CHAPTER ONE

The Aging Face Consultation

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HISTORY

The elusive features of beauty have been studied for millennia. The facets of beauty change with time, and with every era new components take on a greater or lesser importance. Alhough this quest leads to many definitions, it has also identified certain specific features that define beauty. We must search through the art or writing of an era to understand what constituted beauty at that time. From ancient Egyptian depictions of Queen Nefertiti to the paintings of Leonardo da Vinci, the pursuit of facial beauty has been attempted by history's greatest artists (Fig. 1-1). Through their work, we can glean the details that, when brought together, create beauty. In ancient times, combinations of facial features, body proportions, hair color, and skin tone could remain popular for centuries. As time progressed, however, these preferences began to change more quickly, first by decades, later by seasons, and now by weeks.

Figure 1-1 The classical beauty of the Egyptian Nefertiti continues to be seen as an ideal image of beauty and elegance. Copyright © Bildarchiv Preussischer Kulturbesitz/Art Resource, NY.

The ideal of universal beauty is just that, an ideal. Differences in epochs, cultures, and ethnicity dictate that a unanimous definition of beauty will be ever elusive. However, there are common threads in the proportions and harmony of the face that throughout time and civilizations confer an overall sense of attractiveness.[1] Beauty can be defined and measured.[2] It has also been shown that attractiveness plays a covert but significant role in the way people behave and how they react to another.[3] Through the centuries we can see the ever-changing definition of beauty, and recognizing its perception is an innate human trait.[4] Indeed, infants have been shown to prefer faces that have been deemed more attractive.[5] This tendency continues through adulthood. Faces that deviate the least amount from standard averages have been found to be more attractive among older study participants.[6] The traits that subjects have found to be consistently more attractive in females are high cheekbones, large eyes, a smaller vertical third of the face, and a narrow jaw.[7]

ANCIENT GREECE

The ancient Greek civilization is considered by many to be the progenitor of modern facial analysis. The Greek artist Praxiteles (370–330 BC) provided a model of beauty with his sculpture of Aphrodite. His work, and that of others influenced by him, displays the evolution of beauty by incorporating human expression into the classic context of a goddess (Fig. 1-2). With her triangular forehead and eyes that express warmth, innocence, and sadness, she conveyed components of reality that had been overlooked by Praxiteles's predecessors. Her features were regular and depicted imperfections that added to her beauty by making her more human. In creating the sculpture of Aphrodite, Praxiteles emphasized subtlety versus the more rigid, precise expressions popular at that time. Her facial features emanated beauty without overwhelming the observer. Aphrodite became a standard of beauty passed on to subsequent generations.[3,8,9]

The origin of the pursuit of beauty is often associated with the ancient Greeks, and their effect still permeates our modern conceptions of desirability. It was the Greek civilization, Plato specifically, that defined beauty as an

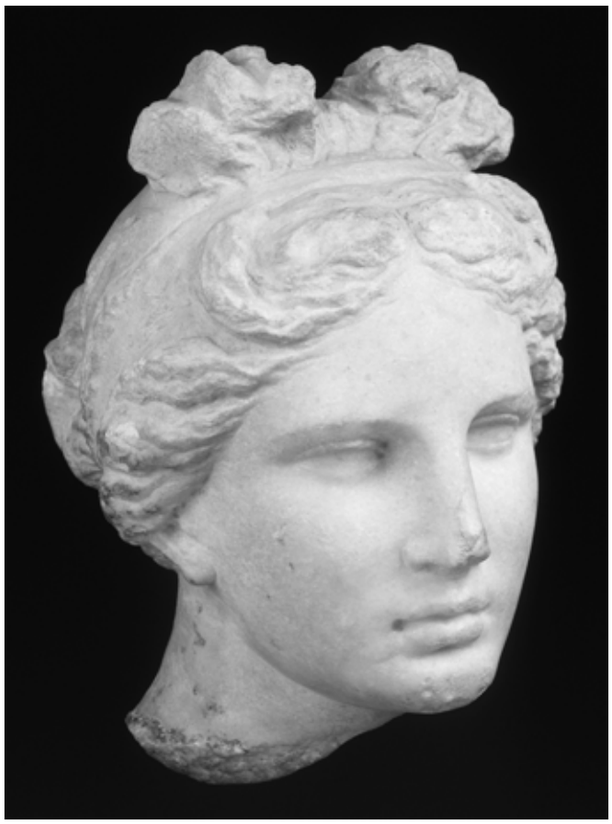


Figure 1-2 The face of Aphrodite serves as a model of facial proportion and beauty. Copyright © 2004 Museum of Fine Arts, Boston, MA.

appropriate balance. We see this concept mirrored today as we analyze the face into fifths, vertically, and thirds, horizontally. To the Greeks the concept of balance went beyond physical characteristics and included wealth, health, and beauty.[3] Indeed, the Greeks considered physical beauty to be worthy of fame. They delved into the meaning of these factors in the context of an orderly universe. In this vein, they attempted to understand the concept of beauty as they sought to define it through mathematical terms.[10] The Greeks, and others throughout history, also realized beauty is attained when good taste, balance, and proportion are in harmony.

This sentiment was echoed by Polyclitus (fifth century BC). He defined a series of proportions that he believed would produce an image of faultless beauty. For his doubters, he would create two sculptures, one naturalistic and one according to his proportioned principles. Viewers of the works agreed the statue following strict proportions was more beautiful by far.[3,11] This balance, known as the elusive "golden mean," has been the topic of debate for centuries as artists, architects, and philosophers have sought to define beauty through mathematical terms.[12]

RENAISSANCE

The Greek influence reemerged in the late 14th century at the birth of the Renaissance. The Renaissance covered many aspects of human endeavor and included the search, definition, and expression of beauty. The goal of the artists of the time was not merely the depiction of objects, but the creation of them from various forms to attain an ideal. The positive tone of this time is echoed in its artistic impressions. No longer were women depicted in the harsh terms of earlier times. They emerged as independent and intelligent.[3] Peter Paul Rubens (1577–1640) depicted vigorous female forms that were once seen as the ideal portrayal of female beauty, perhaps due to the spirit they emanated as opposed to the forms themselves. The women Rubens created were intelligent and alert, with dark eyes, long necks, and round heads (Fig. 1-3). This ideal evolved as Rubens aged and the vigor of his early paintings was slowly displaced by softness in form in his later works.[3,13]

Although the Renaissance is noted for its humanistic approach to art, it valued the mathematical method that dated back to the Greeks. The artists of the era desired to discover scientific explanations of beauty. The science of beauty intrigued the artists of this age as never before. The theories of Vitruvius Pollios (first century BC), a Roman architect, on using the human form to derive

Figure 1-3 The societal evolution of the perception of beauty is evidenced in Rubens' portrait of the young women whose dark eyes and manner belie an advanced intelligence. Copyright © Erich Lessing/Art Resource, NY.

Figure 1-4 The flowing, obvious beauty of Venus epitomizes the Renaissance ideal of beauty. Copyright © Erich Lessing/Art Resource, NY.

perfect proportions in building sacred edifices were not merely taken as reference but as foundation.

Perhaps no other artist is more closely defined by this period than Leonardo da Vinci (1452–1519). Da Vinci's passionate pursuit of proportion is seen throughout his copious works. Da Vinci was relentless in his pursuit of the balance between science and beauty. His numerous studies of the face and head stand as masterpieces of the human form. Da Vinci first broke the face into thirds to assess their individual contributions to the whole.

