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REVIEW ARTICLE

Aesthetic analysis of the ideal eyebrow shape and position

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Abstract The aesthetic importance of the eyebrow has been highlighted for centuries. In this paper, we investigated ideal eyebrow. Eyebrows and eyelids, varies among different races, ages and genders. It is considered to be of primary importance in facial expression and beauty. We present one form of the ideal eyebrow aesthetic and discuss methods of optimising surgical results. For the modern acceptable concept of the ideal brow, the medial brow should begin on the same vertical plane as the lateral extent of the ala and the inner canthus and end laterally at an oblique line drawn from the most lateral point of the ala through the lateral canthus. The medial and lateral ends of the brow lie approximately at the same horizontal level. The apex lies on a vertical line directly above the lateral limbus. Individual perceptions and expectations also differ from person to person. The brow should over lie the orbital rim in males and be several millimetres above the rim in female. Male tend to have a heavier, thicker brow with a little arch present. There are some pitfalls in brow aesthetics. Overelevation creates an unnatural, surprised and unintelligent look which is the most common surgical mistake in brow lifting. Medial placement of the brow peak would create an undesired 'surprised' appearance. Moreover, a low medial brow with a high lateral peak induces an angry look. Overresection of the medial brow depressors may lead to widening and elevation of the medial brow, which creates an insensitive look and can also lead to glabellar contour defects. It is impossible to define an ideal eyebrow that is suitable for every face. However, one must consider previously described criteria and other periorbital structures when performing a brow surgery.

Keywords Eye brow · Facial expression · Beauty

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Introduction

Facial aesthetics have been described and evaluated since the Renaissance by artists and scholars, including Leonardo da Vinci, Bergmuller, and Elsholts [1]. In addition to these neoclassical canons, in the late nineteenth century the science of anthropometry was applied in clinical practice [2]. Knowledge of the ideal facial aesthetic proportions is vital to achieve ideal outcomes and avoid complications.

In particular, the upper third of the face, including the eyebrows and eyelids, varies among races, ages and genders. In facial expression and beauty, the upper third of the face is considered to be of primary importance [3]. The brow is known as the master line of the face, used as a reference for all other angles and contours of the face [4].

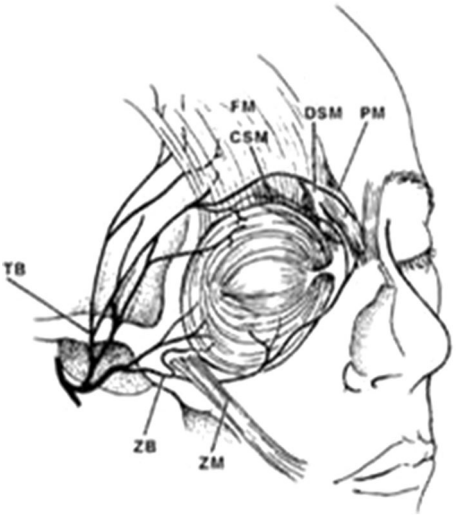

Fig. 1 Periorbital motor nerves and the muscles they activate [7, 8]. *TB* and *ZB* temporal and zygomatic branches of the facial nerve, *FM* frontalis muscle, *CSM* corrugator superficialii muscle, *DSM* depressor supercilii muscle, *PM* procerus muscle, *ZM* zygomaticus major muscle

The aesthetic importance of the eyebrow has been highlighted for centuries. However, there is great variety in the shape and position of the eyebrows; therefore, it is difficult to define 'ideal' criteria for all faces.

In this paper, we review the literature, present one form of the ideal eyebrow aesthetic and discuss how to optimise the surgical results.

Anatomy

The supraorbital ridges or arches form the upper boundary of the orbit and demarcate the midface from the forehead. The medial one-third of the rim tends to blend into the glabella. The lateral one-third of the rim is well defined and forms an overhanging ledge [5].

The frontalis muscles are the only muscles that can elevate the brow. These muscles are paired extensions of the galea aponeurotica and insert into the supraorbital dermis by interdigitating with the orbicularis oculi muscle. The galea is continuous with the superficial temporal fascia laterally and the superficial muscular aponeurotic system inferiorly. Contraction of these muscles leads to transverse to forehead wrinkling [6, 7].

