

Cosmetic Procedures for the Aging Face

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The United States' population is aging dramatically. Today approximately one in eight Americans is 65 years or older [1]. The average life expectancy for men in 1935 was 60 years and that for women was 64 years. By 1998 the average life expectancy had increased to 72 years for men and 79 years for women [2]. There has been an eleven-fold increase in Americans 65 years or older since 1900, whereas there has only been a threefold increase in those younger than 65 years of age. The increase in life expectancy at 65 years has increased even more impressively. The average woman reaching 65 years of age could now be expected to live to 84 years, and the average man reaching 65 years of age can expect to live to 81 years. In one generation life expectancy for those reaching age 65 years has thus increased 17%, whereas life expectancy at birth has increased by 8% [2].

This population shift has been mirrored by quality of life issues: the importance of staying healthy through exercise, diet, and behavior modification has become increasingly apparent to patients and health care workers. Published data to document the impact on quality of life following cosmetic surgery in elderly patients are sparse. These aging factors, health-related issues, and the increasing emphasis on youth and vigor, however, have all played a role in the dramatic increase in popularity of cosmetic procedures [3]. In the past 50 years cosmetic surgery procedures have gone from being operations performed infrequently for a small subset of the population to being some of the most common procedures performed in the United States. Recent American Society of Plastic Surgery statistics estimate that 3,000,000 individuals were injected with botulinum toxin A for cosmetic purposes in 2004 [4]. According to the 1998 American Society of Plastic Surgeons' statistics there was an increase of 113% in the number of plastic surgery procedures performed in patients older than 65 years of age between

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1996 and 1998 [5]. Similarly the Academy of Facial Plastic and Reconstructive Surgery has reported a doubling in the number of procedures performed on individuals in the eighth decade of life and a quadrupling of procedures performed on individuals in their ninth decade of life [6].

This article addresses the aging face and means of minimizing or reducing the aging process. A brief description of ideal facial proportions is followed by an analysis of the components of the aging face, including changes in the skin, soft tissue, and bone. A brief review of the surgical procedures used to address these aging problems is then presented.

Ideal facial proportions

Although artistry is an important aspect of aesthetic surgical correction of the aging face, objective measures play an important part in facial analysis. The norm, or the ideal, must be appreciated if the abnormal is to be corrected.

Several schemata have been developed for frontal and profile analysis. The following outline is extremely useful because it is simple, straightforward, and amenable to rapid analysis in the office setting.

In the frontal view, horizontal lines are drawn at the apex of the eyebrows, through the medial canthi, through the base of the nose, through the corners of the mouth (commissures), and through the inferior aspect of the chin (Fig. 1). In the ideal face the vertical distance from the brow

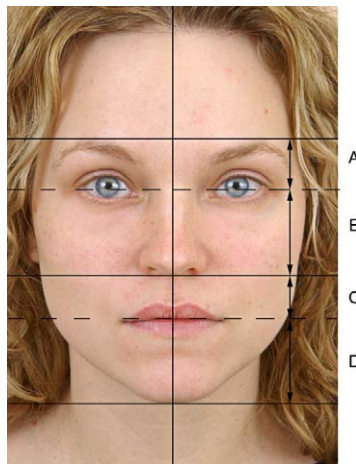


Fig. 1. Schematic drawing of the ideal facial proportions in the frontal view. The vertical distance from the top of the brow to the medial canthus (*A*) is roughly equal to the vertical distance of the upper lip (*B*). Similarly, the distance from the medial canthus to the base of the nose (*C*) is roughly equal to the vertical distance from the corner of the mouth to the inferior aspect of the chin (*D*). Finally, the vertical distance of the upper lip (*C*) is roughly equal to one half of the length of the chin (*D*).

to the medial canthus is roughly equal to the vertical distance from the base of the nose (alar base) to the corner of the mouth. Similarly the vertical distance from the medial canthus to the base of the nose is roughly equal to the vertical distance from the corner of the mouth to the inferior aspect of the chin (see Fig. 1). Finally the vertical length of the upper lip (distance from the base of the nose to the corner of the mouth) is equal to roughly one half of the vertical length from the commissure to the inferior aspect of the chin. With facial aging, these distances often change, with a resultant adverse affect on facial appearance (Fig. 2).