The Renaissance artist Sandro Botticelli (1444–1510) again illustrated the desire to place classic concepts in a modern format.[3] By combining the traditional features of beauty with the partialities of his time, Botticelli epitomized the Renaissance ideal. In *The Birth of Venus*, Botticelli depicted a traditional subject with current features. Her long, angular face had previously been depicted as a standard oval. Her emotions emanate from her geometrically regular and perfectly calm facial expression (Fig. 1-4).[3] The two common threads in the pursuit of beauty are adherence to classic forms and a modern manipulation of those forms to meet the taste of the times.

The Romantic period was heralded by Prud'hon's interpretation of female beauty. In his images of his mistress this ideal woman merges dream and sensuality. The woman in the painting titled *The Happy Mother* gazes adoringly at her nursing infant (Fig. 1-5). Prud'hon stressed the natural beauty of maternity—and with this physical and emotional bond, the beauty of feminine tenderness is skillfully portrayed.

HISTORY OF FACIAL REJUVENATION

Aesthetic surgery is the pursuit of what is described by the Greek word *aisthetikos*, meaning a passion for that which

Figure 1-5 The soft, feminine portrait of this mother gazing at her child depicted the Romantic sense of beauty. Copyright © The J. Paul Getty Museum.

is beautiful. The surgical enhancement of appearance was roundly dismissed until the late 1800s. Before this time, such perceived vanity was socially unacceptable and the procedures themselves were considerably dangerous. As the constraints of the Victorian era receded, women became empowered to alter their appearance as they chose. Makeup and hair styling became commonplace and the shroud surrounding the world of cosmetic surgery began to slowly unravel. Surgery, however, was a perilous endeavor at the beginning of the 20th century. Anesthesia methods were crude at best and antibiotics were not in existence yet. It would not be until the middle of the century that these two vital components to surgical management of complex problems came into common use.[3]

The surgeons during this time had little to no appreciation of the challenges they faced. The knowledge of facial anatomy and function was marginal. Little was known about the complex interplay of skin, muscle, fat, cartilage, and bone. Manipulation of these components could not be confidently addressed until the physiology of blood supply, lymphatic drainage, and flap dynamics was more completely understood.

This field has rapidly evolved over the past 20 years as aesthetic surgery has blossomed to the forefront of

American culture. The final barriers to cosmetic alterations have been removed with the advent of less invasive methods and glamorization of plastic surgery in the media. Cosmetic surgery has indeed become commonplace with magazines and television shows promoting it on a daily basis.

CONSULTATION

HISTORY

A complete history and physical examination must be performed prior to the analysis of the patient's cosmetic desires and possibilities. This is especially true in cosmetic surgery. There can be no excuse for an overlooked medical issue that can compromise the health of a patient undergoing an elective procedure. General issues that should be investigated include previous surgeries, medications, alcohol use, allergies, and any coexisting medical conditions. Specific issues to facial rejuvenation such as the use of aspirin and other nonsteroidal anti-inflammatory medications, hypertension, and smoking history should be thoroughly explored.

If the patient plans to undergo eyelid rejuvenation, a complete ophthalmologic history should be obtained with emphasis on dry eye symptoms. There is significant controversy for the role of a formal ophthalmologic consultation.[14-16] Each patient should be individually evaluated in order to determine the need for an ophthalmology evaluation. A history of dry eyes usually requires formal testing of tear production using the Schirmer test. Thyroid-related diseases, facial palsy, and prior blepharoplasty are also important conditions that increase the risks of eyelid malposition in the postoperative period.

PHYSICAL EXAMINATION AND FACIAL ANALYSIS

The physical examination is specific to each surgeon and there is no right or wrong way to examine the patient. However, certain components of the physical examination should always be included. We prefer to analyze the overall appearance of the face. The ethnicity, body habitus, and general proportions of the face should be considered. A three-dimensional approach must be considered to account for the patient's facial volume, skin texture, muscular activity, and bony skeletal support. Several landmarks and known relationships should be appreciated by all surgeons performing aesthetic surgery (Table 1-1; Fig. 1-6). The face is generally broken down into fifths vertically, based on the width of an eye, and thirds horizontally, as measured from the hairline to the glabella, glabella to the subnasale, and subnasale to menton (Fig. 1-7). Any facial asymmetry should be noted at this time. All normal faces have some level of asymmetry, which should be conveyed to the patient.

Table 1-1 Standard Facial Angles

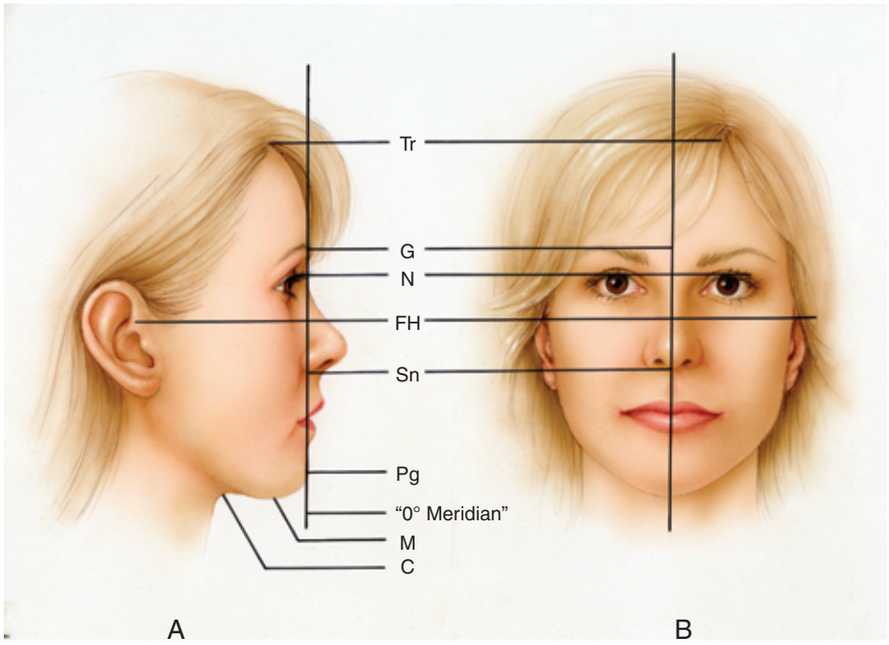
Angle	Description
Nasofrontal angle	Angle between the nasion, glabella, and the dorsal line of the nose (~115 to 135 degrees)
Nasofacial angle	Angle between the dorsum of the nose and the facial plane (~30 to 40 degrees)
Nasomental angle	Angle between the dorsal line of the nose and a line from the pogonion to the nasal tip (~120 to 132 degrees)
Mentocervical angle	Angle between a line from the menton to the cervical point and the facial plane (~80 to 95 degrees)
Nasolabial angle	Angle between the line of the nasal columella and tangent of the upper lip (~90 to 105 degrees)

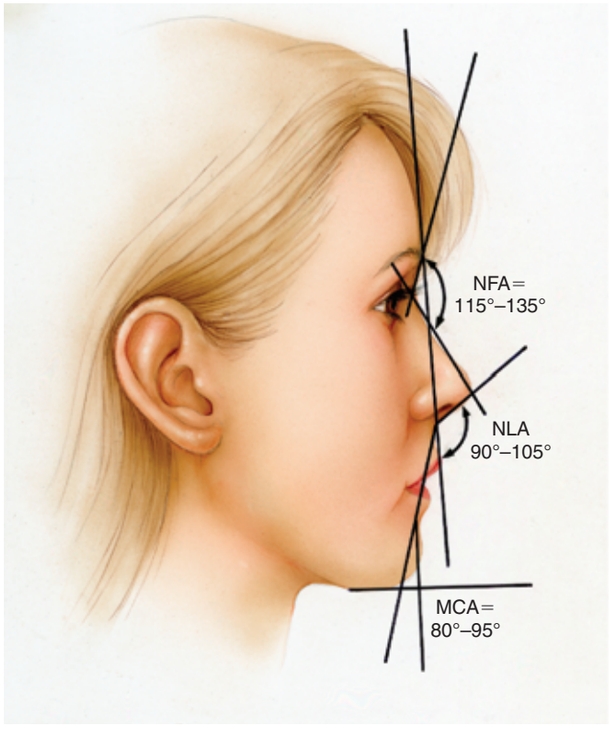
Facial rejuvenation procedures must create an overall harmony to the face without any major discrepancies. All facial regions must therefore be assessed during the consultation. The upper third of the face encompassing the forehead, brow, and eyes is generally evaluated jointly. The middle third of the face is composed of the midface, malar eminence, submalar soft tissue, nasolabial fold, and nose. The lower third of the face is assessed by evaluating the perioral, jowl, and neck regions. Specific aspects of the evaluation will be discussed in the following sections.