The depressors of the brow are the procerus, corrugator supercilii, depressor supercilii, and orbicularis oculi muscles. Of these muscles, the corrugator plays the dominant role. The procerus muscles originate from the upper lateral cartilages and nasal bones to insert into the glabellar skin. Contraction produces transverse wrinkling at the radix of the nose [6, 7].

The corrugator muscle has a transverse and an oblique head. The procerus, depressor supercilii, and the oblique head of the corrugator muscle originate from the superior-medial orbital rim and insert under the medial eyebrow dermis. The transverse head originates from the medial-superior orbital rim and inserts into the dermis of middle third of the eyebrow. This transverse head moves the eyebrow medially [6, 7].

The orbital portion of the orbicularis oculi muscles interdigitates with the corrugators medially and continues around the lateral cantus into the zygomatic area. Contraction results in downward displacement of the eyebrow (especially the lateral portion) [6, 7].

The sensory nerves of the forehead are the supraorbital and supratrochlear nerves. The motor nerve is the temporal branch of the facial nerve. This nerve supplies the frontalis muscle, the superior orbicularis muscle, the transverse head of the corrugator supercilii muscle, and the superior end of the procerus muscle. The zygomatic branch of the facial nerve supplies the inferior orbicularis oculi muscle, the inferior end of the procerus muscle, the depressor supercilii muscle, the oblique head of the corrugator supercilii, and the medial head of the orbicularis oculi muscle (Fig. 1) [7, 8].

Pathophysiology

Prolonged hyperactivity of the upper facial musculature produces three deformities in the forehead–brow complex; transverse forehead wrinkling (frontalis muscles), brow ptosis (corrugator and orbicularis muscles), and glabellar wrinkling (corrugator, orbicularis, and procerus muscles) [9].

The three forces that act on brow ptosis are: (1) the frontalis muscle resting tone, which suspends the eyebrow medial to the temporal fusion line of the skull; (2) gravity, which causes the soft-tissue mass push the eyebrow segment downward; and (3) corrugator supercilii muscle hyperactivity in conjunction with orbicularis oculi muscle, which can antagonise frontalis muscle activity and facilitate descent of the eyebrow [9, 10].

The lateral segment of the eyebrow develops ptosis earlier in life than the medial segment. According to Knize [11], the lateral segment has less support than the medial brow from deeper anatomical structures, causing this lateral segment ptosis. On the other hand, Lemke [12] suggests that the anatomical limits of the frontal muscle fibres do not extend as far laterally as the lateral part of the brow. Thus frontalis contraction cannot prevent lateral brow ptosis.

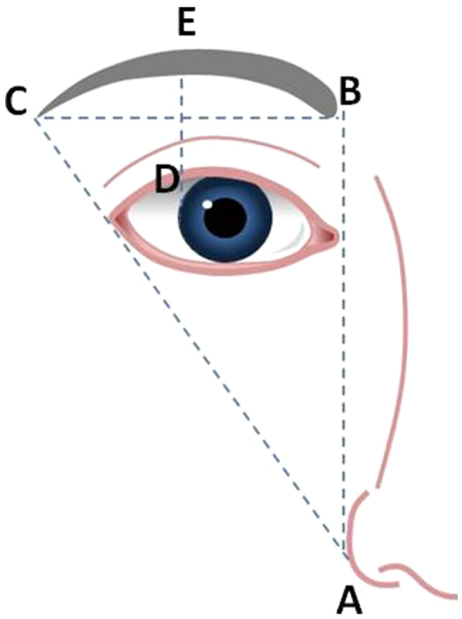

Fig. 2 Ideal brow shape (from Westmore) [14]

