Eyebrow Position Recognition and Correction in Reconstructive and Cosmetic Surgery

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Objectives: To improve (1) recognition of eyebrow ptosis, asymmetry, or deformity and (2) selection of the appropriate surgical technique based on the patient’s underlying etiology.

Design: Nonrandomized, retrospective study of patients undergoing surgical correction of eyebrow asymmetry. Forty consecutive patients were identified as having asymmetric eyebrow ptosis or deformity. Varying etiologies included those that were congenital, posttraumatic, age-related, iatrogenic, or idiopathic, with or without facial nerve paralysis. Patients underwent a variety of surgical approaches for correction of the eyebrow malposition, including transblepharoplasty, midforehead, coronal, and endoscopic procedures. Preoperative evaluation of patients, identification of patient-specific appropriate surgical technique, and photographs and grading of postoperative results are discussed.

Results: All patients had a minimum follow-up period of at least 4 months (mean, 15 months; range, 4 months to 3 years). Preoperative and postoperative photographs were obtained and graded. Complete symmetry was achieved in 8 patients (20%), considerable improvement in 23 patients (57%), modest improvement in 7 patients (18%), and no improvement in 2 patients (5%). No notable postoperative complications were reported. Recommendations for improving results are included.

Conclusions: The key to correction of eyebrow ptosis in patients undergoing reconstructive and cosmetic surgery is to first recognize the asymmetry. It is also important to note the effect of reconstructive and cosmetic surgical procedures on eyebrow position in order to limit the need to perform additional procedures to correct resultant eyebrow asymmetries and deformities. Finally, the surgeon must consider which eyebrow-lift technique is optimal for the patient’s underlying etiology to improve postoperative results and patient satisfaction.

Arch Facial Plast Surg. 2008;10(1):44-49

Surgical correction of eyebrow asymmetry or deformity is a commonly performed procedure in a facial plastic surgery practice. Numerous etiologies for eyebrow ptosis and asymmetry exist, including those that were congenital, posttraumatic, iatrogenic, facial paralysis–related, and functional (usually age related). Many different surgical techniques are available to correct these deformities, all of which have been well detailed in the literature. However, key components of appropriate surgical treatment of eyebrow ptosis and asymmetry must be addressed during a thorough evaluation of each patient to improve the surgical results as well as the patient’s satisfaction.

The first key component in patient evaluation is the recognition of eyebrow ptosis or asymmetry. This can be easily overlooked in patients undergoing reconstructive procedures who have other, more obvious injuries, or in those undergoing cosmetic surgery who have different areas of concern. Therefore, it is vital that evaluation of eyebrow symmetry and function be included in a comprehensive facial evaluation. Second, after any eyebrow deformity or asymmetry is identified, it is necessary to select the appropriate surgical procedure that will provide the optimal results for each individual patient. This involves not only a clear understanding of the etiology for each patient’s eyebrow deformity but also requires the surgeon to have experience in a variety of different surgical techniques. Furthermore, the importance of realizing the effect of any reconstructive surgical procedures on the resultant eyebrow position can reduce the need to perform further corrective procedures on these patients. In this review, we will discuss key factors for identifying and treating eyebrow deformities in our series of patients.
METHODS

This study is a retrospective review of one facial plastic surgeon’s (J.L.F.) experience with surgical correction of eyebrow deformities. Forty consecutive patients were identified as having eyebrow asymmetry or ptosis, with or without facial nerve paralysis, and were selected in a nonblinded manner to be included in this study. The etiology of the eyebrow asymmetry was then noted as cosmetic (congenital or age related) (9 patients), posttraumatic (with intact nerve function) (8 patients), postsurgical (with intact nerve function) (5 patients), or with facial nerve paralysis (posttraumatic or iatrogenic, such as after acoustic neuroma surgery) (18 patients). A comprehensive preoperative clinical evaluation was completed for each patient. Optimal eyebrow position was determined in conjunction with evaluation of the patient’s other facial features, as well as a thorough understanding of the patient’s underlying etiology. This was particularly important in terms of selecting the appropriate surgical technique for each patient. Of note, patients who presented with facial paralysis were assessed somewhat differently so as to provide improved symmetry both at rest and with facial expression.

Patients underwent selected eyebrow-lifting procedures in accordance with their presentation. A transblepharoplasty approach was used in a limited number of cases (3) in which the eyebrow asymmetry was considered to be limited. A midforehead approach was selected for a total of 14 patients with preexisting surgical or posttraumatic scars that could be utilized for the procedure or with unilateral facial paralysis and severe rhytids on the contralateral side of the forehead so as to improve the aesthetic results. Coronal approaches were used in the 12 cases in which this approach was required for other reconstructive procedures, as well as in most cases in which a previous coronal or hemicoronal approach had been performed. Finally, endoscopic approaches were used in most cosmetic asymmetries and in several other situations that seemed amenable to this approach (a total of 11 cases).

REPORT OF CASES

Case 1 is a patient undergoing a cosmetic procedure who presented with aging-face concerns and moderate eyebrow asymmetry, with the right eyebrow being lower than left, and the more elevated left eyebrow considered to be more attractive. Along with a face-lift, she underwent a right (unilateral) endoscopic approach eyebrow-lift with resultant elevation of the right eyebrow, as seen on the postoperative photograph (Figure 1B).