Skin

Our preference is to first examine the condition of the patient's skin. Whether for facial rejuvenation or rhinoplasty, the status of the skin will have profound ramifications on the result of the planned procedure. The texture, thickness, pigmentation, degree of sun exposure, and smoking-related skin changes should be completely evaluated. The youthful face has smooth elastic skin with ample subcutaneous tissue. Subcutaneous fat and muscle begin to atrophy with time and the skin becomes less elastic. For facial rejuvenation, the skin should be manipulated in vectors similar to those of the proposed procedure to assess its mobility. Dynamic and gravitational rhytids must be evaluated and the surgeon should note any previous procedures, scars, or skin lesions. Fitzpatrick scale can be utilized to evaluate appropriate candidates for skin resurfacing (Table 1-2).[17,18]

The surgeon should at this time educate the patient as to the consequences of certain skin types and conditions. Thick, oily, porous skin tends to mask fine irregularities





C

Figure 1-6 A and **B**, Facial landmarks. The *Frankfort horizontal plane (FH)* is determined by drawing a straight line from the tragus to the infraorbital rim. *Cervical point (C)* is the junction of the submental area and neck. *Glabella (G)* is the prominence of the forehead at the level of the supraorbital rim in the lateral view. *Menton (M)* is the lowest point of the chin. *Nasion (N)* is the deepest depression at the superior aspect of the nose. *Pogonion (Pg)* is the anteriormost projection of the chin. *Subnasale (Sn)* is the junction of the nasal columella and upper lip. *Trichion (Tr)* is the anterior border of the hairline in the midline. The *0° Meridian* determines chin and facial projection; a line is drawn at the level of the nasion and perpendicular to the Frankfort horizontal plane. **C**, The *nasofrontal angle (NFA)* is the angle between the nasion, glabella, and the dorsal line of the nose. *Mentocervical angle (MCA)* is the angle in between the facial plane and a line drawn from the menton to the cervical point. *Nasolabial angle (NLA)* is the angle between the nasal columella and the tangent line of the upper lip.

but at the cost of increased scarring. Thin skin generally heals better than thick skin at the expense of the patient's perceiving slight irregularities that might otherwise go unnoticed. This is especially true when the surgeon performs rhinoplasty, a procedure increasingly popular with the aging population. The ideal skin type lies between these two extremes.

The patient's facial volume also needs to be thoroughly assessed. This is an area which has been historically undervalued in facial rejuvenation. During the

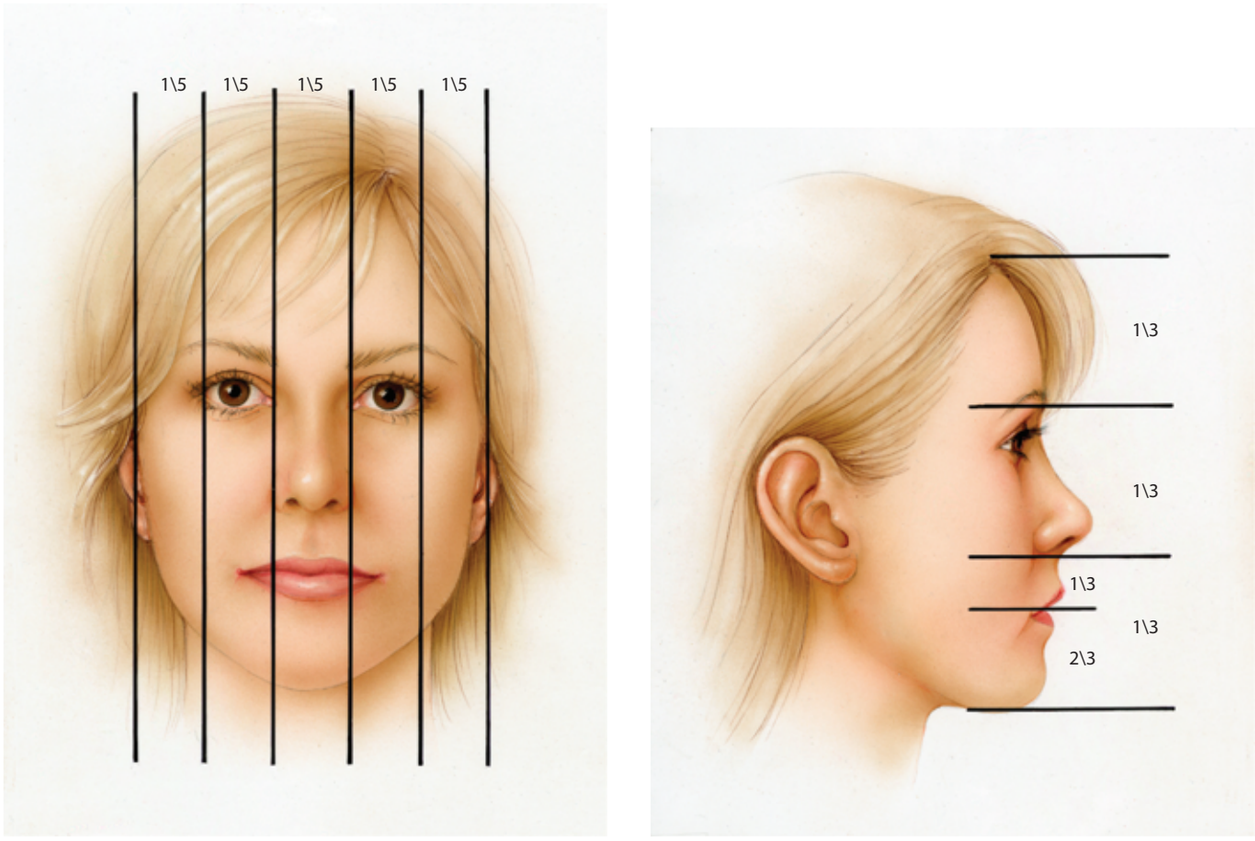


Figure 1-7 *Facial* proportions. **A**, The vertical facial proportions are generally broken down into fifths based on the width of an eye. **B**, The horizontal facial proportions are divided into thirds as measured from the hairline to the glabella, from the glabella to the subnasale, and from the subnasale the menton.

Table 1-2 Fitzpatrick Skin Evaluation

Skin Type	Skin Color	Reaction to Sun
Type I	Very white or freckled	Always burns
Type II	White	Usually burns
Type III	White to olive	Sometimes burns
Type IV	Brown	Rarely burns
Type V	Dark brown	Very rarely burns
Type VI	Black	Never burns

aging process, the subcutaneous fat and muscles not only shift secondary to gravitational forces, but also deflate and atrophy. Furthermore, the skeletal framework may also recede in the edentulous patient.

