Endoscopic Full Facelift

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Abstract. This article demonstrates the efficacy of endoscopic techniques in total facial rejuvenation. The author has introduced the total subperiosteal dissection to the endoscopic forehead lift. This concept has been extended to the rejuvenation of the central and lower third of the face. Patients up to the late 40s can have a total facelift *without skin excisions*. In older patients, the introduction of endoscopic techniques helps to minimize some of the undesirable sequelae of the traditional open procedures such as alopecia, scalp paresthesias, and facial edema of the subperiosteal lift. The author also introduces a new, more efficacious method of midface suspension.

Key words: Endoscopy — Facelift — Forehead lift

The application of endoscopic techniques in facial rejuvenation is one of the most recent advances in aesthetic surgery of the face. This technique has been applied successfully to the rejuvenation of the forehead [2, 5–7]. Having used the open subperiosteal approach for facial rejuvenation for many years and having done the endoscopic subperiosteal browlift using the same principles of the open approach, it became evident that the subperiosteal approach was uniquely suited for applying the endoscopic technique to total facial rejuvenation [8,12].

Similar to my experience with the open subperiosteal browlift, the endoscopic subperiosteal browlift taught me that browlifting relied more on soft tissue repositioning rather than on stretching or pulling. Likewise, the open subperiosteal facelift relied more on tissue repositioning than on pulling [11]. Therefore, the marriage of both techniques—the endoscopic

and the subperiosteal—*for total facial rejuvenation* were ideal and almost inevitable.

This surgery was designed to minimize facial and scalp scars and prevent other sequelae of the open approach such as alopecia, numbness, and itching common to the coronal or hairline incisions, potential visible periauricular scars, and other stigmatas of the midface lift. This article describes the indications, instrumentation, and surgical technique of this new approach.

Indications

The best candidates for a total endoscopic full facelift without skin excisions are patients in the late 30s or early 40s who present with good skin tone but have developed ptosis of the brows, sagging of the cheeks, early nasolabial folds, and frowning of the corners of the mouth. For patients in their mid or late 40s presenting early jowls and neck laxity with mild fat accumulation, the endoscopic upper and midfacelift combined with liposuction or direct lipectomy of the jowls and neck and corset platysmoplasty with suture suspension to the mastoid areas without skin excision works well in selected cases.

For patients in their 50s or 60s with significant skin excess, the endoscopic technique helps to minimize some of the undesirable sequelae of the traditional open procedures. The latter group of patients can have the following combinations of operations:

1. For patients with short foreheads: endoscopic browlift *without scalp excisions* combined with the standard, intermediate depth (Hamra's, Barton's) or "extended" subperiosteal facelift (Ramirez). The neck is treated with traditional cervicofacial lifting.
2. For patients with high foreheads: biplanar (subcutaneous, subperiosteal) browlift with endo-

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scopic resection of the procerus, corrugator depressor supercilii combined with any variation of the midface/necklift procedures. Forehead and periauricular skin excisions are done. This variation allows shortening of the forehead while maintaining scalp innervation above the forehead incision line.

These last two variations will not be described here; we will deal solely with the total facelift without skin excisions.

Instrumentation

Adequate instrumentation is essential for the safety of the procedure and to carry out each step of the operation effectively.

Endoscopic Unit

The scope best suited for the endoforehead is a rigid 4-mm arthroscope with a 30° angle. This is introduced with a sleeve used for irrigation. There are integrated or separated sleeve tip retractors that have *sharp,* straight, or angulated tips. However, I prefer a *blunt,* slightly elevated tip that allows safe displacement under the flaps, particularly at the temporal area. In this area the rigid, straight, sharp sleeve tip can injure the frontal branch of the facial nerve. For the midface, mandible, and neck, a 0° or 15°, 6-mm scope works the best, however, the afore mentioned endoforehead scope is optimal. For total facelift, the use of two monitors, one to the right and one to the left of the patient, is ideal because the surgeon and the assistant, each with his/her own monitor, can monitor the surgery simultaneously. The surgeon also can change position in relation to the patient as in the open approach. For documentation, a VCR and a printer is recommended. The standard VCR records in VHS format. Some more sophisticated systems have outlets for super-VHS or U-Matic format. The printer can take pictures in print or slides depending on the hardware used.