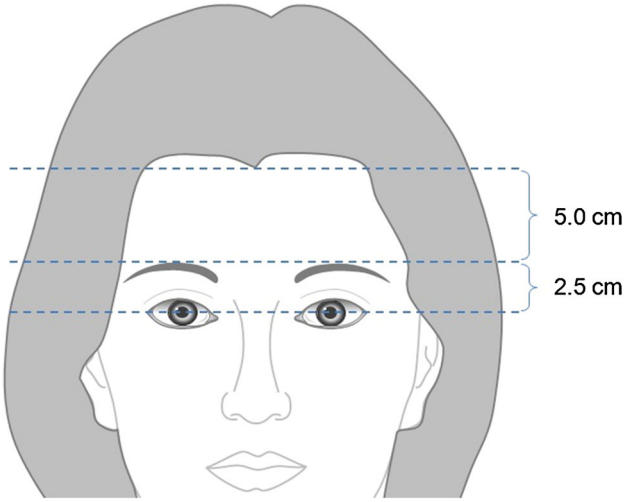

Fig. 3 The distance from midpupil to the top of the brow should be at least 2.5 cm. The forehead height averages 5 cm in female and 6 cm in male [20]

Aesthetic review

Eyebrow aesthetics are influenced by various factors, including age, sex, culture, ethnicity, and current fashion trends. Further, the surrounding periorbital features also affect eyebrow appearance.

Since the eighteenth century, much research has aimed to define useful criteria for eyebrow aesthetics. According to the art historian Johann Winckelmann, the Greek ideal of a beautiful brow forms a delicate arch just over the brow bone and grows over the nose [13]. Westmore [14] described the modern acceptable concept of the ideal brow.

According to Westmore (Fig. 2) [14]:

1. The medial brow should begin on the same vertical plane as the lateral extent of the ala and the inner canthus (A–B).
2. The medial brow ends laterally (C) at an oblique line drawn from the most lateral point of the ala (A) through the lateral canthus.
3. The medial and lateral ends of the brow (B, C) lie approximately at the same horizontal level.
4. The apex lies on a vertical line (D–E) directly above the lateral limbus.

Ellenbogen [15] largely supported Westmore's criteria; however, he reported that the caudal hairs of the medial brow must be 1 cm above the supraorbital rim. On the other hand, Whitaker et al. [16] stated that the medial end of the brow should be below the supraorbital ridge. Additionally, they reported that the apex should be at the juncture of the middle and lateral thirds.

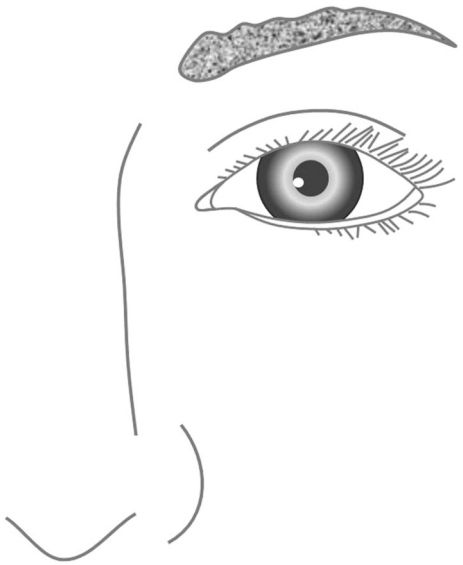

Fig. 4 Attractive eye (from Gunter) [21]

Cook et al. [17] relieved the brow positions of numerous attractive females. In addition to Westmore, they thought that the apex should be further lateral to the lateral cantus. They felt that Westmore's model for the apex would result in a 'surprised' look.

Connell [18], Matarasso and Terino [19], and McKinney [20] contributed various guidelines for ideal brow position. Connell [18] described the distance between the upper eyelid crease and the lower edge of the eyebrow as 15 mm. In contrast, Matarasso and Terino [19] described this distance as 1.6 cm. Additionally, they stated that the distance

between the eyebrow and midpupil should be 2.5 cm, that between the eyebrow and the supraorbital rim should be 1 cm, and from the eyebrow to hairline should be 5–6 cm. McKinney [20] reported that the distance from the midpupil to the upper edge of the eyebrow is 2.5 cm and the distance from the upper edge of the eyebrow to the hairline 5 cm, on average (Fig. 3) [20].

