



# Cosmetic Surgery

# 6

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## Facial Analysis

### General Esthetics

#### Transverse Facial Fifths

- Divided into equal fifths based on intercanthal distance, the distance between the medial canthi. This should equal the width of an eye in the average person. Intercanthal distance = eye width = distance from lateral canthus to lateral projection of ear (Fig. 6.1).

#### Vertical Facial Thirds

- Equal thirds: trichion to glabella; glabella to subnasale; subnasale to menton.

#### Forehead

- Communicates with scalp.
  - 5 layers: **S**kin, **C**utaneous tissue, **g**alea **A**poneurotica, **L**oose areolar tissue, and **P**ericranium.
- Four muscles contribute to its motion: frontalis, procerus, corrugator supercilii, and orbicularis oculi.

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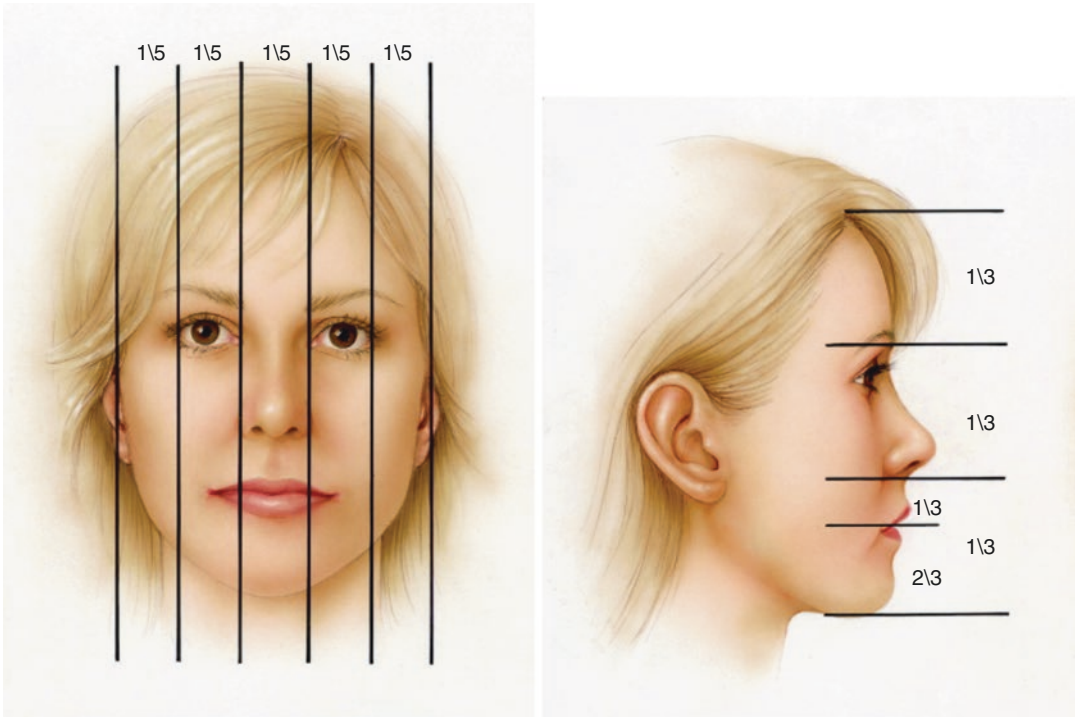
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**Fig. 6.1** Facial proportions. (Reprinted with permission from Azizzadeh B, Murphy MR, Johnson CM. *Master Techniques in Facial Rejuvenation*. WB Saunders Company; 2006)

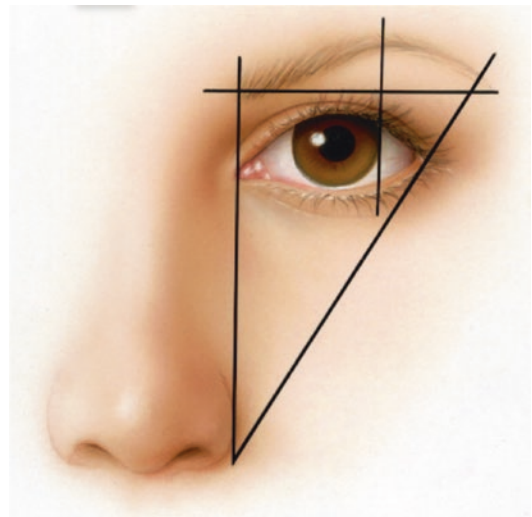
- These contribute to the dynamic wrinkles in the forehead often treated with neuro-modulators (e.g., botulinum toxin).

### Eyebrows

- Medially, it begins in the same vertical plane as the medial canthi about 1 cm superiorly.
- Apex should lie on a vertical line drawn on the lateral limbus.
  - The most lateral portions of the eyebrows meet in tandem with an oblique line drawn from the alar base to the lateral canthus (Fig. 6.2).
- The medial and lateral portions of the eyebrow should lie in the same horizontal plane.

### Eyelids/Eye

- The upper eyelids cover a small portion of the iris and the lower lid should be within 1–2 mm of the iris in neutral gaze.
- Profile view, the cornea should be 12–16 mm anterior to the lateral orbital rim.



**Fig. 6.2** Ideal female eyebrow position. (Reprinted with permission from Azizzadeh B, Murphy MR, Johnson CM. *Master Techniques in Facial Rejuvenation*. W B Saunders Company; 2006)

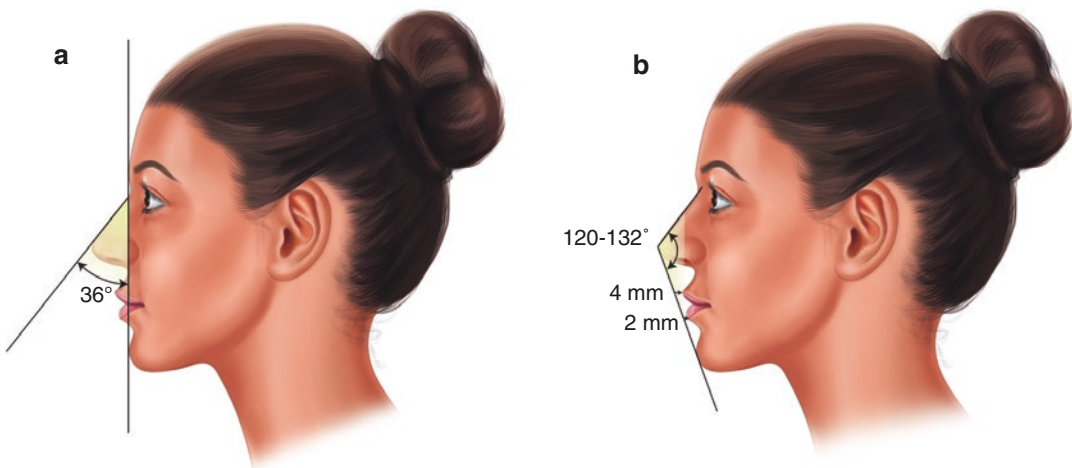
### Nose/Midface

- Ideal anatomic relationships:
  - Nasofrontal angle: 115–135°.
  - Nasolabial angle: 95–110° in females, 90–95° in males.
  - Nasofacial angle: 30–40° (Fig. 6.3a). Angle formed from a vertical tangent to the glabella through the pogonion and intersecting the line formed through the nasal tip.
  - Nasomental angle: 120–132° (Fig. 6.3b). The angle formed by the tangent line from nasion to the nasal tip and the nasal tip to pogonion.
- Radix should be 4–9 mm anterior to corneal plane.
- Nasal projection:
  - Simons' method: length of the upper lip from the vermillion border to columella, and columella to tip ratio should be 1:1. (Fig. 6.4a) [1].
  - Goode method: ratio of radix-nasal tip (RT) and the line drawn from RT to the alar groove should be 0.55–0.6 RT. Retains nasofacial angle from 36 to 40° (Fig. 6.4b).
  - 3-4-5 triangle by Crumley and Lanswer. Hypotenuse is a line from nasion to nasal tip, projection is the smallest length (Alar crease to nasal tip). Nasal projection is 60% of nasal length (3:5) [1].

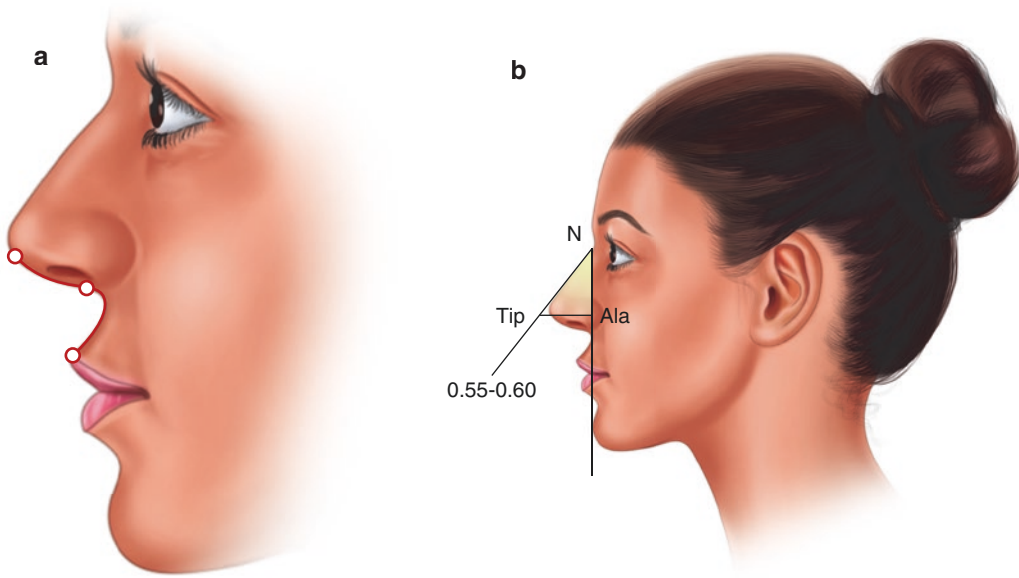
- Columellar show: 2–4 mm can be seen below the level of the alae when viewed in profile.
- Malar projection is ideally located at a point 1 cm lateral and 1.5 cm inferior to the lateral canthus.

### Mouth/Chin (Lower Facial Third)

- Thirds: upper lip (stomion superioris) to nasal base =  $\frac{1}{3}$ , lower lip to chin =  $\frac{2}{3}$  (1:2 ratio).
- Posture of lip can be procumbent (pushed out) or recumbent (pushed in).
- Lip position:
  - Determined from line drawn from subnasale to soft tissue pogonion. Upper lip should be 3.5 mm anterior and lower lip 2.2 mm anterior to this line.
  - E-line: A line between nasal tip and pogonion. Upper lip should be 4 mm and lower lip 2 mm behind this line.
- Ideal chin projection:
  - 0 Degree meridian: pogonion in vertical alignment with the nasion, perpendicular to the Frankfort horizontal line. Chin position should be within 2 mm ahead or behind this line.
  - Subnasale vertical: A line drawn perpendicular to Frankfort horizontal through subnasale. Chin position more than 6 mm behind this line is considered deficient. Chin position on or in front is considered excessive.



**Fig. 6.3** (a) Nasofacial angle (b) Nasomental angle. (Reprinted with permission from Zimble M. Cummings Otolaryngology 6th edition. Elsevier Books; 2015)



**Fig. 6.4** Nasal tip projection. (a) Simons method (b) Goode method. (Reprinted with permission from Zimble M. Cummings Otolaryngology 6th edition. Elsevier Books; 2015)

## Skin Evaluation

### Wrinkles (Rhytids)

- Dynamic – due to repetitive muscle movement
  - E.g., between eyebrows, forehead wrinkles, crow's feet
  - Rx: Neuromodulators (Botox)
- Static – due to skin elasticity loss
  - Nasolabial folds, mentolabial sulcus, along the cheeks, under the eyelids, and neck wrinkles
  - Rx: dermal fillers, chemical peels, lasers, and rhytidectomy

*Glogau Classification of Photoaging* – assesses patient's level of photoaging and categorizes the amount of wrinkling and discoloration into four categories (Table 6.1) [2].

*Fitzpatrick Scale of Sun-Reactive Skin Type* – evaluation of skin response to UV light and thus susceptibility to burn (Table 6.2).

*Dedo Classification of Cervical Anomalies* – classifies aging neck abnormalities based on the

anatomic layers of the neck (Fig. 6.5a, b and Table 6.3) [3, 4].

- Position of hyoid is important in formation of the cervicomental angle that ideally is between 105 and 120°.

## Rhinoplasty

### Evaluation

- The first step is to identify the patient's chief complaint. Are the expectations realistic? Is there a functional component in addition to an aesthetic component?
- Standardized photographs are necessary for all rhinoplasty patients. Frontal,  $\frac{3}{4}$ , profile, and submental views are the minimum required photos.
- Is there a history of previous nasal trauma, surgery, and/or sinus disease? Computed tomography might be helpful in these situations.

**Table 6.1** Glogau classification of photoaging

Type	Photoaging	Age	Wrinkles	Description
I	Early	20s–30s	Minimal	No age spots Mild pigment changes Little or no makeup use No keratoses
II	Moderate	30s–40s	During movement	Early brown “age spots” Skin pores more prominent Early skin texture changes Usually wears some foundation Keratoses palpable but not visible
III	Advanced	50s–60s	At rest	Telangiectasias and some dyschromia Visible brown “age spots” Prominent, small blood vessels Heavy foundation worn Advanced photoaging
IV	Severe	>60s	Everywhere	Yellow-gray skin tone Prior skin cancers Actinic keratoses “Caked on” makeup, cannot wear makeup as it cakes and cracks

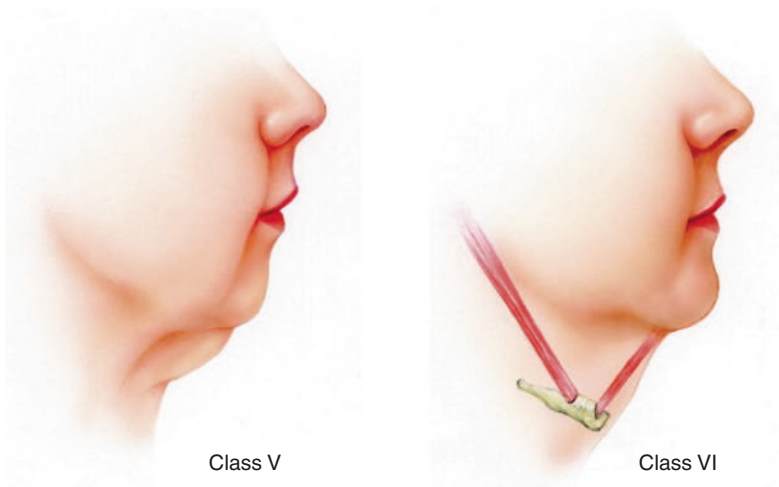
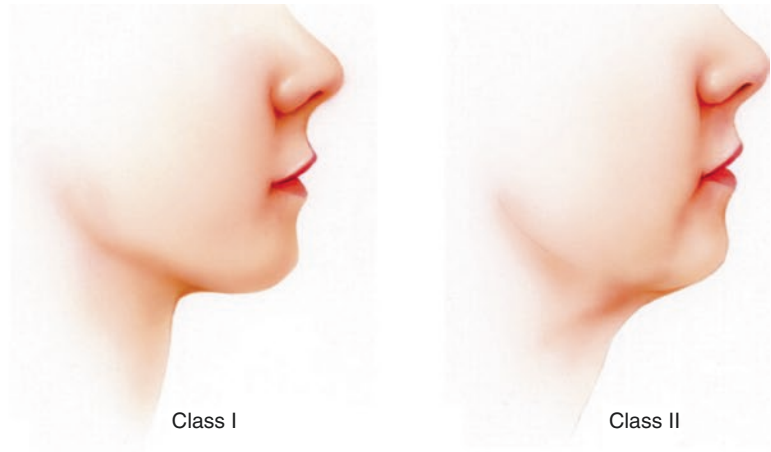
**Table 6.2** Fitzpatrick scale of sun-reactive skin type [2]

Skin type	Skin color	Response to ultraviolet light
I	White (very fair)	Always burns, never tans
II	White (fair)	Usually burns, tans with difficulty
III	White/olive (most common)	Occasional mild burn, tans on average
IV	White (light brown)	Rarely burns, tans easily
V	Dark brown	Very rarely burns, tans very easily
VI	Black	Never burns

- Characteristics of the soft tissue envelope of the nose.
  - Thick sebaceous overlying skin can make a rhinoplasty quite challenging by obscuring the underlying anatomical structures.
  - Thin skin will expose every underlying characteristics and flaws.
- Nasal complex:
  - Deviated, wide/narrow, does the nose look too big or too small (over-/under-rotated, over-/under-projected, etc.)?
  - Nasal tip: bulbous, round, triangular, trapezoidal, boxy, amorphous.

- Nasal dorsum: C-shaped, reverse C-shaped, twisted, deviated, deflected, wide/narrow, inverted-V deformity.
- Nasal complex deviation is often indicative of septal deviations. Asymmetrical nostrils are also telltale signs of caudal septal deviation. Any underlying cartilaginous or bony irregularities are noted.
- Cottle’s test is performed in order to assess the integrity of the internal nasal valve. The test is performed by occluding one nostril and having the patient breathe in and out of the other nostril. After assessing patency, the cheek tissue is pulled laterally on the same side as the breathing nostril. If breathing significantly improves, the test is positive denoting collapse of the internal nasal valve.
  - A more reliable clinical diagnostic procedure is a modified Cottle’s test. In the modified test, the wooden end of a cotton tip applicator is placed at the junction of the dorsal septum and upper lateral cartilages to stent out or expand the internal nasal valve angle.
- External valves are assessed by watching the patient breathe in and out forcefully. If the nostrils collapse during negative inspiration, then the lower lateral cartilages are weak and need augmentation during surgery.