Periosteal Elevators

The initial available endoscopic forehead periosteal elevators were made with a straight shaft and blunt tips; however, for a more effective elevation of the periosteum, sharp tips with curve or angled shafts, depending on the anatomical area to be worked on, were designed by the author. The tips are sharp with slight elevation at the sides of the "blade." The sharp sides allow contact of the cutting edge in the bone/periosteal interface, and the slope of the blade allows
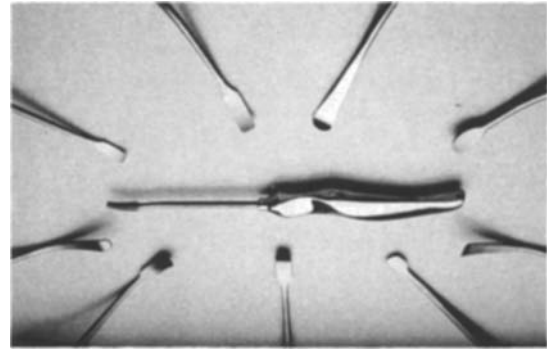

Fig. 1. Set of sharp, curved periosteal elevators, each one with specific functions

safe elevation and gliding of the elevated tissues. The curvature of the elevators adapt to the round curvatures of the face and there is no risk of poking the elevated flaps as does the rigid sharp scope sleeve. There is a series of elevators, each one with a specific function in each side of the face (Fig. 1).

Others

Graspers, scissors, and needle holders were specifically designed for this type of operation. There are left- and right-curved graspers for the corrugator/procerus debulking, and right- and left-angled scissors for myectomies of the same muscles and for incising the external leaf of the temporal fascia. Endoscopic needle holders allow fixation of the temporal fascia.

Surgical Technique

To treat the forehead and midface using the endoscopic technique, I favor the subperiosteal approach for the following reasons:

1. The subperiosteal dissection is quicker, safer, and almost bloodless. These characteristics are especially relevant to the endoscopic technique.
2. The forehead and midface are dissected in the same plane.
3. The zygomatic arch "barrier" is overcome through the subperiosteal dissection.
4. The technique allows continuity in vertical lifting and suspension of the soft tissues of the upper face and midface.
5. The flaps have better vascularity.
6. The technique allows combination with more superficial procedures such as liposuction and chemical peeling.
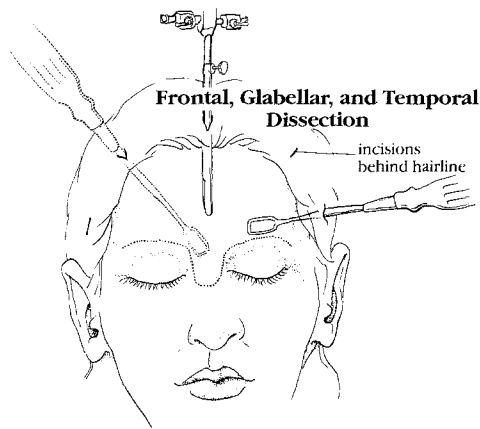
Fig. 2. Five scalp slit incisions are needed for upper-face rejuvenation. For the endoforehead alone the extent of the subperiosteal and subtemporoparietalis dissections is indicated by the dotted lines

Fig. 3. An extremely curved periosteal elevator allows release of the periosteum at or just above the "arcus marginalis"

The surgery is preferably done under general anesthesia, although local with neuroleptic anesthesia can be used. The nerve blocks and infiltration of local anesthesia are given as indicated in a previous article [10]. If blepharoplasties are indicated, they are done first. If orbital rim remodeling or lateral canthoplasty is planned, closure of the upper blepharoplasty is left for later. Lower blepharoplasties are done next. However, lower eyelid skin excision is left for after the midface fixation and lateral canthal repositioning. The browlift is done next.

Forehead Dissection and Management of the Brow Depressors

Five 1.5-cm incisions are made in the scalp, three longitudinal and two vertical. One is located in the midline, two paramedian about 4 cm lateral to the first, and one vertically oriented in each temporal scalp. This last incision is done in the projection of a line starting at the alae and passing through the lateral canthus. An additional incision in the sideburn area can be done if needed (Fig. 2).

