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Personal Approach to the Aging Lower Lid and Face

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Today's aesthetic plastic surgeon is able to offer a spectrum of surgical procedures to rejuvenate the aging lower lid and facial units, based not only on the surgeon's on-going training and experience, but also on his/her knowledge of the particular procedure's safety, efficacy, reproducibility, persistence and cost. At the time of consultation and at surgery, the final procedural choices are based primarily on **anatomical findings**, but also on the individual's goals, expectations and lifestyle needs.

Recently, aesthetic surgeons have been made aware of results obtained from computerized superimposition and GIF animation studies[1-2] suggesting that **skin ptosis** may not be the principal mechanism responsible for the interrelated changes observed in the aging lower lid and face. The results of these analyses implied that skin remained **static** for the most part during the aging process, while the **subdermal soft tissues** demonstrated regional **volumetric shifts** of relative losses and gains. Whether or not these conclusions are confirmed or modified as a result of future investigations, the significance of these findings has already impacted our current surgical viewpoints and procedures. Most contemporary surgical algorithms, therefore, offer a number of techniques that account for not only skin adjustments and tightening of the orbicularis oculi or SMAS units, but volumetric procedures such as soft tissue and fat **removal** or **transposition, filling with alloplastic implants** or **injections with microfat droplets.** The ultimate goal is an age-appropriate, individualized, and natural enhancement after lower lid and facial rejuvenation.

Current Clinical Considerations

Lower Lid Complex

Since the aged lower lid may exhibit different combinations and degrees of skin folds and wrinkles, skin dyschromia (pigmentation, shadowing, venous discoloration, and the bluish Tyndall effect of surfacing fat), fat bulges, lid laxity, and hollow indentations at the tear trough and lid-cheek junction, there exist by inference a variety of techniques available to achieve favorable outcomes, depending on the clinical situation. For example, a younger patient without skin excess may be concerned about slight protrusions of lower lid fat which, in turn, are magnified by the incipient hollows at the tear-trough and palpebro-malar junction. Utilizing a transconjunctival approach, these patients may be helped with either a conservative removal of fat or with a transposition of fat inferiorly into the hollow sites. Each technique, however, presents a number of shortcomings that must be explained to the patient prior to surgery. In my experience, the optimal amount of fat excision, that consistently results in a favorable outcome, is difficult at times to determine during surgery. Over-resection may exchange the original deformity to an iatrogenic focal hollow, while under-resection may require an additional surgery to smooth out the lid. Revisional surgeries within scarred beds oftentimes result in more unaesthetic and irregular lower lids. An inferior transposition of pedicled fat pads can also cause further undulations in both the lower lid and lid-cheek junction, because of volumetric shifting of fat under a delicate thin cover. Consequently, in cases with minimal fat protrusions, a more predictable but temporary result may be obtained either by suturing the capsulopalpebral fascia to the arcus marginalis to retroset the fat by reinforcing the overlying septum or volumizing the deficient sites with injections of microfat droplets that will mask the protrusions. In order to maximize the potential benefits of lipoinjection, however, pearls of fat should be injected just

above the bone, avoiding clumps of fat at a superficial level. As can be observed, the uneven lower lid presents major challenges to the surgeon because of the occurrence of volumetric deformations of overfill or underfill, which, upon correction, have the potential to create additional iatrogenic troublesome consequences.

Older patients may present not only with more visible fat bulges and hollowed areas, but also prominent skin folds, wrinkles, and possible involutional lid laxity. In these more advanced cases, surgical attention to correct excess skin folds and latent lid laxity may become necessary in addition to the management of bulges and hollows. An infraciliary approach is recommended to conservatively remove the skin folds and provide access to the underlying fibers of the septal orbicularis muscle. Intraoperative management of the fat under the septal orbicularis muscle is based on the preoperative findings in the upright patient. When the medial-central fat bulges are large and below the orbital rim, I am inclined to transversely split the septal orbicularis muscle from the lateral commissure to midpupillary line, and suture-fix each fat pedicle subperiosteally into the designated deficient sites of the medial tear trough and central palpebro-malar groove. Whenever substantial and pendulous fat pads are observed, however, my considered opinion is to remove first a conservative portion of the protruding fat pads that passively extend through the released septum and then transpose the remaining vascularized remnants inferiorly into the hollowed sites. If there are no clinical signs of lid laxity, the muscle is repaired and any excess skin prudently removed. If there are signs of lid laxity, a lateral-based muscle flap is developed and sutured upward under or over the lateral raphe to the lateral orbital periorbitum at Whitnall's tubercle and adjacent temporal fascia. The likely placement of the suspension muscle flap is preoperatively determined by the degree of globe prominence and vector analysis. Other techniques to consider for the correction of involutional lower lid laxity include a dermal pennant

flap, lateral canthopexy, and various types of canthoplasty procedures. Horizontal lid shortening methods may be required in selected cases. If cicatricial ectropion is present, the restrictive inferior lid retractors and adhesions are released from side-to-side either through an external or transconjunctival approach. A contoured ear cartilage or hard palatal spacer graft is sutured to the inferior border of the tarsal plate for additional stable support. With the spacer graft in place, a determination is made whether a conservative skin resection or no skin removal is required.

