The beauty of the face is the result of the harmonious relation among the different components. This is determined by the skeletal framework, providing a structural support, and the soft tissues. For purposes of clinical examination and aesthetic evaluation, the face is arbitrarily divided into three sections. The importance of the middle and lower thirds in facial aesthetics is well recognized and widely discussed in surgical forums. Possibly because it is partially covered by the hair or by the different varieties of hats dictated by climates and cultures, the upper third has received less attention.

The upper third of the face is limited superiorly and laterally by the hairline. Inferiorly it extends to the frontonasal groove, the brows, and the supraorbital ridge. The skeletal support is provided basically by the frontal bone, which is responsible for the shape of the forehead and the supraorbital ridges. Laterally the squamous portion of the temporal bone, covered by the temporalis muscle, conforms the upper third. The frontalis muscle provides support for the brows and, with the corrugators and procerus, is responsible for the movements and the facial expression of the area.

Numerous surgical procedures designed to rejuvenate the upper third of the face have been proposed for over half a century, mainly designed to correct brow ptosis or to decrease the skin wrinkles of the forehead and the interciliary area. Many of them are well known and also considered standard procedures in the armamentarium of the plastic surgeon.

In this article we report our experience with alterations of the skeleton of the forehead by recontouring or augmentation for aesthetic purposes and also with the subperiosteal face lift performed through a coronal approach.

**SURGICAL APPROACH**

**Incision**

Access to the forehead and periorbital area is obtained through a coronal scalp incision behind the hairline beginning at the level of the apex of the ear on each side. This basic incision and its extension to the face, described in previous publications, has been refined through the years in order to increase its versatility when dealing with facial asymmetries and to obtain a less visible scar.

At the present time we use a gull wing design made by two curved incisions with anterior concavity beginning at the midline 4 to 5 cm behind the hairline and extending to the level of the apex of the ear. The skin cut may be extended to the tragus following the contour of the helix and also in continuity with a conventional face lift approach—around the ear to the mastoid. This incision eliminates the contractive effect of a straight line and increases exposure. It also facilitates a selective resection for the correction of asymmetries and the prevention of an exaggerated elevation of the medial portion of the brows. To avoid a wide hairless scar, it is important to preserve the hair folli-
cles. This is accomplished by cutting on a bevel with the surgical blade following a plane parallel to the roots of the hair. This maneuver must be repeated with extra care at the end of the operation, when a strip of the scalp is removed. An almost invisible scar can be obtained, avoiding the amputation of the hair follicles. When a brow lift only is contemplated, the dissection is carried caudally over the periosteum to the supraorbital ridge and the lateral orbital rim. Laterally the undermining is carried out directly over the fascia of the temporalis muscle.

For the remodeling of the bone, a second incision is made on the periosteum, which is elevated to the level of the supraorbital ridge inferiorly and the temporal crest laterally (Figs. 1 and 2).

To remodel the orbital rim only, the periosteum is cut horizontally 2 cm above the orbit and undermined caudally, exposing the emergence of the supraorbital nerve (Figs. 2 and 3). A 2-mm chisel is used to open the bony duct to liberate the nerve, which is reflected inferiorly, allowing the dissection of the periorbit inside the rim (see Fig. 2).

Recontouring the Bone

The contour of the forehead and the orbital rim can be altered by removing portions of the cortical bone or by augmenting its volume with bone grafts or alloplastic material or by the combination of both procedures. Bone reduction is best achieved with a burr, obtaining a controlled graduated resection that may include the external cortical layer and the cancellous layer, preserving the integrity of the inter cortex. To prevent excessive heating of the remaining bone, it is important to irrigate constantly with cold saline while burring and also to wash the area repeatedly at the end of the procedure to eliminate the bone dust, which is also helpful for hemostasis. Any remaining bleeders are controlled with bone wax. Once the procedure is completed, the surface must be examined to check its regularity. The scalp flap is replaced and the forehead is examined from different angles to judge its shape and symmetry before suturing the skin (see Fig. 1).

Orbital Rim Correction

Drooping upper eyelids are usually produced by ptosis of the brows or sagging of the lid itself. The contour of the superolateral angle of the orbital rim also affects the shape of the lid. A low rim gives an impression of fullness, which is not corrected by skin or fat resection. Contouring of the rim is also done through the coronal approach. The orbital periosteum is freed from the roof and the lateral wall for about 15 mm. The orbital contents are retracted and protected with a maleable plate, and a burr is used to reshape the contour of the rim. Bleeding is minimal and bone wax is rarely necessary. In certain cases, when the eye slant is horizontal or antimongoloid, producing scleral show, the lateral canthus may be detached, freed from the periosteum, and fixed to the lateral rim on a higher position in the same procedure (see Figs. 2 and 3).

Augmentation

To increase the volume or to restore the symmetry of the frontal area, it is necessary to add a bone graft or some alloplastic material. Bone grafts taken from the parietal area, especially when pedicled on the temporalis fascia, usually integrate well, but a loss of volume is frequently observed. They are ideal for the reconstruction of cranial defects of the frontal area or major deformities of the orbital rim. A loss of volume may not be terribly important after a major cranial reconstruction but would

Figure 1. Diagram showing the elevated coronal flap after resection of the strip of the frontal bone and the use of the burr to remodel the supraorbital ridge.
Figure 2. Diagram showing that the periosteum has been elevated from the supraorbital ridge freeing the supraorbital nerve and protecting the orbital contents. A burr is used to remodel the superolateral angle of the orbit.