Profile analysis similarly can be rapidly performed in the office setting. With the patient in straightforward gaze a horizontal reference line is drawn from orbitale (infraorbital rim) to the top of the external auditory canal. A vertical line is then constructed perpendicular to this horizontal line and tangent to the glabella (Fig. 3C, D). This construct corrects for head tilt. The ideal female chin falls slightly behind this line, whereas the ideal male chin falls directly on this line.

Reidel's line is also a popular means of assessing upper lip, lower lip, and chin position. In the ideal lower face the chin falls on a line connecting the anteriormost projection of the upper and lower lips (Fig. 3E, F).

Changes associated with the aging face

Facial aging is a complex interaction between heredity and environment [7,8]. Clearly some of these factors are controllable and others are not. Of



Fig. 2. A 64-year-old woman before (*left*) and after (*right*) hairline browlift. Preoperative photograph demonstrates the adverse affect of a decrease in vertical height of the brow (a). Postoperative photograph demonstrates the beneficial affect of restoring this vertical dimension (a').

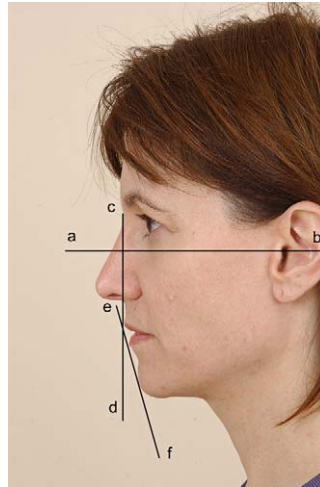


Fig. 3. Frankfort's horizontal (*line a-b*) is constructed from orbitale to the top of the external auditory canal. A vertical line is constructed perpendicular to Frankfort's horizontal and tangent to the glabella (*line c-d*). The chin should fall just posterior to this line (*line e-f*).

the extrinsic factors, it has become well known that sun exposure is the most deleterious [9–11]. Although sun exposure is cumulative over an individual's lifetime, it is estimated that approximately 50% to 75% of an individual's lifetime sun exposure occurs by the age of 20 years [11].

The Glogau classification (Table 1) objectifies the degree of skin wrinkling and is helpful when comparing one patient with another [12]. A Glogau I individual has wrinkles only with animation, whereas a Glogau IV patient has severe photoaging with wrinkles at rest throughout the face. Sun-damaged skin is characterized by epidermal atrophy, a flattening of the rete ridges, and a thinning of the epidermis. There is a marked disorganization of collagen and elastin, and keratinocytes lose their alignment [11,13]. Dyschromia is seen in the epidermis and melanocytes enlarge and occupy higher levels of the epidermis. Chronic stimulation of the melanocytes leads to irregular hyperpigmentation, dyschromia, and hyperkeratosis.

The dominant change in photo-aged dermis is hyperplasia of elastic tissue with near complete disorganization. Large quantities of thickened, degraded, elastic fibers are seen under the microscope. Collagen bundles are in disarray and ultimately disappear in sun-damaged skin [14]. Retin-A reverses many of these changes and results in a thickening of the epidermis, a regularization of collagen bundles, and increased vascularity [15,16]. This increase in vascularity is seen clinically by the pink hue that many patients have following retin-A treatment. It is because of these documented changes that retinoic acid is a mainstay of many skincare programs. Skin thickness in women reaches a maximum in one's mid-thirties. Thickness gradually decreases from that time on [13,17].