If the surgeon' s strategy is to preserve the integrity of the orbicularis muscle in a patient who presents with fat bulges and skin folds, a transconjunctival approach permits manipulation of the subseptal fat bulges, while an infraciliary incision is used to adjust the overlying skin. I usually select this dual surgical approach if the preoperative anatomical and functional findings suggest that an incipient degree of lower lid laxity is present or is apt to occur from the eyelid procedure. Depending upon the clinical findings, an additional supportive procedure, such as a canthopexy, to the lower lid is recommended to reduce the chances of iatrogenic lid laxity. In my opinion, an **immediate** and **sustained** descension of the lid is most likely a result of too liberal an amount of skin removal for that lid to compensate for, while a **delayed permanent** onset of lid lowering is probably due to cicatrization of the middle lamella and/or weakening of the muscle unit. Although the perception that a surgical transection of the orbicularis oculi muscle may result in a compromise its supportive functions is controversial, the presence of an intact muscle after a blepharoplasty minimizes its role in the formation of surgically-induced lower lid laxity or ectropion.

Face Complex

The ill-defined lid-cheek junction continues to be one of the most challenging regions for rejuvenation. Whether this boundary is characterized as the change from thin darker skin to thick lighter skin or by a change from bulges (lower lid fat and malar bag) to hollows (tear trough, naso-jugal groove, and palpebro-malar groove), most consistent aesthetic results are attained by combining volumetric procedures at both the lower lid and cheek fat pad. The lower facial landscape is further compromised by undulations at the nasolabial fold, jowl and buccal region that are characterized by local areas of fat inflations or deflations, SMAS laxity, and focal regions of skin folds. The goal is to achieve a full, smooth and blended face that extends from the lid down to the nasolabial fold and mandibular margin.

A younger patient may be concerned with areas of modest deflation at the lid-cheek junction and malar eminence as well as adjacent sites of relative fullness or increased definition at the malar mound and nasolabial fold. Although these patients are generally too young to experience photoaging, thinning and laxity to the overlying skin, they may exhibit simultaneous fat bulging at the lower lid. This type of patient would not be a candidate for any skin lifting or tightening procedure, but may benefit from volumetric techniques such as minimal fat reduction and/or transposition of the lower lid in combination with elevation of the midface cheek fat and/or liposculpturing to the deficient areas at the lid-cheek junction and anterior midface.

Older patients present not only with areas of volumetric fullness, deflations and shifting at the lower lid, midface and jowls, but also with skin folds produced by the underlying volume loss and intrinsic loss of dermal elasticity from photoaging. The folds represent localized areas of skin and fat descent, which are impeded at sites of relative skin fixation (orbito-malar cutaneous

ligaments, zygomatic-cutaneous ligaments, parotid-masseteric-cutaneous ligaments, mandibular-cutaneous ligaments, and the nasolabial fusion line). The aged face may also demonstrate looseness and redundancy of the deeper SMAS units that contribute partially to the formation of the marionette folds and jowls. The depth and prominence of the marionette fold, prejowl sulcus, and jowl are accentuated also by the concomitant loss of fat around them. With these diverse clinical presentations, the aged face may benefit from a number of procedures that combine variations of skin adjustment, SMAS lifting and/or tightening, repositioning of the orbital orbicularis and platysma muscles, volumetric shifting of the cheek fat pad, volumetric filling with implants and/or lipoinjected fat, along with previously mentioned blending procedures to the lower lid.

Malar Fat Pad

The anterior face is defined as the area demarcated above by the lid-cheek junction, medially at the paranasal border extending down to the nasolabial and marionette lines, laterally from a vertical line drawn from the lateral eyelid commissure through the apex of the malar eminence to the mandible, and inferiorly along the mandibular border. Although this smooth curvilinear convexity in the youthful face appears to be uniform, it is a complex region composed mainly of the malar bag, large subcutaneous cheek fat pad, and underlying SMAS-invested muscles.