**Fig. 6.5** Dedo neck classification system. (Reprinted with permission from Azizzadeh B, Murphy MR, Johnson CM. Master Techniques in Facial Rejuvenation. W B Saunders Company; 2006)



**Table 6.3** Dedo classification of cervical anomalies

Class	Anatomical area involved	Deformity	Features
I	Normal	Minimal deformity	Well-defined cervicomental angle, good muscle tone, nominal submental fat
II	Skin	Turkey-gobbler	Lax skin – begins to hang like a curtain. No fat accumulation. No platysma weakness <i>Treatment: Cervicofacial rhytidectomy</i>
III	Fat	Jowling	Excessive submandibular/submental adipose <i>Treatment: submental lipectomy/liposuction +/- cervicofacial rhytidectomy</i>
IV	Muscle	Anterior platysmal banding	Have patient grimace with teeth clenched to evaluate <i>Treatment: resect platysma/suture together +/- cervicofacial rhytidectomy</i>
V	Bone	Microgenia/retrognathia	<i>Treatment: consider chin implant or bony genioplasty vs orthognathic surgery +/- cervicofacial rhytidectomy</i>
VI	Bone	Low hyoid bone	Normal hyoid position is C3-C4 Lowered position precludes optimal outcome/requires more aggressive surgery Inform patient of limitations

- Endoscopic- or speculum-assisted anterior rhinoscopy is undertaken to evaluate for any septal deviation, turbinate hypertrophy, and patency of the nasal airway.

### Pertinent Anatomy (Fig. 6.6)

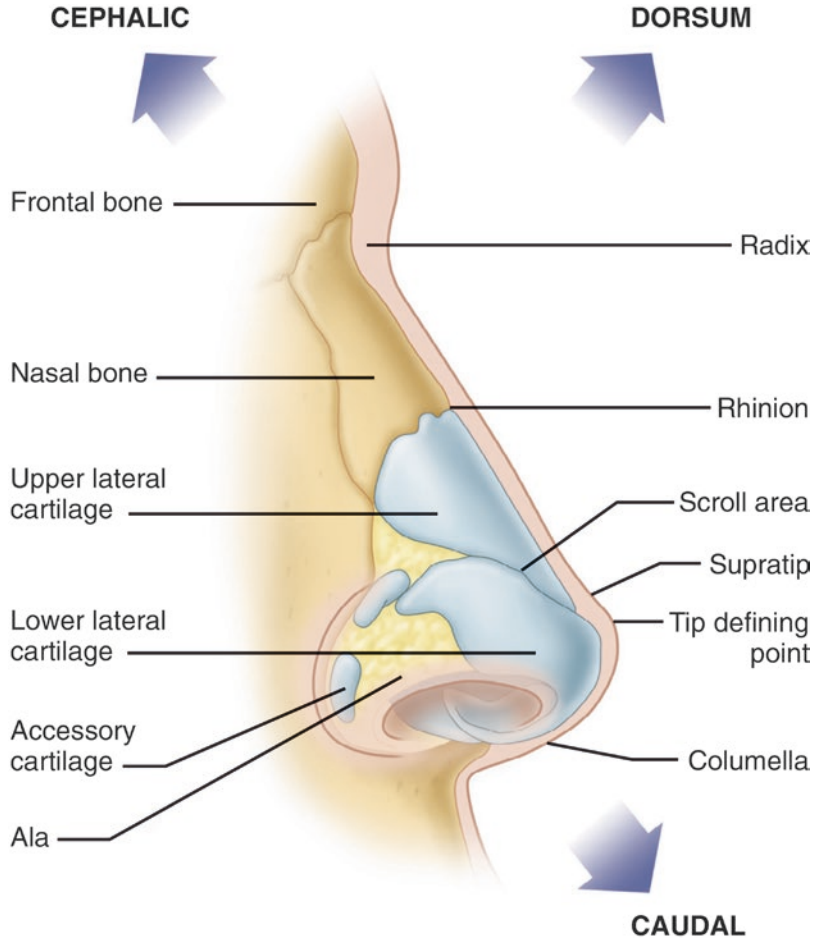
It is imperative to use appropriate language when describing the topography of the nasal complex. Due to its orientation on the face, phrases such as anterior or posterior are not as descriptive; rather, terms such as cephalad, dorsal, or caudal are much more useful. A nose that is “up turned,” similar to a *Miss Piggy* appearance, is called an over-rotated nose. A nose whose tip is ptotic and pointing toward the floor is called under-rotated. Conversely, a nose that is “too big,” and projecting off the face, is called an over-projected nose. The cartoon character of *Pinocchio* has an over-projected nose.

There are four different tissue types in the nasal cavity: skin, mucosa, cartilage, and bone. The soft tissue envelope is thickest at nasal bridge and nasal tip and thinnest along the mid-dorsum region. There are two major components of the nose: the bony vault and the cartilaginous vault, components of which are listed below:

- Bony Vault
  - Paired nasal bones
  - Bony septum: vomer inferior, ethmoid superior

- Cartilaginous Vault
  - Cartilaginous septum
  - Paired upper lateral cartilages (ULC)
  - Paired lower lateral cartilages (LLC)
    - Lateral crura of LLC
    - Medial crura of LLC
- The caudal edge of the septum sits along the nasal crest of maxilla and attaches to the anterior nasal spine (ANS). Deflection off this crest can cause nostril asymmetry.
- Upper and lower lateral cartilages are attached to each other via the scroll area.
- The internal nasal valve is made up of the septum medially, the caudal end of the upper lateral cartilage laterally, and the anterior end of the inferior turbinate inferolaterally. The valve is typically about 10–15° in most Caucasian noses.
- The external nasal valves are the external perimeter of the nostrils (comprises LLC, nasal septum, and nasal floor). A weak LLC will cause collapse of the external valves upon forceful inspiration.
- It is also important to note that the two medial crura are attached to each other by transdomal ligaments that attach the medial crura to the caudal edge of the septum (transdomal ligaments are a major structural support mechanism of the nasal tip) (Table 6.4).

**Fig. 6.6** Nasal anatomy. (Reprinted with permission from Bagheri S and Khan A. Clinical Review of Oral and Maxillofacial Surgery. Elsevier; 2014)



**Table 6.4** Support mechanisms

Major tip support mechanisms	Minor tip support mechanisms
Size, shape, resilience of the medial and lateral crura	Interdomal ligament
Attachment of the medial crural footplates to the caudal margin of the quadrangular cartilage	Dorsal cartilaginous septum
Connective tissue attachment of the upper and lower lateral cartilages (scroll region)	Membranous septum
	Sesamoid complex
	Skin and subcutaneous fibrofatty tissue
	Nasal spine

**Table 6.5** Open vs. endonasal technique

Open technique	Endonasal technique
Longer operation	Shorter procedure
Longer recovery	Shorter recovery
External scar	No external scar
Prolonged tip swelling (due to transcolumellar incision)	Limited access, especially for structural grafting
Greater access and visualization	Preferred for “touch-up” revision surgery

**Surgical Technique**

There are essentially two methods to approach the nasal complex: open structure rhinoplasty and endonasal. There are inherent advantages and disadvantages to each technique (Table 6.5).

**Open Technique**

1. Open structure rhinoplasty should begin with harvest of the septum. First, the nose is approached through a marginal incision that is connected to an inverted “V” transcolumellar incision. Once the nose is degloved in a



subperichondrial and subperiosteal fashion, attention is directed to the septum. Submucosal resection of the septum involves removal of cartilaginous septum for grafting purposes and to remove nasal deviation.

- Must retain a 1 cm “L” strut to maintain support of the nasal complex (1 cm dorsal and 1 cm caudal septum).
  - Septum can be approached through the dorsal approach, Killian incision, and/or hemi- or complete transfixion approach. Once the septum is harvested, attention is directed back to the nose.
2. If a dorsal hump reduction is needed, removal of the cartilaginous and bony components must be performed incrementally to prevent over-resection.
  3. Spreader grafts are indicated for augmentation of the internal valve, or if trying to straighten a crooked nose. Spreader grafts are harvested usually from the septum and placed between ULC and dorsal septum. For revision rhinoplasties with previously harvested septal cartilage, allograft rib cartilage or autologous rib/ear may be used. After placement of spreader grafts, lateral and medial osteotomies are frequently performed.
  4. Lateral osteotomies involve fracturing of the frontal processes of maxilla and portions of the nasal bones in order to reduce nasal width, straighten a deviated nasal complex, or close minor open roof deformities. Medial osteotomy requires fracturing of the nasal bones in order to further narrow a nose or to prevent a “rocker deformity.”
  5. Nasal tip: Once the cephalad portion of the nose is addressed, attention is directed toward the tip.
    - A columellar strut graft is placed between the medial crura to provide tip support.
    - Alar batten grafts can be placed along the dorsal aspect of lateral crura to provide stability, especially in cases of external valve collapse.
    - Cephalic trim, if necessary, requires removal of cephalic portion of lateral crura to debulk the tip and rotate the nasal tip; it is imperative to leave about 7–8 mm of

native lateral crus in place to maintain tip support.

- Transdomal and intradomal suturing are performed to narrow the nasal tip and provide support.
- Shield grafts, named for their “shield”-like shape, are secured to the dome in four corners for enhanced tip definition, to provide an increase or decrease in apparent tip rotation, and to increase tip projection (Table 6.6).

### Postoperative Management

- If internal packing is used, systemic antibiotics must be administered for the duration of the intranasal packing. External dressing must be used in all cases in order to redrape the soft tissue envelope over the underlying cartilaginous and bony skeleton; this is a critical part of the procedure.
- Postoperative systemic decongestants are helpful, although patients are asked not to blow their nose for 7–10 days. Saline nasal rinses can be used as often as necessary.
- If an open structure rhinoplasty was performed, persistent tip edema occurs in all of the cases due to the transcolumellar incision; this edema will take months up to 1 year to resolve. Patients must be informed in advance about this.
- Regarding residual asymmetries, minor asymmetries should not undergo revision surgery for several months (up to a year); minor issues usually resolve with time, massaging, or steroid injections. However, major asymmetries, or significant residual deviation of the nasal complex, should undergo revision within a few months; major deviations will not self-correct.

### Common Complications

- *Residual Hump* – very common occurrence; this is typically due to inadequate hump reduction. Requires revision surgery.

**Table 6.6** Nasal tip augmentation

	Cephalic Trim	Cephalic Resection	Intradomal Sutures	Interdomal Suture	Columellar Strut	Shield Graft	Medial Crura Resection	Caudal Septal Resection
Increased tip rotation	✓	✓	✓		✓	✓		
Decreased tip rotation						✓	✓	
Narrow nasal tip	✓		✓	✓				
Decrease tip projection		✓					✓	✓
Increased tip projection			✓	✓	✓	✓		

- *Pollybeak Deformity* – fullness of the nasal supratip relative to the rest of the nose. Classified as cartilaginous (e.g., due to loss of nasal tip support) or soft tissue etiologies (e.g., scar tissue fills the supratip break). It is caused by inadequate dorsal septum removal and/or excessive bony dorsum removal, excessive dorsal septum resection, excessive alar cartilage removal, or excessive supratip scar removal. If soft tissue, may attempt intraleSIONAL steroid injection. Surgical revision dependent on etiology.
- *Saddle Nose Deformity* – loss of septal support and saddling of the nose; could occur due to large septal perforations and loss of structural support. Requires major reconstruction of the nose, typically requiring large cartilage and/or bone grafting.
- *Open Roof Deformity* – flat dorsum following large hump reduction due to failure to perform lateral osteotomy to close the “open roof.” Requires revision surgery via lateral osteotomy.
- *Rocker Deformity* – green stick lateral osteotomy. This occurs when a lateral osteotomy is extended too cephalad along the medial canthal area where the bone can be quite thick. As an incomplete fracture occurs, the inferior aspect of the osteotomy “rocks” and the upper portion simply hinges or does not move at all. This deformity requires revision surgery in order to complete the cephalic portion of the lateral osteotomy.
- *Inverted V* – collapse of the upper lateral cartilages. Caudal edges of nasal bone can be seen through the non-supported skin. Treated most often with spreader grafts.
- *Keel Deformity* – the dorsum in cross section comes to a point rather than a rounded dome. Often treated with spread grafts and nasal osteotomies.

### Pearls of Wisdom

- A minimum of 7–8 mm of lower lateral cartilage should remain after a cephalic trim to prevent pinching, alar retraction, external nasal valve collapse, and/or tip asymmetry.
- The supratip break is formed from the junction of the caudal edge of the lower lateral cartilages and the dorsal septum (anterior septal angle). For significant reduction of the cartilaginous septum, one should use the anterior septal angle as the starting point for hump reduction.
- There should be roughly 2–4 mm of the columella shown from the profile view. The amount of columella shown is related to the amount of “hooding or retraction” of the alar rim or the amount of “hanging or retraction” of the columella.

- Tip defining points of the nose: supratip break, infratip break, domes of the lower lateral cartilages.
- Relative over projection of the nasal tip may be due to microgenia or midface deficiency. A rhinoplasty evaluation must also include consideration of the chin projection and midface projection.

## Rhytidectomy (Face Lift)

A surgical procedure to rejuvenate the appearance of the face by the removal of excess skin and may include manipulation of the SMAS (superficial musculoaponeurotic system).

## Anatomy

There are five layers of the face that includes the skin, subcutaneous tissue (superficial fat layer/superficial fascia/deep fat or areolar layer), musculoaponeurotic layer, retaining ligaments and spaces, and the deep fascia in the midface and periosteum in the scalp.

- The SMAS is the superficial fascia and incorporates muscle and fat of the face, temples, forehead, and neck.
  - Separates the superficial fat layer from the underlying deep fat and fascia.
  - Superficial to the facial nerve in the surgical area.
  - Over the parotid gland, it is thick and aponeurotic.
  - Over the facial mimetic muscles, it is thin and layered.
- Retaining ligaments of the face are osteocutaneous (tether skin to bone) and fasciocutaneous (SMAS to deep fascia).
  - Osteocutaneous ligaments: zygomatic, infraorbital, and mandibular ligaments.
  - Fasciocutaneous ligaments: parotid cutaneous and masseteric cutaneous ligaments.
- McKinney's point – where the greater auricular nerve passes over the center of the sternocleidomastoid muscle.

- It is 6.5 cm inferior to the caudal most point of the bony external auditory meatus with the head turned 45 degrees in the opposite direction.
- McGregor's patch – zygomatic cutaneous ligaments found in the malar area, difficult area of dissection due to fibrous attachment and thickening of the subcutaneous layer. Risk of bleeding due to perforating branch of transverse facial artery.
- All muscles of facial expression are innervated on their deep surfaces except:
  - Levator anguli oris
  - Buccinator
  - Mentalis

## Evaluation

- What is the patient's chief complaint?
- Complete medical history to include social and psychological evaluation. Past facial surgery/cosmetic surgery? Multiple cosmetic surgeries should raise concern for body dysmorphic disorder.
- Medications and supplements should be reviewed. It is important to identify products that can increase bleeding such as antiplatelet agents, anticoagulants, NSAIDS, high dose vitamin E, fish oil, ginseng, ginkgo biloba, and St. John's wort.
- Smoking/nicotine history? Recommended to stop using nicotine products 6 weeks before and 4 weeks after any surgery to reduce necrosis risk (3× incidence versus non-smokers). As nicotine supplements aids are widely available over the counter, question patients on such aids as patches and gums. Medications such as bupropion SR (Zyban ®) or varenicline tartrate (Chantix ®) can help aid in quitting prior to surgery.
- Realistic expectations? Will not erase all signs of aging. Will address lower third of face including neck laxity, jowling, mesolabial folds, and some nasolabial folds. Will not address wrinkles around mouth.
- Upper, middle, lower face evaluation. Platysmal dehiscence, jowling, descent of the

malar fat pads, nasolabial folds, marionette lines, etc.? Skeletal profile, e.g., retrognathia? Microgenia?

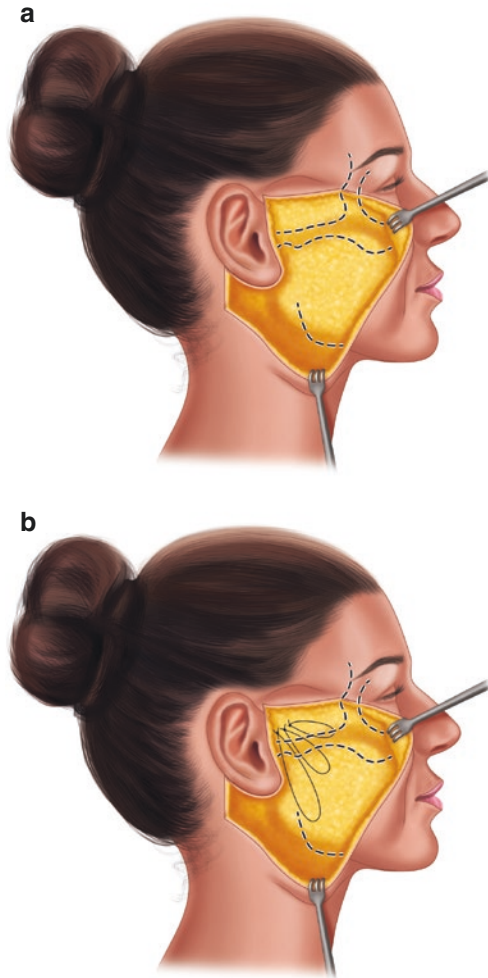
- Clinical photos (both smiling and at repose): frontal, right and left ¾ view, right and left profile views, submental vertex.

