INTRODUCTION

In the last decade the approach to facial rejuvenation was been in constant evolution. Fat grafting and fat preservation, endoscopic techniques and botulinum toxin (BTX) have radically changed the nature of facial rejuvenation, which was traditionally based on skin and SMAS (superficial musculo-aponeurotic system) tightening and resection. Traditionally the face has been separated into ‘upper face’, ‘midface’ and ‘lower face and neck’. However, we consider it clinically more relevant to approach the temporal area, orbital rim, lateral canthus, lower eyelid, malar area and nasolabial fold as one entity.

In line with this philosophy, the aesthetic goals of midface enhancement are to recreate malar volumes, smooth the nasolabial folds, reposition the lateral canthi, fill the lower eyelid concavities, correct crow’s feet and lift the eyebrows. The technical objectives are dictated by the demands of the patient and the quest for reduced morbidity. These requirements encompass the use of local anaesthesia and sedation whenever possible (monitored anaesthesia care, ‘one-day hospital’), a reduction of the length of incisions, enhanced safety of dissection, a volume correction rather than skin or muscle tightening or fat resection, and a gentle and physiological improvement of the facial muscle balance in order to obtain a natural result.

These new concepts give the surgeon the opportunity to enhance facial volumes (‘volumetric facelift’) by modifying the deep architecture through small incisions and by changing the dynamics of the antagonist muscles.

ANATOMY

The Mid-facial Planes

Each layer of the midface has its specific influence on facial morphology. Consequently, it is essential to determine which anatomical component is responsible for facial disharmony before selecting the technique used for its correction.

SKIN

Skin colour, thickness, mobility and texture change from one facial aesthetic unit to another. In the midface the skin properties of the periorbital area are quite different from the cheek area. The skin of the eyelids is the thinnest of the body, whereas the skin of the adjacent cheek is considerably thicker.
Static wrinkles are generated as the result of skin degeneration with age, sun exposure and smoking. The skin layer can be rejuvenated by means of skin resurfacing (peeling, laser resurfacing, dermabrasion) and dermal fillers.

**FAT, MUSCLES AND SMAS**

Fat harmoniously fills the youthful face (Figure 11.1). The subcutaneous tissue layer, located between skin and muscles, varies in thickness. The eyelids have no subcutaneous fat, whereas the malar fat pad is composed of a thick layer of subcutaneous fat extending from the malar eminence to the nasolabial crease.

Loss or paucity of subcutaneous fat may lead to a gaunt and unattractive appearance and/or premature ageing. In fact, many of the signs of ageing are due to the loss of subcutaneous fat. The use of subdermal fillers or the implantation of autologous fat acts at the subcutaneous fat level. Liposuction can be used to remove excessive fat deposits.

Important muscles of expression in the midface are: orbicularis oculi, zygomaticus major and minor, levator labii superioris, levator anguli oris and levator labii superioris alaeque nasi. These muscles are surrounded by a fibromuscular layer, the superficial musculo-aponeurotic system (SMAS). Whereas the SMAS is quite adherent to the skin in the area of the zygomatic cutaneous ligaments (MacGregor’s patch), Furnas’ ligaments (SOOF), the malar fat pad is easily separated from the underlying muscle layer. Ptosis of the malar fat pad causes deepening of the nasolabial groove.

The fibromuscular SMAS layer of the midface merges inferiorly with the superficial layer of the orbicularis oris muscle. Laterally it is continuous with the SMAS layer of the cheek. At the anterior border of the masseter, the massteric cutaneous ligaments form an area of adherence of the SMAS to the skin.

The orbicularis oculi muscle consists of pretarsal, preseptal and periorbital portions (Figure 11.2). Together with the eyelid skin, the orbicularis oculi muscle forms the anterior lamella of the eyelid. Laterally and medially, fibres of the superior and inferior pretarsal portions join the lateral and medial canthal tendon. These canthal tendons are formed by contributing fibres from tarsus, orbital septum, corner of the upper-eyelid elevator muscles and periosteum. In general, the lateral canthal angle is more acute and positioned more superiorly than the medial canthal angle.