Since 1995, I have concentrated on the anatomy of the dominant subcutaneous cheek fat pad because it represents one of the key elements for aesthetics, aging and rejuvenation at the lower lid-cheek junction and anterior face. In the youthful face, the **internal** dimensions and topography of the subcutaneous cheek fat pad are confluent and ill-defined because it is a continuation of the superficial fat layer of the entire face. In the anterior midface, the cheek fat

pad is not of equal depth but is condensed into thicker and more substantial portions at its upper lateral pole (malar eminence) and at its lower medial pole (nasolabial fold). In an anatomic study[3] of 10 cheek fat pads in 5 fresh-frozen cadavers (average age of 49.6 years), the average depth over the malar eminence was about 8.2 ± 0.4 mm, while the average thickness at the nasolabial fold was about 6.1 ± 0.5 mm. The average thickness of the subcutaneous layer between the two opposite poles was assessed to be about 3.5 ± 0.7 mm. In another cadaver study[4] of 20 cheek fat pads in 10 older fresh-frozen cadavers (average age of 67.3 years), the average depths at the two designated locations was less at the upper pole (6.0 ± 0.3 mm @ malar eminence), but greater at the lower pole (7.2 ± 0.4 mm @ nasolabial fold). Similar changes in differences in thicknesses were observed by spiral computed tomographic scanning findings in 10 live patients in repose (average age of 65.0 ± 6 years) at these sites (8.9 ± 0.7 mm @ malar eminence; ll.1 ± 0.8 mm @ nasolabial fold). These results from these studies and from other investigations[5-6] indicated that, in younger patients, the depth of fat at both the malar eminence and nasolabial fold are almost of equal thicknesses. As the midface ages, the depth of fat at the malar eminence does not change appreciably from its starting point, but the lower pole of fat at the nasolabial fold becomes progressively fuller, accentuating the depth at the nasolabial line. It remains unclear, however, whether the lower lid- midface irregularities (palpebro-malar hollow, tear tough, nasojugal groove, malar bag and nasolabial fold) in the aged patient are the result of ptosis of the cheek fat pador accentuated by fat atrophy and soft tissue ptosis in different parts of the cheek fat pad. For example, the malar bag overlying the malar eminence consists of multiple layers of skin, orbital orbicularis muscle, suborbicularis oculi fat pad, glide space and preperiosteal fat. Its isolated crescent-shaped outline is sharpened in the aged face by a combination of processes that involve both ptosis of the muscle and involution and shifting of

surrounding soft tissues. In a similar manner, the prominence of the nasolabial fold also becomes more evident as regional skin laxity, fat ptosis and circumferential loss of soft tissue fat occur.

The goals of volumetric elevation of the cheek fat pad by my suspension suture systems are to recreate a more youthful, full and triangular-shaped midface that blends into the lower lid-cheek junction and fills the intervening irregularities at the palpebro-malar groove, naso-jugal hollow and nasolabial depression. This technique has limitations, however, as it is dependent not only on the volumes and locations at each of the different subdivisions of the cheek fat pad at the time of the procedure, but also on the internal fibrous nature of the fatty tissue. Along with skin adjustments and SMAS tightening, optimal results can be obtained first utilizing repositioning of the patient's own cheek soft tissue, and secondly, by complementary procedures such as fat relocation in the lower lid, liposculpturing into strategic areas, and alloplastic implantations.

Evolution of the Gore-Tex Knotted Suspension Suture Systems (1995-2005)

In 2002, I reported my 1995-1998 experience[4] in 255 patients with 3 different types of looped suture suspension systems (braided absorbable vicryl and prolene sutures) that were passed percutaneously from the nasolabial line, threaded at a deep level through the cheek fat pad above the maxillary bone, and fixed into the deep temporal fascia in a superolateral direction. Results that were evaluated to have "good to mediocre" percentage outcomes at the 2 year follow-up period were disappointing because of inefficient suspension and fixation by these sutures (1 vicryl suture system: 26%; 2 vicryl suture systems: 46%; 2 prolene suture systems: 70%). In 1998-2001, a looped CV-3 Gore-Tex suture was introduced as the system of choice by incorporating a 3 x 8 mm Gore-Tex patch at the bottom of the loop to prevent "cheese-cutting"

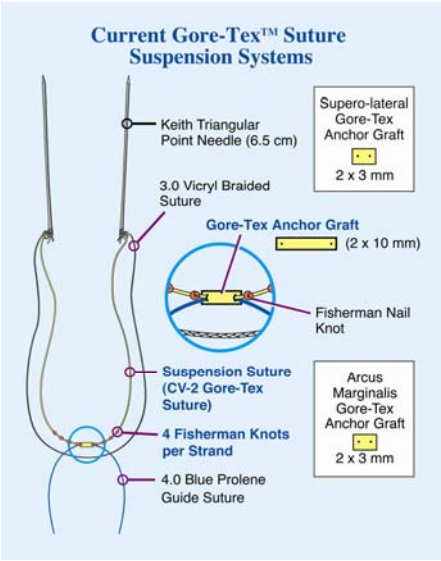
through the fatty tissue. At the two-year anniversary date, favorable outcomes were observed in 82 per cent of 137 patients with the Gore-Tex suture system. The vector of cheek fat repositioning with a 1 or 2 Gore-Tex suture systems per side, however, continued to be in a supero-lateral direction towards the malar eminence and lacked a secondary vector in a vertical direction. In my second publication[7] of 197 patients in 1999-2002, an additional single vertical Gore-Tex suture system was threaded over the bone from the nasolabial line to arcus marginalis at the lid margin, elevating the cheek fat pad upward to blend as much as possible the hollow at the lid-cheek junction. The rim of the lower lid was accessed through transconjunctival approach, which also permitted a translocation of fat into the palpebro-malar groove and tear trough hollow. The bidirectional lift with 2 cable suture systems, each with a 3 x 8 mm Gore-Tex patch at the bottom of the loop, was used until 2005 and provided a more balanced harmony to the lower lid and cheek. An 85 to 90 percent retention rate of cheek fat suspension was assessed for "closed, hybrid and open" procedures in 691 patients at the 2 year evaluation period. An estimate of longer-termed efficacy of the bidirectional Gore-Tex lifts to maintain suspension of the cheek fat pad demonstrated a gradual loss of effectiveness, leveling out at 65 percent at 5 years and beyond. Repositioning of the cheek fat pad was performed in isolation for the younger patient without skin and/or SMAS laxities. In the aged face, cheek fat pad suspension was usually complemented by other procedures that include relocation and/or excision of septal fat and tightening of the orbicularis oculi muscle and a SMAS rhytidoplasty.