### Superficial Plane Versus Deep Plane Face Lifts

- Superficial plane facelift
  - Substantially faster to perform; however, the appearance isn't as natural and has a limited duration.
  - Skin only, mini-lifts, SMAS plication, SMAS imbrication, SMASectomy, and thread lifts.
- Deep plane facelift
  - Deeper plane facelifts use the facial SMAS to achieve and maintain a consistent, predictable, natural, stable, and youthful appearance to the middle and lower thirds of the face.
  - Surgery takes longer to perform and care has to be taken when elevating the SMAS off the facial nerve.

### Surgical Technique

- The exact locations, extensions, and depth vary from doctor to doctor and type of facelift (Fig. 6.7a, b).
- The typical incision design consists of a temporal hair tuft sparing incision, 45° hockey stick, or vertical incision design.
- The incision rests in the preauricular sulcus until the tragus of the ear is reached. At this point either an endaural incision (females) is made or one may choose to stay in the preauricular fold (men). The preauricular fold is preferred for men to prevent hair growth on the tragus.
- The inferior extension goes under the earlobe (a 2 mm cuff to prevent a pixie ear deformity) and then extends to the posterior auricular sulcus. Some surgeons prefer to carry the inci-

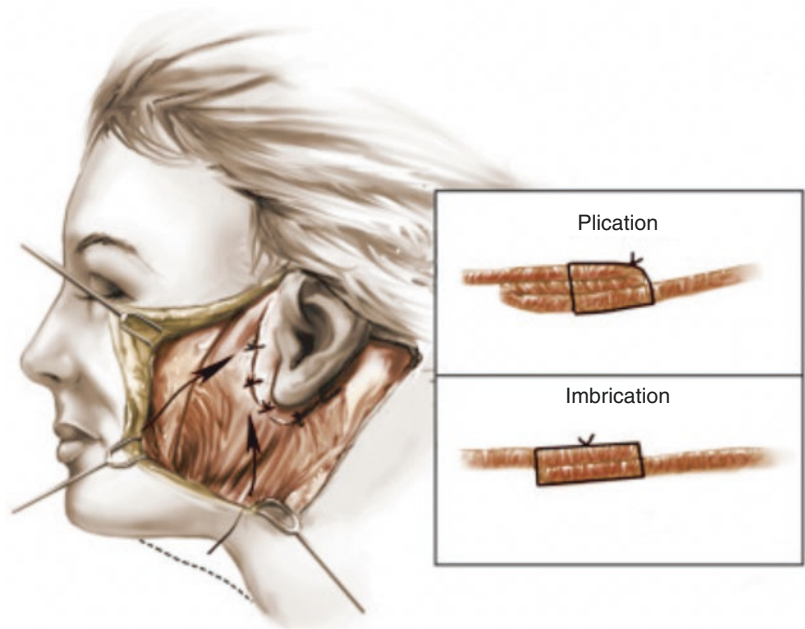


**Fig. 6.7** (a) Mini lifts: skin only. (b) Thread lift. (Courtesy of Dr. William T Evans DDS, MD, FACS)

sion onto the conchal cartilage to prevent migration of the scar.

- At the point of the greatest width of the pinna, the incision turns posteriorly into the hair-bearing region of the scalp. The incisions in the hair are beveled as much as possible to allow ingrowth of hair into the scar.
- Short scar facelifts may only have a pretragal incision with minimal extension.
- Dissection and management of the SMAS varies depending on the type of facelift performed (Fig. 6.8). SMAS plication: The SMAS is folded on itself and sutured.

**Fig. 6.8** Imbrication vs. plication facelift. (Reprinted with permission from Fisher E. Rhytidectomy. Oral and Maxillofacial Surgery, Third Edition. Elsevier; 2017)



Includes the preauricular and possibly the infrazygomatic SMAS.

SMAS imbrication: The SMAS is incised, overlapped, and sutured.

SMASectomy: A portion of the SMAS is excised from the malar eminence to the mandibular angle and the edges are sutured together.

uated by sutures that are typically fixed to the preauricular deep temporal fascia.

## Types of Facelifts

### Superficial Plane Facelifts

- Skin lift: Utilizes a short flap or an extensive long flap and only a subcutaneous dissection is performed. Redundant soft tissues are repositioned by traction of the skin only. Looks tight, pulled, and unnatural. Rarely used.
- Mini lifts (S-lift, Feather Lift) (Fig. 6.7a): Redundant preauricular soft tissue is excised and incision edges are undermined for closure. Minimal undermining may be performed. The facial SMAS is plicated, purse stringed, or barbed sutures are utilized for elevation.
- Threadlift (Lifestyle lift, Quicklift, Lunchtime lift, etc.) (Fig. 6.7b): Redundant SMAS is ele-

### Deeper Plane Facelifts

- SubSMAS: First a subcutaneous dissection is performed. Then infrazygomatic, preauricular, and infra-auricular platysmal incisions are made through the facial SMAS. The SMAS is then undermined to the anterior border of the parotid gland. Traction is placed on the SMAS and the excess is excised or folded, then sutured.
- Extended SubSMAS: Purported to improve facelift results in the area of the nasolabial fold. First a subcutaneous dissection is performed. Then infrazygomatic, preauricular, and infra-auricular platysmal incisions are made through the facial and neck SMAS. The SMAS is then undermined further than the subSMAS facelift, enough for passive mobilization. The retaining ligaments are interrupted. Traction is again placed on the SMAS and the excess is excised or folded, then sutured. A cervicoplasty is usually performed.

- **Deep Plane:** An extended SubSMAS facelift that has minimal subcutaneous dissection. The SMAS incision is from the malar eminence to the mandibular angle. Extreme traction is placed on the SMAS-skin flap in a superolateral direction, then sutured to the preauricular SMAS. A subcutaneous neck dissection is performed.
- **Composite:** A deep plane facelift with a subSMAS dissection below the central part of the malar fat pad that includes the pre-zygomatic SMAS and orbicularis oculi muscle.
- **Extended Multiplanar Multivector:** An extended subSMAS deeper plane facelift that includes a suborbicularis oculi muscle and sub SOOF dissection in order to interrupt the infraorbital osteocutaneous ligaments. In addition, a wedge of the orbital portion of the orbicularis oculi muscle is excised.
- Hydrogen peroxide to clean wounds daily.
- Appropriate pain medication.
- Appropriate antibiotics (topical and oral).
- Avoid aspirin, ibuprofen, vitamin E, herbal and homeopathic medications.
- No alcohol for a minimum of 7 days postoperatively.
- No smoking during healing process.
- Sleep on back with two pillows for 2 weeks.
- Shampoo hair after 48 hours.
- Soft foods initially for comfort.
- Sunblock SPF  $\geq 30$ .

### Post-op Complications and Management of Face Lift Surgery

#### Combined Procedures

- The ideal age for a facelift patient is between 45 and 65. The patient's age can vary significantly depending upon genetics, environmental exposure, smoking, injury etc. The younger the patient, the quicker they will recover and longer they will benefit from the procedure. A facelift only addresses the midface and lower face.
- Multiple additional procedures may be performed simultaneously including brow lifts, upper and lower lid blepharoplasties, fat transfer, facial implants, and rhinoplasty.
- Laser skin resurfacing can only be performed simultaneously if the skin flap is of sufficient thickness to withstand the insult; however, this is reserved for experienced surgeons.

#### Postoperative Care

- Facelift dressing for first 48 hrs then nightly for 1 week.
- See after 24 hours for correct wound drape and rule out hematoma.
- Ice for first 24–48 hours.
- *Hematoma* – two types: major and minor, both pose a risk for skin necrosis. Minor hematoma is usually less than 10 cc and is often not appreciated until bandages are removed. Treatment requires needle aspiration or manual expression. Excessive facial pain and excessive edema are major signs of a major (expanding) hematoma. Major hematomas require operative setting to identify causative vessel.
- *Pixie Ear Deformity* – inferior traction of earlobe due to pull of skin. Avoided by leaving cuff of tissue around earlobe. Surgical treatments include undermining the skin and reinforcing the SMAS or a triangular wedge (V-Y closure) is removed and the lobe is reattached in a superior and posterior position.
- *Necrosis* – most affected areas are the mastoid and post-auricular regions due to thin skin thickness and distance from vascular supply. Cleanse area with hydrogen peroxide and maintain moisture, e.g., trolamine salicylate (Biafine®). Some clinicians recommend nitropaste to encourage vasodilatation. Hyperbaric oxygen may be used to encourage wound healing and revascularization in large affected areas.
- *Unaesthetic Scar* – steroid injections such as triamcinolone 3 mg every 6 weeks for 3 months. Overuse may cause dermal atrophy, depression, and spider telangiectasia. Carbon dioxide laser resurfacing and microneedling

may help reduce visibility of scar. Scar revision surgery may also be considered.

- *Facial Nerve Damage* – temporal and marginal mandibular branch (most common motor nerve damaged) can be affected. Most commonly this is transient and only a matter of time until nerve function returns. May also consider neurotoxin to the unaffected side (to help mask difference in animation) or referral for facial reanimation consultation. Damage to frontal branch may impair orbicularis oculi and require globe protection such as eye patches, temporary tarsorrhaphy, or gold weight implantation to upper eyelid.
- *Sensory Nerve Damage* – greater auricular nerve (most common nerve injured) injury reported around 1–7%. Most injuries resolve in 6 months. Patient may complain of anesthesia, paresthesia, or dysesthesia in the inferior portions of the ear lobule, ear, and the sternocleidomastoid region. If neuroma, suspected MRI may help identify for early intervention. Gabapentin and tricyclic antidepressant therapy may help alleviate pain.
- *Infection* – incision and drainage with cultures and sensitivities.
- *Hair Loss* – tension alopecia can be avoided by adequate wound support without excessive tension. May be due to telogen effluvium, reversible hair loss due to stress, allow 6 months for observation and consider steroid injections. Permanent alopecia may be treated with topical minoxidil (Rogaine®), hair follicle transplant, PRP injections, local flap, or resection with primary closure.
- *Hyperpigmentation* – usually resolves in 6 months. Patient may apply 4% hydroquinone or kojic acid cream to the affected area.

## Platysmaplasty

A platysmaplasty is a surgical procedure that rejuvenates the central submental area of the neck. It is performed through a submental incision. A platysmaplasty rejuvenates a sagging neck by removing excess platysma and by tightening the remaining edges thus improving the angle between the chin and the neck.

- An isolated cervicoplasty/platysmaplasty is typically reserved for patients under 40 years old.
- In an older patient, it should be done in combination with a facelift.
- The results are often enhanced by doing a chin and/or cheek implants at the same time when indicated.

The anterior neck boundaries are as follows:

- Inferior border of the mandible superiorly
- Suprasternal notch inferiorly
- Anterior border of the sternocleidomastoid laterally

The layered anatomy of the neck is:

- Skin
- Superficial fat layer, that is removed via liposuction, open lipectomy or deoxycholic acid injection (Kybella®)
- Superficial cervical fascia (SMAS) that contains the platysma muscle
- Deep areolar fat
- Deep cervical fascia
- Cervical muscles

Characteristics of a youthful attractive neck:

- Cervical-submental angle of 115 degrees +/- 10
- No folds or bands
- Distinct inferior border of mandible
- Distinct edges of SCM
- Appropriate length of neck
- Skin free of aging stigmata

## Evaluation

- Dedo classification and the etiology of facial laxity.
- Skin condition – skin firmness important for success. Skin with more elastic integrity will do better after recontouring.
- Fat location – using pinch and roll technique. Pre-platysmal fat should be differentiated from subplatysmal fat that is firmer.

Liposuction alone will not treat subplatysmal fat. Another method is to pinch the skin and ask patient to grimace, if the fullness is gone, then the fat is under the platysma.

- Integrity of platysma – have patient clench teeth to evaluate the midline dehiscence of the medial borders of the platysma.
- Check for ptotic submandibular glands.

## Surgical Technique

- Mark patient awake and sitting or standing. Mark the anterior borders of the SCM, the inferior border of the mandible, and the thyroid notch inferiorly. This outline is for the subcutaneous dissection.
- The access is a 3–4 cm incision that is 2–3 mm posterior to the submental crease. If the incision is placed in the submental crease, the crease will deepen.
- Local anesthetic with epinephrine is infiltrated into the region of the subcutaneous dissection. Tumescence anesthesia can also be employed. A 22-gauge spinal needle is commonly used to inject the region. Allow 5–7 minutes for vasoconstriction.
- The incision is made with a #15 scalpel blade through skin into subcutaneous tissue. Sharp dissection is performed around the entire incision for about 1 cm in the subcutaneous plane.
- The subcutaneous dissection is completed with facelift scissors leaving 3–5 mm of fat attached to the dermis so as not to skeletonize the neck.
- Once the subcutaneous dissection is completed and hemostasis is achieved, open liposuction can be easily performed under direct visualization using a 1–2 mm liposuction cannula with the tip open toward the platysma. Do not cross the inferior border of the mandible as this risks damaging the marginal mandibular nerve. Lipectomy allows for more fat removal than liposuction. If closed liposuction is preferred, it is done prior to subcutaneous dissection.
- The amount of central laxity of the platysma or fascia to be excised is determined by picking up the tissue with forceps.

- The edges of the platysma are sutured with a running locking 2-0 or 3-0 long lasting absorbable or permanent sutures. The platysma corset suturing begins superior and continues inferiorly, then is reversed to end superiorly. Some surgeons choose to perform mastoid-mastoid suturing techniques (e.g., Giampapa suture) to reposition the cervico-mental angle.
- The skin incision is closed. A cervical dressing is applied.

## Post-op Complications of Neck Liposuction and Submentoplasty

- *Over Resection of Fat* – avoided by using micro liposuction cannulas 1–2 mm. Treated with fat injections that can be harvested from thighs or abdominal fat.
- *Exposure of Platysmal Bands Without Platysmaplasty* – Botox injections may be used as palliative treatment. Platysmaplasty is a more enduring treatment.
- *Cobra Neck Deformity* – if overaggressive, lipectomy subplatysmal or uneven fat removal laterally. If separation of the platysma muscle midline, may plicate platysma muscle.
- *Submandibular Gland Ptosis* – descent with age or prominent gland. Treatment includes suture suspension (limited success). Superficial transection of the gland is more commonly performed.
- *Sialocele* – can occur from the parotid or submandibular gland. Parotid damage more common during facelift procedure and submandibular damage more likely after gland resection for neck recontouring. Treatment is serial aspirations with fluid tested for high levels of amylase (usually greater than 10000 u/L). Treatment includes antisialogogues or botulinum toxin A into the gland.

## Tumescence Anesthesia

- Tumescence anesthesia is a technique of infiltrating large volumes of subcutaneous fluids



in order to produce anesthesia, tissue distention, and hydrodissection.

- The fluid typically contains lidocaine, saline, and epinephrine.
- Benefits include hydrodissection, minimized blood loss, decreased anesthesia requirements, decreased postoperative pain, bacteriostatic effects, and increased tissue firmness facilitating ease and quantity of fat removal.
- Tumescent fluid can be injected into the face and neck via manual pressure utilizing a syringe and a 22-G spinal needle. An infusion pump may also be used for larger volume injection.
- Tumescent anesthesia was first introduced by dermatologist, Dr. Jeffrey Klein for liposuction. He recommended a lidocaine dose between 35 and 45 mg/kg. The American Academy of Dermatology recommends a maximum dose of 55 mg/kg in patients weighing 43.6–81.8 kg.
- Lidocaine's onset of anesthesia is 15 minutes and maximum concentration occurs at 11–15 hours after injection.
- 20% of infiltrated lidocaine is removed during liposuction.
- The toxic level of plain lidocaine (without epinephrine) is 4.5 mg/kg when utilized for local infiltration. Lidocaine with epinephrine should be limited to 7 mg/kg for local infiltration.
- Tumescent anesthesia allows higher maximum doses of lidocaine than that of local infiltration. As a result of the large volume of saline and dilute epinephrine (vasoconstrictor), the volume is pushed interstitially. This slows systemic absorption of lidocaine and thus reduces peak serum lidocaine concentrations. This, in-turn, reduces the risk of systemic lidocaine toxicity.
- Levels only reached 0.8–2.7 mcg/mL postoperatively when using 35 mg/kg. Cytochrome P450 (hepatic CYP3A4) metabolizes lidocaine. 10% is excreted unchanged in the urine.
- Medications such as benzodiazepines, TCAs, SSRIs, antifungals, CCBs, and cimetidine are metabolized or inhibit CYP3A4. Concomitant use of these medications can lead to toxic levels of lidocaine.

- Lidocaine absorption is different in the face vs. the body. Absorption is faster in the face.
- Another concern of tumescent fluid is when large volumes are injected. This can result in volume overload and pulmonary edema. It is important to keep IV fluids to a minimum.

### Klein's Formula

- Normal saline 1000 mL
- 1% Lidocaine 50 mL (500 mg)
- 1:1000 Epi 1 mL (1 mg)
- +/- 8.4% NaHCO<sub>3</sub> 10 mL (10 mEq)
- Final concentration: [0.05% lidocaine with 1:1,000,000 epi].
- Since smaller amounts of fluid are injected for anesthesia of the head and neck, a more concentrated solution may be used.

### Lidocaine Toxicity

- Mild symptoms of toxicity are lightheadedness, headaches, visual disturbances, confusion, metallic taste, circumoral numbness, hypotension, sleepiness, and nausea/vomiting.
- As symptoms progress, muscle twitching, tinnitus, seizures, and eventually unconsciousness occur.
- In severe cases, bradycardia, significant hypotension, arrhythmias, asystole, and cardiac arrest can occur.
- Cardiac toxicity occurs at levels of 5–10 mcg/mL. Respiratory depression and cardiovascular collapse occur above 10 mcg/mL.
- Treatment includes airway maintenance, oxygen administration, intravenous fluids, benzodiazepines to control seizures, vasopressors, and a 20% intralipid infusion.
- The initial bolus of intralipid is 1.5 mL/kg followed by an infusion of 0.25 mL/kg/min with a maximal dose of 8 mL/kg.
- An example of a 20% intralipid is LipidRescue™. If the patient is unresponsive to initial interventions, immediately start CPR

and administer 20% intralipid 1.5 mL/kg over 1 minute followed immediately by an infusion rate of 0.25 mL/kg/min. Continue chest compressions to circulate the lipid. Repeat bolus every 3–5 minutes up to 3 mL/kg total dose until circulation is restored. If the BP declines, continue the infusion at 0.5 mL/kg/min until hemodynamic stability is restored.