Table 1
Glogau classification

Type 1, no wrinkles	<ul style="list-style-type: none"> Early photoaging Mild pigmentary changes No keratoses Minimal wrinkles Younger patient, 20s to 30s Minimal or no makeup
Type 2, wrinkles in motion	<ul style="list-style-type: none"> Early to moderate photoaging Early senile lentiginos visible Keratoses palpable but not visible Parallel smile lines beginning to appear lateral to mouth Patient age, late 30s to 40s Usually wears some foundation
Type 3, wrinkles at rest	<ul style="list-style-type: none"> Advanced photoaging Obvious dyschromia, telangiectasia Visible keratoses Wrinkles even when not moving Patient age, 50s or older Always wears heavy foundation
Type 4, only wrinkles	<ul style="list-style-type: none"> Severe photoaging Yellow-gray skin Prior skin malignancies Wrinkled throughout, no normal skin Patient age, sixth or seventh decade Cannot wear makeup because it cakes and cracks

Adapted from Glogau RG. Chemical peeling and aging skin. *J Geriatr Dermatol* 1994;2:5–10.

Cigarette smoking clearly has a deleterious effect on the aging face. Nicotine, a potent vasoconstrictor, is known to have an adverse affect on wound healing [18]. Clear documentation of a dramatic increase in facelift complications has been demonstrated by Reese and Aston, who documented a significant increase in skin slough following facelifts in active smokers [19].

Intrinsic aspects of facial aging are more difficult to control. These are related to skin type, soft tissue distribution, and bone structure. The Fitzpatrick skin classification is an effective means of analyzing skin type [20]. This classification rates skin types from I to VI, that is, light-skinned individuals who burn readily and never tan (Fitzpatrick I) to dark-skinned African Americans (Fitzpatrick IV) (Table 2). This classification system is helpful in predicting the degree of aging for a given amount of sun exposure and reactions to and efficacy of intermediate and deep peeling techniques.

Clinically, a female who has a Fitzpatrick I skin type (fair hair, fair skin, blue eyes, readily burns, never tans) is more susceptible to the adverse effects of sun exposure and develops more advanced facial aging (fine and coarse rhytides) over time than does a similarly-aged woman who has a darker complexion. Fine lines such as the vertical lines in the upper lip and the laugh lines lateral to the lateral corners of the eyes are caused by vertical attachments that run from the superficial fascia to the dermis (Fig. 4). These

Table 2
Fitzpatrick skin classification

Skin type	Color	Reaction to UVA	Reaction to sun
Type I	Caucasian; blond or red hair, freckles, fair skin, blue eyes	Very sensitive	Always burns easily, never tans; very fair skin tone
Type II	Caucasian; blond or red hair, freckles, fair skin, blue eyes or green eyes	Very sensitive	Usually burns easily, tans with difficulty; fair skin tone
Type III	Darker Caucasian, light Asian	Sensitive	Burns moderately, tans gradually; fair to medium skin tone
Type IV	Mediterranean, Asian, Hispanic	Moderately sensitive	Rarely burns, always tans well; medium skin tone
Type V	Middle Eastern, Latin, light-skinned black, Indian	Minimally sensitive	Very rarely burns, tans very easily; olive or dark skin tone
Type VI	Dark-skinned black	Least sensitive	Never burns, deeply pigmented; very dark skin tone

lines are more noticeable in the Fitzpatrick I and II females, not only because of their thin skin but also because of their lack of subcutaneous tissue. The lack of subcutaneous fat allows the muscles of facial expression to have a more significant impact on these rhytides. Vertical rhytides in the upper lip are almost never seen in males. It is believed but not proven that this is

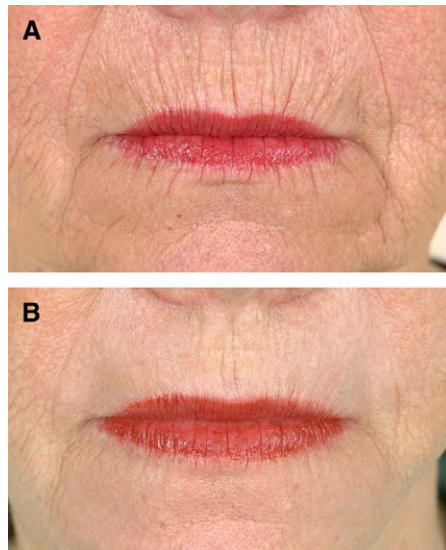


Fig. 4. Vertical wrinkles of the upper lip are caused by attachments between orbicularis muscle and dermis (A). These can be effectively treated by CO₂ laser resurfacing (B).

caused by the thicker subcutaneous tissue in the upper lip of the male when compared with the female.