Canthal tendon laxity will result in descent and rounding of the lateral canthal angle with horizontal shortening of the palpebral fissure. Canthoplasty or retinaculumplasty procedures can successfully reverse these changes.

With ageing, festooning of lower-eyelid skin and muscle may occur over the malar prominence. This can be corrected through skin or skin-muscle flap transcutaneous blepharoplasty. Repeated contraction of the orbicularis oculi muscle causes crow’s feet, dynamic wrinkles, which are amenable to correction with botulinum toxin or surgery.

**SOOF**

In contrast to the malar fat pad which lies subcutaneously, the suborbicularis oculi fat (SOOF) is located deep to the orbicularis oculi muscle at its lower border. The SOOF surrounds the zygomaticus and levator muscles. As the SOOF is thin medially, a ‘tear trough’ deformity may occur as it descends with ageing.

**FACIAL NERVE**

The facial nerve gives off its branches within the parotid gland (Figure 11.3). The zygomatic and buccal branches leave...
the parotid gland at its anterior border deep to the masseteric fascia. Here the branches are at risk during facelift surgery. They enter the central midface superficial to the buccal fat pad of Bichat. Frequent anastomoses exist between the zygomatic and buccal branches. The zygomatic branch runs in close contact with and caudally from Stenson’s duct. The branches divide and pass deep to the surface of the zygomatic major muscle. Only the inferior orbicular ramus crosses the zygomaticus major muscle at its superficial surface. It innervates the orbicularis oculi muscle of the lower eyelid. The importance of these anatomical findings for midface lifting procedures is obvious. Anterior to the parotid gland and postero inferior to the zygomaticus major muscle, sub-SMAS dissection should be done cautiously.

The zygomaticus major muscle itself is an important landmark. Dissection should be performed superficial to this muscle in order to protect the branches of the facial nerve. The zygomaticus major muscle is identified more readily than inferiorly. Its aponeurosis should be preserved to protect the orbicularis oculi branch of the facial nerve.

**DEEP STRUCTURES**

**Ligaments, Septa and Adhesions**

All along the superior temporal line (superior temporal septum, STS; temporal ligamentous adhesion, TLA) and around the orbital rim (periorbital septum, PS; supraorbital ligamentous adhesion, SLA), strong fibrotic adherences exist between the superficial muscles and the periorbital and deep structures: septa and adhesions. These must be cut to free the temporal-orbicularis flap. Moreover, the inferior temporal septum (ITS) is to be dissected carefully: the temporal (frontal) branches of the facial nerve run in this adherence, crossed by the sensitive zygomaticotemporal nerve branches and the sentinel vein.

True ligaments are found in the midface and lower face: zygomatic and masseteric ligaments.

**Periosteum and Bone**

The midfacial skeleton is an important determinant of midfacial contour. It is formed primarily by the maxilla and the zygomatic bone and is surrounded by the periosteum, which is continuous with the periorbita at the arcus marginalis and with all ligaments, septa and adhesions in the temporal and midface areas.

**Orbit**

The orbital septum runs from the arcus marginalis to the tarsus, separating intraorbital fat from extraorbital tissues. In the lower lid there are three fat pads: the medial fat pad, which has a lighter colour and lies medial and superior to the inferior oblique muscle; the central fat pad, which lies inferior and lateral to the inferior oblique muscle; and the lateral fat pad, lying just below the outer canthal region. The posterior lamella of the lower eyelid is formed by the conjunctiva and lower-lid retractors; the latter fuse with the orbital septum approximately 5 mm below the lower margin of the tarsus.

Hence, the incision for a preseptal transconjunctival approach is made less than 5 mm below the lower margin of the tarsus; the incision for a postseptal approach lies more inferiorly.

The orbital septum is in continuity with the periorbital septum (PS), which adheres to the orbicularis oculi muscle.