Forehead and Brow Complex

The upper third of the face is initially evaluated by looking at the relationship of the forehead, brow, and eyes. This region of the face is often overlooked by patients. Outside observers, however, tend to focus on the forehead and eyes to a greater degree than the lower face. We feel it imperative to highlight this region and educate the patient on its importance. The exact configuration of the brow is a topic of debate, though the general shape is agreed upon.[19,20] Ellenbogen used the following criteria for the ideal brow position: the brow usually begins medially through a vertical line drawn perpendicularly from the alar base; the lateral aspect of the brow should terminate laterally at a line drawn obliquely through the lateral canthus of the eye and the alar base; the medial and lateral portions of the brow should lie at the same horizontal level; the brow should be fuller medially and gently taper as it progresses laterally; and the apex of the brow should lie on a vertical line drawn from the lateral limbus (Fig. 1-8).[19] Others argue that the apex should lie farther laterally at a similar line drawn through the lateral canthus.[20] In females, the brow should lie just above the orbital rim, especially laterally. The ideal position of the brow for men is along the superior orbital rim itself.[21]

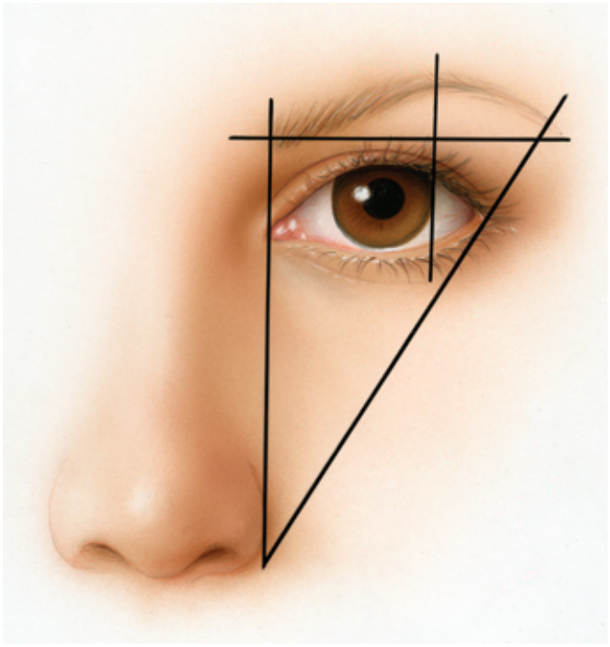


Figure 1-8 The ideal eyebrow position. The brow begins medially through a vertical line drawn perpendicularly from the alar base. The lateral aspect of the brow should terminate laterally at a line drawn obliquely through the lateral canthus of the eye and the alar base. The brow should lie at the same horizontal level and be fuller medially, gently tapering while progressing laterally. The apex of the brow should lie on a vertical line drawn from the lateral limbus.

The aging forehead is highlighted by dynamic rhytids and ptotic tissue. The soft tissues of the brow complex are continuously drawn inferiorly by gravity and depressor muscle activity. These forces are exacerbated in the aging population owing to the loss of soft tissue volume and skin elasticity. Young patients can also present with brow ptosis secondary to overactive depressor muscle activity. Brow ptosis can have a significant impact on accentuating upper eyelid dermatochalazia. A manual lifting of the brow and upper lid complex with a gentle upward sweep makes this point evident to the patient. Asymmetries are common and should be conveyed to the patient after the evaluation of the brow complex. Patients are usually not aware of these irregularities at the time of the consultation. It is very common, however, for the patient to notice them postoperatively.

In addition to the static examination of the patient, the dynamic movements of the upper third must be fully understood. There are four key muscles to consider: frontalis, procerus, corrugator supercilii, and the orbital portion of the orbicularis oculi. The frontalis muscle is the primary elevator of the brow complex contributing to the horizontal forehead rhytids. The contraction of the corrugators serves to bring the brow inferior and medial. This movement causes the patient to have a rather menacing appearance that, when coupled with the ptosis of the aging brow, gives the look of a tired, unpleasant individual. These muscles also contribute to the formation of vertical rhytids in the glabella. The procerus, like the corrugators, also causes the medial aspects of the brows to move inferiorly. However, the procerus's slightly different vector of action causes horizontal glabellar rhytids. The orbital portion of the orbicularis oculi muscle also significantly impacts the appearance of the brow by causing an inferomedial movement of the brow.

Alopecia should be discussed with all men considering brow rejuvenation. Personal and family history of hair loss should be obtained in all cases. Women also have unique concerns that arise when considering brow manipulations. The hairline, style, and volume of the hair are but a few of these topics that dictate the approach to the brow.

Treatment Considerations: Forehead and Brow Complex

The aging process of the forehead and brow complex has been historically undertreated. In the treatment protocol, rhytids and ptotic tissue should be seen as two independent processes that each require specific management. Neuromuscular paralytic agents such as botulinum toxin type A (Botox) should be utilized to treat the dynamic forehead and glabellar rhytids. Fillers can augment the results of botulinum toxin type A in cases of deep glabellar and forehead rhytids. Free fat transfer and injectables such as stabilized hyaluronic acid can also improve the volume deflation of the brow region. Brow ptosis is almost always treated surgically. The coronal and endoscopic browlifts are the most commonly used techniques. The pretrichial foreheadlift should be considered in patients who present with high hairline.

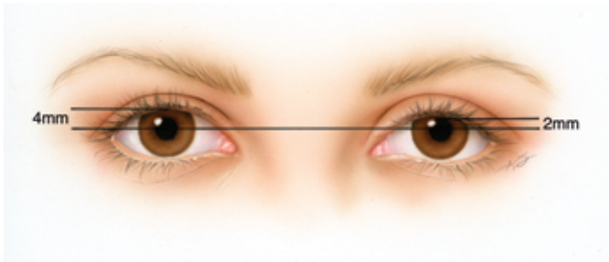
Eyelids and Periorbital Region

Dermatochalazia and pseudoherniation of the orbital fat are the most common reasons patients present for eyelid rejuvenation. Other conditions seen in the periorbital area include festooning secondary to excess skin, soft tissue, and orbicularis muscle; malar bags due to edematous sagging soft tissue containing fluid or fat; and orbicularis hypertrophy.

The physical examination of the periorbital region is vital. Basic ophthalmologic examination must be performed. This includes the evaluation of the extraocular muscles, visual acuity, and Bell's phenomenon (upward rotation of eye with attempted eyelid closure). Other key components of the assessment include the outline and size of the palpebral fissure, the relative positions of the medial and lateral canthi, the intercanthal distance, skin lesions, asymmetry, exophthalmos, enophthalmos, crow's-feet, and signs of previous surgery. In the Caucasian patient the

intercanthal distance should be equal to the interalar width. The lateral canthus should be about 2 mm superior to the medial canthal angle. The periorbital area should be assessed individually and as a component of the midface and forehead.

The upper eyelid examination usually focuses on the level of brow ptosis, dermatochalazia, and extent of lateral hooding. The brow should be elevated manually so that the patient may fully understand its contribution to upper lid dermatochalasis. A gentle sweep of the upper lid excess skin, if present, will also provide the patient with a firm grasp of the potential postblepharoplasty outcome. If patients are complaining of peripheral visual loss secondary to excess dermatochalazia, they should have a formal ophthalmologic evaluation and testing. Other conditions such as lagophthalmos and eyelid ptosis (blepharoptosis) should also be ruled out at this time. The superior eyelid margin should lie about 1.5 mm below the superior corneal limbus in a neutral gaze. Blepharoptosis (Fig. 1-9) can be quantitatively determined by measuring the margin reflex distance-1 (MRD_1), which is the distance between the corneal reflex and the upper eyelid lash line (normal range 4–4.5 mm).