## Blepharoplasty

### Eye Lid Anatomy

- Thinnest skin is on the eyelids without any subcutaneous fat.
- Orbicularis oculi: Innervated by CN VII. Palpebral (further subdivided into pretarsal and preseptal) and orbital segments. It functions as the eyelid protractor.
- Orbital septum: Thin fibrous tissue arising from arcus marginalis from orbital rims. Fuses with levator aponeurosis 2–5 mm above the tarsus (depending on race). Separates preseptal tissue from orbit.
- Orbital fat: Two fat pads on upper eyelid and three fat pads lower lid. Levator aponeurosis immediately beneath fat pads.
- Levator muscle: Innervated by CN III. Originates above annulus of Zinn near orbital apex. 40 mm in length. Transitions from muscle to aponeurosis over Whitnall's ligament (transverse support ligament). Inserts onto tarsus and pretarsal skin creating supratarsal lid crease.
- Mueller's muscle: Sympathetic innervation. Originates undersurface of levator muscle and inserts at superior border of tarsus.
- Tarsus (varies in ethnic groups): Upper – 8–10 mm in height; lower – 4–6 mm in height. Composed of dense connective tissue that maintains structural stability.

### Pathophysiology

- Aging and actinic changes lead to degeneration of elastin and collagen resulting in lax skin.

- Weakening of orbital septum results in fat prolapse (steatoblepharon).
- Stretching or weakening of levator muscle can result in involutional ptosis (droopy eyelid).

### Evaluation

- Understand patients concerns and expectations. Onset and duration of symptoms. Coexisting double vision.
- Identify risk factors: sun exposure, aging, smoking, inflammatory disorders, family history.
- Medications: blood pressure control, use of antiplatelet agents (stop 7 days prior to surgery if possible), and herbal supplements (fish oil, ginkgo biloba, garlic, vitamin E, etc.).
- Identify preexisting ocular conditions such as dry eyes (aggressive blepharoplasty may lead to chronic keratoconjunctivitis) and previous or upcoming ocular surgeries.
- History of prior cosmetic procedures including fillers or neurotoxins.

### Eye Evaluation

- Baseline visual acuity exam and ocular motility exam.
- Brow: examine contour, symmetry, lateral eyelid fold; creases above brow may indicate ptotic brow (to help elevate lid out of field of vision). Female brow above orbital rim, male brow at rim. For female, the brow position should be 1–2 mm medial, 5–6 mm middle, 8–10 mm arch, 10–15 mm tail above orbital rim. For male, it should be 1–2 mm above the orbital rim for all segments [4, 5].
- Ocular motility and alignment: check for Bell's phenomenon (upward rotation of the eye with ipsilateral orbicularis contraction) and strabismus.
- Tear function tests such as Schirmer test. As patient looks up, place Schirmer strip in the temporal portion of the lower fornix. Normal

wetting of the strip should advance to 10–15 mm, <10 mm is abnormal. If abnormal, blepharoplasty not be advised; lagophthalmos may not be tolerated by patients with a history of dry eyes.

- Visual field testing – with and without lid elevation.
- Slit lamp examination.
- Photo documentation to allow preoperative and intraoperative evaluation. Photos may also be used to demonstrate postoperative changes to the patient.

## Upper Lid Blepharoplasty

### Preoperative Evaluation

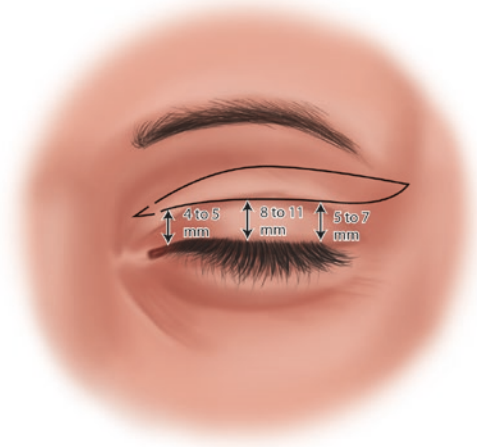
- Eyelid exam for upper lid, rule out blepharoptosis, and brow ptosis.
- Upper lid height: determine MRD1 (margin reflex distance – from central corneal reflex to eyelid margin). MRD1 normally 4–4.5 mm, lower number usually means eyelid ptosis
- Lid function is tested for ptosis. Levator excursion test investigates distance from extreme upward to downward gaze with brow immobilized, normal 13–16 mm. Orbicularis strength (forced resistance to closure, subjective).
- Fat prolapse: note the amount of prolapse. Normally not much fat in the temporal fat that may indicate lacrimal gland prolapse.
- Examine eyelid crease, normal 9–11 mm superior to the eyelid margin. Ask patient look down as the eyelid fold is elevated. If less than 9 mm, consider reconstruction of eyelid crease and fat excision. If more, consider disinsertion of the levator aponeurosis.

### Indications for Upper Lid Blepharoplasty

- Redundant or lax eyelid skin (dermatochalasis) with or without fat herniation (steatoblepharon) that results in functional visual obstruction or cosmetic concerns.

## Surgical Technique Upper Lid Blepharoplasty

- In sitting position, mark natural eyelid crease (Fig. 6.9) for inferior edge of resection (if no crease: female: 8–10 mm, men 6–8 mm from the edge of the eyelid).
- Identify superior edge with pinch testing to determine the amount of skin resection with slight eversion of eyelashes. Must be below eyelid-brow junction. Safe rule: leave ~20 mm between margin and eyelid-brow junction.
- Anesthesia: sedation, oral, intravenous, or general depending on patient's comfort.
- Place topical anesthetic in eye prior to placement of corneal protectors to prevent ocular injury.
- Local anesthetic with epinephrine for hemostasis (inject subcutaneous for blepharoplasty).
- Skin incision: #15 blade, electro-cautery, Ellman RF, or laser. Gentle traction on skin allows precision and visualization.
- Layered dissection: skin only first followed by small layer of orbicularis excision centrally (important not to excise too much laterally or medially to preserve eyelid closure).



**Fig. 6.9** Marking schematic for upper blepharoplasty. (Reprinted with permission from Holds JB, Ch. 10 Blepharoplasty pp. 75–82 in *Manual of Oculoplastic Surgery*, 4th ed. Mark R. Levine, et al. Springer, 2010)

- Create an incision through the septum to allow orbital fat prolapse.
  - Medial fat pad is paler with a thicker capsule. Adequate hemostasis is crucial. Trim redundant fat anterior to the level of orbital rim. Do not force or pull fat. Central fat pad is usually preserved. Aggressive fat excision can result in hollow appearance.
  - If lacrimal gland prolapse is noted, it can be suspended inside the orbital rim with mattress sutures.
  - Skin closure: adequate hemostasis should be confirmed before closure. Skin only, dissolvable, or non-dissolvable suture can be used. Do not suture septum.
- Note: If combining blepharoplasty with brow ptosis repair: perform brow ptosis repair prior to blepharoplasty incisions to prevent over-resection.*
- Test for tone (snap-back test): gently pull eyelid inferiorly and release; normal tone will result in return to baseline position immediately without blinking.
  - Test for laxity (globe distraction test): Gently pull eyelid inferiorly. If able to pull a lower eyelid greater than 8 mm, than it is excessively lax. If abnormal tone or laxity, patient will benefit from lid-tightening procedures to avoid malposition.
  - Lower lid dermatochalasis can be tested by skin pinch test. May need skin excision or laser resurfacing for skin tightening.
  - Fat prolapse: note the amount of prolapse, three fat pads in lower lid. Upward gaze can help in identification of prominent fat pads.
  - Rule out thyroid eye disease, high myopia (long eyes), and bony asymmetry as causes of globe proptosis.

## Postoperative Care

- Topical antibiotic ointment (ophthalmic) over sutures and eye.
- Prophylactic antibiotics (e.g., Keflex 500 mg q 6 hrs × 7 days).
- Cold compresses for the first 2 days.
- Follow-up within 1 week for suture removal.

## Lower Lid Blepharoplasty

### Preoperative Evaluation

Assess lower eyelid position, canthal position, tone, laxity, dermatochalasis, and proptosis.

- Lid function: orbicularis strength and eyelid position. Look for entropion or ectropion.
- Measure margin reflex distance (MRD2) – distance from light reflex to lower lid margin. If greater than 5.5 mm, it can be a sign of lower eyelid retraction.
- Lateral canthal position is 2–3 mm above medial canthal position.

## Surgical Technique

- Anesthesia: sedation, oral, intravenous, or general depending on patient's comfort.
- Place topical anesthetic in eye prior to placement of corneal protectors to prevent ocular injury.
- Local anesthetic with epinephrine is injected through inferior fornix. Infraorbital nerve block.

### 1. Transconjunctival Approach (Most Preferred)

- Does not address anterior lamella skin excess but can be combined with skin excision.
- Transconjunctival incision performed using (laser, Ellman RF, or monopolar cautery) 4–5 mm below tarsus along entire lid length. Incision is through the conjunctiva.
- Blunt dissection through the capsulopalpebral fascia to expose the orbital septum.
- Once the septum is exposed, gentle pressure on the globe will assist in locating lower fat pads.

- A small incision is made through the septum over each fat pad. The entire septum may be exposed, but this is often unnecessary in most cases.
  - Without excessive tugging or manipulation, the exposed fat can be removed and sculpted.
  - Always check for adequate hemostasis and avoid injury to inferior oblique muscle (between medial and central fads).
  - Lids massaged superiorly after ideal contour is achieved.
  - Skin-only closure, conjunctival suture is optional.
2. *Transcutaneous Approach*
- Subciliary skin incision with #15C blade. Stay 2–3 mm inferior to lashes to avoid injury to hair follicles and this allows good cosmesis.
  - Carefully dissect skin flap 4–5 mm inferiorly. Avoid injury to pretarsal orbicularis.
  - Transect through preseptal orbicularis and septum to expose fat pads.
  - Sculpt medial, central, and lateral fat pads. Hypertrophic orbicularis oculi muscles may be judiciously removed if needed.
  - Advance skin superiorly and drape over the incision. Remove excess skin (very conservative).
  - The orbicularis oculi generally does not require resuspension. The skin may be closed with either resorbable or non-resorbable sutures.

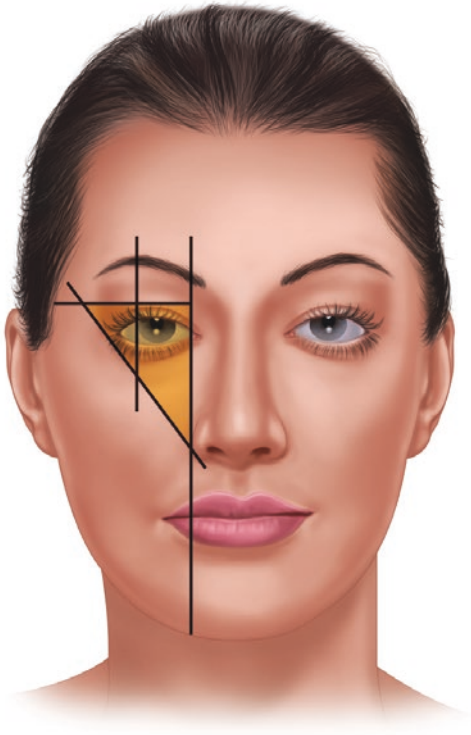
## Complications

- *Retrobulbar Hematoma/Hemorrhage*: may be caused by a bleeding vessel from the fat pad that retracts posteriorly or from bleeding edges of orbicularis muscle. Eye pain with progressive proptosis, ophthalmoplegia, and visual disturbance. Treatment is to remove sutures and possible lateral canthotomy with inferior canthotomy. Medical management includes hypotensive/osmotic agents (acetazolamide 500 mg IV or mannitol 1.5 g/kg), topical beta-blockers, oxygen therapy, and high-dose steroids (e.g., dexamethasone 3–4 mg/kg).
- *Lagophthalmos*: treatment initially should include lubricant eye drops with taping closure of eyelid at night. After 2 weeks, may initiate lid massage and stretch. If no resolution after 3 months, consider full thickness skin grafting from preauricular region or contralateral eyelid.
- *Excessive Skin Remnant or Fat*: allow 6 weeks for edema to resolve and removal of remaining skin/fat.
- *Lower Lid Hollowing*: treatment with autologous fat injection or dermal fillers such as hyaluronic acid.
- *Lacrimal Gland Prolapse*: reposition with a 5-0 non-absorbable suture passed through gland capsule to the periosteum of the anterior tip of the lacrimal gland fossa.
- *Suture Granuloma*: focal inflammation around the suture. Most resolve overtime, if persistent; injection of steroids, topical steroid application, or excision.

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## Brow Lift

- The eyebrow helps frame the eye and contributes to the perception of the eyelids.
- Eyebrow ptosis, especially laterally, contributes to the appearance of excess skin (Connell's sign) and cannot be optimally treated with blepharoplasty alone.
- The female eyebrow is ideally positioned in a vertical line with the medial canthus and nasal ala and horizontally aligns with the tail of the brow (Fig. 6.10). The female brow is ideally several millimeters above the orbital rim.
- The male eyebrow sits lower than the female eyebrow. The male brow sits along the level of the orbital rim.
- The eyebrow arches superolaterally with the maximal arch at or just lateral to the lateral limbus, before terminating in an imaginary line drawn between the nasal ala and lateral canthus.
- Eyebrow ptosis usually starts laterally and progresses medially with age. The frontalis



**Fig. 6.10** Eyebrow position. (Reprinted with permission from Zimble M. Cummings Otolaryngology 6th Edition. Elsevier Books; 2015)

has diminished activity lateral to the temporal fusion plane, which accelerates the effect of gravitational forces laterally. Compensatory frontalis elevation raises the eyebrow, but produces rhytids that become more visible as the skin and subcutaneous tissue thins. Lateral hooding will become more pronounced when the frontalis is relaxed. Chronic glabella contraction can lead to an angry appearance and depress the medial eyebrow.

### Preoperative Evaluation

- Complete medical history including prior facial procedures, eyebrow tattoos, ophthalmic surgeries, facial nerve palsy, facial trauma, fluctuating symptoms, and cardiovascular risk factors.
- Prior LASIK surgery or symptomatic dry eye may necessitate a more conservative approach.

- Review of all current medications, including supplements, anticoagulants, or antiplatelet agents must be done. Patients on anticoagulants, or antiplatelet agents, have increased risk of bleeding even if the medicines are stopped preoperatively. A direct brow lift may be the best option for these patients, as hemostasis can be obtained under direct visualization, and less risk of postoperative hematoma.
- Eyebrow position and contour are judged with the frontalis relaxed.
  - With the patient's eyes closed, a hand can be placed on the forehead to stabilize the frontalis; the true brow position can then be appreciated when the patient opens their eyes.
  - Some patients remove brow hairs and they may have eyebrow tattoos, this must be recognized preoperatively.
  - Patients must be counseled on preoperative asymmetry.
- The facial nerve and eyebrow function are assessed to ensure full eyelid closure.
- The evaluation of the eyelids with the brow held to expected postoperative position to examine eyelid margin height (MRD) and residual dermatochalasis will accurately assess the need for adjuvant eyelid surgery.
- Assessment of hairline, forehead, and glabellar rhytids for incision planning:
  - Deep mid-forehead and suprabrow rhytids can be used to camouflage incisions.
  - Mild glabellar rhytids can be treated with neuromodulators. This can be combined with treatment of the lateral brow depressors in mild cases of brow ptosis. In more severe cases, forehead lifting with the release of the corrugators is recommended.
  - Corrugator myectomy can also be performed through an upper eyelid blepharoplasty incision if a brow lift is otherwise not indicated.
- The hairline and forehead length are important for procedure selection. Patients with a receding hairline, male-pattern baldness, or females who wear their hair back are poor candidates for a pretrichial incision. Pretrichial

forehead lifts shorten the forehead and coronal lifts will lengthen the forehead.

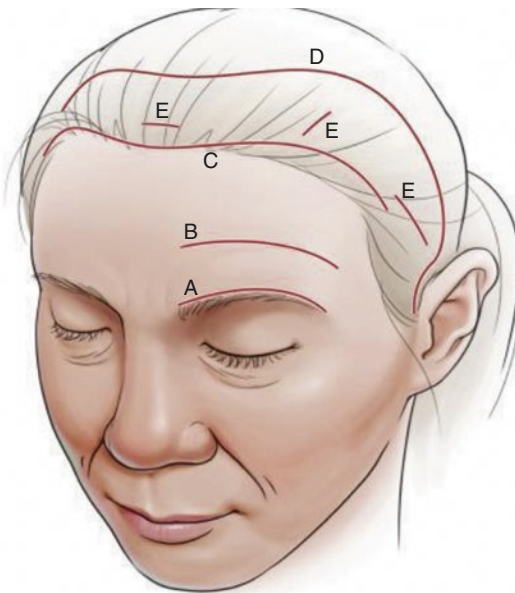
- All patients must have preoperative photos. A frontal view and oblique view to demonstrate secondary upper eyelid hooding are recommended. Any preoperative asymmetry must be captured by the photographs and documented and discussed with the patient.

## Surgical Technique

- See Fig. 6.11 for incision markings for the various brow lift techniques.

### 1. Indirect Brow Lift

- Performed through an open blepharoplasty incision, the periosteum is exposed at the superior orbital rim.
- The retaining ligaments are released, and the brow fat pad sutured to the periosteum with 4-0 or 5-0 absorbable suture above the orbital rim.



