Paparella: Volume IV: Plastic and Reconstructive Surgery and Interrelated Disciplines

Section 1: Plastic and Reconstructive Surgery

Chapter 8: Rhytidectomy and Coronal Forehead Lift

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Aging begins at the moment of birth and follows a predictable and relentless course the rest of our lives. A number of factors influence aging such as race, genetic constitution, facial dynamics, environmental exposure, and life style. However, the basic physical changes associated with aging are common to all races and cultures. Considerable time and money are spent on cosmetics that do little but provide the illusion of slowing or reversing the biologic clock, while cosmetic surgery seeks to restore the facial features to a configuration associated with a more youthful appearance. The actual process responsible for aging, and the physical changes associated with the appearance of aging, are caused by the degeneration and relaxation of the skin elastic fibers and connective tissue fascia. These changes give rise to a "sagging" of the face and the classic changes associated with aging such as the development of jowls, the formation of prominent melolabial creases, the onset of facial rhytids, the accumulation of submental adipose tissue, and sagging of the platysma in the submental region.

The primary procedure employed to reverse the changes associated with the aging face is the rhytidectomy or face lift. The goal of a successful rhytidectomy is to reposition the sagging facial structures to a position and configuration that denote a more youthful appearance.

Additional factors that contribute to the physical changes seen in the aging face are the loss of support from underlying bony structures due to resorption of bone, particularly from loss of teeth. The facial muscles and adipose tissue also undergo some atrophy, giving rise to further loss of support and definition. Rhytids or wrinkles are also a manifestation of aging, but represent a somewhat different process in which there is actual breakdown and loss of elastic fibers and collagen in the dermis. The most pronounced rhytids occur at the point of attachment of the facial muscles to the skin. The rhytidectomy is most effective for reversing the changes associated with sagging and relaxation of facial structures, and is not as effective for correcting true rhytids.

Patient Selection

The initial patient interview provides the foundation for the special relationship that forms between the facial plastic surgeon and the patient seeking aesthetic surgery. The consultation serves as a forum for the patient and physician to mutually evaluate each other. The patient's goals and expectations are discussed as well as an outline of the procedures, its limitations and risks, and postoperative care.

A detailed questionnaire, addressing the patient's specific goals and providing a medical and psychological profile, is completed by the patient before the interview. Unless

the patient requires a total facial analysis, only the procedure that the patient desires are addressed. Avoiding an appearance of trying to "sell" surgery is essential in establishing and maintaining good physician-patient relationships.

In a review pertaining to psychological evaluation, Dr. Thomas Baker writes, "patient selection may well be the most critical facet in the success of an aesthetic surgical procedure". Reasons for rejecting a patient include the following:

1. *Unreasonable expectations.* Patients seeking cosmetic surgery are acknowledged as being among the most demanding, yet certain individuals exceed reasonable demands. They may insist on rejuvenating their appearance beyond the capabilities of the surgeon. For example, they may bring photographs of their early adolescence to the initial consultation and expect postoperative results to recreate these images.

2. *Discordant interpersonal communication.* If there is a personality conflict between the surgeon and the patient or if the patient lacks the ability for basic comprehension of the procedure, a serious misunderstanding may arise that causes both parties considerable turmoil in the postoperative period. Certainly both surgeon and patient have the right to defer surgery if their personalities are not conducive to the formation of a reasonable relationship.

3. *Litigious patients.* Those patients seeking revisional surgery who are actively engaged in litigation are not good surgical candidates. The primary surgeon should never be belittled or criticized, as this may only aggravate an unpleasant situation. If revisional surgery is appropriate, the patient is given the option of returning to the primary surgeon or having an alternative surgeon operate when the case is settled. It is probably unwise to perform revisional surgery before completion of pending litigation.

4. *Patients with ulterior motives.* Such individuals seek surgery as a means to an end that is often unrealistic. For instance, they may have face-lift surgery at the insistence of a spouse or in an attempt to rekindle lost emotions. Other patients may seek surgery to ensure job advancement or solve social problems. The common denominator for patients with ulterior motives is that they expects result from the surgery that have little to do with actual surgery, and may be unhappy despite an adequate result. Should the ulterior motive not be realized, patients may displace their dissatisfaction and unhappiness onto the surgeon and find fault with the surgical result.

5. *Surgically addicted patients.* Such patients go from surgeon to surgeon requesting multiple surgical procedures or revisional procedures for conditions that do not really warrant surgery. Surgery should not be refused simply because of multiple previous cosmetic procedures, but an honest evaluation of the indications for surgery is required to avoid doing these patients a disservice. If face-lift surgery will not elicit a reasonable improvement, patients should be told that surgery is not presently indicated and be given follow-up appointments to reinforce the idea that the surgeon is genuinely interested in them.

6. *Manipulative patients.* The patient who lavishly flatters the surgeon and staff and gives the doctor carte blanche to perform any surgical procedure should be carefully screened. "Doctor, you are so wonderful, do whatever you think best" should signal to the consultant that the procedure and its limitations should be specifically delineated. These patients often

become dissatisfied postoperatively and Dr. "Wonderful" is asked to perform numerous revisions to satisfy them.

Psychological Profile of Patients Undergoing Face-Lift Surgery

In a comprehensive study by Edgerton and colleagues, 106 face-lift patients were evaluated with motivational and psychological profiles and were then analyzed. Patients seeking face-lift surgery were divided into four categories:

1. *Working group.* These patients are in their 40s or 50s and are employed in occupations demanding frequent public exposure such as sales or executive business positions. They want to retain a youthful image to help maintain success in their fields. They frequently request several cosmetic procedures, explaining that they have the financial resources and time for recuperation.

2. *Grieving group.* According to Edgerton, this group consists of women over 50 who are lonely after a divorce or the death of their spouse. To improve morale, they seek face-lift surgery, often after having considered this step for some time.

3. *Emotionally dependent group.* These patients are younger, usually in their 30s or 40s. They often are unemployed and dependent financially and emotionally on a spouse or parent. They may have a history of depression or some other psychological conflict. They place great value on their appearance.

4. *Male face-lift group.* This group is subdivided into first those in the working group in their 50s who are in business or a profession and seek face-lift surgery to improve appearance for their vocation; they are often married and well adjusted and have children. The second group are recently divorced or widowed and interested in rejuvenating their appearance to appeal to younger women or for an improved self-image.

A review was made of 104 patients undergoing face-lift surgery from February 4, 1987 to August 4, 1987 at the McCollough Facial Surgery Clinic. The average patient age was 58. Seventeen per cent were in the emotionally dependent group, 26 per cent in the working group, 24 per cent in the grieving group, and 9 per cent in the male face-lift group. A fifth group not previously described was apparent from this review, consisting of well-adjusted homemakers, often with grown children, who were desirous of face-lift surgery for self-improvement. They were typically involved in many social activities and usually were in their 50s or early 60s. This has been referred to as the *homemaker group* and made up approximately 24 per cent of the patient group.