Although the onset of the characteristic appearance of facial aging may vary from individual to individual, it follows a consistent pattern. Changes in the upper face generally occur first [21]. These are characterized by a descent of the brow and the development of laugh lines (or crow's feet) with animation, usually beginning in the thirties (Fig. 5). Also in the thirties, vertical lines occur between the medial aspects of the eyebrows secondary to contraction of the corrugator supercilii muscles. These are first seen only with animation, but with time they become present at rest also. These upper face fine rhytides become more pronounced in the fourth, fifth, and sixth decades of life (Fig. 6).

Horizontal forehead wrinkles become noticeable generally in the forties. These lines are exacerbated by brow descent. The patient attempts to clear upper skin excess by activating the frontalis muscle leading to deepening of the horizontal forehead lines. Brow descent combined with loss of skin elasticity in the upper eyelids leads to upper eyelid skin excess and loss of the natural eyelid folds. As the combination of brow descent and laxity of the upper eyelid skin continues through the fifties, sixties, and seventies, it can ultimately lead to the functional problem of loss of visual fields in the superior and superolateral quadrants. This then becomes a medical problem (see Fig. 6).



Fig. 5. The effect of facial aging with time in this daughter and mother. The daughter is age 41 years (*A*) and the mother is age 70 years (*B*). The daughter has minimal signs of facial aging (laugh lines with animation). The mother has developed increasing signs of aging, including brow ptosis, skin excess of the upper lids interfering with superior lateral visual fields, a hollow at the lower-lid cheek junction, vertical rhytides in the upper lip, down-turned corners of the mouth, jowls, and skin excess in the lower face and neck, respectively.



Fig. 6. Vertical rhytides (frown lines above the nose and between the medial aspects of the eyebrows) become more pronounced in the fifth, sixth, and seventh decades of life. These frown lines are apparent in this 62-year-old woman in the preoperative photograph (*A*). The same patient following hairline browlift (*B*), which has elevated the eyebrows, corrected the vertical rhytides, and lowered the hairline.

Lower lid bags may become visible as early as age 40 years and are predominantly caused by a loss of strength of the orbital septum, allowing orbital fat to bulge. The lower lid bags can be complicated by muscle laxity, lower lid laxity, and skin excess.

In the mid face, facial aging occurs predominantly because of descent of the malar fat pads and developmental laxity in the zygomatic cutaneous, the upper masseteric cutaneous, and the mandibular cutaneous ligaments (Fig. 7).

Deepening of the nasolabial folds and jowl formation, the classic hallmarks of facial aging in the mid and lower face, are caused primarily by the combined descent of the malar fat pad and the progressive laxity in the zygomatic cutaneous and upper masseteric cutaneous ligaments. This soft tissue mass continues to descend until it reaches the nasolabial fold region, where the dermis is adherent in the perioral area. This area acts as a check ligament and prevents further descent. This adherence extends from the nose to the corner of the mouth at the nasolabial fold and then from the corner of the mouth toward the submental area at the marionette cutaneous ligaments, and finally coalesces with the submental ligaments, forming a circle around the perioral area. The nasolabial fold thus begins to deepen in the thirties and progressively deepens during the fifth, sixth, and seventh decades and beyond.