**Trigeminal Sensitive Nerve**

One can safely approach the midface by dissecting in a subperiosteal plane. Care should be taken not to damage the infraorbital branch of the trigeminal nerve, which exits the infraorbital foramen. This foramen is located 7–10 mm inferior to the infraorbital rim, just medial to the zygomaticomaxillary suture.
Bichat Fat Pad
Anterior to the masseter muscle, the deep aponeurotic plane of the masseteric fascia continues deep to the buccal fat pad as the aponeurosis or investing fascia of the buccinator muscle. The facial artery and vein run in the same plane as the buccal fat pad, deeper than the facial nerve branches. The Bichat fat pad extends anteriorly to approximately the first molar. Posterior to the origin of the buccinator muscle on the maxilla, the buccal fat pad is situated just lateral to the maxillary periosteum.

Surgical Anatomy of the Ageing Midface

See Figures 11.4 and 11.5.

Eyebrow Ptosis
Ageing causes ptosis of all the components of the eyebrow (skin, fat, muscle, etc.).

Hyperactivity of Muscles
Crow’s feet develop by iterative concentric contractions of the orbicularis oculi muscle. Horizontal forehead wrinkles are caused by contraction of the frontalis muscle to compensate for eyebrow ptosis.

Lower Eyelid and Orbital Rim
See Figures 11.6 and 11.7. The ‘standard’ treatment for an unaesthetic lower eyelid is the classic lower blepharoplasty, in which a skin or skin/muscle flap is developed, the orbital septum opened and orbital fat taken out. After trimming of the skin/muscle flap, the incision is closed without tension. This technique often works well. Sometimes it leads to suboptimal results: rounding of the lateral canthus, lower-eyelid retraction or even frank ectropion, ‘hollow eyes’, skeletonized lower infraorbital rims, etc.

Eyelid retraction is a problem that is related to canthal tendon laxity, vertical shortening of the lower eyelid and insufficient support of the lower eyelid by the midface (‘negative vector’). If one or more of these disadvantageous parameters are present, lower eyelid surgery should be done cautiously. Skin excision should be conservative and additional support for the lower eyelid should be provided. Canthopexy/plasty may be added to decrease the risk of retraction or ectropion. Canthoplasty can further embellish the result by restoring the youthful position of the lateral canthus. Hollow eyes are the result of a lack of fat in the lower orbita. This can be a congenital condition. Most often, however, it is the result of excessive orbital fat removal in an attempt to match the convex area of fat herniation with the skeletonized infraorbital rim (‘tear trough deformity’). Instead of overaggressive fat removal, lipotransfer to the infraorbital area is a better solution for this problem. Arcus marginalis release and SOOF or midface lifting are viable alternatives.

Malar Eminence
In an effort to create youthful fullness to the midface, malar augmentation with alloplasts became a popular adjunctive procedure in rejuvenation surgery during the late 1980s. However, if rejuvenation is the goal, one should reposition the ptotic malar tissues rather than augment them. In the last decade different techniques have been developed for repositioning of the malar fat pad and midfacial tissues.
Figure 11.6  (a) Preoperative view of a patient who desires periocular rejuvenation (note the 'tear trough' deformity).  
(b) 1-year postoperative result after upper and lower blepharoplasty with fat repositioning and inferior retinacular canthoplasty according to Jelks.

Figure 11.7  (a) Patient with 'tear trough' deformity, malar hypoplasia, midfacial descent and rounding of the lateral canthi.  
(b) 1-year postoperative result after alloplastic malar augmentation, blepharoplasty with fat repositioning and canthoplasty according to Rittler.
True malar hypoplasia is treated by malar augmentation. Most often alloplasts are used. However, a high incidence of complications has been reported.15 These problems can be avoided by osteotomy techniques such as the ‘zygomatic sandwich osteotomy’22–26 or Lipostructure®.17

Nasolabial Fold
Pronounced nasolabial folds are due to sagging of the malar fat pad. The nasolabial crease is an invagination of the epidermis into the dermis. When the dermis has lost its elasticity, the crease progresses to a permanent rhytid. Contraction of the zygomatic muscles accentuates the fold during smiling.