Current Bidirectional Gore-Tex Suture Suspension Systems (2005-present)

In 2006, I published three modifications[8] to improve upon the efficiency of the bidirectional Gore-Tex suture systems (Figure 1). First, a series of 4 to 5 nail knots to each limb of the superolateral suture to centralized the pulley and furnish additional resistant sites for tissue

ingrowth. Secondly, the centralized pulley dimensions were increased to a 2 x 10 mm rectangle to reduce the "cheese-cutting" effect and to capture more tissue. The vertical suture was designed in a similar fashion as the superolateral suture with the exception of having only 1 knot on each side of the pulley. The third modification was a procedural one in that the distal ends of the superolateral sutures, after exiting from the lateral border of the cheek fat pad during an "open" procedure, were weaved in and out of the SMAS layer and deep temporal fascia in a serpentine fashion to imbricate and stabilize the repositioned tissues. These modifications have an improved the efficacy of cheek fat pad suspension up to 95 percent at the 2 year evaluation period in over 150 patients.

Figure 1



The current Gore-Tex suture suspension system can be assembled for "close", "hybrid", or "open" approaches for elevation and fixation of the cheek fat pad. For a vertical lift, two 6.5 cm Keith needles are attached to the system, as shown, with the exception that a single knot on each side of the 2x10 mm anchor graft centralizes the graft and provides added tissue resistance. Each end of the Gore-Tex suture is passed under the arcus marginalis and secured to a single 2x3 mm anchor graft. For a superolateral lift of the cheek fat pad with during an "open" face lift, two 6.5 cm Keith needles are attached to the system, as shown, with 4 knots on each Gore-Tex strand, centralizing the 2x10 mm anchor graft. Upon exiting the lateral border of the cheek fat pad, each Gore-tex suture is passed in and out of the deep fascia and secured to a 2x3 superolateral Gore-Tex anchor graft. For a superolateral lift during a "closed" or "hybrid" endomidface lift, two 10 cm Keith needles are necessary to reach the temporal incision.

Current Surgical Technique for Rejuvenation of the Lower Lid and Face

In the aged lower lid with excess fat protrusions and skin folds, my current preference is to preserve the integrity of the orbicularis oculi muscle by utilizing a dual surgical approach. A transconjunctival incision permits and adequate release of the orbitomalar ligaments and exposure of the medial-central fat pads (Figure 2). After an incision is made anterior to the arcus marginalis at the rim margin, a limited subperiosteal dissection elevates the tissues away from the tear trough and palpebromalar groove. Thereafter, a 2 mm periosteal elevator creates a small flap consisting of the thickened arcus marginalis and inner periorbitum. A single 5 mm incision is made l cm below the level of the nasal sill within the nasolabial line. This opening is widened down to the maxillary bone with a straight iris scissors. A 6.5 cm Keith needle, attached to the ends of the free braided vicryl suture and the CV-2 Gore-Tex suture, is passed percutaneously through the small incision impacting the maxillary bone. The soft tissue around the impacted needle is then pinched to ensure that a full thickness of tissue at a deep level will be incorporated by the needle during its passage in a vertical direction. The redirected needle is then passed vertically just above the bone and retrieved from under the periosteal flap. The second needle (and it's sutures) is inserted through the same nasolabial incision, passed upward in its own parallel tract about 1 cm apart from the first set of sutures, and retrieved from under the same periosteal flap. After the needles are removed, the vicryl braided suture ends are grasped and zig-zagged to release any restricting structures that produce a distortion to the upper lip or skin dimpling just above the entry point. The two ends of the permanent CV-2 Gore-Tex suture are then pulled upward seating the 2 x 10 mm Gore-Tex pulley, centralized by single adjacent knots, into the depths of the prepared tracts just above the incision site. If no further adjustments are required, the vicryl and guide sutures are removed. Each end of the Gore-Tex suture is passed in