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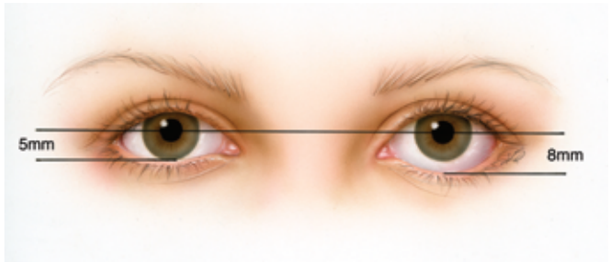

B

Figure 1-9 Margin reflex distance (MRD) –is used in the evaluation of upper eyelid ptosis and lower lid retraction. **A**, Eyelid ptosis can be quantitatively determined by measuring the margin reflex distance-1 (MRD_1). The MRD_1 is determined by measuring the distance between the corneal reflex and the upper eyelid lash line and has a normal range of 4.0 to 4.5 mm. **B**, The margin reflex distance-2 (MRD_2) is utilized to determine the amount of lid retraction (scleral show) by measuring the distance between the corneal light reflex and the lower eyelid lash line during a neutral gaze. The lash line should normally be adjacent to the lower limbus with an MRD_2 of 5 mm. In patients with lower lid retraction with scleral show, this distance is usually greater than 7 mm.

In the lower eyelid, careful attention is needed to evaluate eyelid laxity, pseudoherniation of orbital fat, and double convexity deformity as well as conditions that may lead to postblepharoplasty complications. The degree of lower lid fat pseudoherniation can be assessed by gently pressing on the globe while the patient is looking up. Lower eyelid skin excess should also be determined by having the patient look up, thereby stretching the skin and revealing the exact amount of redundancy. Double convexity deformity occurs when the malar fat pads and suborbital orbicularis oculi fat (SOOF) descend inferiorly while the orbital fat pads herniate through a weakened septum (Fig. 1-10).[22] Retaining ligaments in the lower eyelid also cause characteristic creases and hollows in patients with ptotic soft tissue, decreased skin elasticity, and volume atrophy.[23]

Postoperative blepharoplasty complications such as ectropion and lower lid retraction can be avoided if the surgeon properly evaluates the resting position and strength of the lower lid. The margin of the lower eyelid should lie just above the inferior limbus (see Fig. 1-9). The margin reflex distance-2 (MRD_2) can be used to objectively determine the extent of lid retraction. Excess scleral show in this area is a sign of eyelid malposition, which needs be addressed at the time of blepharoplasty. The lid distraction and snap tests are performed to evaluate the integrity of the lower lid (Fig. 1-11). During the snap test, gentle inferior traction of the lower lid from the globe is performed to assess how quickly it returns to its normal position. The eyelid should normally "snap"

Figure 1-10 Double convexity deformity. Double convexity deformity results from the descent of the malar fat pad and suborbicularis oculi fat pad (SOOF) coupled with herniation of lower eyelid orbital fat through a weakened septum.

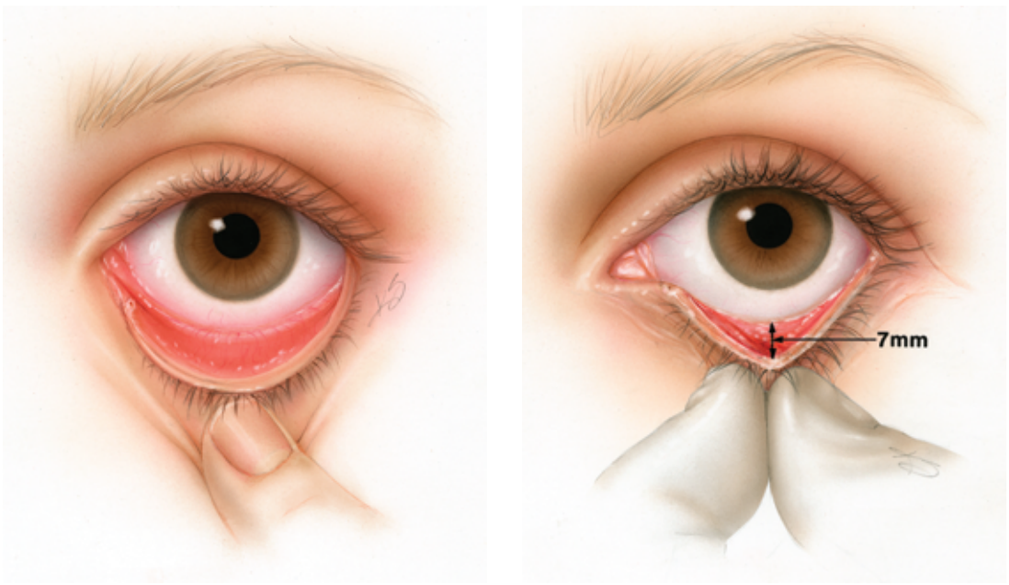

Figure 1-11 Lower lid laxity evaluation. **A**, In the snap test, the lower lid is pulled downward and away from the globe and the patient is asked not to blink. Lid laxity is present if the puncta is displaced by more than 3 mm from the medial canthal tendon. The lid should return to its normal position in less than 1 second. **B**, The lid distraction test is performed by grasping the lid and pulling it away from the globe. Distraction of more the 7 to 10 mm indicates a lax lid.

back to its normal position in less than 1 second. Excess lid laxity is noted if the puncta is displaced by more than 3 mm from the medial canthal tendon, if the lid is slow to return to its normal position, or if blinking reflex is needed to bring it back to its resting location.[24] In the lid distraction test, the lower lid is grasped and pulled away from the globe. Distraction of more than 7 to 10 mm indicates a lax lid.[25] Patients with a negative orbital vector are also at an increased risk for untoward surgical complications such as lower eyelid malposition and hollowed appearance. The orbital vector is determined by drawing a straight vertical line between the cornea and the inferior orbital rim from the lateral view; if the orbital rim falls behind this line, then the patient is diagnosed with a negative vector. Proptosis secondary to thyroid-related ophthalmic disorders are a leading cause of a negative orbital vector. A hypoplastic malar eminence may also contribute to, or magnify, a proptotic eye.

If the patient has signs and symptoms of dry eye syndrome, a formal ophthalmologic evaluation should be considered. The Schirmer test is the preferred method for evaluating patients who are at risk of developing postoperative dry eye syndrome. After the placement of topical anesthetic, a Schirmer strip (Cooper Laboratories, Puerto Rico) is positioned in the lateral fornix. Normal individuals will have more than 10 mm of moisture after a 5-minute placement.

The Midface

The midface is the region medial to the preauricular crease and lateral to the nasolabial fold. This area has gained increasing attention over the last two decades. Multiple approaches to mid-face rejuvenation are now available. The main components of the aging process in this region include the descent and atrophy of the cheek soft tissue. This ptotic and atrophic midface tissue not only accentuates the nasolabial fold and other retaining ligaments but also creates depressions and hollowness in the submalar and lower eyelid region. One of the most important aspects of the midface examination is the relationship of the malar skeletal framework to the submalar soft tissue (see Chapter 12). Prominent malar eminence is of great assistance to the surgeon in providing the patient with excellent surgical results. The layman's "high cheekbones" are classically associated with youth and beauty. They serve as the scaffolding that enables the surgeon to suspend the ptotic tissues of the aging face. However, high cheekbone with significant submalar

Treatment Considerations: Eyelid and Periorbital Region

Eyelid rejuvenation can yield dramatic results. Dynamic rhytids in the crow's-feet can be successfully treated with botulinum toxin type A. Upper blepharoplasty has become standardized, although recently there has been a movement toward orbicularis- and fat-sparing procedures. Lower blepharoplasty can be performed using the skin-muscle flap or transconjunctival techniques. Patients with tear-trough deformity may need to undergo fat transposition and limited resection of orbital fat. Significant double convexity deformity should be treated with midface lifts and volume restoration utilizing soft tissue fillers. Canthoplasty procedure should be considered in patients with lower lid laxity. The treatment considerations in eyelid rejuvenation should always include addressing the aging changes affecting the eyebrows and midface.