Treatment may target each component of the prominent nasolabial fold by using dermal/subdermal fillers or fat and by repositioning the malar fat pad.

TECHNIQUES

Due to its central position, many different approaches to the midface have been designed in order to maximize exposure with minimal visibility of scars: lower-eyelid approach (subperiosteal forehead-supraorbital, endoscopically assisted endo-midface lift), the endoscopic subperiosteal full facelift as advocated by Ramirez23 is the endoscopic variant of Tessier’s mask-lift. In our experience with the subperiosteal endoscopic technique, we observed that the major lifting effect always entailed a collapse of the mass of fat, muscle and skin, resulting in some of the cases in retraction of the lower eyelid.

Endo-Midface Lift

The ‘mask-lift technique’, introduced by Paul Tessier, contains a complete subperiosteal facial dissection repositioning the facial components as a mask.22,23 This is a very effective technique producing impressive results at the expense of increased ‘down-time’, considerable swelling and other disadvantages, such as a lengthy coronal incision.

The endoscopic subperiosteal full facelift as advocated by Ramirez23 is the endoscopic variant of Tessier’s mask-lift. In our experience with the subperiosteal endoscopic technique, we observed that the major lifting effect always entailed a collapse of the mass of fat, muscle and skin, resulting in some of the cases in retraction of the lower eyelid.

Inspired by the concept of the traditional mask-lift and the work of Nicanor Isse,16 we developed our own variant – the ‘endo-midface lift’, an extraperiosteal, endoscopically assisted midface lift. This chapter is based on our experience with over 500 endoscopically assisted midface lifts during a 10-year period. The average age for this endoscopic lifting procedure is 50. In younger individuals with limited signs of ageing, localized endoscopic lifts are usually preferred (Table 11.1).

For older patients with generalized signs of ageing, the endo-midface lift is combined with an ‘open’ deep plane face and neck lift. With the use of the endoscope the facelift incision can be limited to a peri-auricular incision, without lengthy temporal and occipital extensions.

We use a 300-watt Xenon source, an immersible DCI-II remote camera, a fibreoptic 30-degree panaview, a custom-made set of specific instruments we designed (endodissectors, endoscopic guide and special video retractors from Karl Storz GmbH).3,8 Refer to Figures 11.8–11.10.

Local anaesthesia (Xylocaine® 1% + adrenaline/epinephrine) potentialized by sedation (Diprivan®) and controlled with monitoring is used in 90 per cent of the patients. Hydrodissection is important to spread the plans.

Two symmetrical 4-cm incisions are made along the line of a classic temporal or coronal incision. For the temple lift, a wide dissection is made beyond the temporal muscle cranially and posteriorly in the subgaleal plane (Figure 11.11). Dissection then proceeds anteriorly beyond the temporal adhesions STS and TLA up to the lateral orbital rim.16,17 One of the key elements of this dissection is ligating the perforating sentinel temporal vein, which anastomoses the deep with the superficial temporal system (Figures 11.12 and 11.13). This is not a simple vessel hampering the dissection, but a perforating element between the temporal aponeurosis and the superficial tissues of the temple area. Hence the importance of severing this ‘rivet’ in order to obtain a clear lift.

Only the anterior one-third of the zygomatic arch is dissected in order to protect the frontal (temporal) branch of the facial nerve (Figure 11.14). Usually the superior orbital rim has been dissected through an endoscopic subperiosteal forehead-lift approach. From here on, the dissection is supraperiosteal, freeing the lateral two-thirds of the orbicularis oculi muscle.
without severing the orbital septum or lateral canthus. The insertions and adhesions of the orbicularis oculi muscle (lower tarsal fascicle crossing under the upper tarsal fascicle) are detached from the outer canthus in order to obtain a rotation of the orbicularis oculi muscle.