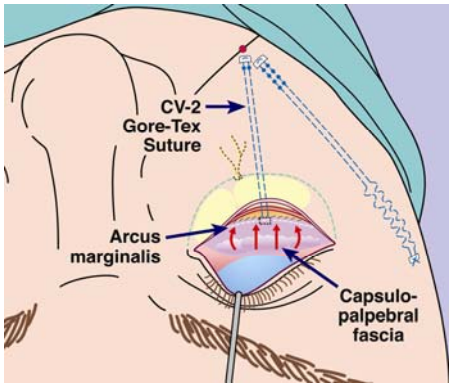
turn under the taut arcus marginalis flap and through a 2 x 3 mm Gore-Tex patch. The sutures are tied as tightly as possible over 5 knots to firmly elevate and fix the cheek fat pad. The prolapsed medial and central fat pads are transposed and suture-fixed with 6-0 absorbable sutures into the palpebro-malar grove and tear tough hollows. If the prolapsed fat volume is too large, a portion of fat is removed before inferior repositioning. In the majority of cases, prolapsed fat from the lateral compartment is excised. After the surgical pocket is irrigated with an antibiotic solution, available remnants of the capsule-palpebral fascia may be suture to the arcus marginalis to provide additional support. The conjunctival edges are approximated with a 7-0 absorbable suture. A pinch of skin is then removed at the infraciliary border to adjust for excess skin.

My preferred method for an "open" rhytidectomy involves an elevation of facial skin about a 6.5 cm anterior to the ear, permitting a complete release of the zygomatic-cutaneous and masseteric-cutaneous ligaments (Figure 3). A diagonally oriented SMASectomy from the level of the ear lobe to the infero-lateral border of the orbital orbicularis muscle is approximated with interrupted and continuous 4-0 permanent sutures. Each end of second CV-2 Gore-Tex suture system with its 2 x 10 mm Gore-Tex pulley, centralized by 4 or 5 knots on each strand, is passed in a similar sequential fashion by each of the two 6.5 cm needles deeply from the same nasolabial incision site above the maxillary bone in a supero-lateral direction perpendicular to the nasolabial line. The ends of each braided vicryl suture are grasped and zig-zagged again to smooth out any dimples or distortions. The ends of the permanent Gore-Tex sutures are pulled firmly seat the knots and pulley into the body of the nasolabial fold. If the pulley is in a satisfactory position, the vicryl and guide sutures are removed. Each Gore-Tex suture strand is passed serially in and out of the superficial and deep fascia, exiting out finally from a 5 mm incision though the superficial temporal fascia about 1.5 cm in front of the upper border of the

ear. Each suture end is passed through the perforated 2 x 3 mm Gore-Tex anchor graft. The suture ends are tightened down on the anchor graft until a 1.0-1.5 mm lateral displacement of the nasolabial incision is measured with a ruler. After the suture ends are tightly secured on the anchor graft with 5 square knots, the fixed anchor graft is buried with a horizontal mattress suture. After skin adjustments and closure, lipoinjected fat is directed to any areas that required further augmentation (nasojugal hollow, tear trough, palpebro-malar groove, nasolabial line, prejowl sulcus, and infrazygomatic depressions). If a patient presents with significant maxillary hypoplasia, which will not be adequately volumized by repositioning of the cheek fat pad and/or liposculpturing, an alloplastic malar or submalar implant may be combined with the previous procedures.

In selected patients who present with an isolated descension or differential areas of fat loss in the cheek fat pad, a “closed” or “hybrid” endo-cheek fat pad suspension may be done with a single superior-lateral Gore-Tex suspension system (Figure 4). In this situation, the sutures are passed from the nasolabial incision with a pair of 10 cm Keith needles which are retrieved from a 1 cm incision behind the hairline of the sideburns.