**Fig. 6.11** Incision placement for different brow lift procedures. (A) Direct brow lift, (B) midforehead brow lift, (C) hairline incision brow lift, (D) coronal incision brow lift, (E) endoscopic brow lift. (Reprinted with permission from Benjamin W. Light B and Leong P. Brow Lift. Operative Otolaryngology. Elsevier; 2018)

- Can be combined with a corrugator myotomy medially.
  - The supratrochlear and supraorbital neurovascular bundles can be injured medially.
  - Incomplete release or inadvertent transposition of corrugators can lead to abnormal contour and movement of the medial brow.

### 2. Direct Brow Lift

- Greatest elevation per amount of tissue excised, also offers excellent control of brow contour. The most technically simple and shortest operation.
- Traditionally used in males with heavy brows, patients with receding hairlines, or patients that do not want a more involved procedure.
- Good for temporal brow ptosis, carrying the incision medially will result in a displeasing scar.
- Can be combined with a mid-forehead lift to treat medial brow ptosis.
- The redundant skin to be removed is marked preoperatively following the contour of the margins of the upper eyebrow.
- The incisions are beveled in the direction of the eyebrow hairs to avoid damage to the follicles, with excision of underlying skin and subcutaneous tissue.
- The frontalis is not touched.
- Deep closure is important and done with buried 4-0 or 5-0 polyglactin sutures.
- Skin closure is accomplished with a running 5-0 nylon or polypropylene.
- Danger zones: the supratrochlear and supraorbital neurovascular bundles are located 1.7 cm and 2.7 cm, respectively, from a midline mark and courses along the anterior aspect of the frontalis. Damage will lead to scalp numbness.

### 3. Pretrichial and Trichophytic Brow Forehead Lift

- Raises the eyebrows and lowers the hairline.
- Effective in patients with a high or long forehead. Hairline and manner of wearing hair must be assessed preoperatively.

- The incision is placed slightly posterior to (trichophytic), or just anterior (pretrichial) to the hairline. This incision is generally confined medial to the conjoint tendons of the forehead.
- If lateral elevation is required, independent temporal incisions may be required.
- Traditionally, the incision is bevelled (10–15°) perpendicular to the hair follicles for preservation and regrowth through the incision. Identical bevel of the anterior and posterior incisions is vital for proper closure.
- Centrally, the dissection is in the loose areolar plane between the galea and periosteum (some surgeons advocate using the subperiosteal plane). Many also perform a trichophytic brow lift in the lipocutaneous plane in order to break up adhesions between the skin and subcutaneous tissue, thus eliminating static rhytids.
- Dissection is carried inferiorly to the level of the superior orbital rim.
- Corrugator release can be performed if indicated.
- Temporally the dissection plane is on the superficial aspect of the deep temporal fascia.
  - If unsure of the depth, a small incision to visualize the temporalis muscle can be performed.
  - The facial nerve is within the temporo-parietal fascia and can be damaged if the dissection is too superficial.
  - The central and temporal planes are connected by the release of the conjoint tendon (fusion of periosteum, temporo-parietal fascia, and deep temporal fascia).
- Wound closure is performed after an appropriate ellipse of skin is excised.
- Deep incisions are closed with 3-0 or 4-0 polyglactin.
- Superficial closure is performed with 4-0 or 5-0 polypropylene.

#### 4. Coronal Brow and Forehead Lift

- Infrequently used presently.
- Lengthens forehead while raising brows.
- Amount of skin to be removed can be done after flap or estimated in initial markings

(best to err on excess than over-resection. If over-resection occurs, may need to mobilize the posterior flap).

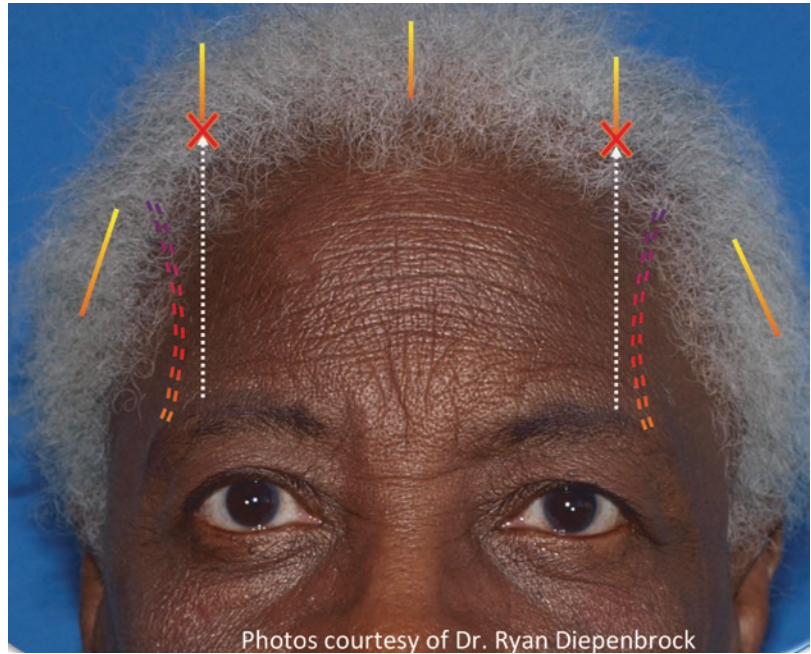
- An ear-to-ear incision is placed anterior to the coronal suture, 6 cm posterior to anterior hairline. Lateral extent is 1–2 cm above the ear insertion. Incisions should be bevelled with course of hair follicles.
- The dissection is performed in the loose areolar plane between the galea and periosteum in the central region and just superficial to the temporalis fascia laterally.
- Subgaleal dissection is performed until slightly above the supraorbital rim to allow access to glabellar musculature. Corrugator, frontalis, and procerus myotomies are performed as required.
- Appropriate amount of tissue skin is excised and the skin is reapproximated. 1.5–2 cm of excision is required to gain 1 cm in brow elevation.
- Reapproximate galea with 2.0 polyglactin followed by skin closure with staples or 3-0 polypropylene.

#### 5. Endoscopic Forehead Lift

- Raises the eyebrows and lengthens the forehead through small incisions (usually five incisions) within the hairline (Fig. 6.12).
- Minimizes scarring and alopecia but not a good option for patients with high hairlines or males with severe brow ptosis.
- Preoperative chemodenervation of the glabella can help with wound healing, particularly in patients with hypertrophic corrugators.
- Facial nerve and sentinel vein – the facial nerve courses superiorly and medially from 0.5 cm below the tragus to 1.5 cm above the lateral eyebrow in the temporo-parietal fascia just deep to the SMAS. The sentinel vein is located 3 cm lateral to the lateral canthus in a line drawn from the nasal ala. This marks the inferior termination of dissection unless a mid-face lift is concurrently performed.



**Fig. 6.12** Endoscopic brow lift incisions. (Image courtesy of Dr. Ryan Diepenbrock)



### Procedure:

- Anesthesia can be local or general.
- Full strength local anesthesia with epinephrine is used along the orbital rims, incisions, and supratrochlear and supraorbital neurovascular bundles.
- Tumescent is used to infiltrate the remainder of the forehead.
- All incisions are placed approximately 2 cm within the hairline and made with a #15 blade.
- The central incision and paracentral incisions are vertical, approximately 1.5 cm in length and subperiosteal in depth.
- The central incision is directly above the center of the glabella. The radial incisions are approximately 3.0 cm lateral to the central incision at the desired level of greatest brow height.
- The temporal incisions are made in the center of a perpendicular line drawn from the nasal ala to the lateral canthus.

### Dissection

#### 1. Central

- A blunt elevator is used for subperiosteal dissection, connecting the central incisions, posteriorly and inferiorly.

- Can be done without the endoscope until 2 cm above the superior orbital rim (all other dissections are done under direct visualization).
  - Adequate posterior dissection is key for mobility and elevation (10 cm posteriorly up until lambdoid suture).
  - Initial dissection stops at the temporal line of fusion laterally.
- #### 2. Temporal
- A #15 blade is used to incise the skin through the dermis, then meticulous dissection is performed to expose the “glistening” white deep temporal fascia.
  - Blunt dissection along the deep temporal fascia is performed anteriorly and posteriorly.
  - The conjoint tendon is released connecting the two planes of dissection. Dissection is carried from temporal to medial scalp rather than vice versa.
  - Dissection is then carried anteriorly toward the orbital rim. The periosteal attachments must be released for adequate mobilization and lift.
- #### 3. Superior Orbital Rim and Glabella
- After elevation of the periosteum from the superior orbital rim, the periosteum is cut for a full release.

- This can be done delicately with a curved elevator as well as bluntly with scissors.
  - Opening the periosteum will expose the glabella and supraorbital and supratrochlear bundles.
  - Endo graspers are used to strip the fibers of the corrugators and a strip of procerus if indicated.
  - Excision of the depressor supercili is not recommended as the periosteal spreading results in significant weakening.
4. Fixation
- Endotines, lactosorb screws/periosteal sutures, and titanium percutaneous screws can be used.
  - Fixating at the posterior aspect of the paracentral incisions provides adequate elevation.
5. Closure
- Laterally, the superficial temporal fascia is advanced temporally, secured to the deep temporal fascia, and closed with 3-0 polyglactin.
  - Deep closure is with 4-0 absorbable sutures.
  - The scalp incisions can be closed with interrupted non-absorbable/absorbable suture, or staples.

## Postoperative Care

- All patients are advised to use topical antibiotic ointment, avoid showering for 24 hours postoperatively, use ice, and avoid physical activity in the perioperative period.
- Compression wraps can be placed over pretrichial, trichophytic, coronal, and endoscopic lift incisions at the time of surgery.
  - This decreases the risk of hematoma and promotes adherence of the periosteum.
  - Wraps are removed 1–2 days postoperatively.

## Complications and Management

- *Alopecia*: most common in coronal incisions. Limited use of electrocautery includ-

ing judicious use of bipolar cautery prevents unnecessary collateral damage to hair follicles. The skin and subcutaneous tissue should be incised at a 10–15 degree bevel to prevent transection and disruption of the hair follicles. Additionally, limiting suture passes through hair-bearing areas minimize follicle damage. Hair loss is usually temporary. Consider hair transplantation for cases where regrowth does not occur.

- *Bleeding*: significant bleeding is usually caused by the superficial temporal, supraorbital, supratrochlear, or zygomaticotemporal arteries. Opening of the incisions and identification of bleeding source with drain placement is necessary in some cases. Some surgeons routinely place drains postoperatively.
- *Facial Nerve Damage*: avoided by maintaining proper dissection planes. Will result in orbicularis and brow weakness. Damage to frontal branch may impair orbicularis oculi and require globe protection such as eye patches, temporary tarsorrhaphy, or gold weight implantation to upper eyelid.
- *Numbness and Paresthesias*: expected transiently. Damage to the supratrochlear or supraorbital bundles will result in permanent dysfunction.
- *Scarring and Depressed Incisions*: closure under tension increases risk. A proper multi-layered closure minimizes risk. Laser resurfacing can be used for direct brow lift incisions once the wound has matured.
- *Asymmetry*: meticulous preoperative evaluation reduces risk. Can result from failure of fixation after an endoscopic lift. Revision with refixation is recommended in the early postoperative period in these cases.
- *“Surprised Look” with Brow Widening*: occurs with overzealous resection of the corrugators. Consider Botox in selected regions.
- *Lagophthalmos*: mild lagophthalmos is common in the early perioperative period and managed with topical lubrication. More common when combined with upper eyelid blepharoplasty, or if the patient has had prior surgery. Fixation devices can be explanted or revised if necessary.

## Pearls

1. Meticulous preoperative planning to evaluate function, asymmetry, and the need for adjunct procedures are key for success.
2. Evaluation of the forehead length, hairline, the manner hair is worn, and rhytids to camouflage scars ensure proper procedure selection.
3. Visualization is the key to ensure proper dissection planes and avoid damage to neurovascular bundles.
4. Limited resection of the corrugator and procerus muscles minimizes postoperative contour abnormalities and brow widening.
5. Matching the bevel on both sides of the incision and meticulous wound closure minimize scarring.
6. Limitation of electrocautery, use of blade for incisions, and minimizing suture passes reduce the risk of alopecia.

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## Otoplasty

- Excessive otic projection or prominauris has two main root causes.
  - Lack of a well-defined antihelical fold; corrected with Mustardé sutures.
  - Excessive conchal bowl depth; corrected with Davis technique.
  - Combination of the two.
- Ideal candidates are preschool or kindergarten children (5–6 years old).
- Roughly 85% of ear growth is completed by 3 years old.
- Ear is fully developed by age 7–8. Cartilage is more pliable and easier to mold and manage.
- Studies have demonstrated an improved quality of life, increased self-esteem, and decreased psychosocial anxiety when performed at a younger age.
- Blood supply of the external ear consists of two branches of the external carotid artery: the posterior auricular artery and vein and the superficial temporal artery and vein.

## Preoperative Evaluation

When the patient presents for an otoplasty consultation, it is first imperative to ask his or her chief complaint. In the pediatric population, excessive otic projection is often accompanied by ridicule from peers or siblings, thus pediatric patients are often eager and willing to undergo the procedure. Adults often state a long history of teasing dating back to their childhood.

During the history and physical, the surgeon should specifically assess the external and internal ear for the following:

- Symmetry
- Dystopia of the ears
- Anatomy of the ears
- Root cause of excessive projection (lack of antihelical fold/conchal bowl hypertrophy/combination)
- Flexibility and resiliency of the cartilage
- Signs of skin lesions or history of otitis media or externa
- Hearing loss
- Integrity and condition of the tympanic membrane and external auditory canal

In addition to a thorough history and physical exam, preoperative photos and measurements are imperative. The following is a list of recommended photos:

- A frontal view
- Right and left  $\frac{3}{4}$  view
- Right and left profile views
- Submental vertex
- Posterior view
- Isolated ear photos with a ruler:
  - Conchal bowl depth
  - Measurement of the superior, middle, and inferior mastoid to helix distance

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## Physical Findings

- First the surgeon must assess the degree of protrusion. This is accomplished by

determining the auriculocephalic angle and the scapha conchal angle.

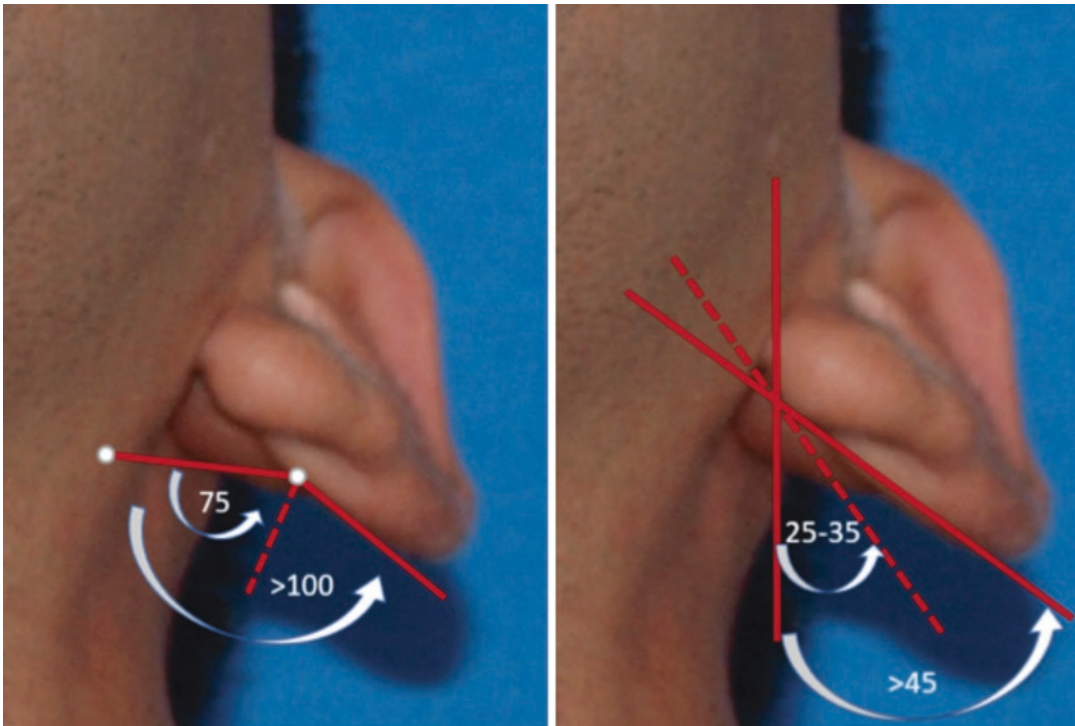
- A normal auriculocephalic angle is roughly 25–35° (Fig. 6.13). An abnormal or protrusive angle is generally greater than 45°.
- The scapha conchal angle is normally 75–100° (Fig. 6.13).
  - Lack of an antihelical fold, which causes failure of the ear to fold normally will typically present with a scapha conchal angle of >100°.
- The depth of the conchal bowl is measured from the cavum concha to the anterior segment of the anti-helix. A normal depth should be roughly 8 mm.