A 3–4-cm frontal subperiosteal and subtemporoparietalis fascia dissection is made anteriorly. The endoscope is introduced through the central scalp incision and the rest of the subperiosteal/subtemporoparietalis dissection is made under endoscopic control. It is important to maintain a continuity of planes of dissection in the frontal and temporal areas. This is better accomplished with dissection from lateral to medial in the temporal area.

The dissection posterior to the slit incisions in the frontal scalp is made at the subperiosteal level up to about the midparietal area. Laterally the rest of the temporoparietalis over the posterior portion of the temporal muscle is elevated.
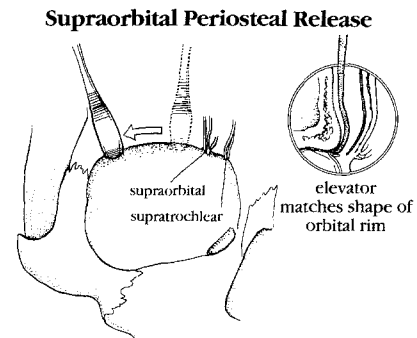
The dissection in the temporal area is continued down close to the zygomatic arch leaving in the elevated flap, the loose aereolar tissue under the temporoparietalis fascia (subgaleal flap), and the minor fat pad overlying the superficial layer of the temporal fascia.

The frontal dissection continues until the supraorbital and supratrochlear nerves are identified. Attachments of the periosteum to the glabella and root of the nose are elevated. Using extra-curve and sharp periosteal elevators, the periosteal attachment at or above the superior orbital rim is released. Alternatively, this release can be done with curved endoscopic scissors (Fig. 3).

The procerus, depressors supercilii, and corrugators are debulked through the endonasal approach using special angled graspers or scissors. This is done while protecting the supratrochlear nerve and vessels with a curved nerve hook introduced from the front. Alternatively, the ablation of these muscles can be done with a temporal or frontal approach.

The superior orbital rim dissection is continued laterally toward the zygomatic frontal suture line and zygomatic arch.

Midface Dissection

Through the lower eyelid incision, the periosteum of the interior and lateral orbital rim is elevated. The entire orbital rim dissection is completed if significant periosteal mobilization is indicated. Malar bone and the entire zygomatic arch periosteum are dissected. At this point, the zygomatic arch dissection is only a tunnel. With endoscopic visualization through the temporal incision, the zygomatic arch dissection is continued superiorly with sideway movements with a sharp periosteal elevator. The external leaf of the temporal fascia is elevated (Fig. 4). This leaf along with its fat pad is incised and separated from the deep layer of the temporal fascia. This will be used for suture suspension of the midface. The incision of the tempo-
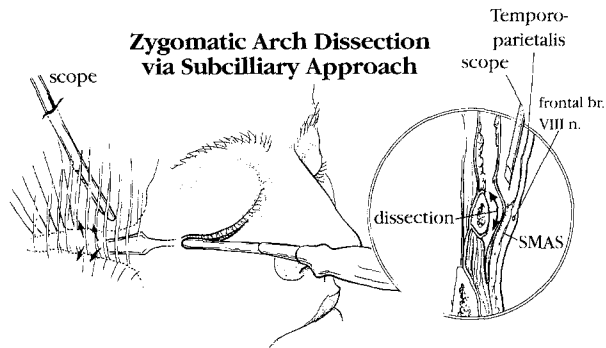
Fig. 4. Under endoscopic control the zygomatic arch subperiosteal pocket is connected with the "intertemporal fascia" pocket. The fascia of the masseter muscle is elevated through the eyelid or gingival incisions
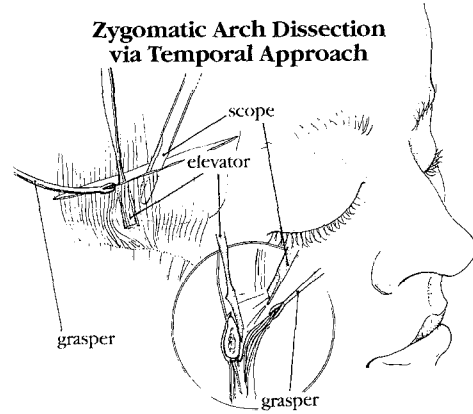

Fig. 5. The zygomatic arch dissection via a temporal approach. The square-shaped sharp periosteal elevators help to elevate the zygomatic arch periosteum

ral fascia is done with special scissors or scalpel (Fig. 5).

