Periorbital Surgery
Forehead, Brow, and Midface

John J. Chi, MD

KEYWORDS

• Brow lift • Upper facial rejuvenation • Ptosis • Midfacial rejuvenation • Midface lift • Aging face

KEY POINTS

- The periorbital region plays an important role in human social interactions; it effectively communicates not only emotion but also frequently the human condition.
- The evaluation and treatment of the aging face in the periorbital region necessitate careful consideration of its function and anatomy.
- There are many changes to the skin, bone, and soft tissues of the face that are associated with aging: bony atrophy, lipoatrophy, and descent of facial soft tissues.
- Many surgical and nonsurgical techniques exist to treat the aging periorbital region; however, careful consideration of the patient's complaints and existing anatomy is critical to achieving a safe and esthetically pleasing outcome.

INTRODUCTION

The evaluation and treatment of the aging in the periorbital region necessitate careful consideration of its function and anatomy. The periorbital region plays an important role in human social interactions. It effectively communicates not only emotion but also frequently the human condition. As the periorbital region is one of the first parts of the face to show signs of aging, a frequent complaint is that the patient appears tired, sad, or angry.[1]

The periorbital region is composed of the upper and lower eyelids and eyebrow. This region is bounded by the glabella medially, the forehead superiorly, the temple laterally, and the midface inferiorly. Because of the complex interplay between these facial subunits, safe and effective periorbital surgery requires an understanding of the structural changes of this region with aging and a mastery of the anatomy of the orbit, midface, forehead, and brow. The eyebrow and upper eyelid are so intimately intertwined in their function and esthetics that they are considered 2 parts of a continuum: requiring careful consideration of one when treating the other.[2] The lower eyelid and midface share a similar relationship albeit to a lesser degree.[3–5] This article details the principles and techniques for treatment of the periorbital region with respect to the upper face and midface; the discussion of the latter will be limited to the aspects that directly impact the periorbital region.

ESTHETICS AND AGING

There are many changes to the skin, bone, and soft tissues of the face that are associated with aging[6,7] (**Box 1**). Facial aging is due to bony atrophy, lipoatrophy, and descent of facial soft tissues. The esthetic ideal for the forehead and eyebrow is a subjective and controversial topic. Because of gender, ethnic, and age-related variations, there are many published statements of the esthetic ideal.[2,8,9] Westmore's[10] ideal female brow position, one of the most popular ideal female brow positions, locates the peak at the lateral limbus.

Disclosure Statement: The author has no conflicts of interest or financial disclosures to disclose.
Division of Facial Plastic & Reconstructive Surgery, Washington University Facial Plastic Surgery Center, Washington University in St. Louis–School of Medicine, 1020 North Mason Road, Medical Building 3, Suite 205, St Louis, MO 63141, USA
E-mail address: JChi@wustl.edu

Facial Plast Surg Clin N Am 24 (2016) 107–117
http://dx.doi.org/10.1016/j.fsc.2015.12.003
1064-7406/16/$ – see front matter

Box 1
Aging in the face

Bony remodeling/atrophy
Volume loss
Brow ptosis
Upper eyelid ptosis
Dermatochalasis
Lacrimal gland prolapse
Fat prolapse
Fat atrophy
Temporal hollowing
Periorbital hollowing
Rhytids
Skin laxity/thinning

However, current trends place the brow's peak at a more lateral position closer to the lateral canthus.[9] Given the variance in opinions, an honest dialogue between the patient and surgeon is imperative in establishing a plan of treatment that is both acceptable and achievable.

In youth, there is a smooth transition from the lower eyelid to the cheek. Ideally, the midface convexity is uniform and relatively free of concavities. With aging, there is a loss of continuity due to contour irregularities and volume differences. The bony orbital rim becomes more pronounced due to inferior displacement of midfacial fat caused by ptosis and atrophy combined with the increased prominence of orbital fat and bone superiorly. In the midface, the position of the malar fat pad is the primary distinction between the youthful face and the aging face. In the youthful face, the malar fat pad should be positioned overlying the zygomatic arch and the orbital component of the orbicularis oculi muscle. Inferiorly, the malar fat pad should be at, but not extending beyond, the nasolabial fold.[11]

PREOPERATIVE ASSESSMENT

Preoperative assessment and planning are critical to achieving safe and effective results. Prior history of facial nerve injury or weakness, neurotoxin injection, facial surgery, or trauma should be elicited. The choice of the rejuvenation technique depends on the patient's presenting complaints and anatomy, including scalp hair, eyebrow hair, hairline position and shape, forehead length, forehead shape, hairstyle, quality of skin, jowls, depth of nasolabial folds, malar contour, and degree of lift needed. There are additional considerations that should be made when assessing the forehead, brow, and upper eyelids (**Boxes 2** and **3**). The principle of Hering's law, which describes the symmetric motor innervation of bilateral levator and frontalis muscles, should also be taken into account, especially when encountering unilateral ptosis or asymmetry.[2] Depending on the patient's needs, a combination of treatment approaches to the brow, forehead, and midface may be implemented.

In addition to recognizing the esthetic and surgical issues, a detailed history of pre-existing ocular conditions, such as prior ophthalmologic surgery, chronic lid infections, ptosis, or refractive errors, is an important part of the initial assessment. A complete medical history should be elicited to discover any comorbidities that may have ocular manifestations. The physical examination of the patient may also include visual acuity, extraocular muscle assessment, visual fields, lacrimal secretion, corneal sensation, pupillary assessment, lower eyelid position, margin gap, and the presence or absence of a Bell phenomenon. Assessment of the marginal reflex distances (MRD1, MRD2) may be useful in assessing for ptosis and ectropion. MRD1 is the distance from the pupillary light reflex to the upper eyelid. MRD2 is the distance from the pupillary light reflex to the lower eyelid. The margin gap is the distance between the margin of the upper and lower eyelid with involuntary blink and maximal effort. The palpebral fissure height is the distance between the upper and lower eyelid in primary gaze.

FOREHEAD AND BROW

Anatomy

The eyebrow extends from the glabella medially to the temporal region laterally. The skin and soft

Box 2
Considerations when assessing the upper third of the face

Assessing the upper third of the face
Brow ptosis
Brow shape
Upper eyelid ptosis
Dermatochalasis
Rhytids
Hairline (shape, position)
Forehead length
Asymmetry (brow, eyelid, hairline, rhytids)
Skin quality