## Technique for Otoplasty

### Preoperative Markings

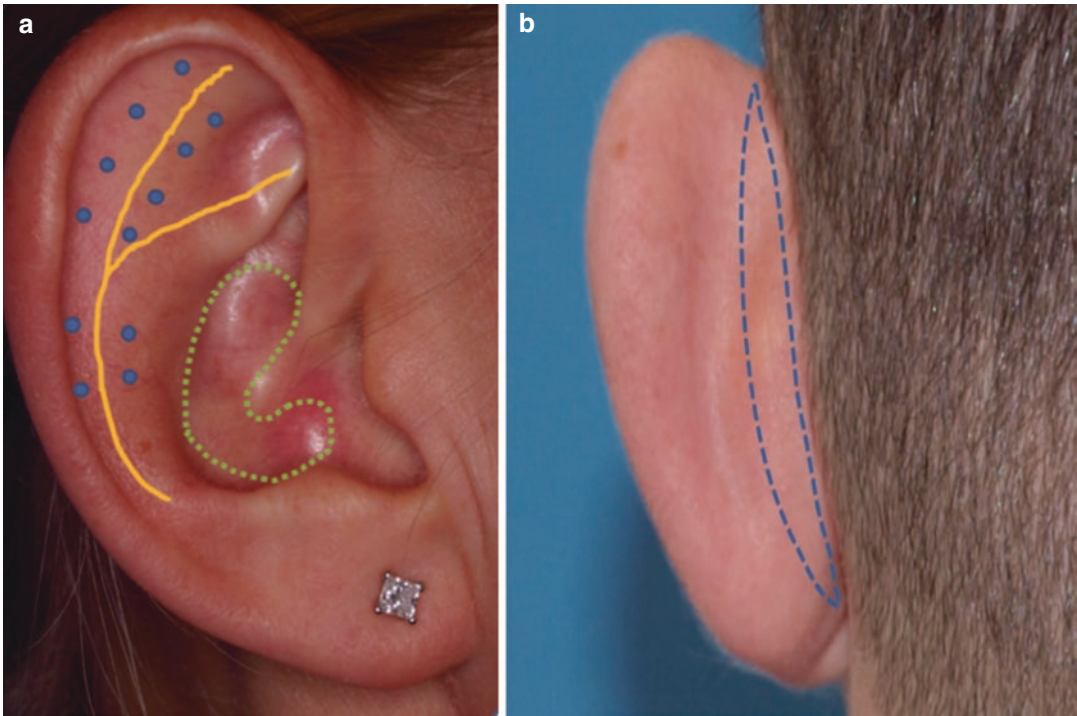
- First, the proposed antihelix is drawn.

- Next, the proposed markings for the placement for the Mustardé sutures are drawn (Fig. 6.14).
  - Trapezoidal in shape with the anterior arm being slightly shorter than the posterior arm.
  - Markings should be placed roughly 7–8 mm on either side of the proposed crest of the newly formed antihelical fold.
- Using calipers or a ruler, the conchal bowl is measured to a depth of 8 mm from the transition line of the antihelix. This ensures a proper height of residual bowl remains after excision (generally, in a kidney bean fashion).
- Posterior auricular incision is marked. This is generally fusiform in fashion extending superiorly to inferiorly to gain surgical access to the entire ear. Incision is made 2–3 mm lateral to the sulcus.
  - This will ease dissection to the helix of the ear as well as promote good tissue approxi-



**Fig. 6.13** A normal auriculocephalic angle is 25–35°. Greater than 45° is considered excessive. Scapha conchal angle is normally 75–100°. Greater than 100° is usually

attributed to a lack of an antihelical fold. (Images courtesy of Dr. Ryan Diepenbrock)



**Fig. 6.14** (a) Proposed markings of the Mustardé sutures placed to form the new antihelical fold, and the planned cartilage excision (Davis technique) for conchal bowl resection. (b) Planned fusiform excision of skin in the posterior sulcus. The preoperative markings are crucial

because they will be used during the surgery to facilitate tattooing of the cartilage for accurate suture placement and bowl reduction. (Images courtesy of Dr. Ryan Diepenbrock)

mation during closure; 5–10 mm wide depending on the amount of setback needed.

- Only remove enough skin to facilitate extension of the incision laterally to ensure access to preoperative markings.

### Intraoperative Markings

Prior to local anesthetic infiltration and nerve blocks, the surgeon may decide to use methylene blue to tattoo the cartilage.

- A 30-gauge needle (1/2"–3/4") is passed from the external markings through the skin, cartilage, and posterior body of the ear.
- The needle is inserted into the tip of a 1 ml syringe filled with methylene blue and withdrawn.
- Each of the trapezoidal dots is inked.

- Outline of the kidney bean shaped marking is completed in identical fashion. The final markings should appear as in Fig. 6.14.

### Surgical Procedure

- The fusiform marking is excised to expose the posterior ear cartilage.
- A subperichondrial dissection is completed until all the markings for the Mustardé sutures and conchal bowl excision are visualized. Usually the subperichondrial dissection is carried nearly the full distance to the helical cartilage. The methylene blue tattoos are visualized and Mustardé sutures commence.
- Mustardé sutures are utilized to create a crease in the cartilage in order to form a new antihelical fold.

- Using 4-0 Mersilene® sutures, the needle is passed from posterior to anterior through the cartilage; being cognizant not to buttonhole the skin. The knot is tied in a vertical vector to promote the curvature along the long axis of the newly formed antihelical fold. Usually two to three horizontal mattress sutures are placed.
- Once the antihelical fold is created, attention is turned to reducing the conchal bowl. The tissue posterior to the bowl must be excised to create what will essentially become the new floor of the conchal bowl. The tissue posterior to the bowl is removed to expose the mastoid fascia. The excised tissue will include subcutaneous tissue, fat, and a portion of the posterior auricular muscle. The mastoid fascia must be thoroughly exposed, smoothed, and free from remnants of superficial tissue.
- A full thickness incision through the cartilage of the conchal bowl is made. The cartilage is then dissected from the overlying perichondrium and removed.
- After verification of final measurements, mattress sutures (Furnas sutures) are placed with 4-0 Mersilene® at the superior, middle, and inferior aspects. The sutures are placed through the remaining cartilage and secured to the mastoid fascia. Next, the sutures are individually tied and placed under appropriate tension using a ruler or caliper to verify final position of the ear.
- The incision is then closed with a running 5-0 fast gut suture. Bolsters may be placed using dental cotton rolls or resorbable sutures through the bowl to the fascia to close dead space. Xeroform gauze is placed in the newly formed bowl as well in the sulcus. A dressing consisting of fluffs, Kerlix™, and Coban™ is then applied.
- The patient is seen the next day for follow-up. He or she is instructed to bring an athletic headband to the follow-up appointment. At the follow-up, the head wrap is removed and the surgical sites are inspected for hematomas and tissue integrity.
- Patients are instructed to wear the athletic headband for 24 hours per day for the first 2 weeks. At that point, they are to wear the headband in the evening and while sleeping for an additional 2 weeks.
- The patient is instructed to clean the incisions with 50:50 hydrogen peroxide/H<sub>2</sub>O and liberally apply antibiotic topical ointment 4–5 times per day for at least 1 week.

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## Postoperative Complications

- *Infection* – perioperative antibiotics such as cefazolin to cover *Staphylococcus aureus*. Some prefer preoperative ciprofloxacin to cover *Pseudomonas aeruginosa*. Cultures for causative bacteria as well as sensitivities for post-op infection.
- *Hematoma* – bolster dressing, Xeroform™ gauze (3% bismuth tribromophenate in petrolatum blend with fine mesh gauze), head-wrap. Follow-up in 1 day. Drain as needed, open incision, and localize the bleeding vessel or consider returning to the operating room. Requires early intervention and follow-up to prevent perichondritis.
- *Cauliflower Ear* – caused by untreated hematoma or fluid collection under the perichondrium (prevention is key).
- *Wound Dehiscence* – keep the wound clean with 50:50 hydrogen peroxide and water cleanses. Cover the wound with Xeroform® dressing/wet-to-dry packing. Consider reapproximation for large, non-healing wounds.
- *Tissue Sloughing or Necrosis* – topical vasodilators such as nitropaste or hyperbaric oxygen.
- *Perforation of External Auditory canal (EAC)* – primary closure with gut suture and otic antibiotic drops.

## Postoperative Course

- The patient is discharged with a 5–7 day course of oral antibiotics, a non-steroidal anti-inflammatory medication, a small dose of narcotic analgesics, 3 days of postoperative steroids, and antibiotic ointment.

- *EAC Stenosis* – ensure bowl is set back, difficult to correct. Avoid problem.
- *Telephone Ear Deformity* – over-tightening or over-resection of middle-third antihelical region. Treatment of overcorrection with a Mustarde procedure can be corrected by removing the offending suture, scoring the cartilage and suspending appropriately.
- *Reverse Telephone Ear Deformity* – opposite of the above with over-tightening or over-resection of the superior and inferior antihelical regions. Treatment of overcorrection with a Mustarde procedure can be corrected by removing the offending suture, scoring the cartilage and suspending appropriately.

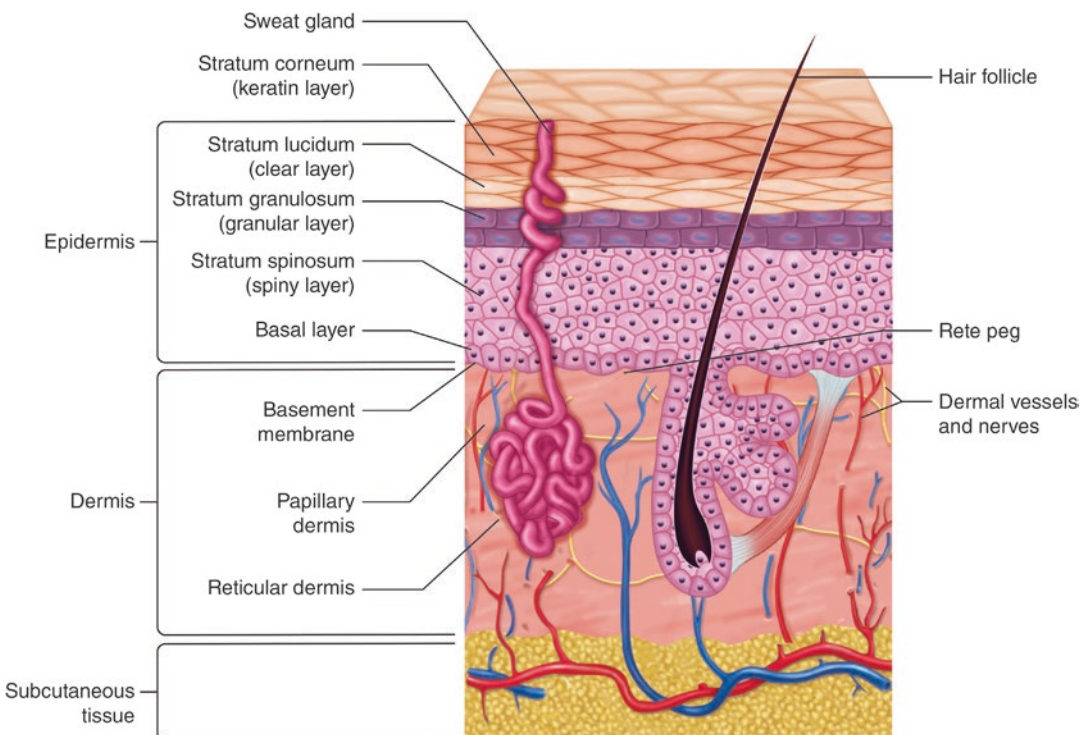
## Chemical Skin Resurfacing

### Skin Preparation Prior to Peels

- Tretinoin (Retin-A) 0.05% or 0.1% twice daily
  - Metabolite of vitamin A.

- 2–4 weeks prior to treatment.
- Thins and compacts stratum corneum (Fig. 6.15) by decreasing cohesiveness allowing easier penetration of peeling agents.
- Induces type I procollagen.
- Reduces melanin content.
- Stimulates angiogenesis and epithelial cell mitotic activity leading to rapid wound healing.
- Normalizes keratinization allowing for chemical peel agent to penetrate deeper and more evenly.
- Not to be used within 1 year of laser resurfacing due to scarring.
- Don't forget, retinoic acid (Isotretinoin, Accutane®) is contraindicated 1 year prior to treatment.

- Glycolic Acid 5–10%
  - 4–6 weeks preoperatively.
  - Reduces thickness of stratum corneum allowing increased chemical peel penetration.
- Herpetic Prophylaxis



**Fig. 6.15** Layers of epidermis. (Reprinted with permission from Young A. Rehabilitation of burn injuries. Phys Med Rehabil Clin 2002;13(1):86)

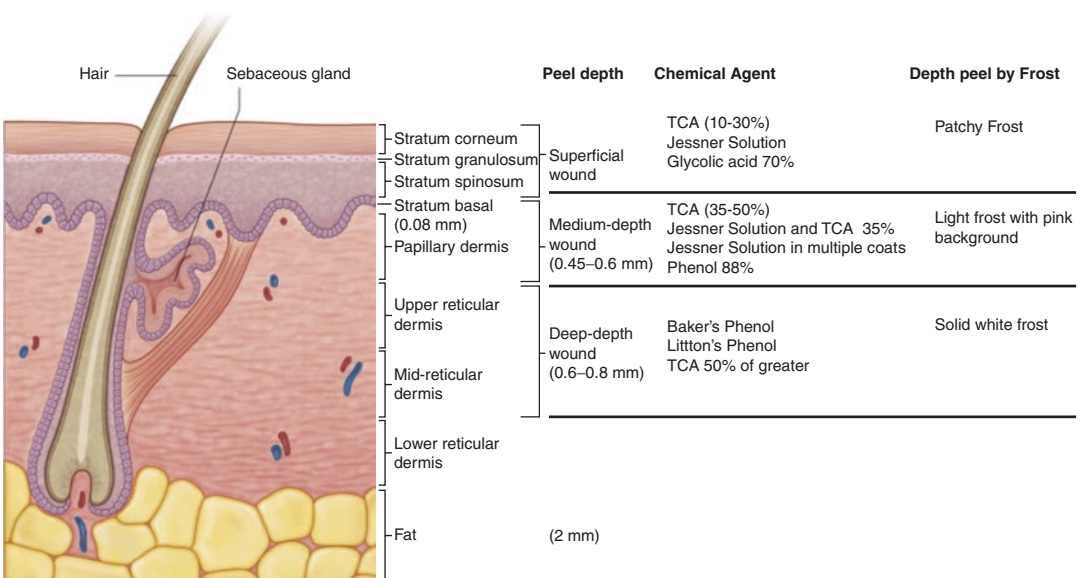
- For medium-depth chemical peels or laser resurfacing.
- Acyclovir 400 mg three times daily, valacyclovir 500 mg twice daily, or famciclovir 250 mg twice daily for 3 days prior to the procedure and continued for 10 days postoperatively.
- Hydroquinone 4%
  - Inhibits tyrosinase enzyme preventing melanocytic production of melanin.
  - Reduces risk of post-inflammatory hyperpigmentation.
  - Used twice a day.
- Sunscreen
  - Must be used daily to lessen the development of hyperpigmentation.
  - Allows skin to rest before peel/resurface.
  - Needs to be started 3 months prior.
- Be cautious when treating neck skin due to reduced or limited adnexal dermal structures which may result in hypertrophic scar. This is due to reduced epiboly as pilosebaceous units provide progenitors of new epithelium. Superficial peel can be used more safely on neck skin.
- History of herpes labialis is a relative contraindication due to increased risk of scarring.
- Patients on hormone replacement therapy (birth control or menopause treatments) are at a higher risk of drug-induced increased melanocytic activity and pigmentary changes.
- Caution with patients with inflammatory skin conditions such as psoriasis or vitiligo, which can exacerbate and spread to face.
- Avoid patients with use of isotretinoin within past year.

**Patient Selection**

- Indications are for patients with extensive rhytids (will only treat passive), seborrheic or actinic keratosis, acne vulgaris, melasma, and post-inflammatory hyperpigmentation.
- Fitzpatrick skin types 1 and 2 are best candidates, 3–6 have a higher risk of post-inflammatory hyperpigmentation.

**Chemical Peeling**

- Chemical peeling is a controlled exfoliation process.
- Classified by depth of burn (Fig. 6.16).
- Light peels are for fine lines and wrinkles.
- Medium and deep peels help improve scarring, texture, and blemishes.
- Work by causing keratolysis and keratocoagulation.



**Fig. 6.16** Chemical peel wound depth and chemical agent. (Reprinted with permission from Landau M and Ghannam S. *Surgery of the Skin* 3rd Edition. Elsevier Books; 2015)



- Lighter peels usually work by keratolysis to interrupt adhesions for exfoliation but no effect on deeper wrinkles (e.g., glycolic acid, lactic acid, and salicylic acid).
- Deeper peels denature and coagulate proteins (e.g., TCA and phenols).
- White frosting is due to precipitation of salts.
- *Hypopigmentation* – can blend in with CO<sub>2</sub> laser or treat with topical oxisoralen cream 1% weekly. Usually occurs later on, about 6–12 months after treatment.
- *Infection* – herpes simplex should be treated with double the acyclovir/valacyclovir prophylactic regimen if provided or treated with traditional doses. *Candida albicans*, examine with KOH to confirm. Treat with topical antifungals and discontinuation of petroleum jelly dressing. Bacterial infection can be cultured and treated with parenteral or topical antibiotics.

## Technique

- Mark the mandibular border prior to laying patient supine to aid transition line into neck.
- Anesthetize with local blocks and/or sedation if medium to deep peel planned. Handheld fan for cool air could be used for superficial peels.
- Prepare skin to remove oils, dirt, and impurities with agents such as acetone or alcohol on gauze pads.
- Peel of choice applied with cotton tip applicator with care around eyes. Deep line and scar treatment aided with swab stick to work in.
- Monitor for frost level for desired penetration. Neutralizing agent should be available (water for dilution is an option as well) for spills.
- Once depth of desired peel achieved, wash off with water/neutralizing agent and cleanse skin.
- Petroleum jelly is applied to face.
- *Milia* – clogged hair follicles may form cyst-like structures. Normally resolve with improved skin hygiene. May be treated with needle evacuation or topical tretinoin.
- *Scarring* – treated with injection of corticosteroids. 585-nm pulsed dye laser can also be used to treat the area. Application of occlusive silicone strips may help as well.
- *Persistent Erythema* – erythema lasting over 6 months, most redness should resolve by month 3 after treatment. Firstly, patient must stop all skin care as the increased sensitivity of the skin may be the cause. Question patient about skin exposure to sun and use of sunblock. Examine with potassium hydroxide test for subclinical fungal infection, if positive treat with antifungal. If all negative, treat with topical steroid cream, expect to resolve in 12 weeks.