In a classic study on the psychological profile of 50 patients undergoing face-lift surgery, Goin and colleagues found that 14 per cent were depressed preoperatively and that 54 per cent experienced depression postoperatively. There was no correlation with recent mourning, preoperative expectations, marital status, or postoperative complications. Most depression was transient, occurring early in the postoperative period and lasting a few days. However, some patients had delayed depression that occurred 2 to 3 weeks postoperatively. The cosmetic surgeon should be cognizant of postsurgical changes in affect and provide support for those patients who develop depression. In Goin's study, patients less likely to

develop depression were those who had prior cosmetic surgery or were highly motivated (the working group).

Aesthetic Analysis

Facial profile analysis and classification is important for preoperative assessment to plan the appropriate procedure, to compare postoperative results objectively, and to provide standardization for surgeons to compare various techniques. Dedo proposed six classes of cervical abnormalities based on anatomic deformity to help surgeons tailor surgical procedures to the patient's specific pathologic condition (Table 1).

Histologic Changes Associated With Aging

The changes in appearance brought about by aging are due to the intrinsic aging process within the skin itself, and this process is significantly influenced by environmental factors affecting the skin. Owing to its relatively exposed position, the facial skin is subjected to more environmental agents such as rain, wind, heat, and, most important, solar radiation than the rest of the skin.

Skin thickness reaches its peak at 35 years of age in women and 45 years in men. After skin thickness peaks, there is gradual thinning and atrophy over the rest of the life span. The epidermis undergoes a progressive loss of rete peg height and a slowing of cell turnover in the basal layer. The dermis also gradually thins out with a loss of collagen, degeneration of elastic fibers, and diminution of water content. There is progressive atrophy of sebaceous and eccrine glands and obliteration of the dermal and subdermal capillary arcade.

Exposure of the facial skin to ultraviolet radiation produces characteristic changes in the skin at both a histologic and a molecular level. Rudolph and Woodward found that when solar-damaged skin was compared with non-solar-damaged skin, the major distinguishing histologic feature was the accumulation of large amounts of amorphous material that stained PAS positive. This amorphous material has been termed "elastosis" and is seen on electron microscopic studies to accumulate near fibroblasts. It has been speculated that this material is produced by radiation-damaged fibroblasts and represents a failed attempt at synthesis of normal extracellular skin proteins such as collagen or elastin. Although this material is referred to as "elastosis", there is no true increase in dermal elastin and the skin is not more elastic. In fact, aging skin, particularly actinically damaged skin, is less elastic, with less resting tone, than skin not exposed to solar radiation. Daly and Odland noted that aged skin has the following mechanical properties: (1) a progressive loss in the elastic recovery for skin with low stress levels associated with degenerative changes in the elastin network and (2) increased time for viscoelastic recovery for greater stress levels, which is a function of changes in the ground substance of the dermis rather than in the elastin network. The effect of these histologic and biomechanical changes is to render the aged skin less elastic with less resting tone, thus leading to the sagging and the stretching seen clinically.

There is no doubt that simple aging contributes to these changes in skin tone and elasticity, but a number of articles have shown that the aging process is greatly hastened by sun exposure. Kligman compared facial skin exposed to solar radiation with nonexposed buttock skin and found that the facial skin showed an accelerated, progressive accumulation

of amorphous ground substance (corresponding to the previously mentioned elastosis) and increased disorganization of the elastin fibers compared with nonexposed skin. The changes seen in unexposed buttock skin were of a similar nature but lagged well behind those seen in the facial skin. Additional evidence of the deleterious effects of sunlight was the fact that blacks, with their protective melanin, underwent much less severe changes than Caucasians of a similar age.

Anatomic Considerations in Rhytidectomy

The external skin is the most obvious structure affected by aging, but there is also coincident progressive degeneration and stretching of the underlying connective tissue and fascia, which allows drooping of the facial muscles, fat, and salivary glands. Modern face-lift surgery requires a thorough understanding of the anatomy of these structures to properly restore them to their original position and provide adequate support for long-lasting results. Also, a firm understanding of the anatomic course and distribution of the facial nerve and facial vasculature allows for safer and more consistent face-lift surgery.

Muscles of the Face

The muscles of facial expression are paired, originate from major facial bones, act on skin, and are innervated by the seventh cranial nerve.

The facial muscles are generally subdivided into five groups according to their anatomic location: oral (upper and lower), nasal, orbital, auricular, and scalp. The cheek muscles all converge to intermingle with the orbicularis and this allow coordination of lip and cheek movements.

The facial muscles are unique in the body because their primary site of action is on the skin by way of attachments to the dermis. The muscles of facial expression are ensheathed by an anterior extension of the superficial musculo-aponeurotic system (SMAS), and it is through these attachments tot he skin that SMAS suspension places traction on the anterior facial skin.

Fascia of the Face

As mentioned, some of the major changes associated with aging are seen in the skin. However, with aging there are also changes occurring in the underlying muscles, fat, and fascia. Basically, these supporting fasciae tend to elongate and stretch, resulting in sagging anteriorly and inferiorly. It has long been recognized that simple excision of lax skin gives good short-term results but does not provide long-lasting improvement. To achieve lasting results in face-lift surgery one must also reposition and support the underlying muscles, adipose tissue, and salivary glands and secure them in some fashion. To accomplish this repositioning and suspension of the underlying facial units requires a structure with considerable strength, and this has prompted intense study of the facial and cervical fasciae. Unfortunately, numerous studies of facial fasciae have been published with varied terminology, varied descriptions of the anatomy, and variable significance assigned to the different layers. A detailed description of the cervical fascia can be found in Volume III, Chapter 43.

Classically two main fasciae are described for the head and neck: the superficial cervical fascia and the deep cervical fascia. The superficial fascia encircles the platysma, and both the platysma and superficial cervical fascia end by mingling with the SMAS. The superficial layer of the deep cervical fascia is a sheet of fibrous connective tissue that encircles the head and neck, with attachments to the fascia of the shoulders, thorax, and axilla.