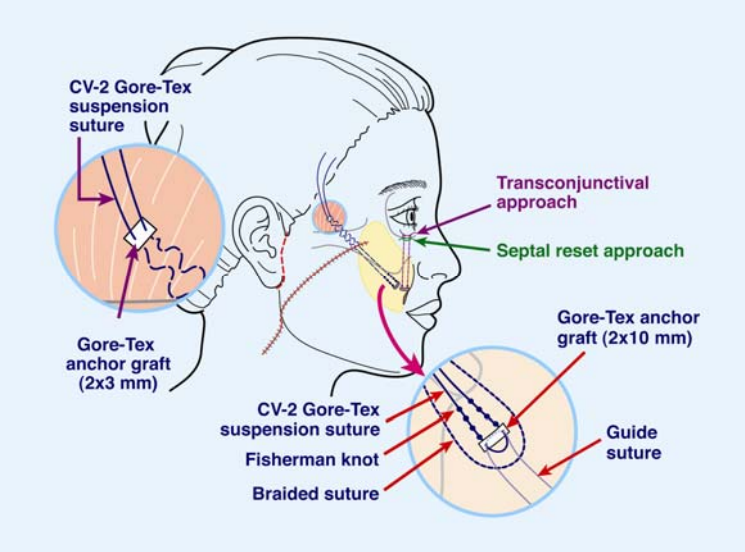
Figure 2



The illustration shows the final position of the vertical Gore-Tex suture with its centralized 2x10 mm Gore-Tex anchor graft in the depth of the nasolabial fold. The suture ends are retrieved from under the subperiosteal space, passed under the stout arcus marginalis at the rim and secured to its distal 2x3 mm Gore-Tex anchor graft.

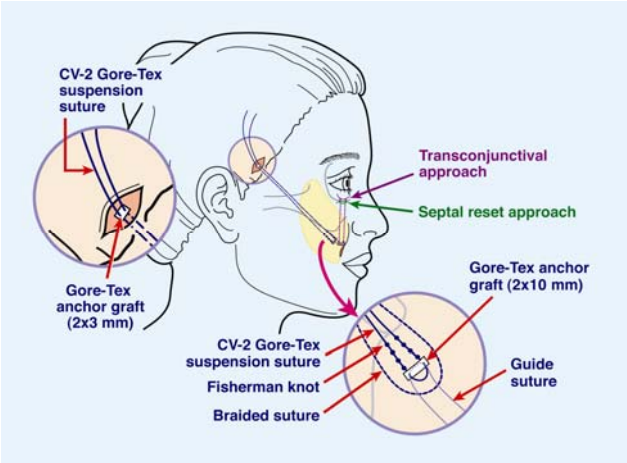
Thereafter, medial-central prolapsed fat bulges are suture-fixed under the tear trough and palpebro-malar hollows. The capsulo-palpebral fascia may be sutured to the arcus marginalis for further support. The supero-lateral Gore-Tex suture tract is also shown for orientation purposes.

Figure 3



The illustration shows final stage of an "open" facelift procedure with a supero-lateral Gore-Tex suture with its centralized 2x10 mm Gore-Tex anchor graft in the depth of the nasolabial fold. The suture ends are retrieved at the lateral border of the cheek fat pad, imbricated in a serpentine fashion in the deep fascia and finally secured to its distal 2x3 mm supero-lateral anchor graft. The SMASectomy closure in the face and neck is shown, aiming obliquely to the inferolateral border of the orbital orbicularis muscle towards the lateral commissure. The vertical Gore-Tex suture is demonstrated for reference and is placed either through a transconjunctival or external approach.

Figure 4



The illustration demonstrates the final phase of a "closed" or "hybrid "endo-cheek fat pad suspension by a supero-lateral Gore-Tex suture and its 2x10 mm Gore-Tex anchor graft centralized by the four knots on each strand. The suture ends are threaded deeply upward by 10 cm Keith needles in a direction perpendicular to the nasolabial line.

A 1 cm incision is made behind the hairline to expose the deep temporal fascia. The distal ends of each suture are secured to the deep fascia by the distal 2x3 mm Gore-Tex anchor graft. When and endoscopic approach is used from the temporal incision, the endo-dissection is performed to the lateral border of the cheek fat pad. After multiple passages of a 1 mm suction cannula under the cheek fat pad, the percutaneous Gore-Tex knotted sutures are passed from the nasolabial incision and retrieved at the temporal incision. The vertical Gore-Tex suture is positioned through either a transconjunctival or septal reset approach.