This rotation involves the lateral two-thirds of the muscle, while the muscle stays fixed at the supraorbital and infraorbital nerves and the inner canthus (Figure 11.15). During the dissection of the orbicularis oculi muscle it is important to stay in contact with the periosteum, to protect the small facial nerve branches which innervate the orbicularis oculi muscle (see Figure 11.14).
After undermining the inferior portion of the orbicularis oculi muscle, we locate the apex of the malar fat pad at the top of the cheekbone and start to dissect with the closed blunt endodissector (see Figure 11.9) while pinching the malar fat pad between two fingers of the left hand. The malar fat pad is freed from the underlying zygomaticus major muscle (Figure 11.16). The movements must be gentle to avoid damaging the vessels. While grasping the malar fat pad externally between our fingers, we can execute the dissection towards the cheek, until the ligaments of Furnas are reached; then upwards and downwards beyond the nasolabial fold. For these dissections, the temporal endodissector or smooth endodissector (softer and less traumatic) is used (see Figure 11.8). The temporal endodissector has considerable range and allows for a perfect dissection of the whole area.3-5

There is still a difficulty in dissecting Furnas’ ligaments by endoscopy. They limit dissection towards the cheek, as severing Furnas’ ligaments solely by endoscopy is a very delicate operation. For this we have to resort to the ‘open’ deep plane lift (see Figure 11.11).2 The benefit of using an endoscope in these cases is the possibility of performing major dissections through small incisions using the endoscope for the central midface.2 The temporal and occipital traditional facelift incisions can virtually be omitted. The vector of the lift is more of an upward rotation, the direction superior rather than posterior.4 Limiting temporal and occipital incisions and skin resection is important in the prevention of alopecia in these areas.

Fixation sutures can be placed in the malar fat pad and tied to the periosteum of the lateral orbit if necessary. By severing the upper external part of the orbicularis oculi muscle (‘myotomy box’), the tail of the eyebrow is lifted by the action of the frontalis muscle, without the need for fixation of the eyebrow by sutures (see Figures 11.10 and 11.15). It is more natural to take advantage of the muscle balance between eyebrow depressors and elevators instead of fixing the brow with sutures.18 The brow maintains its full capacity of expression. Finally, the temporal fixation is performed with three Vicryl 2/0 sutures, taking temporoparietal fascia and subcutaneous tissue (superior to the level of the frontal branch to avoid injury) and fastening this flap to the (deep) temporal fascia.20

Adequate resection of a strip of the scalp is sometimes useful for absorbing the excess temporal skin. A dressing is applied during the first night only. The small bandage and gauzes are removed at day 1; antiseptic shampoo and hairdrying are advised on a daily basis. We like to use cryotherapy and lymphatic drainage to reduce swelling and bruising as soon as possible, instead of compressing the face and neck.

Figure 11.14  Extra-periosteal dissection of the lateral two-thirds of the orbicularis oculi muscle, staying far away from the ‘danger zone’ of the frontal branch.

Figure 11.15  Left hemiface: After freeing the lateral two-thirds of the orbicularis oculi muscle, three fixed points remain – supraorbital nerve, infraorbital nerve and inner canthus. Right hemiface: Sectioning the superolateral part of the orbicularis oculi muscle releases the lifting action of its antagonist, the frontalis muscle, which results in rotation of the orbicularis muscle around the three fixed points.

Figure 11.16  Dissection of periorbital ligaments and septa completed. Dissection of the midface continues on top of the zygomaticus major muscle.
This endoscopic fronto-temporo-malar lift can be performed as an isolated procedure in young patients, or it can be combined with a deep plane facelift. In approximately 30 per cent of patients who receive endoscopic treatment of one or more regions, a deep plane lift with short scars is added.\textsuperscript{2,21}

**Lipostructure\textsuperscript{®}**

We like to use fat grafting in the midface as described by Coleman.\textsuperscript{17} We try to find fat in the neck and jowls. If we need more volume, abdomen, knees or hips are potential donor sites. Centrifugation is important to separate oil and blood from pure fat cells. The fat is reinjected harmoniously through 1.5-mm canulas deep to the skin (Figure 11.17). Multiple crossing tunnels and injection sites give the best result.

We start with Lipostructure\textsuperscript{®}, before any dissection. It fills in the hollow areas, augments facial volumes and reduces the necessity for wide undermining or huge dissections. Approximately 40 per cent of our endoscopic lifts are complemented with Lipostructure\textsuperscript{®}.