Gunter [21], found that it is difficult to evaluate ideal brow without considering other periorbital features. They formulated the following criteria for attractive eyes (Fig. 4):

1. The intercanthal axis should be tilted slightly upward from medial to lateral.
2. The upper lid should cover the iris approximately 1–2 mm.
3. The medial portion of the upper lid margin should be in a more vertical plane than the lateral upper lid margin.
4. The upper lid crease should parallel the lash line and divide the upper lid into an upper two-thirds and a lower one-third (approximately, but never more than, a 1:1 ratio).
5. The medial extension of the supratarsal upper skin fold should not exceed the inner extent of the medial canthus.
6. The lateral extension of the supratarsal upper skin fold should not extend beyond the lateral orbital rim.
7. There should be minimal, if any, scleral show between the lower lid and iris.
8. The lower lid margin should bow gently from medial to lateral, with the lowest point between the pupil and the lateral limbus.

Angres [22] classified intercanthal distance either as ‘well-spaced’ (normal intercanthal distance), ‘wide-set’ (increased intercanthal distance), or ‘close-set’ (decreased intercanthal distance). He agreed with Westmore on the medial brow position. However, he stated that the brow should begin medial to the medial canthus for an increased intercanthal distance, and likewise, the brow should begin lateral to the medial canthus for a decreased intercanthal distance [22].

Baker [23] suggested that the ideal brow varies among facial shapes. The Westmore eyebrow is not ideally suited for long or square faces. In long faces, a flatter brow may be more suitable. In contrast, a lateral curvature may help to soften the angles of a square face.

The ideal brow shape and position varies between male and female. The brow should over lie the orbital rim in male and be several millimetres above the rim in female. Male tend to have a heavier, thicker brow, with little arch present. In female, the eyebrow tends to have a pleasant arch peaking in the lateral third of the eyebrow and furthermore, a club-shaped medial portion. In male, the lateral brow is more prominent [24, 25].

Browlift techniques

The major goals of this surgery are the restoration of brow position, shape, and symmetry. For a soft, aesthetically pleasing result, it is important to avoid overcorrection of the brow position and excessive elevation of the medial brow. Numerous browlift techniques have been defined, including the coronal lift, the endoscopic brow lift, the pretrichial lift, the midforehead lift, the direct browlift and the internal browlift [26].

Coronal brow lift

This technique utilises either a pre-trichial or post-trichial incision, and has the advantage of allowing correction of glabellar frown lines and forehead rhytids while lifting the brow. This technique is not appropriate for those patients with a high hairline or those with thinning hair. There are numerous potential complications following this procedure including sensory and motor nerve dysfunction, skin necrosis, permanent overcorrection, alopecia, abnormal soft tissue contour, and eyebrow and eyelid asymmetry [26].

Endoscopic techniques

Endoscopic methods of brow lifting have comparable success rates to open coronal lifting, but a significantly lower incidence of complications and a faster rehabilitation time [26]. Withey et al. [27] reported the complications of endoscopic techniques as postoperative numbness, itching, hair loss, tissue swelling and asymmetry.

The pretrichial lift

Pretrichial denotes an incision in front of the hairline. It is advisable to make the bevelled incision about 2 mm behind the hairline to induce hair growth through the scar and improve cosmesis [28].

Mid-forehead lift

The mid-forehead lift utilises a forehead crease as the foundation of the incisions. This technique can be used to good effect especially in men who have deeper forehead creases and receding hairlines. The potential disadvantages are the same as for a direct lift, in terms of scarring and altered sensation [26].