Most authors describing face-lift surgery acknowledge the presence of the SMAS and the fact that it encircles the muscles of facial expression with attachments to the skin, but there is debate concerning its origins and actual location. Mitz and Peyronie were the first to discuss the SMAS extensively and the possibility of utilizing it in rhytidectomy. In an elegant and detailed study, these authors noted the following points concerning the SMAS: (1) it is a distinct fibrous sheath lying deep to the first layer of subcutaneous fat; (2) it is in continuity with the posterior part of the frontalis muscle and superior portion of the platysma; (3) it is densely adherent to, but separate from, the parotid fascia; (4) it extends from the parotid area to encircle the muscles of facial expression, and at the same time it sends attachments to the dermis - these connections with the dermis and muscles of facial expression are the factors that allow suspension of the SMAS to exert a pull on the facial skin in areas well anterior to the cheek; (5) the sensory nerves of the parotid area (great auricular, greater occipital, lesser occipital) lie superficial to the SMAS; (6) the motor fibers of the seventh cranial nerve run deep to the SMAS; and (7) the main facial vessels (the facial artery and vein) lie deep to the SMAS and send perforating vessels through the SMAS to reach the subdermal plexus.

Recognition of the SMAS as a distinct anatomic unit was a major advance in face-lift surgery. Previously, face-lift surgery consisted simply of widely undermining the facial skin with posterior, superior traction and then cutting off the excess skin. This technique effected only short-term improvement and was associated with a higher incidence of complications such as hematomas, flap necrosis, and injury to the seventh cranial nerve. Since recognition of the SMAS it has become possible literally to resuspend the face and secure it with sutures in this tough fibrous tissue, providing more secure and long-lasting face lifts. In addition, using the SMAS to suspend the facial structures makes possible comparable results with less skin undermining and thus less complications.

The Facial Nerve In Face-Lift Surgery

After the SMAS, the structure that most directly affects face-lift surgery is the facial nerve. The facial nerve is a major concern in any type of surgery in this area, and fear for its safety is often a limiting factor in the amount of dissection that may be safely performed. Knowledge of the anatomy of the facial nerve has become particularly important with the more recent innovations in face-lift surgery such as sub-SMAS and subplatysmal flaps, because the plane of dissection is deeper than that utilized in simple skin elevation; there is no doubt hat the facial nerve is at increased risk in these types of procedures.

Numerous authors have noted the wide variation possible with facial nerve anatomy. The most anatomically consistent portion of the nerve is at the stylomastoid foramen and the position of the main trunk of the nerve lying deep in the parotid tissue. Once the nerve begins to branch, there is considerable variation in the number and distribution of the branches and the frequency of interbranch anastomosis. The point to remember is that while the nerve

usually manifests the classic configuration of temporal, zygomatic, buccal, mandibular, and cervical branches, their exact location and distribution cannot be relied on for any individual patient.

As the facial nerve travels anteriorly it becomes more superficial owing to the thinning of the parotid. At the anterior portion of the parotid the facial nerve lies under only a thin sheet of connective tissue corresponding to the SMAS, and is lateral to the masseter muscle and Stensen's duct. As the nerve approaches the muscles of facial expression, which it innervates, it enters them from the deep side and then courses through the muscle to provide innervation. On the basis of these observations, several points concerning the facial nerve may be made: (1) the main branch of the nerve and most of its anastomoses are contained within the substance of the parotid gland and will not be injured unless the parenchyma of the gland itself is violated; (2) a dissection that stays lateral to the SMAS, muscles of facial expression, or platysma will be superficial to the plane of the facial nerve; and (3) if the parotid fascia is violated or the plane of dissection is deep to the SMAS, platysma, or muscles of facial expression, there is a danger of injury to the facial nerve.

Although injury to the zygomatic and buccal branches of the facial nerve cause the most deleterious effects owing to paralysis of the periocular or perioral muscles, this rarely occurs because there is considerable anastomotic connection between branches, and the nerve is usually able to compensate for injuries to distal, small, individual branches. However, the temporal and marginal mandibular branches have virtually no interbranch connections and thus recovery is usually much less complete. In addition, the marginal and temporal branches occupy the most superficial portions of the nerve's course and are at greatest risk of injury in the dissections.

With the increasing popularity of procedures to rejuvenate the upper third of the face, particularly the forehead lift and extended temporal face lift, the frontalis nerve is at increased risk. The area of greatest risk to the frontalis nerve is where the nerve crosses between the skin and zygomatic arch. The course of the frontalis nerve lies along a line drawn from just inferior to the tragus to a point 1.5 to 2 cm above the lateral eyebrow. It is also important to consider the plane in which the nerve is traveling. There is considerable discussion as to the exact plane the nerve travels in, but it is generally agreed that the nerve lies lateral to the temporalis fascia in what would correspond to the temporal continuation of the SMAS. This plane consists of loose areolar tissue that lies between the subdermal plane and the temporalis fascia. It should also be pointed out that the frontalis nerve enters the frontalis muscle from the inferior, deep portion of the muscle and is at risk during a simultaneous face lift and forehead lift, because the plane of dissection for the forehead lift is deep to the nerve, while the plane of dissection for the face lift is superficial to the nerve. If this is not kept in mind when connecting these two areas of dissection, the nerve may be transected or injured. Thus, one must consciously make a transition from the plane deep to the frontalis muscle for the forehead lift to a subdermal plane employed for the face lift. It is recommended that while posterior to the temporal hairline the plane of dissection should be deep to the hair follicles or just superficial to the temporalis fascia. When elevating the flap anterior to the temporal hairline, there should be a transition to a more superficial subdermal level, thereby avoiding injury to the frontalis nerve, which will be traveling in the SMAS layer.

The marginal mandibular branch of the facial nerve is the other branch of the facial nerve that is at risk during rhytidectomy, particularly in sub-SMAS and subplatysmal dissection. Dingman and Grabb found that in preserved anatomic specimens, 81 per cent of the dissected marginal mandibular nerves were located superiorly to the mandibular margin while posterior to the facial artery, and 100 per cent of the nerves were superior to the edge of the mandible anterior to the facial artery. However, Baker and Conley pointed out that the marginal mandibular nerve always courses at least 1 to 2 cm below the mandibular margin, and may be found up to 4 cm inferior to the mandible in older patients. The marginal mandibular nerve lies just deep to the platysma and superficial to the submandibular gland fascia and facial vessels; it is at risk in any sub-SMAS or subplatysmal dissection.

The occurrence of injury to the facial nerve during rhytidectomy is reported as between 0.4 and 2.6 per cent. Baker and Conley reviewed 13 series, with a total of 6551 patients, and 50 instances of facial nerve injury (0.7 per cent) were found. The most frequently injured branches were the temporal and marginal mandibular. It was also noted that 80 per cent of the paretic branches recover to some degree within 6 months of injury. (For a more complete discussion of facial nerve injuries, see the section on complications.)