Using the zygomatic arch periosteal elevator, the fascia of the masseter muscle is elevated initially for about 1 cm.

The rest of the midface dissection is done via a lower-eyelid approach or the Caldwell–Luc approach. The dissection and extent of the masseter fascia elevation are similar to those of the open approach. Similarly, the inferior orbital rim, malar, and maxillary subperiosteal dissections are similar to those of the open approach [11]. Any restraining periosteal or deep facial attachments are released under endoscopic visualization.

Treatment of the Lower Face and Neck

If the patient presents mild laxity of soft tissues around the chin and jaw, a subperiosteal dissection of the chin and mandible through a submental incision is done. This separates the insertion of the depressors of the lip and the periosteal attachments of the platysma. The body of the mandible is dissected inferior to the submental nerve. Laterally, this dissection is extended to the masseter insertion and the corresponding inferior border of the mandible. This subperiosteal separation of the soft tissues around the chin and mandible allows the upward pulling of the suspension sutures in the midface to be transmitted to the lower face.

The cervicoplasty is managed with the following steps:

1. Wide subcutaneous neck dissection.
2. Direct lipectomy above and below the platysma as needed.
3. A half, three quarters, or full corset platysmoplasty depending on the clinical situation. The accuracy of the subplatysma dissection and lateral mobilization is checked using endoscopic visualization.

4. Further definition of the jaw/neckline is obtained with interlocking suture suspension of the platysma to the mastoid area as described by Giampapa [4].
5. There is *no skin resection* in the procedure.

Lifting and Fixation of the Midface and Scalp

The midface is suspended before the scalp. The number and the levels of fixation are dependent on the desire of elevation of the soft tissues of the face. 2-0 Vicryl or Maxon are used for fixation.

The first suture is applied to the periosteum and the suborbicularis oculi fat pad (SOOF), which is located in the lateral two-thirds of the anterior orbital rim and corresponding malar area [1]. The second stitch is applied to the periosteum just superior to the origin of the zygomaticus major muscle. This stitch may tend to produce a dimple and should be applied judiciously. These stitches are applied through the lower-eyelid incision. The ends of the sutures are driven to the temporal area and temporarily pulled through the scalp slit incisions. The symmetry of the lifting and the position of the suspensory stitches are checked by applying temporary traction to these sutures. These sutures suspending the midface are then fixed to the temporal fascia.

Three mattress stitches are applied to the external layer of the temporal fascia and fixed to the temporal fascia above the line of the fascia splitting and above the previous row of sutures. All these sutures are tied using "endoscopic fishing knots."

The scalp is suspended with galeal/periosteal stitches anchored to microscrews (2 × 4 mm). These microscrews are applied to the external cortex only and should avoid the midline where the sagittal sinus is located. Although accidental entry into this structure is highly improbable, you should bear this possibility in mind.
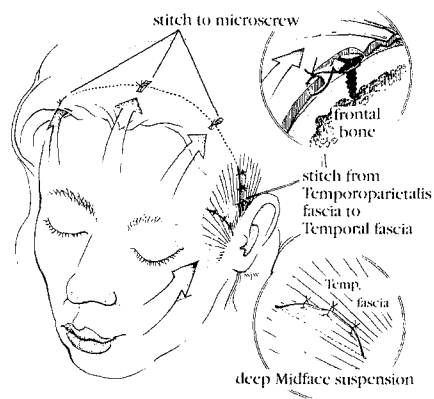
Fig. 6. Deep suture to galea–periosteal layer is anchored to microscrews. The temporoparietalis fascia is anchored to the temporal fascia. The midface is suspended with the "Ramirez–Maillard" temporomasseteric flap as in the open approach. The SOOF is used as an additional or alternative suspensory structure for the cheek's soft tissues

The temporal scalp is suspended with sutures applied to the temporoparietalis fascia and fixed to the temporal fascia.

The slit incisions are closed with skin staples. An additional external support is applied with tied-over dressing using three stitches of heavy sutures (0 or 1) anchored to the skin staples anteriorly in the frontal and temporal scalp and posteriorly to the occipital scalp (Fig. 6).

