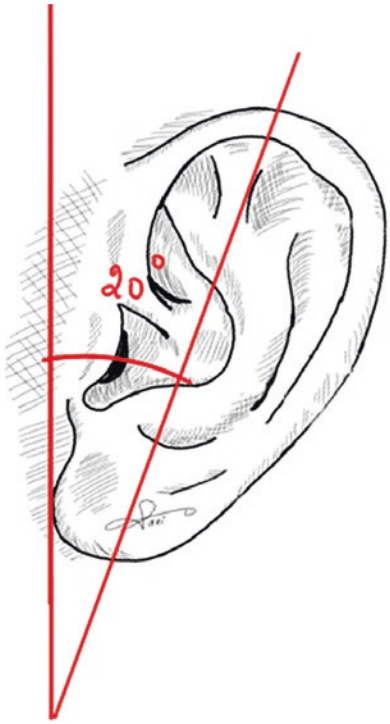

Fig. 67.10 View showing the auriculocephalic angle

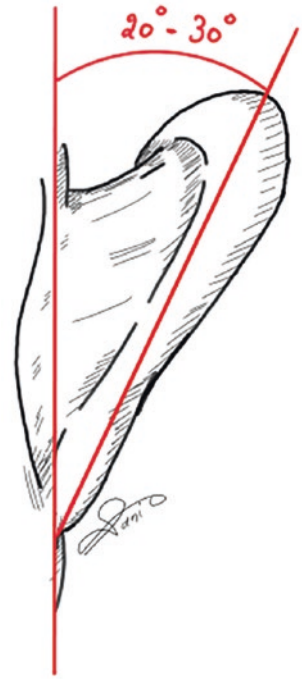

Fig. 67.11 View showing the long axis of the ear

and the shape of the lower lateral cartilages, and the height of the caudal cartilage outs septum

The distance between the tip and a vertical line drawn passing by the upper most projecting portion of the lip is usually 50–60% of the distance from the tip of the nose to the alar-cheek junction

- If >60%, it means that is overprojected
- If <50%, it mean that projection is inadequate

This relationship is only effective if the lip projection is normal

The tip projection is usually equal of the alar base width

Tip Rotation

- The rotation of the nose tip is on long the radius based at the external auditory canal, with increased rotation along the upper operation of the arc while decreased rotation is along the lower portion of the arc

The tip rotation is usually determined by the nasolabial angle (discussed in the angle section)

67.12 The Ears [7]

Angles

- Auriculocephalic angle: angle between the scalp and the anterolateral aspect of the helix, usually around 20–30° (Fig. 67.10).
- Long axis of the ear is inclined posteriorly 15–20° from the vertical line (Fig. 67.11).

Measures

- The vertical height of the ear is equal to the height of the nose from the nasion to the subnasal and it is usually around 6 cm.
- The width is around 50% the ear length.
- The helix is around 15–25 mm away from the mastoid skin.
- The helix projects 2–5 m more laterally from the antihelix.

67.13 The Mouth

The key point and landmarks to be assessed:

- Dental occlusion
- Vermilion-cutaneous junction
- Cupid's bow
- Philtral columns
- Perioral rhytids
- The volume
- The lateral angles of the mouth. Usually it gets down with age
- Upper lip length; at rest the upper lip should expose around half inch of the upper incisor teeth
- The depth of nasolabial groove at rest and during animation

67.14 Chin

- The chin is a pivotal facial unit when analyzing the nose and the neck
- The chin should be at the line perpendicular to the Frankfort and passing by the nasion
- The labiomental groove should be around 4 mm deep to the abovementioned line
- Evaluation of microgenia which is the diminished chin eminence that requires augmentation, versus the retrognathia which is the retrodisplaced mandible that requires sagittal split osteotomies

67.15 The Neck

The neck ideally has to be well defined from the pogonion to the mandibular angle, with the mentocervical angle around between 80° and 90° as discussed previously; the neck should always be assessed along with the chin, Because an obtuse mentocervical angle gives a false perception of a poor projected chin.

Take Home Messages

- The patient's skin quality affects the result of the operations.
- A proper communication between the physician and the patient is needed to insure that the patient expectations are congruent with what the surgeon can do.
- It's important to consider both the facial subunit and the face as whole during the preoperative aesthetic evaluation.
- There are people with aesthetically appealing faces that don't have these ideal facial proportions.
- Facial angles and proportions are adjuvant tools that facilitate the surgeon's work in order to provide the best result for the patients.

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