### Postoperative Care:

- Facial rinses with tepid water or 0.25% acetic acid-soaked sponges to loosen desquamated skin cells and loosen coagulum 4 × daily for 10 days followed by application of petroleum jelly.
- Return to maintenance program including cleanser, sunscreen, and topical steroid.

## Complications

- *Hyperpigmentation* – hydroquinone 4% and tretinoin treatments. Seen usually 30 days later.

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## Laser Resurfacing

### Patient Selection

- Similar to chemical peel.

### Laser Ablation and Pre-treatments

- Appropriate skin care is essential for facial rejuvenation.
- Cleansing to remove oil, dirt, bacteria, and dead skin. Mild detergents such as Cetaphil® or Neutrogena® are recommended.

- Moisturizer to decrease epidermal water loss.
- Daily sun protection prevents premature aging and decreases postoperative inflammatory hyperpigmentation.
- Prescription of topical retinoids improves appearance of photodamaged skin and increases collagen production resulting in smooth tone and texture.
- Use of retinoids prior to lasers or chemical peels also aids in re-epithelialization postoperatively.
- CO<sub>2</sub> laser: infrared energy at wavelength of 10600 nm that is specific for water. Ideal for skin as it consists of 70% water. Higher risk of lateral thermal damage as it is also absorbed by proteins and fats. Minimal fluence necessary is 4–5 J/cm<sup>2</sup>.
- Er:YAG laser (erbium:yttrium-aluminum-garnet): infrared radiation at wavelength of 2940 nm. More specific for water than CO<sub>2</sub> laser. Lower risk of adjacent thermal damage but higher risk of bleeding. Better for elevated lesions or scars. Minimal fluence necessary is 0.5–1.7 J/cm<sup>2</sup>.

### Ablative Skin Rejuvenation

- Light amplification by stimulated emission of radiation (LASER) has become a popular modality for skin resurfacing.
- Fractionated CO<sub>2</sub> laser resurfacing is safe and effective for photoaging and treatment of wrinkles. It vaporizes small areas (MAC – micro ablative columns) of skin in a grid-like pattern with undamaged skin in between to allow faster healing.
- Energy: amount of energy delivered to each MAC per pulse (increasing energy increases depth and coagulation).
- Spot size: diameter of each MAC (small spot size with high energy increases depth of penetration).
- Fluence: energy per MAC divided by spot size area (allows for comparison of different lasers) in J/cm<sup>2</sup>.
- Pulse duration: amount of time to deliver each pulse.
- Power: energy per MAC divided by pulse duration (higher power results in deeper penetration).
- Density: number of MACs per unit area of grid (higher density decreases distance between MACs – increased erythema and edema). Lower density is recommended in areas of hair follicles and thin skin such as eyelids.
- Differences between lasers depend on the media in which the excited photon energy is released.
- Hybrid lasers: combination of CO<sub>2</sub> and Er:YAG.
- Anesthesia is administered with regional blocks with 1–2% lidocaine with epinephrine or subcutaneous infiltration of dilute 0.3% lidocaine with epinephrine. Topical proparacaine to eyes before placing metallic eye shields.
- Post-laser care involves dilute vinegar soaks (antibacterial and antifungal). Aquaphor or Vaseline® to act as a barrier and moisturizer. Cool compresses. Avoid cosmetics until the skin surface is healed.

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### Botulinum Toxin

- Botulinum toxin A, trademarked under the name Botox®, inhibits the release of the neurotransmitter acetylcholine at the neuromuscular junction of nerve terminals, causing a temporary paralysis of the injected muscle. It targets SNAP-25, a presynaptic membrane protein containing acetylcholine vesicles.
- Other available forms are abobotulinumtoxin A (Dysport®), prabotulinumtoxinA-xvifs (Jeuveau®) and incobotulinumtoxin A (Xeomin®).
- All are derived from the gram-positive spore-forming bacteria *Clostridium botulinum* type A.
- Botox® cosmetic is approved by FDA for the temporary improvement of glabellar rhytids caused by the procerus and/or corrugator muscles and crow's feet caused by lateral orbicularis oculi in adult patients 18–65 years of age.

In 2017, it was approved for the temporary improvement in the appearance of moderate to severe forehead lines associated with frontalis muscle activity in adults. This approval makes the brand the first and the only neurotoxin indicated for three facial treatment areas – forehead lines, crow’s feet lines, and glabellar lines.

- It must be recognized that the use of Botox® for the eyelids, nasal, cervical, and perioral areas for cosmetic results is considered off-label.
- The paralytic effect of neurotoxins ranges from 3 to 6 months; however, the FDA approval is for 3–4 months duration depending on the brand. Recovery is based on new axonal sprouting and new SNAP-25 production.
- Peak effect is 14 days, will start seeing results in 48 hrs.
- The lethal dose in 50% of humans (LD<sub>50</sub>) for Botox® is 2500–3000 Units, or approximately 40 U/kg.

## Evaluation of the Neurotoxin Patient

### HPI

- What experience does the patient have with neurotoxin? Previous treatment, with whom, and a record of injection points with dosing.
- What expectations does he or she have with neurotoxin treatment? It will treat dynamic wrinkles only, not static or deep wrinkles.
- Medical history
  - Blood thinning medications or herbs as this can lead to excessive bruising.
  - Medications that interfere with neuromuscular transmission such as curare-type medications, aminoglycosides, muscle relaxants, or anticholinergics may potentiate Botox® effects.
  - There is a small risk of developing clinical antigenicity to albumin contained within each vial, and thus rendering the Botox® product ineffective. Directly inquire about any known allergy to albumin.

**Table 6.7** Neuromuscular conditions contraindicated for Botox treatment

Neuromuscular disorders
Myasthenia gravis
Amyotrophic lateral sclerosis (ALS)
Multiple sclerosis (MS)
Eaton-Lambert syndrome

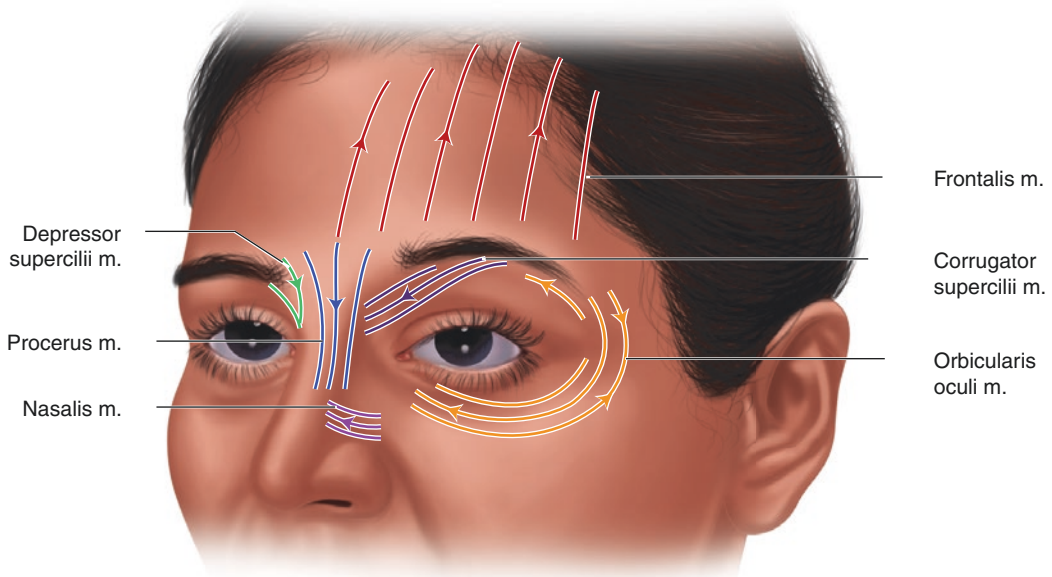
- A history of specific neuromuscular conditions is pertinent to ask the potential neurotoxin patient, as the product must be used with caution in these patients as it can exacerbate preexisting conditions (Table 6.7).
- Maxillofacial exam
  - Rule out skin infections.
  - Evaluate for heavy use of foundation to hide wrinkles and hairstyle.
  - Evaluate for thickened scars as this may be a relative contraindication for injection site due to lack of dissipation.
  - Ptosis should be evaluated as weakened frontalis muscle can lead to exaggerated eyelid droop.
  - It is also important to have photo documentation.

## Important Facial Musculature in Botulinum Toxin Treatment (Fig. 6.17)

- Muscles commonly treated and their clinical effects are presented in Table 6.8.

## Reconstitution of Botox® (Allergan)

- Store refrigerated (2–8 °C), can store up to 24 months, once opened manufacturer recommends use within 4 hours.
- Reconstitute with sterile, preservative-free saline. Stir, do not mix vigorously.
  - 1.25 mL saline per 50 U vial = 4 U/0.1 mL
  - 2.5 mL saline per 100 U vial = 4 U/0.1 mL



**Fig. 6.17** Facial muscles of expression and their action. Arrows indicate the direction of contraction. The mimetic lines are created perpendicular to the pull. (Reprinted with

Permission from Qaish C. Atlas of the Oral and Maxillofacial Surgery Clinics. Elsevier. 2016)

**Table 6.8** Mimetic muscles of the face

Muscle	Action	Clinical effect
Orbicularis oculi	Closure of eyelids and lateral eyebrow depression	Crow's feet
Corrugator supercilii	Depresses and adducts medial half of eyebrow	Creates vertical furrows above the nose "11's"
Procerus	Depresses medial eyebrow	Creates horizontal furrows above the nose; bunny lines
Depressor supercilii	Depresses head of eyebrow	Depresses head of eyebrow
Frontalis	Furrows forehead, elevates eyebrows	Creates forehead horizontal furrows
Orbicularis oris	Purses and puckers lips	Vertical lip lines
Depressors of mouth: depressor labii inferioris depressor anguli oris	Depresses lateral angle of mouth	Marionette lines
Platysma	Depresses lower lip and jaw	Platysmal banding

**Treatment of Botox®**

- Obtain informed consent for treatment.
- Determine your treatment plan prior to injecting, ask patient to activate muscles of planned injection to identify areas of maximum muscular contraction.
- Ensure makeup is removed, apply ice to the area for 20 sec, and pretreat skin with alcohol.
- Place patient in upright position.
- May enter skin and muscle either in an oblique or perpendicular injection.
- Inject directly into muscle except for crow's feet, which are injected subdermally.
- Peri-orbital injections: injection sites placed at least 5–10 mm from orbital rim and 5 mm medial and lateral to supraorbital nerve.
- Avoid forehead injections lateral to the lateral canthus to prevent inhibition of temporalis function.
- Inject at least 2 cm above eyebrow to prevent ptotic brow.
- Change the needle as needed to diminish pain from dulling; injection slowing can also diminish pain.

**Table 6.9** Suggested Botox injections

Forehead (frontalis)	2–4 U per injection site
Glabella (procerus and corrugator)	5–7 U per injection site
Crow's feet (lateral orbicularis)	3–5 U per injection site

- Apply pressure for 1–2 min.
- Instruct patients not to disturb the treated area for 4 hours to prevent spread to unwanted regions.

Suggested Botox® (Allergan) treatment dosages (Table 6.9)

### Post-op Instructions/Expectations

- Expect skin wheals posttreatment; usually resolve within 20–30 minutes.
- Ice the areas after treatment.
- Remain upright for 4 hours and do not apply makeup, scrub, or wash face for 4 hours (this prevents diffusion of the product).
- Exercise may be resumed the next day.
- A noticeable effect may be seen in 3–5 days with peak effect in 30 days.

### Complications

- *Post-op Bleeding* – apply pressure; do not rub as this may spread the toxin to undesired areas.
- *Hematoma* – usually self-resolving.
- *Chemodenervation of Unwanted Muscle* – involving the levator palpebrae superioris causing temporary blepharoptosis (this can be temporarily reversed by treatment with alpha-adrenergic agonist drops (e.g., apraclonidine 0.5%)); ptosis usually does not last as long as the intended treatment (on average lasts about 3 weeks). Chemodenervation of zygomaticus muscle can create lip asymmetry.
- *Inability to Close Eye* – paralysis of orbicularis oculi. Tape eye shut and placement of eye lubricant advised until paralysis resolves.

- *Diplopia* – undesired entry of botulinum around extraocular muscles may lead to a binocular diplopia. This should be a transient problem. Refer to an ophthalmologist for evaluation (possible prism lenses can be prescribed until effect has diminished).
- *Xerophthalmia* – botulinum affecting lacrimal gland will block acetylcholine release leading to diminished tear production. Repeated treatment may cause a chronic dry eye syndrome. Supportive care with lubricating eye drops; should reverse in 3–6 months.
- *Short Duration of Desired Effect* – some patients reported to develop antibodies if given injections within 1-month time period. Best to allow 3 months between injections and less than 400 units. May use botulinum toxin type B as alternative.

### Injectable Fillers

- The most commonly used fillers used in the USA today are composed of hyaluronic acid (HA). It is composed of a linear polysaccharide of repeating disaccharide units of glucuronic acid and N-acetylglucosamine.
- HA's mechanism of action is its attraction and its ability to bind over 1000× its weight in water, thus ballooning and increasing volume in atrophied areas.
- The effect of HA fillers can be seen immediately and can last on average for 6–12 months. Longevity due to process of isovolumetric degradation, the degraded filler products draw water as the filler degrades.
- HA fillers are FDA approved for injection into the mid-to-deep dermis (superficial) for correction of moderate to severe facial wrinkles and folds such as nasolabial folds and marionette lines.
- Juvederm Voluma XC® is approved for deep injection into the cheek to correct age-related volume loss.
- HA fillers can be reversed with the injection of hyaluronidase.

- Calcium hydroxyapatite fillers consists of hydroxyapatite spheres in a soluble gel medium, and because of this composition, it maintains a longer duration of action, averaging 9–18 months; they are useful for treatment of heavier folds (nasolabial), e.g., Radiesse®.
- Poly-L-lactic acid fillers initiate an inflammatory reaction that induces the production of collagen in the injected area; their effect is not immediate. Useful for larger zone contouring in the deep dermal or subcutaneous plane and are FDA approved for the treatment of HIV-associated lipoatrophy (Sculptra®, FDA approved in 2004).
- Glabellar region (may be used to augment neurotoxin treatment in this area).
- Pre-jowl area (hollowing of the area on either side of the chin at the jawline).

### Treatment Technique of Fillers

- Premark the intended injection sites with surgical pen.
- Choose an anesthetic (topical, local blocks, or none).
- Position the patient in upright position. May allow patients to use a mirror to evaluate effect and allow the patient to take part in the procedure.
- Inject into the subdermal plane in the predetermined marked areas.
- Always aspirate prior to injection to ensure appropriate placement and avoid intravascular deposition.
- Massage the injected areas manually and instruct the patient to do so.
- Apply ice to treatment areas.

### Evaluation of the Filler Patient

- Similar to the neurotoxin patient; see previous section.
- Non-animal stabilized hyaluronic acid products should not be used by people with previous allergies to hyaluronic acid products.

### Common Treatment Areas with Dermal Fillers

- Used to treat moderate to severe wrinkles or tissue deficiencies.
- Nasolabial folds (laugh lines, “parentheses,” lines between the nose and the corner of the mouth).
- Marionette lines (vertical lines that laterally circumscribe the chin).
- Tear troughs (shallow area underneath eyes; depression of the medial lower eyelid just lateral to the anterior lacrimal crest and limited in its inferior aspect by the inferior orbital rim).
- Nasojugal fold (a shallow groove in the skin that extends downward and lateral from the medial canthus).
- Lips.
- Chin (deepened nasolabial folds, deficient genial projection).
- Cheek volume (malar volume).

### Complications

- *Tyndall Effect* – superficial injection of HA, treatment is with 15–50 IU of hyaluronidase.
- *Tissue Necrosis due to Vascular Compromise* – apply 2% nitroglycerin paste immediately, then q5m × 2 hr. Prescribe ASA 325 mg sublingual immediately, then take 1 tab PO daily. Prednisone 24–40 mg for 3–5 days. If hyaluronic acid is used, reversal with hyaluronidase should also be used; should not be used in patients with a history of allergy to bee stings. Warm compresses to the area. Applying a ½ inch strip of 2% nitroglycerin paste to the affected area will also stimulate vasodilation. Consider Hyperbaric oxygen therapy (HBO) if massive necrosis. Keep wounds covered with topical antibiotics.
- *Volume Irregularity* – treat with massage to redistribute filler or add additional filler to repair under filled area. Consider hyaluronidase if hyaluronic acid used. Cross-linked

collagen can be softened with steroid or hyaluronidase injection.

- *Blindness* – highest risk in glabella region. Immediate injection of hyaluronidase into the treated area followed by immediate referral to an ophthalmologist.
- *Herpes Simplex Infection* – reactivation of infection, especially in lip area. Patient with HSV infection should be given prophylactic antiviral therapy (e.g., valacyclovir 500 mg BID) 2 days before treatment.
- *Foreign Body Granuloma* – a chronic inflammatory reaction. Treatment is with hyaluronidase or intralesional corticosteroids.

### Filler Pearls

- Observe the needle as it enters the skin; when the bevel can no longer be seen, you have reached the intradermal plane.
- There are two main injection techniques: serial puncture and linear threading.