Anesthesia

The choice of anesthesia for face-lift surgery depends on the individual surgeon's preference, the surgical setting, and the available personnel. We prefer to use a combination of intravenous sedation and local anesthesia. A number of techniques for intravenous sedation are available, but the Brevital (methohexital sodium) drip is becoming increasingly popular for this type of outpatient surgery. This consists of running a continuous infusion of Brevital, the rate being titrated to maintain a constant level of sedation, which can be increased or slowed down depending on the patient's response. Brevital has a very short half-life, and patients generally recover quickly with few side effects. Alternative regimens for intravenous sedation use combinations of a benzodiazepine (Versed or Valium) and narcotic (Fentanyl or Sublimaze). Individual doses of Pentothal (thiopental) are added as needed for more profound sedation. For this type of anesthesia it is highly recommended that full vital sign monitoring be employed with electrocardiography (ECG), an automatic blood pressure monitor, and a pulse oximeter. One per cent Xylocaine (lidocaine) with 1:100.000 epinephrine is infiltrated along the actual line of incision, and 0.5 per cent Xylocaine with 1:200.000 epinephrine is then infiltrated over the areas to be undermined. It is generally recommended that the infiltration be extended for at least 1 cm beyond the expected areas of undermining to provide for maximal anesthesia as well as hemostasis from the vasoconstrictive effects of the epinephrine.

Face-Lift Techniques

More controversy and dogma focus on face-lift techniques than on most aspects of facial plastic surgery. The classic rhytidectomy consisting of just skin flap elevation and flap rotation has largely been replaced by skin flap elevation in combination with SMAS techniques. The literature is replete with articles advocating conservative flap elevation, and just as many supporting more radical procedures.

The lack of consensus over which techniques to use stems from a fundamental inability to conduct truly scientific, long-term, meaningful studies on the various proposed methods. Those few scientific studies that have attempted to approach the problem scientifically have inherent flaws secondary to an inability to categorize consistently and classify objectively the preoperative appearance and postoperative results. Also, ethical considerations in elective surgery exclude some methods of study, there is a lack of adequately matched control groups, and it is almost impossible to eliminate fundamental bias influencing investigator observations.

Various names have been ascribed to face-lift techniques: "two-layered four-flap rhytidectomy", "suspension rhytidectomy", and "segmental rhytidectomy" are but three. All share the common goal of undermining, advancing, and resection the redundant skin flap and tightening the relaxed SMAS layer by means of imbrication or plication.

Incisions

There are many variations in the type of incision used with rhytidectomy. We prefer an incision that starts in the temporal region approximately 2.5 to 3 cm behind the temporal hairline. This is brought inferiorly to the root of the helix and placed in the helical crease at its anterior border. Continuing inferiorly, it is brought posterior to the tragus and into the inferior preauricular crease. The incision is then brought around the inferior border of the lobule and superiorly in the postauricular sulcus, approximately 0.5 cm up onto the conchal cartilage. At the superior border of the external canal, the incision is brought straight back into the hairline with an inferior extension to handle the dog ear. The advantage of this type of incision, keeping the temporal and postauricular incisions in the hairline, is that it provides for maximal camouflage of the incision itself. The disadvantage of placing incisions in the hair is that when the flaps are advanced, it changes the hairline. In the temporal region non-hair-bearing skin is advanced up into the temporal area, which can give rise to a telltale bald spot. Postauricularly, incisions within the hair can give rise to an uneven hairline that has a step-off appearance. An alternative incision favored by some surgeons is to make the temporal incision anterior to the temporal tuft, and then curving 2 to 3 cm posteriorly into the temporal hair. In the postauricular region, the incision is placed just at the inferior border of the hairline. In this approach there is minimal distortion of the temporal or postauricular hairline. The disadvantage of placing incisions at the hairline is that in some patients scars along the hairline may become visible and may be very difficult to correct. Placing the incision along the inner aspect of the tragus is now a fairly standard part of most face-lift incisions in females; it significantly improves the camouflage of the preauricular portion of the incision.

Male Incision

The incision used for a face lift in males must be modified somewhat from the incision used for females. The major reasons are alopecia and the differences in hairlines, facial hair, and hair styles. In males the incision is modified so that it does not extend superiorly above the lateral canthus if there is evidence of temporal alopecia. Since men have beards, the post-tragal incision cannot be used because advancement of the flap would place hair-bearing skin inside the ear. Formerly the incision was placed just at the margin of the facial hairline, but this left a cheek scar that was too conspicuous. We now place the cheek portion of the incision at the preauricular crease and inform the patient that his beard will be

moved posteriorly. The postauricular portion of the incision is placed 5 mm up onto the conchal cartilage to provide maximal camouflaging of the scar. The incision is extended superiorly to just above the level of the external auditory canal and then brought straight back into the hair for 4 to 5 cm. A downward cut is then made to handle any skin redundancy. Patients should be counseled preoperatively that they may need to wear their hair longer to provide maximal camouflage.

Skin Flap Elevation

Once the incision has been made, Allis or nonpenetrating towel clamps are placed along the edges of the incision to provide traction. The skin flap is then elevated with sharp dissection under direct vision, or indirectly by creating tunnels with blunt scissor dissection and then connecting the tunnels. The flaps are elevated in a subdermal plane with approximately 4 mm of subcutaneous tissue left attached to preserve the subdermal vasculature.

In the temporal region the incision stops just above the temporalis fascia, so as to preserve the hair follicles in this area. At the anterior border of the temporal hairline the level of undermining is switched to a subdermal plane to avoid injury to the frontalis branch of the facial nerve. There is a consistently observed branch of the superficial temporal artery and vein (called McGregor's patch) in this transition zone that must be carefully ligated or coagulated to avoid injury to the frontalis nerve.

Length of Flap Elevation

Aside from the imbrication versus plication controversy, the other area of major disagreement is over the amount of undermining used and the length of the skin flap. Opinions vary regarding the benefits, long-term effects, and limitations of these two surgical approaches. We believe the extent of flap undermining should be determined by the patient's particular needs. Patients with fairly minimal jowling and moderate skin ptosis are effectively treated with a short flap. Patients with marked jowling, significant skin ptosis, and platysmal cording are more effectively handled with the long-flap technique.

We define a short flap as one that is 5 cm or less from the incision. Advantages of the short flap are that (1) the more conservative technique involves fewer risks; (2) with less dead space, there is a lower incidence of hematoma formation; (3) the flap is shorter and more tension can be applied at the suture line with less risk of skin slough; and (4) with less skin undermining, there is less risk of injury to the facial nerve.

Advantages of the long-flap technique are that (1) more extensive facial contouring is possible with liposuction; (2) there are possibly longer-lasting effects secondary to wider fibrosis between the SMAS and skin flap; (3) it allows better access for more extensive SMAS and platysma work; and (4) it provides better contouring and draping of skin flap.

SMAS Plication

As mentioned, plication consists of advancing the SMAS upon itself, without incising it, and then securing it. Imbrication consists of incising the SMAS and removing a portion.