Postoperative Management

Antibiotics are started at the beginning of surgery; 8 mg of Decadron (dexamethasone sodium phosphate) is given intravenously at the beginning of the incision and then every 6 hours times 2–3 doses. The IV steroid is continued with 4 mg of 21 Medrol/Dosepack (methylprednisolone tablets) as indicated in the package instructions. The external support is removed on the tenth postoperative day and a tennis headband is worn for several weeks as social activities allow.

Routine head elevation used during traditional facelifting may not be applicable in this type of surgery. After the first 72 hours, we allow patients to sleep flat in bed. I believe that this facilitates drainage of edema posteriorly on the neck since there have been no incisions interrupting normal flow of drainage.

Discussion

When you perform endoscopic facelifting the first question to ask is "Is the procedure applicable to everyone?" As stated, the full endoscopic facelift without skin excisions can be applied only to patients with sagging soft tissues and without significant skin ex-

cess (Figs. 7–9). If the patient has excessive skin redundancy, this should be removed. Otherwise, excessive skin redundancy around the preauricular or the jaw/neck areas may detract from any improvement obtained with the deep lifting. To some extent mild redundancy can be redraped with superficial liposculpting [13].

The second question to ask is "What is the best plane of dissection for endoscopic forehead and browlifting?" What about the midface and lower face? In relation to the endoforehead, Core et al. [2] favor the subgaleal plane anterior and posterior to the slit scalp incisions. Isse [6] prefers the subperiosteal plane anteriorly and subgaleal plane posteriorly with disruption of the periosteum and a change in the plane of dissection around the slit incisions. I prefer the subperiosteal plane anteriorly and posteriorly. The galeal flap tends to stretch and has a greater probability of stress relaxation with the potential of subsequent recurrent brow ptosis. This has been my experience using the open approach and will probably be applied to the endoscopic technique as well. Furthermore, the subgaleal dissection will produce more scarring with variable adherence of the tissues to the underlying pericranium. This will produce unnatural forehead activity.