The jowl area is formed predominantly because of laxity of the masseteric cutaneous ligaments. The lower facial fat descends similarly as described for



Fig. 7. This 64-year-old woman demonstrates aging in the upper face characterized by lower lid bags, malar fat pad descent, deep nasolabial folds, and jowling (*A*). Photograph on the right (*B*) demonstrates same patient 1 year following facelift and hairline browlift with correction of these problems of facial aging.

the malar fat pad until it reaches the marionette cutaneous ligament area, which again, acts as a check to further descent medially and inferiorly. The jowl is, therefore, composed of soft-tissue fat that overhangs the lower jaw border and coalesces with the marionette lines caused by the marionette cutaneous ligament adherence.

Laxity in the lower face is transmitted to the neck because of the lack of bony attachments of the platysma muscle. In addition, there is inherent laxity that develops in the platysma itself. This is combined to a greater or lesser degree with inherent skin laxity and the deposition of submental or subplatysmal fat. This combination leads to an obtuse cervicomenal angle and a loss of lower jaw definition (Fig. 8).

In addition to laxity of skin and ligaments and soft-tissue descent, further deflation of the skin envelope seems to occur because of atrophy of the soft tissues of the face. This further exacerbates the relative skin excess.

Bony changes also occur with facial aging. Bone atrophy seen in the upper and lower jaw, however, is almost totally caused by tooth loss. This results in the loss of vertical height of the alveolar process of the maxilla and mandible. This loss of the alveolar process bone leads to a reduction in lower vertical facial height, overclosure of the bite, and pseudoprogathism. These bony problems must be corrected by prosthodontic means and should be addressed before surgery for facial aging [22].



Fig. 8. This 62-year-old woman demonstrates the characteristic findings of facial aging in the lower face and neck preoperatively (*A, B*). This includes jowling, skin laxity in the neck, and deposition of fat in the neck area. Postoperative view demonstrates correction of the lower face and neck (*C, D*).

Lips and perioral area

Facial aging also occurs in the perioral area. As previously mentioned, vertical perioral rhytides caused by vertical attachments of the orbicularis muscle to the dermis of the upper and lower lips begin and are noticeable only with animation in the fifth decade. They become progressively more noticeable in the sixth and seventh decades, ultimately becoming present at rest. These “smoker’s lines” are caused by the vertical attachments that extend from the orbicularis oris muscle to the dermis. In addition, the upper lip tends to lengthen with age, whereas the upper and lower lips thin and

invert, ultimately covering the upper teeth and exposing the lower teeth, giving the patient an edentulous appearance (see Fig. 4).

Surgical correction

The most effective approach to facial aging addresses all of the areas mentioned. That is, when ideal facial proportions are not realized, bony alteration using osteotomies or alloplastic implants are used to restore ideal facial form. In the facial-aging patient, this most commonly means correction of the sagittally-deficient chin with a chin implant. Correcting the sagittal deficiency makes neckline correction significantly easier. Mid-face descent, cheek laxity, jowling, and platysmal laxity are corrected by facelifting procedures, of which there is a large variety [23,24] (see Figs. 7 and 8). Forehead and eyelid correction are treated by a combination of browlifting and upper lid blepharoplasty (see Fig. 6).

Although these operations are the hallmark for the correction of facial aging, correction of surface skin abnormalities or quality of skin issues also needs to be addressed. This can be done before or concomitant with the surgical procedures mentioned [25]. Correction of dyschromias, irregularities in pigment, and some improvement in fine lines can be accomplished nonsurgically with the use of combinations of retin-A, hydroquinone, vitamin C, and alphahydroxy acids. Intermediate (trichloroacetic acid, erbium laser resurfacing) and deep (CO₂ laser, phenol-croton oil peels) can be used for the correction of deeper rhytides at the time of surgery or as an isolated treatment (see Fig. 4). Current trends, however, have veered away from the deeper peeling techniques because of the associated significant downtime. The more superficial nonablative techniques have gained popularity. Deep rhytides, however, respond only to more aggressive resurfacing modalities.