Clinical Cases

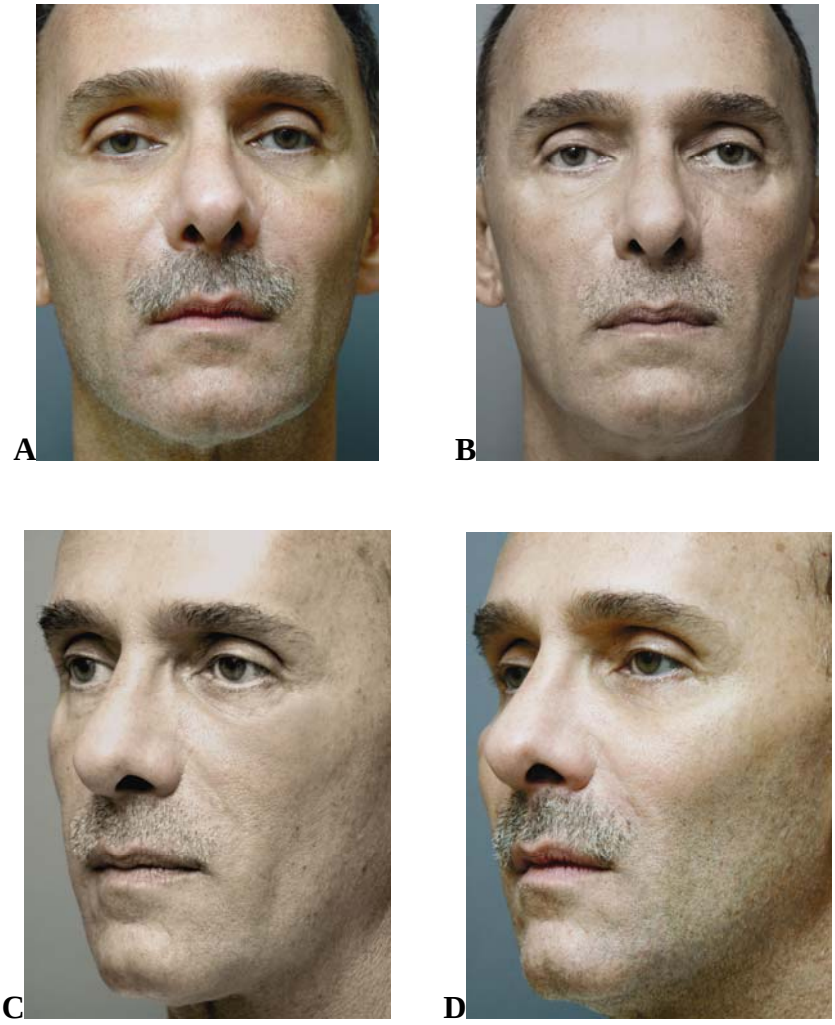


Figure 5. A, C, Preoperative views of a 55 year-old male. **B, D,** Postoperative views 2 years following and endoscopic "closed" cheek fat pad elevation with knotted Gore-Tex superolateral suspension sutures. Note rejuvenation at the lid-cheek and nasojugal hollows with blending over the malar bag as the cheek fat pad provides fullness over the malar eminence.

Figure 6. A, C, Preoperative views of a 57 year-old female with left midface palsy at the age of 3, localized primarily to the zygomaticus major, zygomaticus minor muscles and orbicularis oris muscle. **B, D,** Postoperative views 2 years following endoscopic forehead and periorbital lift, transconjunctival lower lid blepharoplasty with fat transposition into tear trough and palpebromalar groove, SMAS facelift with bidirectional cheek fat pad elevation with knotted Gore-Tex sutures (method described under Current Surgical Technique), palmaris longus sling to left oral commissure, liposculpturing to the lower lid-cheek junction, tear trough, nasojugal groove, prejugal hollow, and release-wire subcisions to nasolabial folds with SMAS strips.

Figure 7. A, C, Preoperative views of a 73 year-old female. **B, D,** Postoperative views 2 years following septal reset lower lid blepharoplasty, SMAS face/neck lift with bidirectional cheek fat pad elevation with knotted Gore-Tex sutures (method described under Current Surgical Technique), liposculpturing to lower lid-cheek junction, tear trough, nasojugal groove, and prejugal hollow.