Case 2 is also a patient undergoing a cosmetic procedure who presented with aging-face concerns, but she was noted to have bilateral upper eyelid dermatochalasis and eyebrow ptosis, with the left eyebrow positioned lower than the right. She underwent conservative upper eyelid blepharoplasties and placement of a left eyebrow fixation device (Endotine Transblepharoplasty; Coapt Systems Inc, Palo Alto, California) via an upper tarsal crease approach, all under local anesthesia with oral sedation only. Her postoperative results (Figure 2B) demonstrate improved eyebrow position, although asymmetry still persists.

Figure 1. A 60-year-old woman with moderate right eyebrow ptosis. A, Preoperative view; B, postoperative view at 8 months.

Figure 2. A 54-year-old woman with upper eyelid dermatochalasis and left eyebrow ptosis. A, Preoperative view; B, postoperative view at 3 months.
Case 3 is a postsurgical patient who had undergone an emergency left craniotomy for an aneurysm and subsequently developed an infection of the left frontal craniotomy bone, necessitating removal of the infected frontal bone and subsequent reconstruction with methyl methacrylate. He was referred by the neurosurgical service for treatment of his asymmetric eyebrows and was noted to have considerable left eyebrow ptosis with normal functioning frontalis muscles. Utilizing his previous coronal incision, we performed exploration and repair, which revealed poor attachment of the periosteum to the underlying alloplastic material. Numerous tunnels were drilled in the methyl methacrylate, and permanent braided sutures were used to facilitate fixation of the periosteum and elevated eyebrow to the methyl methacrylate. Excellent eyebrow position is demonstrated in his postoperative photograph (Figure 3B).

Case 4 is another postsurgical patient in our series who had previously undergone extirpation of the frontal sinus for chronic sinus disease. During his evaluation, he was noted to have not only a frontal deformity consistent with removal of the sinus but also a congenital facial asymmetry with right orbital dystopia and eyebrow malposition. He underwent a coronal approach for reconstruction of his frontal deformity, as well as a right globe elevation and a right eyebrow-lift, deferring formal orbital osteotomies with repositioning. The postoperative photograph (Figure 4B) demonstrates improved, but not completely symmetric, eyebrow position.

The severe posttraumatic deformity noted in case 5 occurred in a man who 2 years previously had sustained an open, avulsive frontal injury that had been treated conservatively, as well as bilateral midfacial and orbital fractures that were repaired at that time. In this particular case, the patient was referred for treatment of his considerable left frontal deformity, but on examination he was also noted to have bilateral globe dystopias and a concomitant left eyebrow malposition with medial eyebrow elevation from his previous repair. The patient wished to defer orbital correction. Accordingly, the frontal deformity was reconstructed via the coronal approach using a custom frontal alloplastic prosthesis (Medpor; Porex, Newnan, Georgia) with inferior fixation of the medial eyebrow to the underlying implant. A postoperative photograph (Figure 5B) at 9 months demonstrates both improved frontal contour and left eyebrow position, although a new iatrogenic upper eyelid ptosis exists.

RESULTS

All patients were critically evaluated using standardized photographs by the senior author (J.L.F.) who performed the eyebrow-lift procedures. All patients were fol-
The most important step in appropriate surgical treatment of eyebrow ptosis and asymmetry is recognition of the deformity; however, this is rarely discussed in the literature. During the patient’s initial consultation, a comprehensive facial evaluation should be performed, usually with special emphasis on the patient’s presenting concerns. It is not uncommon for the patient to present with an eyebrow deformity of which they are unaware; therefore, it is critical for the asymmetry to be identified and discussed with the patient. Eyebrow deformities can easily be overlooked if not specifically included in a facial evaluation, especially when a patient presents with other, more obvious and striking deformities, or when the patient is focused on another facial feature of concern. By not identifying these eyebrow deformities preoperatively and, therefore, not correcting them as necessary in conjunction with other planned surgical procedures, postoperative results may be suboptimal and may lessen overall patient satisfaction.

After identification of eyebrow ptosis or asymmetry, one must determine the patient’s optimal eyebrow position. Optimal eyebrow position is both objective and subjective, and ideal criteria vary from surgeon to surgeon and continue to be debated.8-11 Useful information includes objective eyebrow measurements, manual eyebrow elevation to assess the degree of correction required, and possibly an ophthalmologic evaluation to identify functional visual defects. For patients with facial paralysis, an evaluation of the ptotic eyebrow should be performed both at rest and with maximal elevation, comparing with the normal eyebrow, and excessive contralateral forehead rhytids should also be noted.12 It is particularly important in cases of paralysis to have the patient relax the contralateral eyebrow, which is often subconsciously overelevated.