Figure 3. A. Preoperative view of patient with acromegaly showing excessive protrusion of the frontal and the orbital ridge. B. Postoperative view of the same patient after remodelling with a burr.
be unacceptable for the patient seeking aesthetic improvement of the forehead as an elective procedure. For this reason, for the augmentation of small areas of the forehead, we prefer to use Proplast introduced through a distant incision. The prosthesis is carved from a block, carefully reproducing the shape of the depressed area. The edges are carefully trimmed, and the alloplastic material is inserted under the periosteum, making certain it is not bent or wrinkled (Fig. 4).

For the augmentation of larger areas of the forehead, we prefer to use methylmethacrylate. The mixture is prepared when the bone is exposed. It is applied directly over the external cortical layer and modeled with a spatula. To avoid displacement of the acrylic plate, it is important to have a solid fixation to the skull. This is accomplished by introducing two or more metallic screws (depending on the size of the plate) through the external cortical and part of the cancellous layer of the frontal bone, leaving a section of the screw protruding through the bone surface. The metallic pegs are therefore included into the acrylic plate, providing a solid attachment to the bone surface (Figs. 5 and 6). We frequently use the combination of burring some sections of the frontal bone with simultaneous augmentation of a neighboring area to obtain symmetry of the forehead in post-traumatic deformities, in benign tumors such as fibrous dysplasia, and in minimal forms of craniosenosis. Miniforms of unilateral or bilateral coronal stenosis are best treated in infancy by craniectomies and supraorbital rim repositioning. In adults presenting these minimal deformities that were not treated at an early age, the potential problem resulting from bone resorption after a craniectomy may not justify a major remodeling. We believe the combination of burring and augmentation is best indicated in these patients (Fig. 7).

**Subperiosteal Face Lift**

Better understanding of the anatomy of the face has changed the original skin resection...
Figure 6. Diagram showing addition of methylmetacrylate on the depressed area of the frontal. The insert shows introduction of metallic screws into the frontal bone to provide fixation to the acrylic plate.

Figure 7. A and B. Patient with a fibrous osseous dysplasia of the right frontal and orbital areas with a previous surgical attempt resulting in a depressed scar. C and D. Postoperative view of the same patient after remodeling of the frontal bone and the orbital roof and with an addition of an acrylic implant.
rhytidectomy into a more sophisticated procedure. Subplatysmal and sub-SMAS dissection are now commonly used to restore the tension of the facial musculature, and through the coronal approach we can correct the ptosis of the upper third of the face. When these procedures are combined, the facial muscles remain attached to the skeleton only at the zygomatic and malar level. In order to displace the whole musculature of the face in a cephalad direction (directly opposite the force of gravity), it is necessary to free the periosteum from the lateral orbital rim, the malar, and the zygoma. Once this maneuver is completed, the deep facial structures can be mobilized as a unit with the skin or combined with subcutaneous undermining (Fig. 8).

This is a relatively simple maneuver that can be carried out safely if the anatomy of the frontal branch of the seventh nerve is clearly understood. The frontal branch crosses the zygoma at the level of its middle and lateral thirds very near the periosteum. The traction of the subperiosteal dissection can produce a temporal palsy or a section of the nerve if not properly protected.

Our own cadaver dissections correspond to the findings of O. Ramirez and A. Musolas (personal communication).

The two layers of the superficial temporal fascia are fused to each other about 1 cm above the zygoma. To avoid injuring the nerve, the two layers of the fascia are transected horizontally about 2 cm above the zygomatic arch, exposing the fat layers. The dissection is extended caudally deep to the insertion of the fascia into the periosteum. The periosteum can then be elevated from the zygoma, extending the dissection inferiorly over the fascia of the masseter muscle (Figs. 9 and 10).

The procedure is carried out incising the periosteum along the lateral orbital ridge and extending the subperiosteal dissection along the orbital rim and the maxilla, around the infraorbital nerve, and along the malar and the medial half of the zygoma. The only area left to complete is the liberation of fascia over the arch. The rest of the dissection is carried out through the lateral portion of the coronal incision as in a standard face lift.

This procedure can be combined with a conventional face lift dissection of the cheeks and the neck, extending the coronal incision around the ear or through two independent incisions in order to preserve the hair of the sideburns.
Figure 9. A and B, Preoperative views of a patient with a moderate sagging of the tissues of the middle and upper face. C and D, Postoperative view after subperiosteal face lift and lateral canthopexy. No skin incisions were used on the face.
Figure 10. A and B, Preoperative views of a 53-year-old patient with marked sagging of the upper and middle facial thirds. C and D, Postoperative views of the same patient after subperiosteal lift through the coronal route without any facial incisions.
This technique improves the results of the operation, allowing the elevation of the periorbital and malar-zygomatic areas, complementing the vertical pull of the SMAS and the frontal, allowing the mobilization of the whole muscle layer of the face in one unit as a mask.

REFERENCES


Address reprint requests to
Fernando Ortiz Monasterio, MD
Calzada Tlalpan 4800
Mexico 14000, DF
Mexico