A

B

Figure 1-12 Frontal (**A**) and base (**B**) views of a patient with an aging nose.

volume loss may increase the "skeletonization" of the face, which is associated with an aged appearance.

The contribution of the nose to the aging face has also gained increased attention. The importance of the nose to the overall facial appearance is evident by its central location and often overwhelming effect on the patient's sense of facial beauty. The skin, cartilage, and soft tissue of the mid and lower thirds of the nose are malleable unlike the nasal bone. Just like the rest of the midfacial region, the nose is significantly affected by decades of shearing forces and decreasing skin elasticity. Patients are often under the impression that noses "get bigger" or "continue to grow." This is not completely incorrect. Aging forces do cause the nasal tip to droop with time, giving the impression that the lower third is indeed "getting larger." The nasal support structures also lose strength over time. As such, the nasal base may widen and buckling may become evident in noses that have not had preceding trauma or surgery (Fig. 1-12). Rhinoplasty in this patient population requires unique techniques to address the complex anatomical changes of the nose.

Treatment Considerations: The Midface

As a result of the complex three-dimensional anatomy, facial analysis plays a vital role in the protocol for midface rejuvenation. Aesthetic surgeons must utilize multiple techniques to achieve satisfactory results in this difficult region. Patients with early signs of aging can be treated with soft tissue fillers to restore facial volume, efface the nasobalial fold, and improve depressions near the lower eyelid. Individuals with moderate midface ptosis without significant volume loss can be surgically treated with deep plane rhytidectomy or endoscopic midface lift. Patients with advanced volume loss will additionally require volume enhancements via fat grafting, submalar implants, or volumizing fillers such as injectable poly-L-lactic acid. Individuals with double convexity deformity may require endoscopic midface lift, lower blepharoplasty, or soft tissue fillers in order to efface the infraorbital rim and improve the cavitary depression in the region.

Lower Face and Neck

The key elements of the lower third of the face are the perioral region, jowls, chin projection, and neck. The perioral region encompasses the lips, chin, and soft tissue from the menton to the nasal base bordered by the nasolabial folds. Several aging changes are noted here. First, there is a loss of volume in the lips as they become thinner over time, usually with the upper lip being more affected. Vertical perioral rhytids form in a radial pattern around the oral orifice secondary to the orbicularis oris hypertrophy and decreased skin elasticity. These rhytids are more common and difficult to treat in smokers. Marionette furrows also emerge during this time as the

Table 1-3 Edward Angle Dental Occlusion Classification

Angle Class	Description
Angle class I (normal)	The mesiobuccal cusp of the maxillary first molar articulates within the mesiobuccal groove of the mandibular first molar
Angle class II (overbite)	The mandibular first molar articulates distal to the mesiobuccal cusp of the maxillary first molar
Angle class III (underbite)	The mesiobuccal groove of the mandibular first molar is mesial to the mesiobucccal cusp of the maxillary first molar

Table 1-4 Dedo Classification of Cervical Abnormalities

Class	Description
Class I	Minimal deformity Well-defined cervicomental angle Normal platysmal tone Minimal fat accumulation
Class II	Cutaneous laxity Normal platysmal tone
Class III	Accumulation of fat
Class IV	Platysmal banding
Class V	Retrognathia
Class VI	Low positioned hyoid

inferior extensions of the oral commissure and the nasolabial lines. These furrows result from the descent of the lower and midfacial tissue as they abut the rather static soft tissue of the perioral area.

Chin projection is another key component of the lower third of the face. Similar to the malar eminence in the midface, a strong mandible provides an advantageous anatomic feature for facial rejuvenation. In addition to congenital microgenia and orthognathic malocclusion, the aging population can also develop soft tissue atrophy and bony erosion of the symphyseal region leading to a decreased chin projection. During the assessment, the patient's occlusion must be first evaluated (Table 1-3). The chin position is then assessed from the lateral view. Gonzalez-Ulloa developed a simple method based on the Frankfort line to analyze facial and chin projection.[26] The Frankfort plane is a straight horizontal line drawn from the supratragal notch to the infraorbital rim (see Fig. 1-6). A perpendicular line, designated as the 0° meridian, is then drawn from the Frankfort plane at the level of the nasion to determine the amount of chin projection. If the pogonion is posterior to this line, the patient has microgenia. In women, the 0° meridian is generally 1 to 2 mm anterior to the pogonion.

The jowls are perhaps the most prominent feature of the aging face. The prejowl sulcus specifically results from soft tissue and bony atrophy of the anterior mandibular groove inferior to the mental foramen. Mandibular erosion in edentulous patients can lead to an exaggeration of the jowls and prejowl sulcus.

The last area of the lower face examined during the consultation is the neck. In the appropriate candidate, tremendous gains can be attained in the neck, ensuring a satisfied patient. The young, attractive neck is one with scant soft tissue in the submental area and a defined, strong mandibular line. Several components of the aging neck should be evaluated. The amount of submental fat (superficial and deep to the platysma), platysmal

Treatment Considerations: Lower Face

The lower face and neck require a combination of surgical and nonsurgical methods to achieve the best possible aesthetic outcome. The perioral region, for example, is a very difficult area to treat surgically. Soft tissue fillers as well as skin resurfacing are indispensable tools in the management of this area. The marionette furrows are also not significantly improved with facelift techniques and almost always require fat grafting or injectable fillers.

Patients with microgenia and class I occlusion are candidates for chin augmentation. Alloplastic chin implants are straightforward procedures and represent an excellent technique for chin augmentation in patients with mild to moderate microgenia and shallow labiomental sulcus. Sliding genioplasty is a technically more demanding operation that should be reserved for patients with vertical microgenia or deep labiomental sulcus. Individuals with class II or III occlusion should be referred for orthognathic surgical evaluation. If patients with severe malocclusion do not desire orthognathic surgery, they should be educated as to the limitations of facial rejuvenation.

The jowls are very well treated with most types of facelifts including the deep plane rhytidectomy, lateral SMASectomy, and short-flap SMAS (superficial musculoaponeurotic system) rhytidectomy. The prejowl sulcus is difficult to address even with aggressive facelifting techniques. Extended chin implants can successfully address this region and should be considered if this is an aesthetic complaint the patient wants remedied.

Suction-assisted lipectomy, corset platysmaplasty, chin augmentation, and cervicofacial rhytidectomy are indispensable techniques for neck rejuvenation. Isolated platysmal banding can be successfully treated with high doses of botulinum toxin type A in patients who do not desire surgical intervention.