The subperiosteal dissection, on the other hand, is more effective in pulling the brow into position because of its inherent rigidity. It also is less likely to suffer from stress relaxation. The periosteum seems to adhere to the bone quicker than the galea to the pericranium. This will require a shorter fixation period of the advanced structures. Since I started using the pure subperiosteal dissection in the frontal and parietal areas. I have relied only on temporary external fixation with the tied-over dressing. This has become more acceptable to my patients because most of them do not readily accept the idea of the microscrew skull fixation despite its small size. The subperiosteal dissection preserves the areolar tissue at the galea–periosteal interface. This preserves the normal gliding mechanism of the occipitalis–frontalis complex and a stable and dynamic brow position. Remember that this is the only muscle complex that elevates the brow. For obvious reasons, the dissection in the temporal area is under the temporoparietalis fascia, regardless of which technique is used. When I perform the posterior dissection, it rarely reaches the occipital bone. Observe that 3/4 to 4/5 of the glabella–occipital distance is given by the frontal and parietal bones. The dissection of the transition between the frontal and temporal areas is better done under total endoscopic visualization because at this level it is very easy to change the plane of dissection, going either too deep or not deep enough into the temporal area. The dissection in the temporal area should be done immediately over the temporal fascia. The loose areolar subgaleal flap, and more inferiorly the minor fat pad, should be elevated in the flap in preparation for entering the midface.
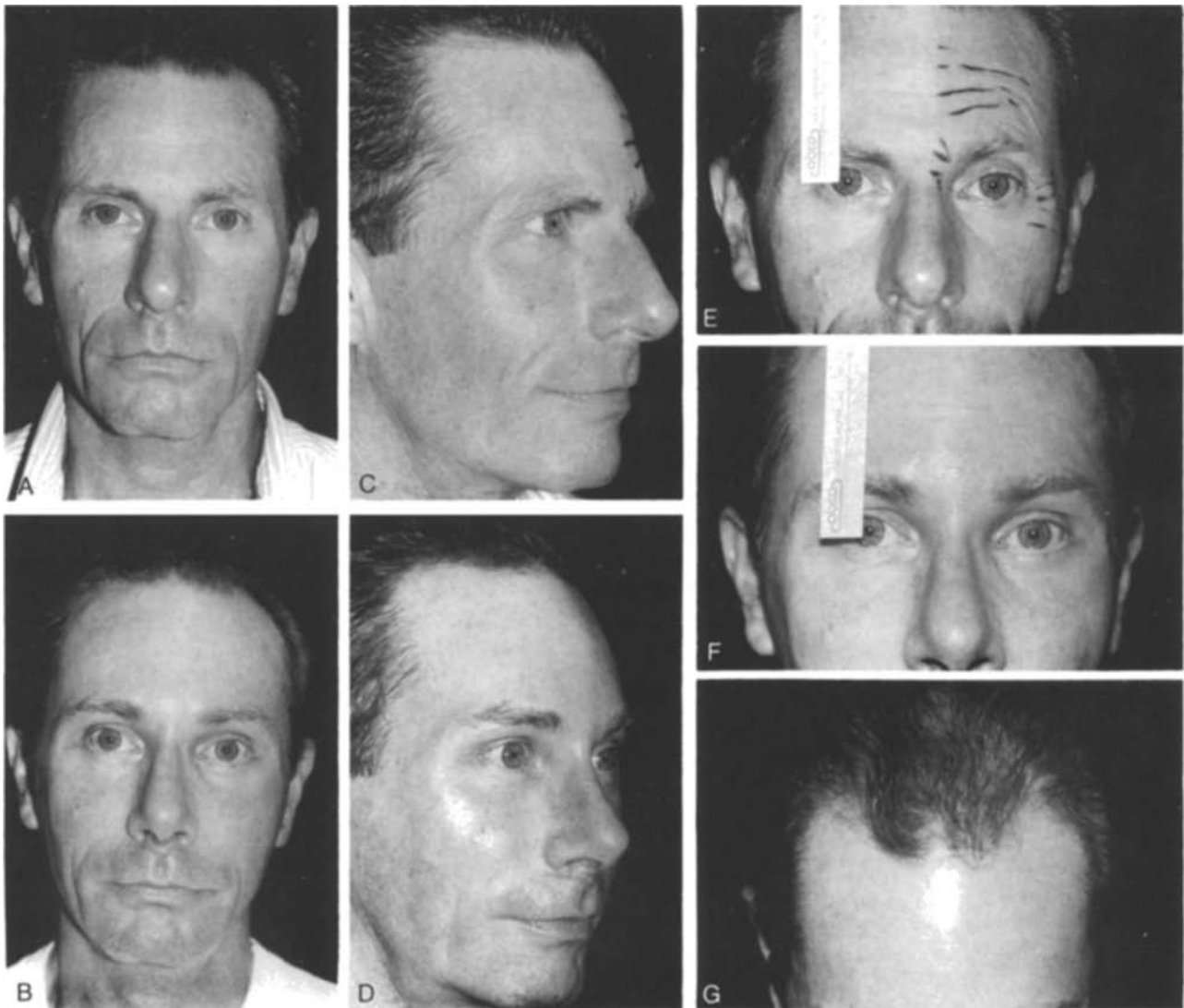
Fig. 7 (A) Front view of 49-year-old male, before and **(B)** after endoscopic brow and midface lift without skin excisions. No upper or lower blepharoplasties were done. Note the rested look after surgery. Observe the relative elevation of the nevus of his right cheek. Two months' followup. Oblique view **(C)** before and **(D)** after. The improvement is obvious. He looks younger without the stigmata of a facelift. Patient also had a rhinoplasty. **(E, F)** The midpupillary–brow distance has been increased after the browlift. This shows of the efficacy of the endoscopic procedure. **(G)** The scars of the slit incisions are not noticeable

The endoscopic browlift should rely on a very aggressive debulking of the brow depressors and complete maintenance of the integrity of the frontalis–occipitalis complex. Even in patients with deep forehead creases, the partial resection or scoring of the frontalis muscle will weaken the only muscle capable of elevating the brow position. The scoring or partial resection of the frontalis muscle will transect the small branches of the supraorbital/supratrochlear nerves and there is a great chance that this will result in painful neuroma which is extremely difficult to treat. In my nine years of practice using the open subperiosteal browlift in over 200 cases, I have not resected or scored the frontalis muscle. In some instances I have scored the pericranium to allow the galea and overly-

ing skin to stretch. I have noticed that over a period of several months the forehead creases improve. This is probably due to the decrease in frontalis hyperactivity since factors for forced elevation of the brow position are removed [9]. On the other hand, simply releasing the brow depressors (procerus, corrugator, and depressor supercilii), as advocated by some authors [6], will probably not work and there will be more risk of recurrence. This is because these muscles will reattach quickly in their new positions and will continue their activity as brow depressors. I have observed this using the open subperiosteal browlift.