The two edges are then sutured together. Most authorities agree that to achieve the maximal benefit from a face lift the SMAS needs to be addressed in some fashion, either by plication or by imbrication. Proponents for either method can be found. Webster and associates performed a series of face lifts using plication on one side and imbrication on the other and could find no substantial difference in long-term results. Because plication does not require dissecting underneath the SMAS or platysma, the chances of injuring a branch of the facial nerve are fewer. A major disadvantage of SMAS plication is that patients with excessive adipose tissue can develop noticeable fullness and lumpiness in the preauricular region. For this reason it is advised that the subcutaneous adipose tissue lateral to the SMAS be removed as completely as possible by either direct excision or liposuction. Another disadvantage of SMAS plication, cited by some authors, it that it is more difficult to correct excessive platysmal laxity with plication alone.

Plication of the SMAS is performed by grasping the platysma-SMAS complex near the mandibular angle with a pair of toothed forceps and advancing it posteriorly and superiorly to a position just inferior to the tragus. It is then secured with interrupted 2-0 Ethibond sutures with the knots buried. Considerable tension is placed on this stitch and it is usually necessary to use a smooth needle holder to secure the stitch after the first throw and prevent slipping of the knot. The next major stitch is begun at the level of the oral commissure and brought posteriorly to the midtragal region. Additional sutures are then placed superiorly and posteriorly to take up any residual slack or redundancy and smooth the ridge of plicated SMAS as much as possible. Typically, four to six plicating sutures are placed on each side.

Imbrication of the SMAS involving incising if from the zygomatic arch to approximately 1.5 cm inferior to the mandible. A sub-SMAS dissection is then performed for 4 to 5 cm (not past the edge of the parotid) advancing the SMAS posteriorly, resecting excess SMAS, and suturing the free edge with 2-0 Ethibond sutures. In most of our patients we employ simple plication, reserving imbrication for patients with excessive skin and platysmal laxity or excessive subcutaneous adipose.

Skin Excision

Once the SMAS has been plicated, the skin flap can be advanced superiorly and posteriorly and the redundant skin marked and trimmed. We prefer to advance the skin and secure two key points postauricularly and preauricularly. After these two points are secure, "cut-downs" or darts are made at 1.5- to 2-cm intervals, and the skin flap is then tailored to the incision. The amount of tension that can be safely applied to the incision varies with the amount of undermining and the site being closed. Webster advocated applying 1000 to 2000 gm (2 to 4 lb) of tension, citing that a greater degree of tension (4 to 6 lb) may cause skin necrosis and permanent hair loss.

The ideal amount of skin tension at closure depends on the patient's tissue, the area of closure, and ultimately the surgeon's surgical experience. As a general rule, most of the tension needed to elevate the face should be taken up by the SMAS plication, and little, if any, tension is placed along the incision. Particular attention should be given to avoiding tension on portions of the ear that are mobile, such as the lobule or tragus, which may be deformed by tension along the incision. A well-known sequela of face-lift surgery is

elongation of the lobule, giving a pixie-ear appearance. More tension can be placed along the temporal and postauricular portions of the incision. When a shorter skin flap is used, more tension can be placed along the incision with less risk of causing skin flap necrosis.

Submental Lipectomy

Milliard and colleagues were among the first to advocate directly addressing the submental region with incision, undermining, and removal of excess fat. Submental lipectomy can be performed with scissor dissection or suction cannulas. Care must be exercised to avoid suctioning directly on the skin flap, which may cause a wavy appearance, and to avoid exposure or injury of the platysma, which may cause visible banding or the "cobra" deformity.

Platysma Procedures

Laxity of the platysma muscle is responsible for the prominent anterior neck cording often seen as part of the aging face. In addition, this lax muscular sling helps create submental fullness and contribute to the "turkey gobbler" deformity.

Numerous surgical procedures have been proposed to deal with the problem of platysmal laxity, such as plicating the anterior muscle edges, complete muscle transection and excision of a portion of muscle, or various platysma muscle flaps created by transecting the muscle, rotating it posteriorly, and then plicating it to the parotid fascia.

We generally prefer more conservative treatment of the platysma. With SMAS plication or imbrication in the periauricular area, the platysma usually is also repositioned posteriorly and superiorly, providing a more youthful appearance to the neck.

Careful preoperative assessment of photographs showing clenched teeth and facial animation can determine whether further procedures are required for more extensive platysmal cords in the anterior neck. For patients with prominent cording we favor transecting the anterior edges of the muscle with either the bipolar cautery or Metzenbaum scissors via the submental incision.

More radical procedures on the platysma pose a higher risk to the marginal mandibular nerve, of developing hematomas or postoperative irregularity of the neck. Also, those procedures directed at suturing the platysma along its anterior edge in the midline create a pull that works against the repositioning of the SMAS plication. It is anatomically incorrect to have the platysma joined in the midline.

The accumulation of inordinate amounts of submental skin, the "turkey gobbler" deformity, is best treated with direct vertical excision. Although this leaves a scar perpendicular to the relaxed skin tension lines in the neck, Z-plasty repair at a later date can improve this. Patients need to be forewarned that they are trading the deformity for the possibility of a prominent scar.

Coronal Forehead Lift

Within the last several years it has become increasingly well recognized that rejuvenation of the upper third of the face can significantly enhance the results of a face-lift procedure. In the past the major procedure available for rejuvenation of the upper third of the face was the classic four-lid blepharoplasty. It is now accepted that a forehead lift with repositioning of the eyebrow can dramatically improve the appearance of the upper third of the face. In fact, some authors say that 30 to 50 per cent of all patients who undergo blepharoplasty could significantly benefit from some brow repositioning. Several methods are available to assist in rejuvenation of the upper third of the face in terms of brow lifting. The most frequently used technique is a coronal incision and forehead lift. In patients with a high forehead or sparse hair, a pretrichal incision that spares the hair follicles is employed. For patients in whom a coronal or pretrichal scar would be too obvious, a direct brow lift, either with an incision in the midportion of the forehead concealed in a forehead crease or with direct excision of skin just above the brow, is performed. The most popular technique, and the one that lends itself most readily to be performed in conjunction with a face lift, is the coronal forehead lift. This is easily incorporated into the face lift by extending the temporal portion of the incision across the top of the head and connecting it with the opposite side.