In addition, botulinum toxin A alone or in combination with fillers is perhaps the most popular procedure for the aging face [26]. Botulinum toxin A is most effective in the eyelid and forehead areas (upper face). Fillers, such as hyaluronic acid gel, hydroxyapatite micro particles, and collagen varieties are most effective in the lower face. Judgment needs to be used, however, when treating elderly patients with fillers and botulinum toxin A. Fillers are most effective in patients who have good skin elasticity and in those who do not demonstrate significant degrees of skin excess. In the elderly patient who has significant skin excess, however, such as the patient who has deep nasolabial folds (Fig. 9), skin excision is a far better answer than hyaluronic acid gel or other fillers. This is because the skin envelope is deflated and a large amount of filler (and significant cost) is required to refill this deflated skin envelope.

Similarly, botulinum toxin A alone is not the best answer for deep rhytides present in the glabellar area. Paralysis of the muscle alone by botulinum toxin A does not ablate this longstanding deep wrinkle. This patient requires botulinum toxin A to paralyze the muscle and a filler to fill the wrinkle present at rest.

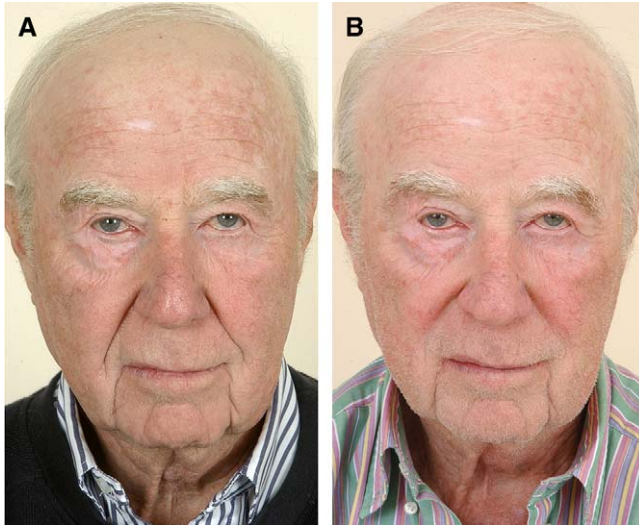


Fig. 9. A 78-year-old gentleman who had deep nasolabial folds preoperatively (A). This patient is not a good candidate for fillers. Direct excision of the nasolabial folds (B), however, yields significant improvement with minimal scarring.

Surgical techniques

Traditional surgical techniques used for the correction of facial aging can be applied to a range of ages from the forties to the eighties [27]. In the authors' practice, however, we make several compromises in the elderly group arbitrarily defined as 70 years and older. In this patient group, efforts are made to minimize the length of surgery and the length of recovery time. This can be done by substituting direct excision techniques for more aggressive ones or by combining direct excisions with standard rejuvenating procedures [24]. Further, it should be emphasized that the physiologic rather than the biologic age is a critical factor in deciding whether or not a surgical procedure is appropriate. There are data in the literature to support the premise that elderly patients (>75 years) have no higher complication rate following aesthetic surgery when compared with patients 65 years or younger when both groups are ASA 1 or ASA 2 [28]. With proper preoperative screening, elderly patients may well be considered for cosmetic surgical procedures. Traditional procedures and those procedures particularly useful in the elderly patient are detailed briefly.

Skin resurfacing

Most elderly patients who are candidates for correction of facial aging benefit from skin resurfacing. All patients are begun on a preoperative regimen including retin-A with or without 4% hydroquinone, depending on their degree of dyschromia. Retinol is substituted for those patients who

are skin sensitive and cannot tolerate retin-A. The so-called superficial or nonablative lasers are most helpful for the correction of dyschromia, rosacea, and telangiectasias. They are only mildly effective for fine lines. Furthermore, these techniques require multiple (usually five) sessions for the greatest affect.