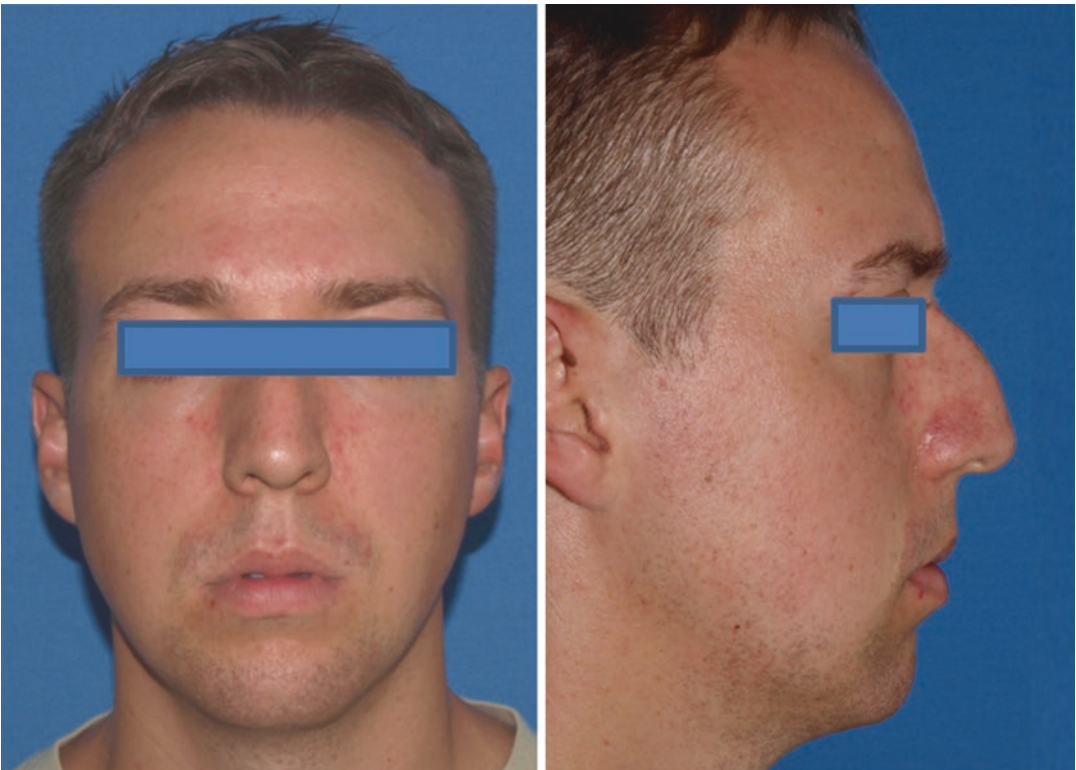
- *Serial puncture*: multiple small amounts of filler are sequentially injected into the subdermal plane immediately anterior to the previous injection (i.e., multiple entry points).
- *Linear threading*: continuous deposition of filler through one subcutaneous entry point.

### Rhinoplasty Case Example

A 27-year old male, ASA 1, no medications, No known drug allergies, presents for consultation with a chief complaint:

“My nose is too big (Fig. 6.18).”

- *Describe your preoperative evaluation.*
  - First complete a thorough medical history to include any history of nasal trauma, nasal functional deficiencies, history of prior surgery, seasonal allergies, chronic or acute sinus disease. Psychiatric history including screening for SIMON (single, immature, male, overly expectant, narcissistic).



**Fig. 6.18** Rhinoplasty case figures. (Images courtesy of Ryan Diepenbrock)

- Pre-operative photos to include frontal, right and left ¾, right and left profile, and submental vertex. An anterior rhinoscopy should be completed to evaluate the nasal septum and turbinates. A CT scan may be beneficial. Perform a Cottle's test.
- *Describe a Cottle's test.*
  - I would apply upward and lateral traction to the skin of the cheek and ask the patient to sniff. If the sensation of blockage improved, there is likely a nasal obstruction.
- *What comprises the internal nasal valve?*
  - It is made up of the septum medially, the caudal end of the upper lateral cartilage laterally, and the anterior end of the inferior turbinate inferolaterally.
- *What comprises the external nasal valve?*
- It comprises the lower lateral cartilage, nasal septum, and the nasal floor.
- *Describe what you see in the above photos.*
  - The patient has a smooth radix curve with the nasal tip coincident with the midsagittal plane. The alar base is of appropriate width for the patient's race. The nasal dorsum is wide with a slightly asymmetrical gull wing appearance. On the profile view, the patient has a good radix take-off and projection with a significant dorsal hump. The nasal tip is well projected and slightly under-rotated.
- *What procedures could you offer to address his chief complaint?*
- An open rhinoplasty to include dorsal hump reduction, lateral osteotomies, minor tip work, and a columellar strut.
- *After completing the hump reduction, what post-op condition are you most concerned about?*
- An open roof deformity.
- *Describe an open roof deformity.*
  - An open roof deformity is when the dorsum of the nose is over-reduced and the

nasal bone, and upper lateral cartilage is visible through the skin. If the internal nasal valve will not be too restricted, osteotomies can be made at the lateral aspect of the nasal bones. The mobile nasal bones then are mobilized medially to close the open-roof. If the internal nasal valve will be restricted, spreader grafts should be placed prior. They should be sutured to the dorsal septum to lateralize the upper lateral cartilages.

- *What is external nasal valve collapse? And what is normally done to fix this issue?*
- It is the collapse of the ring of cartilage around the nostril. This is usually corrected with alar batten grafts.
- *What do you see in (Fig. 6.19)?*
  - *Saddle nose deformity*
- *What is a saddle nose deformity?*



**Fig. 6.19** Rhinoplasty complication. (Reprinted with permission from Brenner K and Calvert J. *Masters Techniques in Rhinoplasty*. Elsevier Books; 2011)



- A loss of nasal dorsal height due to deficiency or collapse of the bony and/or cartilaginous nasal dorsum.
- *How is a saddle nose deformity treated?*
- With dorsal onlay graft.
- *What kind of graft do you use?*
  - I would harvest cartilage from the septum (other sources include rib, ear, and calvarial bone, and synthetics like Medpor® or Gortex® are reserved for cases where there is insufficient autogenous source).

### Rhytidectomy Case Example

A 68-year-old female presents to your office with a chief complaint of “I don’t like the way I look anymore” (Fig. 6.20).

- *How would you proceed?*
- Try to narrow down the chief complaint to specific problems. Ask the patient what they

don’t like when they look in a close-up mirror or photo, specifically what bothers them.

- *She states “her tired eyes, her jowls, and her neck.” What else would you like to know?*
- Review medical conditions, medications, and allergies. Assess for smoking history and uncontrolled diabetes.
- *She has a past history of smoking. She is on a statin for high cholesterol and takes an H<sub>2</sub> block for acid reflux. What do you do next?*
- Perform a full facial aesthetic evaluation. Evaluate the amount and degree of skin redundancy. Ask the patient if she has previously had facial cosmetic surgery. Take standardized pictures.
- *Describe what you see in the pictures (Fig. 6.20)?*
- This is an older Caucasian female.
- She is a Fitzgerald class III and Glogau scale III. Her forehead has deep static rhytids. Her eyebrows appear in good position and form.



**Fig. 6.20** Rhytidectomy case figures. (Images courtesy of Anthony Alessi)

She has dermatochalasis of her upper lids. Crow's feet present bilaterally. She has lower eyelid festooning. She has deepening of the nasojugal groove (tear drop deformity). She has descent of the malar fat pads contributing to jowling. She has deepened nasolabial folds. Her nasal dorsum appears midline. Her nasal tip has good definition. Her alar bases are coincident with inner canthi. Her columellar show is appropriate. She has perioral rhytids, marionette lines, and platysmal banding. She lacks definition of the inferior border of the mandible.

- *What procedures do you perform?*
- I would recommend a rhytidectomy with a cervicoplasty procedure to treat her midface, lower face, and neck. To address her eyes, I would recommend upper and lower blepharoplasties.
- *How would you perform a rhytidectomy?*
- I would begin by marking the patient in the preoperative setting to include the planned incision design for the face-lift.
- After the patient is prepped and draped, I would anesthetize the planned incisions with 2% lidocaine with 1:100,000 epinephrine. I would then administer tumescent anesthesia for the planned areas of dissection
- Next, the temporal, endaural incisions would be made with a #15 blade through the skin to the lipocutaneous layer. After elevation of the skin flap, the SMAS is identified (*managed according to the surgeon's preference. If you are not an experienced facelift surgeon, it is recommended that you simply perform a SMAS plication with 3-0 polypropylene sutures or other comparable permanent sutures.*) The SMAS should be pulled in a posterior/superior vector.
- Next, hemostasis is obtained, excess skin is trimmed, and key sutures are placed. The deep sutures are placed to suspend the deep tissue to alleviate tension on the skin, especially below the ear. The skin is then closed.
- A drain may be placed and the head is wrapped.
- The patient is followed up the next day to evaluate for hematomas.
- Sutures are removed at 6–7 days.
- *You have a follow-up on a rhytidectomy on post-op day one. You remove all of the facelift/necklift dressings and you see this. What do you see (Fig. 6.21)?*
- Hematoma
- *What do you do?*
- Perform needle decompression with an 18-G needle and syringe. Once the hematoma is evacuated, apply a pressure dressing.
- *When do you see her back?*
- The next day.
- *The next day you find that the hematoma is back. What do you do now?*



**Fig. 6.21** Facelift complication. (Reprinted with permission from. Clevlen R. Avoiding Patient Dissatisfaction and Complications in Facelift Surgery. Facial Plastic Clinics of North America. Vol 17 issue 4; 2009)

- Take the patient back to surgery and remove the blood clot. Identify the bleeder and coagulate it.
- *On postoperative day #5, the patient returns for suture removal. You notice on the right side that the skin below the sideburn and above the anterior superior helix looks very dark. The area is the size of a quarter. What do you think is going on and what do you do?*
- The edge of the skin flap is undergoing necrosis due to a lack of blood supply. Apply an antibiotic ointment TID until the area granulates in. You may apply a vasodilator medication such as nitro-paste. You may also consider HBO therapy. After complete healing, assess if further treatment is necessary.

### Blepharoplasty Case Example

A 64-year-old female presents with a chief complaint of “My eyelids look heavy and I can’t place eye-liner anymore” (Fig. 6.22).

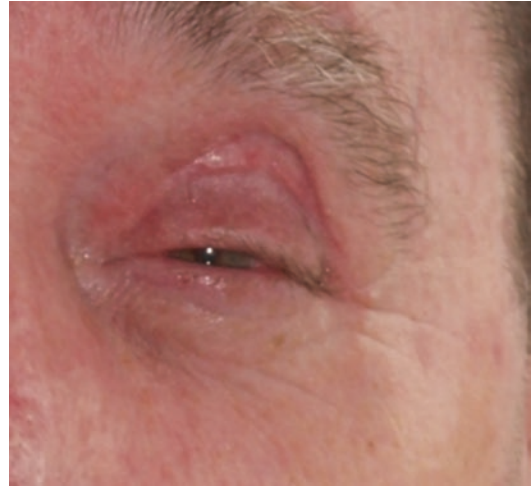
- *How would you evaluate this patient?*
- Review the patient’s medical conditions, especially by questioning about any endocrine disease history such as diabetes or thyroid disease. I would ask if there is any prior history of eyelid or globe surgery or history of periorbital trauma. Question if there are recent vision changes or a history of xerophthalmia.
- *What would be included in your physical exam?*
- Position of the lid crease and any asymmetries, brow position, upper lid ptosis, scleral show of the inferior limbus, integrity of the skin, and lower lid supporting structures. Look for pseudo-herniation of the fat in the upper and lower lids as well as orbicularis oculi hypertrophy.
- Perform an eye exam in the standard fashion evaluating for pupil reactivity, size, equality, shape, and accommodation. Evaluate the visual fields and assess visual acuity. (Some may endorse a referral to an ophthalmologist for “clearance” and Schirmer’s test.)
- *How would you assess the integrity of the lower and upper lids?*
- Distraction test, pull test, snap test, pinch test, and checking for Bell’s phenomenon.
- *What photos would you take?*
- Frontal, right and left  $\frac{3}{4}$  view, right and left profile view, periorbital views with eyes open, eyes closed, upward gaze, and inferior gaze.
- *Where is the normal upper lid crease position for a female?*
- 8–10 mm from edge of the eyelid.
- *What is MRD 1?*
- Margin reflex distance. The measurement from the light reflex of the pupil to the lower margin of the eyelid (ciliary line). Normal is 4–5 mm. If less than 3 mm, you must evaluate for lid ptosis.
- *The patient is a good candidate for upper eyelid blepharoplasty. Describe the procedure.*
- The patient consents and is medically cleared for surgery and anesthesia. The procedure may be accomplished with local anesthetic alone, with sedation, or under general anesthesia. The patient is marked in the pre-op region. The markings include the upper lid tarsal crease and the superior portion of the skin to be excised. The marking should leave at a minimum of 20 mm of residual skin from the



**Fig. 6.22** Blepharoplasty case example. (Image courtesy of Dr. Ryan Diepenbrock)

ciliary line to the transition of the brow and lid skin.

- The region is anesthetized with local anesthetic with epinephrine.
- Next the skin is excised, followed by muscle.
- With gentle pressure on the globe, prolapsed fat may be contoured or removed via opening the septum and removing fat.
- After judicious hemostasis, the incision is closed with suturing of skin only with 6-0 polypropylene.
- *After the procedure, the patient is found to have 2 mm lagophthalmos in the PACU. Are you concerned?*
- At this point no, instruct the patient to clean the incision and keep it moist. Apply ice for the first 24 hours followed by warm moist heat after 24 hours.
- *The patient returns at 6 days for suture removal and now has 3 mm of lagophthalmos and cannot close with lid without significant effort. What will you do?*
- Remove the sutures. Instruct the patient to begin gentle massage and stretching of the upper lid. Prescribe moisturizing eye drops and follow-up in 1 week.
- *After 2 months of following the patient, there is no improvement in lagophthalmos (Fig. 6.23). The patient now complains of xerophthalmia and is quite frustrated with the inability to close the eyelids completely. What is your next course of action?*
- Consider interpositional full-thickness skin grafts or placement of gold or platinum weights. Depending on the level of comfort in managing this complication, you may consider referral to oculoplastic surgeon.



**Fig. 6.23** 3 mm of lagophthalmos 2 months status post upper lid blepharoplasties secondary to untreated wound dehiscence along the incision line. (Image courtesy of Dr. Ryan Diepenbrock)



**Fig. 6.24** Browlift case example. (Images courtesy of Dr. Ryan Diepenbrock)

*tory, no history of trauma, takes no medications or supplements, and has no allergies.*

- *How would you determine if a blepharoplasty or a brow lift is indicated?*
- With the eyes closed and frontalis relaxed, a hand is used to stabilize the frontalis with the eyebrow in appropriate position. If dermatochalasis is no longer apparent, a brow lift without concurrent blepharoplasty is recommended.

## Browlift Case Example

*A 48-year-old presents for aesthetic consultation (Fig. 6.24). Her principal complaint is puffiness of the right upper eyelid and drooping of her eyebrows. She has no past medical or surgical his-*

- Which are your options for surgical correction of brow ptosis?
- Direct brow lift, pretrichial brow lift, trichophytic brow lift, coronal brow lift, or endoscopic brow lift.
- What are some disadvantages of the direct brow lifting technique in this patient?
- Medial brow ptosis cannot be corrected by direct brow lifting alone, thin eyebrows limit the ability to camouflage the incision.
- What are the major disadvantages of coronal forehead lifting?
- Alopecia and forehead lengthening.
- To what depth is the dissection performed during trichophytic brow lifts?
- Centrally, the dissection can be performed in the subperiosteal, pre-periosteal, or subcutaneous planes. Temporally, the dissection is performed to the level of deep temporal fascia.
- What is the course of temporal branch of the facial nerve?
- The facial nerve courses superiorly and medially from 0.5 cm below the tragus to 1.5 cm above the lateral eyebrow in the temporoparietal fascia just deep to the SMAS.
- What other neurovascular bundles must be considered? Where are they located?
- The supratrochlear and supraorbital neurovascular bundles are located 1.7 cm and 2.7 cm from a midline mark and courses along the anterior aspect of the frontalis.
- After undergoing a forehead lift, the patient has mild lagophthalmos (1.5 mm) the first postoperative day. How would you manage this? What concurrent procedure increases the risk of postoperative lagophthalmos?
- Topical ophthalmic lubricating drops and lubricating ointment at night is sufficient for mild dryness and lagophthalmos. Concurrent blepharoplasty or ptosis repair increases postoperative lagophthalmos.
- While discussing the risks, benefits, and alternatives of browlifting, the patient asks if both sides will look exactly the same. How would you address this?
- Postoperative asymmetry is a risk of brow/forehead lifting, especially if preoperative asymmetry exists. This should be discussed with the patient and documented before informed consent is obtained. The patient's preoperative exam and photographs should be reviewed with the patient to demonstrate the existing asymmetries.
- After undergoing a trichophytic forehead lift, the patient develops severe forehead pain, swelling, and profuse bleeding from the incisions the night of surgery. What is the most likely diagnosis and appropriate course of action?
- Hematoma formation and hemorrhage from the supraorbital or supratrochlear artery. Opening the surgical incision and obtaining hemostasis are indicated.
- Your patient states that she is very difficult to "numb" and requests full-strength local anesthetic for the entire forehead instead of tumescent dilute anesthesia. What is the major risk of this and symptoms?
- Lidocaine toxicity. Major symptoms are myocardial depression, peripheral vasodilation, bradycardia, hypotension, drowsiness, tremors, paresthesias, and convulsions.
- Why is the forehead length important in evaluation for endoscopic forehead lifting?
- An endoscopic forehead lift raises the forehead. Patients with long foreheads are not good candidates for this procedure.
- What is the average thickness of the bony skull in the parasagittal region?
- 7.5 mm (varies 4–11 mm). This is a safe region to place a bone screw, as it is free of venous lakes. The midline region has a thickness of 7 mm but has multiple midline lakes.

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