The coronal forehead lift has two main objectives: (1) to elevate the brow and alleviate sagging of the upper eyelids and (2) to help eliminate wrinkles in the forehead region. Elevation of the brow is performed by direct excision of scalp that has been advanced superiorly along with the forehead and brow. Improvement of forehead wrinkles is accomplished by weakening or eliminating the effects of the forehead and glabellar muscles that are responsible for causing the crease. The muscles responsible for causing creases in the forehead region are the frontalis muscle, which causes the horizontal creases, and the corrugator and procerus muscle of the glabellar region, which cause vertical creases. We generally excise a portion of both the procerus and corrugator muscles to weaken their effect in the glabellar region and help smooth the glabellar rhytids. The horizontal creases from the frontalis muscle are more difficult to eliminate fully. Many surgeons advocate cross-hatching of the galea and excision of a portion of the frontalis muscle to significantly weaken its effect.

Technique of Coronal Forehead Lift

The coronal forehead lift is performed by extending the temporal portion of the face-lift incisions superiorly and across the top of the head. In general, we place the incision so that it lies approximately 4 cm behind the hairline. If a patient has an excessively high forehead, consideration should be given to performing a pretrichal incision, since a coronal forehead lift in an individual with an already high forehead will move the frontal hairline even more posteriorly and possible an unacceptably high forehead. In general, we do not recommend coronal lifts in males, since the balding patterns are too unpredictable to ensure that a coronal scar will not become exposed at some point in the future.

The hair is secured as it would be for the rest of the face lift. We do not routinely shave the hair along the incision. The incision is then injected just as for the rest of the face lift. The incision is carried down through the skin, subcutaneous tissue, and galea, stopping just above the periosteum.

With a pretrichal approach the incision is placed 2 to 3 mm behind the frontal hairline and beveled inferiorly. By beveling in this fashion, viable hair follicles are included in the incision that will then grow through the incision and help camouflage the scar.

The flap is incised and then reflected anteriorly in a subgaleal plane. This plane beneath the galea and above the periosteum is usually quite avascular and the procedure can be performed primarily with blunt dissection. In the temporal region one must make the transition from deep the galea, on top of the temporalis fascia, to the subdermal layer used with the face lift. This transition from a subgaleal plane to a subdermal plane is necessary to avoid injury to the frontalis nerve, and occurs just at the anterior temporal hairline. The flap is dissected anteriorly and inferiorly, the supraorbital rims are identified, and the frontalis muscle is separated from its attachment to the superior orbital rim. This is usually performed with a blunt pair of Metzenbaum scissors placed at the orbital rim, using a prying motion to detach the tissues. Care must be taken to identify the supraorbital and supratrochlear nerves in order to avoid injury to them. Once the fibers attaching the forehead flap to the orbital rim have been divided, the procerus and corrugator muscles come into view in the glabellar region. These muscles are isolated and a portion of each muscle is excised with the cutting current of the electrocautery. Every effort should be made to transect the muscles completely so as to weaken them as much as possible and avoid having them reattach to the skin with recurrence of the rhytids. We also perform superficial scoring of the deep portion of the forehead flap, which weakens the frontalis muscle and helps smooth out the forehead. The scoring should be superficial, to avoid injury to the sensory branches of the supraorbital and supratrochlear nerves. The forehead flap is then elevated superiorly and the excess scalp is draped over the posterior portion of the incision. The forehead skin is split in the midline and excess skin is removed as needed; generally, 1 to 2 cm of scalp can be removed. In an uncomplicated case with no excessive bleeding, we do not drain the forehead incision.

Dressing and Closure

After completion of the SMAS plication and skin excision, careful hemostasis is achieved. The hair-bearing portions of the forehead, temporal, and occipital incisions are closed with staples in a single layer. The wound edges must be carefully everted to minimize scarring and avoid postoperative dehiscence that may lead to a widened scar. The periauricular incision is closed with 6-0 plain gut or 7-0 Prolene sutures in a single layer. We have found, like Gordon and others, that a double-layer closure does not provide for an improved scar. The decision whether or not to place drains is made on an individual basis, depending on how much oozing or edema is present. Drains are attached to bulb suction units. If drains are not placed, a 1-cm opening in the postauricular sulcus is left to evacuate any fluid or clots that may accumulate.

Xeroform gauze is placed over the incisions, followed by cotton and then fluffed 4 x 4 gauze sponges over the undermined areas. Kerlex is placed circumferentially in a fairly tight compression dressing and covered with Coban (an elastic paper tape that adheres to itself). Some authors advocate no pressure dressing or only a light dressing and rely on suction drainage to avoid the accumulation of fluid. A moderately tight compression dressing does not seem to produce significant edema and has been found to diminish the incidence of hematomas.

The patient returns on the first postoperative day, when the dressing is removed, and is examined for hematomas, compromised flap circulation, and facial nerve function. The preauricular sutures are removed on the third to fifth postoperative days and the staples and postauricular sutures on the seventh to tenth postoperative days.

Complications

In today's litigious society, any untoward result may precipitate a lawsuit. Careful preoperative counseling delineating potential risks is required for proper informed consent. Nevertheless, certain complications may occur even in the most experienced hands. The techniques we have described reduce, but do not eliminate, the potential for complications (Table 2).

Complications are divided into those occurring in the first week following surgery (immediate) and those occurring after 1 week (delayed).

Hematomas

Hematomas are the most frequent complication in face-lift surgery. Postoperative hematomas can be classified as minor or major. Minor hematomas, requiring only needle aspiration, are fairly common and are thought to occur in 2 to 15 per cent of patients. Major hematomas require reelevation of the flap and evacuation of the clot and occur in 1.0 to 8 per cent of patients. Baker reviewed 19 series with over 9000 patients and found an overall average of 3 per cent for major hematomas.

Because the operative site is usually covered by a dressing, hematomas may reach a large size before being detected. It is important that patients be told of the symptoms of a developing hematoma and that they should contact their surgeon if this arises. Increasing unilateral ear pain, expanding ecchymosis, and severe edema should raise concerns over the possibility of an expanding hematoma. Hematomas may be unilateral or bilateral and usually develop within the first 12 hours after surgery. If any suspicion of a hematoma arises, the surgeon should remove the dressing and inspect the flaps. Undiagnosed large hematomas can jeopardize flap circulation and cause major skin necrosis if not diagnosed and treated promptly.

Elevated blood pressure; increased intrathoracic pressures from coughing, straining, or vomiting; antiplatelet drugs; and cigarette smoking all may contribute to the formation of hematomas. Men are believed to have a somewhat higher incidence of hematoma formation than women, averaging 7 to 8 per cent of cases reviewed. This increased tendency for hematomas in males may be related to increased vascularity in the subdermal plexus or more dense fibrous attachments in the plane of dissection between skin and subcutaneous tissue.

Large hematomas necessitate opening the entire flap for adequate exposure, removing clots with saline irrigation, and coagulating or ligating the bleeding vessels in the operating room with proper lighting and instruments and general anesthesia. If there is the possibility of a significant delay in bringing the patient to the operating room, the suture line should be opened at the bedside and as much clot as possible expressed to relieve tension on the flap. In addition to parenteral antibiotics, we irrigate with an antibiotic solution to reduce the

possibility of wound infection. After removal of the hematoma, a drain and pressure dressing should be placed.