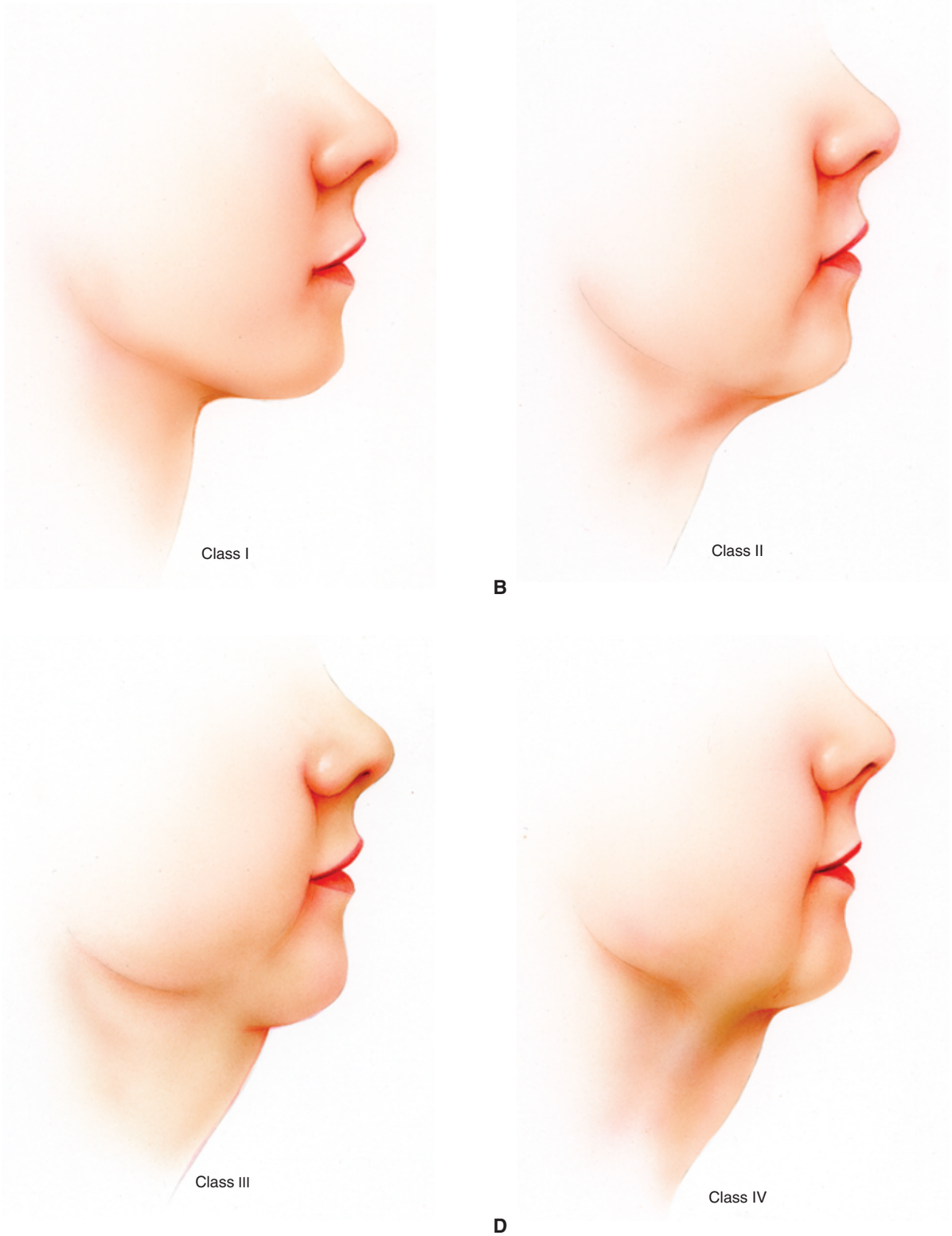

Figure 1-13 Dedo neck classification system. Class I patients have minimal deformity with well defined cervicomental angle, normal platysmal tone, and minimal fat accumulation. Class II patients have cervical skin laxity with normal platysmal tone. Class III patients show signs of fat accumulation. Class IV patients have platysmal banding.

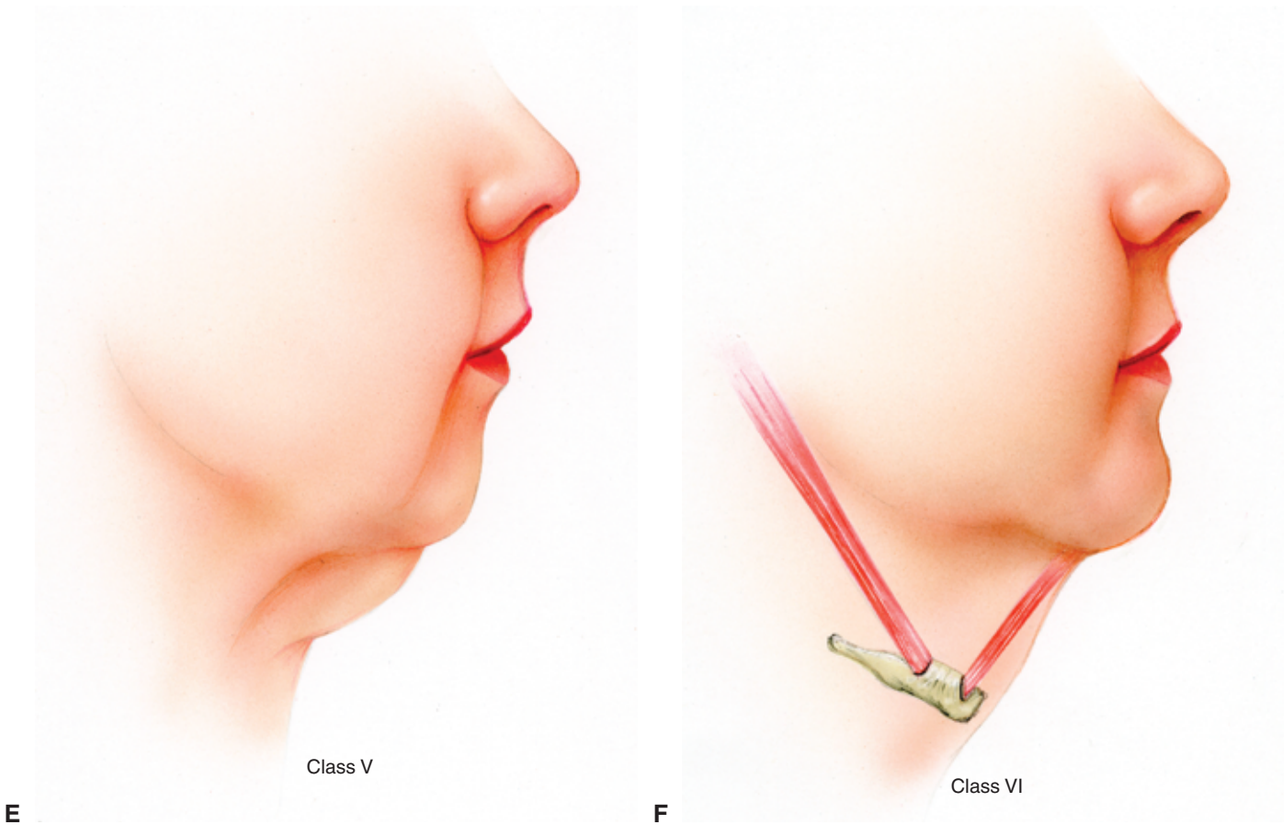

Figure 1-13 *Continued.* Class V individuals have retrognathia. Class VI patients have an anterior and low positioned hyoid bone.

banding, hyoid position, skin redundancy and ptotic submandibular glands should all be taken into account. The Dedo cervical classification is a useful tool for neck analysis (Table 1-4; Fig. 1-13).[27] The hyoid should ideally be situated at the level of the fourth cervical vertebra. The hyoid at this position serves to create a sharp demarcation of the cervicomental angle providing the patient with an attractive angular appearance. Individuals with anteriorly positioned hyoids do not obtain satisfactory cervicofacial rhytidectomy results and therefore should be appropriately consulted. The appearance of the neck is also greatly affected by the surrounding anatomy such as microgenia and excessive jowling.