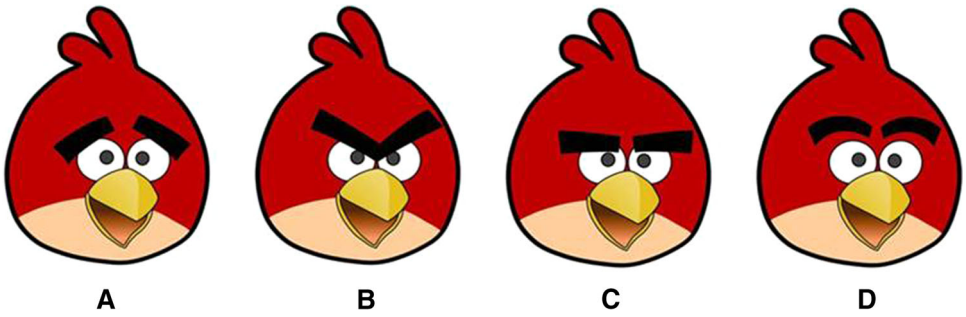

Fig. 5 Eyebrows of Angry Birds illustrate eyebrow placement, denoting **a** sadness, **b** anger, **c** tiredness, or **d** smile [29]

The direct brow lift

The direct brow lift is a simple procedure which allows the surgeon good control over the amount of tissue excised, and therefore, the degree of lift achieved, as well as the postoperative contour of the brow. Nevertheless, the resulting scar may result in poor cosmesis, and damage to the supraorbital nerve may lead to paraesthesiae or numbness over the forehead region [26].

Internal brow lift (browpexy) or trans-blepharoplasty browpexy

This technique achieves brow elevation or fixation through a standard blepharoplasty incision. The lateral eyelid is debulked by excising the descended lateral galeal and preseptal fat pad, and the brow is anchored with mattress sutures to the periosteum above the supraorbital rim. The procerus and corrugator muscles may be approached through the same incision if required. Advantages are simplicity and placement of the wound within a naturally occurring skin crease. Disadvantages include the limited amount of brow lift which can be achieved, and damage to the supraorbital neurovascular bundle if the medial portion of the brow is approached [26].

Pitfalls

The upper third of the face, especially the eyebrows, have a major role in facial appearance and expression. For example, in the mobile phone game, Angry Birds [29], eyebrows that tend laterally (Fig. 5a) transmit sadness, those that tend medially (Fig. 5b) transmit anger, low eyebrows transmit fatigue (Fig. 5c), and properly aligned eyebrows (Fig. 5d) transmit an alert, rested countenance that allows the mouth to transmit the smile.

Overelevation creates an unnatural, surprised and unintelligent look. This is the most common surgical mistake in brow lifting. In male patients, the eyebrow sits lower than in female and has a flatter contour; therefore, overlifting may feminise the patient's appearance [30]. Additionally, medial placement of the brow peak would create an undesired 'surprised' appearance. Moreover, a low medial brow with a high lateral peak induces an angry look [31]. Slight asymmetries between the eyebrows are natural and common. Nevertheless, greater asymmetries in height cause a curious appearance [32].

Overresection of the medial brow depressors may lead to widening and elevation of the medial brow, which creates an insensitive look and can also lead to glabellar contour defects. Caution must be used when elevating the brow in patients with deep-set eyes. Brow elevation can unmask the hollowing above the globe and results in prominence of the supraorbital rim, which creates an emaciated look [33].

The distance from the superior edge of the eyebrow to the hairline is usually 5–6 cm. If this gap is larger, caution must be used during brow lift procedures that may further raise the hairline [20].

Troilius [34] re-evaluated patients who underwent endoscopic subperiosteal brow-lifting surgery. He found that the great majority of patients had an average of 2.5 mm higher eyebrows 5 years postoperatively compared to 1 year after surgery. Graf [35] also determined a progressive spontaneous increase in eyebrow height. Additionally, this elevation started in the medial portion of the brows. They hypothesized that medial elevation depended on unopposed action of the frontalis muscle. Two years after surgery, lateral points were also elevated. They considered that this situation was due to the release of the periosteum, temporal, and periorbital adhesions, leaving the frontal muscle to pull up the brows. While brow lifting, one must take into account this spontaneous elevation after endoscopic surgery.

Conclusion

Brow shape and position vary among ages, races and genders. Individual perceptions and expectations also differ from person to person. It is impossible to define an ideal

eyebrow that is suitable for every face. However, one must consider previously described criteria and other periorbital structures when performing a brow surgery.

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Conflict of interest The authors declare that there is no conflict of interest.

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