Smaller hematomas may be milked out through the postauricular opening or aspirated with an 18-gauge needle. Flap elevation during the face lift provides relative hypesthesia, and local anesthesia is not usually required for simple aspiration. Alternatively, a stab wound can be made with an No. 11 blade to remove the clot.

Sequelae of hematomas include prolonged skin discoloration, skin slough or necrosis, fibrosis, and soft tissue irregularity. Prolonged local induration and lumpiness may be softened with very conservative use of subcutaneous steroids such as triamcinolone acetonide (Kenalog), 10 to 20 mg per mL, injected with a tuberculin syringe.

Skin Necrosis

Skin flap necrosis occurs as a result of compromised skin vascularity, usually from excess tension on the wound closure, and poor surgical technique with handling of the skin flap. Extensive hematomas, postoperative infection, and cigarette smoke have also been implicated as causing skin slough. The incidence of postoperative skin slough is approximately 2 to 3 per cent.

The standard face-lift flap is widely based, receiving vascularity in a random fashion via the subdermal and subcutaneous plexus. More extensive undermining in the neck and anterior face can result in a compromised blood supply with resultant ischemia along the margins of the flap. With the excellent vascularity in the facial region, this is rarely a problem and often receives little consideration. However, in the elderly patient who smokes or has severe atherosclerosis, care should be taken to maintain a flap with 3 to 4 mm of subcutaneous tissue, and considerations given to using a shorter flap with less undermining.

Most face-lift skin necrosis is minor and occurs in the postauricular area, because this area is the farthest away from the random blood supply to the flap. Also, maximal tension is usually placed along the postauricular closure, and this contributes to vascular compromise.

When skin necrosis does occur, a black eschar forms that separates at 5 to 7 days, and the wound then heals by secondary intention. There is nothing that can be done for skin that has undergone actual cell death, but the extent of skin loss may be influenced by a variety of factors. There is usually a segment of skin whose vascular supply is irreversibly compromised that is surrounded by skin with relatively diminished blood flow. It is the skin with diminished blood flow that the clinician should concentrate on, since there is the possibility of preserving it by timely intervention. Signs of diminished blood flow are extreme pallor without capillary refill of marked cyanoses and congestion, depending on whether it is an inflow or outflow obstruction. This compromised skin is extremely susceptible to other factors that may affect its blood supply, such as pressure, edema, tension, infection, or vasoconstriction (from cold or nicotine). As soon as an area of skin necrosis is recognized, one should minimize the amount of additional surrounding skin loss by taking the following steps: (1) make sure all hematoma is evacuated; (2) avoid pressure dressings; (3) if significant tension remains along the suture line, consider releasing sutures; (4) keep the patient's head elevated; (5) consider prophylactic antibiotics and/or steroids; and (6) institute a strict "no

smoking" policy. If there is an area of skin that is not definitely necrotic, anecdotal evidence suggests that hyperbaric oxygen may help. Once skin necrosis has occurred, most authorities agree that moist dressings with frequent changes and conservative debridement are appropriate, avoiding aggressive debridement and hasty scar revision.

Reassurance should be given to the patient, because most areas of minor skin necrosis heal secondarily without serious sequelae. In some instances, later scar revision, flap advancement and scar resection, or cosmetic camouflage can be recommended. However, a minimum of 3 to 6 months should elapse to allow for adequate scar maturation. Major skin sloughs may require more involved reconstruction with tissue expanders or serial excisions.

Nicotine has been implicated as a factor in predisposing patients to skin necrosis by affecting several aspects of wound healing: impairment of the inflammatory phase of healing, alterations of epithelialization, and compromise of small vessel blood flow. Rees and associates reported in a retrospective series that 80 per cent of patients with skin slough were smokers. They calculated that in smokers there is a 7.5 per cent incidence of skin slough compared with 2.7 per cent in non-smokers. Webster and colleagues advocated more conservative undermining in face-lift patients who smoke. Using a short flap technique, these authors noted no instances of skin necrosis in a study of 407 patients who smoked.

Facial Nerve Injury

Injury to the facial nerve is catastrophic for the patient as well as the surgeon. Although this complication is standardly addressed during the obtaining of informed consent, the actual incidence of facial nerve injuries is quite low. McCollough and associates reported 0 per cent permanent and a 0.084 per cent temporary nerve injuries in a series of 1188 face-lift patients. As previously mentioned, Baker reviewed the available literature, identified a number of series reporting on a total of 7000 patients, and found 55 (0.7 per cent) cases of facial paralysis. Of these 55 cases, there was recovery in 48, and 7 (0.1 per cent) were permanent.

The injection of local anesthetic accounts for the vast majority of cases of immediate postoperative paresis of facial nerve branches. Injection into the proper plane should maintain function in the cheek and neck area. The temporal branch is more superficial, and local injection of local anesthetic for temporal undermining often affects this branch. Recovery for movement occurs within 12 hours.

Permanent paralysis most often affects the temporal or marginal branches. These branches are more superficial and have less cross-over anastomosis compared with the other branches of the facial nerve in the midface.

Although microscopic repair and primary anastomosis are recommended if the nerve is transected at the time of surgery, the surgeon rarely recognizes an injury until the postoperative period, after the local anesthetic has metabolized. Reexploration at this time is fraught with hazard that further compromises flaps: developing hematomas, infection, and postoperative edema make nerve identification difficult.

Causes other than transection cited for facial nerve injury include:

1. Cautery heat trauma.

2. Plication or suspension sutures entrapping a branch of the nerve.

3. Inadvertent clamping of the nerve when vessels are ligated.

4. Postoperative edema causing nerve compression.

5. Coincidental facial nerve palsy such as Bell's, Melkersson-Rosenthal syndrome, or Ramsay Hunt syndrome.

Careful dissection and knowledge of facial nerve anatomy are prerequisites for avoiding nerve injury. Bipolar cautery is also advocated. If it becomes apparent that the paresis is not due to the local anesthetic, the patient will require support and reassurance. More than 80 per cent of facial nerve injuries recover within 6 months of surgery. If adequate animation does not return after an appropriate time, various procedures can be performed to improve symmetry such as transection of the contralateral intact temporal branch, or reanimation techniques such as nerve-muscle pedicle grafts, eyelid springs or weights, or temporalis muscle transfer, depending on the neurologic deficit and the patient's wishes.