IMAGING

PHOTOGRAPHY

Photography is an essential component of the consultation process. Excellent standardized photographs allow better communication between the surgeon and patient. Patient photographs assist the surgeon in several different ways. In the planning stages, photographs can display facial features not readily obvious on the initial physical examination. In the operating room, they act as a guide when the patient is in the recumbent position and local anesthesia has distorted the anatomy. Postoperatively, the images serve as a reminder of the improvements gained for both the patient and the surgeon. They enhance communication between colleagues and are required for medicolegal documentation.

In the last decade digital photography has overtaken standard 35-mm film photography in many practices. The images with digital photography are arguably not as precise as those of film; however, the ease and economy of this method have allowed it to become the preferred medium for patient documentation. One of the key advantages of digital imaging is the potential for savings. There are three main costs involved with digital photography: initial set-up, photograph development, and storage. Although the initial set-up is more expensive than standard photography, the processing, printing, and storage of digital photographs can save a practice thousands of dollars over the long term. Digital photographs can be printed in the office, stored on a hard drive, and backed up on a server for a nominal cost, whereas standard photographs must be developed at an outside facility and

then stored, incurring additional physical space and labor overhead. The printing of quality digital photographs is relatively expensive at this point. But, in a similar pattern to the costs of digital cameras, we expect this cost to decrease over time. In addition, retrieval of digital images for medicolegal, research or other reasons is far simpler than for standard photographs, which are often stored in cumbersome file cabinets. The accelerated evolution of single lens reflex (SLR) digital photography will continue to improve the quality of digital photographs.

There are several other advantages to choosing digital over 35-mm film format. Standard 35-mm photographs age poorly compared to the electronic format. There is also the increased security of this medium, which allows for remote storage to avoid loss from fire or other disaster. Digital medium allows the surgeon to better present his or her work during Power Point presentations. Last, the digital medium allows the visualization of the images in real time and permits instant communication with other physicians when one is faced with complicated cases.

Two predominant factors determine the quality of digital images: resolution and dynamic range. Resolution is determined by the size and number of the individual pixels. Dynamic range refers to the extent of the range of color choices that exist for each pixel. When a camera creates a digital image it converts the captured image into numbers. This process divides the subject into distinct numeric units. In digital photography, these units are named pixels. The precision of replicating the captured image relies on the number of pixels. Within each pixel the camera assigns a particular value to represent the color of the image. This function is dictated by the hardware employed to take the photograph. Increasing the color depth, referred to as the bit depth, increases the dynamic range of the camera. Storage of full-color images requires 24 bits of information per pixel. At this range, the photographer can represent nearly 16 million colors, allowing for film quality images.[28]

When the digital camera obtains an image, it focuses light onto a specialized device called a charge-coupled device (CCD) versus the film of standard photography. The CCD then takes the light and converts it into electrical signals. These signals are then processed by an amplifier and sent to an analog-to-digital converter that digitizes these signals. These digits are then processed by a computer within the camera. The processed image is then stored on a memory card.[28] Two primary file formats are employed by digital photographers for storage: TIFF and JPEG. JPEG compresses images whereas TIFF does not. Compression can save a significant amount of space, at the cost of image quality. High-quality compression ratios are generally in the 3:1 to 4:1 range. We prefer the JPEG format for its ease of use in retrieving files and minimized storage space. TIFF formats are uncompressed and thus consume a significant amount of storage space. Their advantage is superior preservation of data and lack of compression artifacts seen with JPEG formats.

Currently, there is no general consensus on the number of pixels required for digital cameras to match the resolution of a 35-mm film. For most surgeons, resolutions between 1.5 and 2.7 million pixels are more than adequate. We prefer digital SLR systems for the flexibility and greater image quality. In brief, the SLR system is actually defined by its viewing system. Light enters the SLR camera via the lens and strikes a mirror. This mirror then directs the light to a focusing screen where the image is resolved. A prism then inverts the image to the viewfinder so that the photographer can view the image properly. Owing to the dynamics of this system, any slight change in focus, essential for excellent photographs, can be viewed directly through the viewfinder as opposed to an image on an LCD screen in non-SLR digital cameras. In addition, parallax errors, seen in cameras that use a viewfinder that does not look through the lens, are alleviated in SLR systems. SLR cameras also provide superior depth-of-field perception.

A 1:1 aspect ratio, the ratio of an image's length to its width, is ideal. Most digital cameras use a 4:3 aspect ratio, while some higher end cameras employ a 3:2 ratio.[28] To ensure a 1:1 image the size of the CCD must be known. Consultation with the manufacturer should be undertaken prior to purchasing a lens, a vital component of all SLR systems.

Before purchasing digital equipment, the reader is advised to consult with a local professional and the latest publications because this technology is rapidly progressing. The key to excellent, dependable digital photography is the continual use of the same camera in an identical fashion. Digital cameras are individually unique in the way they capture images and thus it is recommended to use the same camera in a dedicated photography room for consistency. The photography room should be isolated from daily light fluctuations and other variables that can alter the image. The lighting methods, flash or lamps, is an individual decision. This is true for either digital or 35-mm film. We prefer a tripod-mounted camera to minimize shake and the slight movements that invariably arise with handheld photographs. A fixed tripod also minimizes the variable distance between the photographer and subject. Markings should be placed in the room to ensure consistency. The patient should sit on a rotating stool that allows for the recommended positions without excessive manipulations. A light blue background provides for a greater depth of field and thus a more three-dimensional appearance than darker colors. The background should be a solid color with a nonreflective surface. All forms of glasses should be removed. In addition, hair should withdrawn from the field either via ties or headbands to ensure adequate evaluation of the brow and upper lid complex. Standard reference points should be created to further ensure consistent photographs.[29] Several standard views are required for patient evaluation: frontal, left and right lateral, left and right oblique, and close-up views of certain areas of con-

A

B

C

D

E

Figure 1-14 Standard photographic views for patient evaluation. The Frankfort line is a straight horizontal line drawn from the supratragal notch to the infraorbital rim. This plane is used to obtain consistent photographic results. **A**, Frontal view; **B** and **C**, left and right lateral views; **D** and **E**, left and right oblique views; **F** and **G**, close-up views of the eyes.

F

G

cern, predominantly the eyes (Fig. 1-14). The Frankfort line should be parallel to the floor and is utilized to obtain constant photographs. The Frankfort line is a straight horizontal line drawn from the supratragal notch to the infraorbital rim. The surgeon should be sure to obtain the oblique view in a consistent manner as it can be acquired from a variety of angles. Some have argued that the tip of the nose should be in line with the opposite cheek.[30] Others recommend less rotation, aligning the medial canthus with the oral commissure.[31]

MORPHING SOFTWARE

Another component of digital photography that merits discussion is that of morphing software programs. With the use of these complex tools, patients can actually view the proposed changes that are being discussed. These programs assist in planning the procedure and guide patients in exactly what they desire and the limitations of what can be achieved. By employing these devices the patient and surgeon can clearly articulate to one another their respective goals. It also allows the surgeon to reveal certain aspects of facial appearance that the patient may not have fully appreciated. For example, patients are often uninformed of the effect of chin projection on the appearance of the nose. Obviously, such a powerful tool must be used with caution. The patient must be consistently reminded that these are computer images and should not be taken as a guarantee of results. This technology also has its shortcomings. It excels at two-dimensional manipulations such as dorsal hump reduction but does not perform as well with three-dimensional changes. Other components of the program, such as facial resurfacing, are also not optimal. In summary, this tool has several unique advantages that must be employed wisely by the facial cosmetic surgeon.

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