Following a comprehensive patient evaluation, an appropriate surgical technique is selected. As mentioned, there are many publications that comprehensively describe the advantages and disadvantages of various eyebrow-lift techniques, as well as the importance of procedure selection based on patient presentation. It is key that the surgeon have experience with a variety of these techniques in order to select the appropriate eyebrow-lift procedure for each patient. In our series, patients undergoing cosmetic procedures, similar to case 1, were frequently selected to undergo an endoscopic approach for correction of moderate eyebrow asymmetry. Benefits of the endoscopic eyebrow-lift procedure include minimal incisional scars, palpable fixation implants (no extrusions), temporary forehead or scalp numbness, and suture extrusions.

Figure 5. A 52-year-old man with left frontal deformity, bilateral globe dystopias, and left eyebrow malposition with medial elevation from previously treated posttraumatic injuries. A, Preoperative view; B, postoperative view at 9 months.
the deformity can be easily overlooked in light of other, more important presenting injuries. Surgical approaches selected for these patients vary depending on the severity of the deformity, concomitant facial deformities requiring repair, existing postruamtic or surgical scars, and the functionality of the facial nerve. Patients undergoing reconstructive surgery, such as cases 3 and 4, are often selected to undergo a coronal approach if multiple deformities will be addressed or if a previous coronal incision exists. The coronal approach provides excellent visualization and access, with the eyebrow-lift again being performed in the subperiosteal plane for maximal elevation.

Finally, it is not uncommon that eyebrow malposition is masked by more striking abnormalities, as demonstrated in case 5. Unique to these patients is the possibility that the surgeon may accidentally injure the frontal branch of the facial nerve or incorrectly reposition the soft tissues during initial repair of postruamtic fractures, both of which can result in an iatrogenic eyebrow ptosis. Because this new deformity must then be corrected with another surgical procedure, one must be cautious when performing reconstructive procedures so as not to cause a subsequent eyebrow deformity. Although a coronal approach was commonly selected in our series of reconstructive patients so as to utilize previous coronal incisions and improve surgical access to other deformities, other surgical approaches were also used. Patients undergoing postruamtruma reconstruction who had preexisting forehead scars that could be used to address the eyebrow deformity underwent a midforehead approach. Occasionally, patients undergoing reconstructive procedures presented with an isolated eyebrow deformity that could be corrected via an endoscopic approach. Our series also included a group of patients with unilateral facial paralysis of varying etiologies. These patients usually presented with a unilateral eyebrow deformity and concurrent upper-eyelid ptosis and were occasionally selected to undergo a transblepharoplasty approach. More frequently, the midforehead approach was selected because these patients also frequently presented with excessive contralateral forehead rhytids. This is a common finding because they attempt to compensate for the paralyzed eyebrow by overelevating the contralateral eyebrow. The resultant midforehead scar from the surgical approach can provide a simulation of forehead rhytids on the paralyzed side to lessen the asymmetry when compared with the contralateral, nonparalyzed side. Although various surgical techniques have been described for treatment of the paralytic eyebrow, it is important to remember that the goal of correction of eyebrow deformities in patients with unilateral facial paralysis differs from those of patients with other cosmetic and reconstructive concerns in that complete symmetry is not usually the desired result. Correction of eyebrow deformities in these patients is a static procedure performed to provide a more natural-looking appearance both at rest and with facial expression. Therefore, appropriate positioning of the paralyzed eyebrow is actually somewhere between the contralateral eyebrow’s position at rest and with maximal elevation. In addition, the result can sometimes be supplemented by partial paralysis of the normal contralateral eyebrow using chemodenervation techniques.

Results in our series of patients included both objective and subjective components, including preoperative and postoperative photographs and use of a grading scale by the operating surgeon to assess symmetry. On the one hand, although grading of the results by the operating surgeon has the potential to bias the results, the use and inclusion of preoperative and postoperative photographs provide objective evidence to support the grading assignments. On the other hand, a factor that potentially skews the grading downward is that a large percentage of these patients presented with unilateral facial paralysis in which complete symmetry was not necessarily the goal of surgical correction. With this in mind, 23 patients in our series (76%) were graded as having complete eyebrow symmetry or considerable improvement, while only 2 (5%) were graded as having no improvement. For continued improvement of surgical results, it is imperative that the surgeon have experience in various surgical techniques in order to select and perform the appropriate procedure for each patient’s presentation and that critical analysis of results be performed.

In conclusion, the key to correction of eyebrow deformities in patients undergoing cosmetic and reconstructive procedures is to first recognize the asymmetry and include this component in each patient’s evaluation. Having experience with a variety of eyebrow-lift techniques will enable you to choose the procedure that best correlates with the patient’s underlying etiology and will improve your postoperative results and the patient’s satisfaction. It is also important to recognize the effect of your reconstructive and cosmetic surgical procedures on eyebrow position in order to limit the need to perform additional procedures for correction. Finally, being critical of your results both subjectively and objectively will improve both your surgical expertise and your patient’s appearance.

Accepted for Publication: April 30, 2007.
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Statistical analysis: Frodel.
Administrative, technical, and material support: Noel.
Study supervision: Frodel.
Financial Disclosure: None reported.
Previous Presentation: This study was a poster presentation at the American Academy of Facial and Plastic Reconstructive Surgeons Fall Meeting; September 22-25, 2005; Los Angeles, California.

REFERENCES