For deeper rhytides, including perioral, cheek, and periocular rhytides, CO₂, CO₂-erbium laser, or phenol-croton oil peeling is most effective. Each of these procedures, however, requires significant downtime. Dermabrasion is particularly effective in the perioral area while not requiring the same depth of injury as CO₂ or phenol-croton oil. All patients who undergo resurfacing should be treated prophylactically with antivirals. The authors do not use intermediate or deep resurfacing techniques at the time of facelift in the area of skin undermining, such as the cheeks. A common preferred approach is resurfacing of the perioral area with intermediate modalities at the same time the facelift is performed (Fig. 10). Although most elderly patients seeking facial rejuvenation would benefit from browlifting, patients often decline because of the scars involved or the invasiveness of the procedure. Endoscopic techniques have reversed this trend to some degree.

Choice of browlifting technique depends on the forehead height, the degree of brow ptosis, and the heaviness of the forehead skin. Endoscopic techniques are chosen for those patients who have normal or low forehead



Fig. 10. A 74-year-old woman who had facial aging and deep vertical wrinkles of the upper lip preoperatively (A) and 1 year postoperatively (B) following facelift and CO₂ laser resurfacing of the perioral area. Used with permission from Zins JE, Moreira-Gonzalez A. *Advances in facial aesthetic surgery: new approaches to old problems and current approaches to new problems. Tissue Surg* 2005;6:107.

height and mild to moderate brow ptosis. This produces only small scars that are placed in the hairline.

If the forehead is high or if the patient prefers to have their hairline lowered, however, a browlift performed at the forehead–hairline junction is the procedure of choice. Non–hair-bearing skin is thus removed, the brow is elevated, and the hairline can be lowered by dissecting posteriorly (see Figs. 6 and 7).

In elderly women, a horizontal temporal ellipse can be performed lateral to the eyebrow with minimal morbidity and a surprisingly good scar. For elderly men, the direct browlift performed at the superior aspect of the eyebrows bilaterally can be performed also with minimal recovery time. This scar can also be surprisingly good when properly performed.

For those patients who have significant brow ptosis, heavy forehead skin, and significant skin excess, skin needs to be excised and a hairline or coronal browlift needs to be performed [29].

Face and neck

This procedure is the mainstay for the correction of facial aging and is the best means of addressing the cheek laxity, nasolabial folds, jowls, and neck [23]. All modern facelifting techniques combine skin undermining with some manipulation of the superficial fascia or superficial muscular aponeurotic system (SMAS). In most instances of primary facelifting, the platysma muscle also needs to be addressed through a submental incision. Significant skin excess is usually present in the elderly patient undergoing facelift surgery [30,31]. For this reason, pure sub-SMAS procedures seem to be less effective as procedures that separate the skin from the SMAS in the dual-plane facelift (Figs. 10 and 11). In addition, a basic tenet of plastic surgery is that skin excess is best addressed where this skin laxity is the greatest. In those patients who have significant skin excess in the nasolabial folds or in the marionette cutaneous ligament area, direct excision of this skin is therefore most effective, either in combination with a facelift or as an isolated procedure (see Fig. 9).

For men who present in their mid-seventies and older wanting correction of the turkey gobbler deformity only and who are interested predominantly in profile and neck change, direct excision of neck skin with a platysmaplasty and Z-plasty on the skin is an effective and well-accepted procedure [24]. For men who have significant skin excess in the neck area, this procedure actually affords a better neck correction with less recurrent skin laxity than does a standard facelift procedure (Fig. 12).

The aging mouth

The aging upper and lower lips are characterized by vertical perioral rhytides and at times a long upper lip, a thin vermilion, and down-turned corners of the mouth. These findings of lower face aging are most amenable to direct local procedures. As mentioned, deep perioral rhytides are best



Fig. 11. A 73-year-old woman who had facial aging including jowling, marionette lines, and neck laxity preoperatively (*A*) and 1 year following endoscopic browlift and dual plane facelift (*B*). Preoperative profile (*C*) and postoperative profile (*D*).

treated by deep resurfacing techniques using the CO₂ laser, dermabrasion techniques, or phenol-croton oil peeling.