A variation of the open technique mobilization and approach to the temporal fascias is initially done through a lateral lower-eyelid incision or existing

Fig. 8 (A) 42-year-old patient after endoscopic brow and midface lift. No skin excisions except from the lower blepharoplasty. She had prior history of two upper and one lower blepharoplasties. She was unhappy with the deep periorbital "circles" and medial brow ptosis. **(B)** Three months' followup. **(C)** Before and **(D)** after. Observe the preoperative laxity of the midface and early jowls. **(E)** Before and **(F)** after oblique view. Observe the improvement of the cheek mound, the "malar bags, " and the "periorbital circles"

lower-bleph incision. This seems to be the best way to elevate safely the periosteum of the zygomatic arch. Once the arch is elevated the rest of the midface is dissected using a Caldwell–Luc incision. Before dividing the external leaf of the temporal fascia, both layers are separated under endoscopic visualization. The scope is introduced through the temporal incision over the temporal fascia and the periosteal elevators through a lower-eyelid incision under the zygomatic arch periosteum and more superiorly under the external leaf of the temporal fascia. This way the surgeon can verify the placement of the periosteal elevator under the temporal fascia. Since this technique is used for mild degrees of facial laxity, it is not always neces-

sary to divide the external leaf of the temporal fascia. If digital displacement of all the mobilized tissues produces significant vertical advancement, then the temporal fascia is not divided and the SOOF/periosteum alone is used to anchor the midface. I have been using this structure for anchoring more frequently because it is located in the same cheek area and mechanically more effective in improving cheek ptosis and the nasolabial fold. The suture holding this structure is driven to the temporal area. Additional suspensory stitches applied to the periosteum close to the origin of the zygomaticus major muscle or to the superficial fat pad of the cheek help to elevate all the mobilized soft tissues of the cheek until the healing process causes

Fig. 9 (A) Preoperative view of 49-year-old patient who had endoscopic brow, midface, and lower facelift. Bilateral lower blepharoplasty, lateral canthal repositioning, orbital rim remodeling, and a cervicoplasty were also performed. No skin excisions done except from lower eyelids. **(B)** Four months' followup. **(C, D)** Tilted view shows the upward elevation of the facial soft tissues and the rejuvenating effect of the endoscopic facelift. **(E, F)** Lateral view shows the improvement of the forehead, periorbital areas, midface, lower face, and neck. The improvement in the chin is due to the subperiosteal repositioning of the soft tissues in the chin and jaw. The neck improvement is due to the corset platysmoplasty and suture suspension. **(G)** Lateral closeup view of the auricle shows the absence of scars. **(H)** The retroauricular area also demonstrates the absence of scars

these tissues to stay in the elevated position. All of these stitches are anchored to the temporal fascia through the tunnel made under endoscopic control.

If patients have ptosis of the chin/jowls area, subperiosteal elevation of this area is necessary so the upward traction of the soft tissues will remodel the lower face. If only excess fat accumulation is present, then superficial liposuction of the lower face will be all that is needed. The neck is treated as described in the *Technique* section. All the surgery is done via submental incision and no skin excision is necessary. Incisions are done in the mastoid area for cervical suture suspension.

With the upward lifting of the tissues of the midface, the only visible redundant skin is in the preauricular area. This usually redrapes and smooths out over a 6–8-week period. The redraping is accelerated if subdermal blunt liposuction is done in the parotid area. Another technique that can be used is the retroauricular tacking to pull the ear back as described by Fuente del Campo [3]. This takes up the slack of the preauricular skin excess. More experience is needed with this step before incorporating it into the full endoscopic facelift without skin excision on a routine basis. The only skin excised is in the lower eyelid if lower blepharoplasty is needed.

The endoscopic facelift is a technique that needs to be evaluated with reproducible parameters to study its longevity and effectiveness. We intend to perform this study. The initial experience presented here is exciting and I believe that the endoscopic technique will become a routine armamentarium in facial rejuvenation. However, experience in open, deep-plane techniques and adequate training in endoscopic surgical manipulation are mandatory.

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