Infection

With the excellent vascularity of the face, infection is rarely seen after rhytidectomy. Use of prophylactic antibiotics perioperatively is now routine, but studies based on other types of head and neck surgery indicate that prophylactic antibiotics may not affect the infection rate. However, the avoidance of any untoward result is important, and antibiotics are commonly used.

Wound Dehiscence

Separation along the wound margins occurs rarely, but can be troublesome in terms of minimizing the incisional scar. The postauricular area where the most tension is applied is the most common site for dehiscence.

Conservative skin excision and a double-layered closure should be implemented if there is a question of an unusually tight closure.

Small separations can be treated conservatively by reassuring the patient and providing topical hydrogen peroxide and antibiotic ointment. These usually heal within 2 to 3 weeks. Larger wound dehiscences may require freshening of the wound edges and resuturing to achieve a primary closure. Alternatively, allowing for healing by secondary intention can be followed later with a scar revision, if necessary.

Hairline Alteration

Hairline changes should be anticipated by the well-informed patient. Patients undergoing secondary or "tuckup" face lifts may wish to preserve their neck and temporal hairlines. Other patients who prefer shorter hair styles and longer sideburns also may not wish to have their hairline altered.

As already discussed, the incision may be varied in such a way that hairlines are preserved, but this comes at the price of having the incisions bordering non-hair-bearing skin. Incisions close to the hairline may become visible and generally require longer hair styles for maximal camouflage.

Depression

It is not uncommon for patients to develop depression during the first postoperative week. The surgery is often associated with high anxiety and expectations of dramatic results. In the first postoperative week there is a letdown both from release of anxiety and the presence of normal postoperative ecchymosis and edema. Patients, even though informed of postoperative healing, are often unable to accept the facial distortion associated with surgery. In addition, they are often isolated from social contacts during the healing phase and lose important sources of support. These patients must be reassured by the surgeon and be seen as frequently as necessary to provide the psychological support to get them through this vulnerable time.

Delayed Complications

Delayed complications have been arbitrarily designated as those occurring after 1 week. Minor hematomas can occasionally occur after the first postoperative week and are easily evacuated with needle aspiration. These hematomas may follow trauma to the flap during sleep or hair washing. Sometimes they occur for no obvious reason and are presumed to arise when a previously coagulated vessel opens.

Hypertrophic Scars and Keloids

Hypertrophic scars and keloids develop as the incisions heal. The most frequent site of occurrence for these disorders of healing is in the postauricular region, followed by the preauricular portion of the incision. The surgeon should allow for adequate scar maturation before attempting to revise these scars. To intervene before complete scar maturation only perpetuates the process.

If a hypertrophic scar or keloid is recognized early enough, injectable steroids (Kenalog) in low concentrations (8 to 10 mg per mL) can be utilized every 1 to 2 weeks until the scar softens. Extreme caution should be used with steroid injection because overuse may cause skin atrophy.

It is important to distinguish between hypertrophic scars and true keloids. Hypertrophic scars are raised areas of excess collagen deposition that correspond to the original incision. Hypertrophic scars usually form in response to a local factor that is deleterious to primary

healing, such as too much tension, infection, or skin slough. Keloids are a true pathologic process in which the fibroblasts and collagen deposition extend beyond the original incision. Hypertrophic scars can usually be significantly improved by simple excision after they have matured. Keloids are notorious for recurring after excision even with steroid injection. Conservatism should be used with excision of keloids because large amounts of tissue can end up being resected in multiple attempts to eradicate these unsightly scars. Reported alternative methods of controlling keloids are custom-tailored Jobst garments to place pressure on the keloids or low-dose radiation (400 to 1800 Gy), which retard fibroblast growth and proliferation.

We advise patients to avoid turning the neck for 2 weeks after surgery. Increased tension on the suture line, especially with frequent head turning, is believed by some to increase scar formation.

Alopecia

Hair loss may occur along the incision line as a result of thermal injury from excessive cautery to the scalp edges, failure to bevel the hairline incisions parallel to the hair shafts, and failure to secure the hair carefully on either side of the incision before making the incision (although this is temporary).

Also, if the hair-bearing flap is closed under tension, the resulting compromised vascularity may jeopardize the hair follicles and cause alopecia around the scar. Some patients, especially females, may notice hair thinning throughout the entire scalp. The stress of surgery appears to cause the hair follicles to undergo telogen effluvium and may cause temporary widespread hair loss.

With the forehead lift, postoperative pruritus due to sensory nerve regrowth may induce constant scratching that results in traction alopecia.

Remedying postoperative hair loss requires proper diagnosis of the cause. With simple telogen effluvium, the hair eventually returns and reassurance of the patient is all that is required. Persistent alopecia that develops along the incision may be effectively treated with simple scar excision and primary reapproximation after suitable wound maturation has taken place. Occasionally, transplantation of hair plugs improves areas of localized alopecia not amenable to scar revision.

Facial Asymmetry

Facial asymmetry usually resolves as the edema subsides. Any preoperative asymmetry must be pointed out to the patient before surgery, because this will persist postoperatively and at times may be accentuated.

Careful placement of the SMAS sutures and skin flap rotation helps to eliminate iatrogenic facial asymmetry.

If the asymmetry is marked, the flaps can be repositioned after allowing for adequate healing.

Earlobe Distortion

Excessive tension on the lobule causes elongation and gives a "pixie" appearance. This can be avoided by carefully tailoring the skin flap so that minimal tension is applied to the mobile portions of the auricle.

Surgical revision may be required if the lobule is significantly distorted, and various procedures have been described. Once the lobule has been distorted, it may be difficult to return it to its normal appearance. Release of the lobule with a V-Y advancement is often effective. Occasionally a local flap or full-thickness skin graft may be required.

Hypesthesia

Patients should be forewarned that hypesthesia will result after face-lift surgery; it is usually temporary and resolves in 4 to 6 weeks. During this time patients are warned to avoid possible injury to the anesthetized ear or cheek flap by razors (in men), curling irons, hot air hair dryers, and so forth. If the proper plane of dissection is not maintained, it is possible to injure the great auricular nerve and cause permanent anesthesia. Care should also be used when placing plication sutures that may entrap the nerve. Occasionally a transected great auricular nerve presents as a painful neuroma. These neuromas are best treated with excision and ligation of the nerve stump or reanastomosis of the proximal and distal ends if they can be identified.

Rhytidectomy is the primary form of treatment for the aging face. It seeks to reverse the effects of gravity and relaxation of the facial skin and fascia by resuspending the facial units and eliminating excess skin and subcutaneous tissue. There are wide variations in the reported techniques of face-lift surgery, and we have attempted to provide a broad overview of commonly accepted techniques that have been shown to be both efficacious and safe. Using this approach, coupled with a thorough knowledge of the anatomy, the facial plastic surgeon should be able to achieve consistently good results with minimal morbidity.