Less deep vertical rhytides are often best treated by undermining of the vertical wrinkles with an 18-gauge needle placed through the vermilion, combined with fillers of fat or Restylane injected along the vermilion cutaneous junction (Fig. 13). The thin upper and lower lips can be treated with fillers, such as fat or Restylane or by direct lip-lifting techniques. If a filler is to be used, care must be taken to assess the position of the upper lip in reference to central incisors. If the patient has minimal upper incisor show, filling techniques may further mask the show, covering the upper incisors and



Fig. 12. A 76-year-old man who had neck laxity preoperatively (*A*) and 1 year postoperative view following direct excision of neck skin and Z-plasty (*B*).

giving the patient an unattractive appearance. This patient would be better treated with a lip lift.

Down-turned corners of the mouth are best treated by a triangular excision of skin at the vermilion cutaneous junction laterally stopping at the



Fig. 13. Preoperative view of a 45-year-old woman who had mild vertical rhytides of the upper lip (*A*) and postoperative view following skin undermining with 18-gauge needle and fat injection (*B*).

commissure. With careful closure these incisions are well tolerated (Fig. 14).

Soft tissue augmentation

As mentioned, physiology of facial aging includes the loss of skin elasticity, the descent of soft tissue, and the loss of soft-tissue volume. Volume restoration has become part of many facelift procedures. The most common material used for augmentation during facelifting or for augmentation alone is fat. It is easily harvested and because it is autogenous, side effects are minimal. Resorption of autologous fat is unpredictable, however, and occurs in all cases at least to some degree. This technique has been championed by Coleman and others [32,33]. His results are unsurpassed. The authors' technique is to augment those patients who have soft-tissue volume loss with fat injections to the mid-face and cheek areas at the time of facelift surgery. Fat can also be used secondarily for the correction of postoperative soft-tissue irregularities. To date, hard scientific data documenting consistent volume maintenance are lacking.

The long-term correction of the mild to moderate soft-tissue deformity of the face therefore still eludes us. Currently several alloplastic soft-tissue augmentation materials are available and FDA approved. Bovine and human collagen has been available and FDA approved for the longest period of



Fig. 14. Preoperative view of a 60-year-old woman who had down-turned corners of the mouth (A) and postoperative view following corner of the lip lift (B). Used with permission from Zins JE, Moreira-Gonzalez A. Advances in facial aesthetic surgery: new approaches to old problems and current approaches to new problems. *Tissue Surg* 2005;6:106.



Fig. 15. Pretreatment view of a 70-year-old woman who had deflation of her skin envelope and soft-tissue atrophy (*A*). Same patient 2 months following two treatments with poly-L-lactic acid (*B*). Note the restoration of facial volume with poly-L-lactic acid treatment.

time and has produced the most clinical experience with this natural filler of any of the fillers currently on the market. The volume maintenance is short lived, however, usually 3 to 4 months [34]. Restylane, which has been FDA approved for soft-tissue augmentation for nearly 2 years, has gained popularity for correction of lower face volume deficits [35,36]. Radiance is also available for similar use [35]. Poly-L-lactic acid is an interesting material recently approved for the correction of highly aggressive, antiretroviral therapy treatment in patients who have AIDS for their soft-tissue atrophy [37]. This polylactic acid is currently being used off-label for cosmetic facial soft-tissue augmentation (Fig. 15). It is used and injected in a manner similar to fat. The authors' experience with the lipodystrophy patients has been favorable, and it seems to be lasting long term.

Summary

As the population in the United States has aged and as cosmetic procedures have become more accepted and commonplace, patients from all age groups and all socioeconomic brackets are seeking improvement in facial aging. The ultimate impact of these procedures on the elderly person's quality of life remains to be determined. Ideal cosmetic approaches include correction of quality of skin, improvement in wrinkles and soft-tissue descent, removal of skin excess, and volume restoration. The physiologic age rather than the chronologic age is the most important factor in

determining the advisability of cosmetic surgery in the elderly population. Several nontraditional procedures can be used in combination with traditional procedures, such as face and browlifting, or can be performed alone to significantly improve the stigmata of facial aging and enhance quality of life.

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