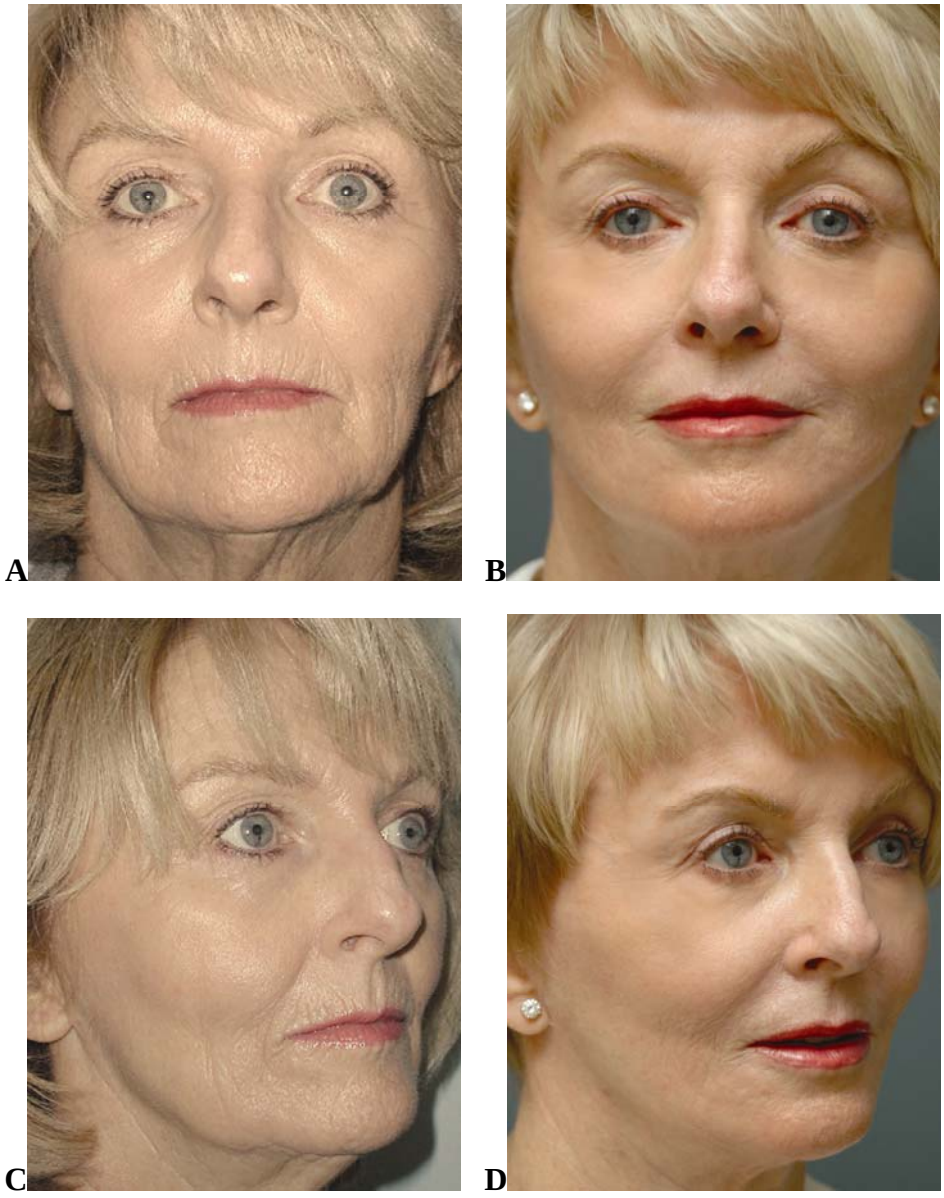


Figure 8. A, C, Preoperative views of a 59 year-old female. **B, D,** Postoperative views 5 years following upper lid blepharoplasty, transconjunctival lower lid blepharoplasty, SMAS face/neck lift with bidirectional cheek fat pad elevation with knotted Gore-Tex sutures, liposculpturing to lid-cheek junction, tear trough, nasojugal groove and prejugal hollow, and fractional CO_2 lasering to forehead, periorbitum, nose and perioral area.

Discussion

In recent years, a number of innovative permanent or biodegradable sutures systems[9-16], including my Gore-Tex sutures, have been introduced into the surgical arena as devices to achieve midface lifting by “closed”, “hybrid”, or “open” approaches. These designed sutures have been configured as either a single or looped strand. Each suture may incorporate zones of traction and tissue integration in the form of barbs (bidirectional or unidirectional orientation), knots and expansions at the looped end, or extrinsically added resistant sites represented by a series of cones. In a comparison study[3] with eight different suture suspension systems, the Gore-Tex suture suspension system was found to have the highest holding tensions, slippage tensions and pull-out tensions to suspend the cheek fat pads in four fresh-frozen cadaver heads. After each type of suture was extracted from the soft tissue, 50% of barbs or cogs on each of these types of sutures demonstrated anteverted bending (bending backward from its original orientation), curling or stripping along the entire length of the suture strand. In contrast, all knots, free-standing cones and anchor pulleys did not undergo any morphological flaws after engagement, slippage and pull-through from the soft tissues. The results of this cadaver investigation and the other cited clinical studies demonstrate that the present bidirectional Gore-Tex suture systems are very effective, safe, and long-lasting to blend the anterior midface and lower lid-cheek junction by elevation and firm fixation of the large and differentially thickened cheek fat pad. Improved outcomes can be expected in the more aged faces when the cheek suspension procedure is appropriately combined with lower lid fat transposition and face-lifting. These concomitant techniques must still adhere to the principles of complete release of the restraining structures (orbitomalar, zygomatic, and mandibular osteocutaneous ligaments),

SMAS tightening, appropriate skin adjustments, and volumetric procedures (liposculpturing, synthetic fills, and alloplastic implants).

Since 1998, complications with the Gore-Tex suture suspension systems have been extremely low. There have been only three infections that required removal of the foreign body with complete resolution of the problem. These infections occurred in the early years of its development and usage. There have been no incidences of suture migration or disruption. Temporary dysesthesia to the ipsilateral upper lip was observed in about 5% of cases that resolved itself within 3 months of surgery. There have been no incidences of permanent motor injury to the lip elevators.

Conclusion

My current approach to the lower lid and midface is based on a systematic process of determining which combination of surgical procedures can optimally address the patient's concerns and correct the anatomical findings. In most faces, there is an opportunity for both suspension and tightening of ptotic structures and also provision for volumetric filling and shifting of tissues. Our present algorithms for lower lid and face rejuvenation are expected to change as we obtain a better understanding of the aging processes and develop more effective, safer and longer-lasting procedures to meet the individualized age-appropriate needs of our patients.

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