**Modern Blepharoplasty Techniques**

The orbicularis oculi muscle and the lateral part of the lower eyelid is one of the most important components of the midface. Complementary eyelid surgery is always discussed with the patient. Often patients have undergone a blepharoplasty in the past. If not, eyelid surgery is almost always decided on.

A regular transcutaneous lower blepharoplasty is usually combined with one or more of the following supporting techniques:

- orbicularis muscular flap sutured to the periostium at the level of the lateral orbital rim, just above the lateral canthal ligament (Vicryl\textsuperscript{®} 5/0 rapid; Figure 11.18)
- canthopexy by tightening the ligament: plication (5/0 Prolene\textsuperscript{®})
- canthoplasty according to Jelks\textsuperscript{22} inferior retinacular lateral canthoplasty, which is a versatile reconstructive procedure (see Figure 11.6)
- canthoplasty by repositioning and reattaching the whole ligament to the orbital periostium in a more superior position
- cantholysis and -plasty according to Ritleng.\textsuperscript{23}

For the last technique, the first step is a transsection from the corner of the eyelid, horizontally, to the orbital apophysis to separate the two eyelids and the two components of the lateral canthus. The second step is cutting of the inferior retinacular ligament and the whole orbital septum to free completely the lower eyelid. The third step is desepithelialization of the lateral part of the lower tarsus (5 mm) and removal of the eyelashes to create a strong strip and to reconstitute a new lateral canthus by inserting the strip to the orbital periostium, slightly more superior than the preoperative position of the canthus (with two Prolene\textsuperscript{®} 5/0 sutures) (Figure 11.19; see also Figure 11.7).

To get a smooth, young and convex continuity from the lower eyelid to the malar projection, we use:

- fat transfer – Lipostructure\textsuperscript{®} to push up the lower eyelid and fill the lower-eyelid depression (hollow orbital sulcus, ‘tear trough’ deformity)
- arcus marginalis release and/or SOOF lift.

**Figure 11.17** Lipostructure\textsuperscript{®} of the malar area.

**Figure 11.18** (a): Patient seeking treatment for her sad and worried look. (b): 1-year postoperative result after upper- and lower-lid blepharoplasty and additional use of Botox\textsuperscript{®}.
ARCUS MARGINALIS RELEASE AND SOOF LIFT

Arcus marginalis release was popularized by Hamra in order to convert the double convexity of the aged lower eyelid and midface into a more youthful single convexity, starting at the tarsal border and blending with the malar fat pad curvature. This technique can be helpful in treating the skeletonized lower infraorbital rim (‘tear trough deformity’), either as an isolated procedure or combined with lifting of the SOOF. These techniques are generally performed through a subciliary approach. Alternatively, execution through a transconjunctival approach is possible, but exposure is more limited.

A standard subciliary incision is made. Care is taken to preserve the pretarsal portion of the orbicularis oculi muscle. Then the dissection continues deep to the muscle over the orbital septum, until the arcus marginalis is identified. Blunt dissection is continued past the infraorbital rim. The ptotic SOOF is identified inferior to the infraorbital rim. Dissection then continues deep to the SOOF, leaving the periosteum intact. One can go beyond the level of the infraorbital nerve, if care is taken not to damage this neurovascular structure. After mobilization, the SOOF is elevated to the level of the infraorbital rim and sutured to the periosteum with Vicryl® 5/0 sutures.

Then the orbital septum is incised with cutting cautery just superior to the level of the arcus marginalis along its entire length. Special attention is paid to cauterize the vessels running in the septum to prevent retraction of the vessels and intraorbital bleeding. The edge of the septal flap is then brought down over the infraorbital rim and sutured to the SOOF and periosteum with 5/0 Vicryl®.

After the SOOF lift and septal reset are accomplished, a canthoplasty and skin/muscle resection is performed and closure proceeds in a classical fashion.

This technique is powerful, but results in a prolonged healing time. We prefer Lipostructure® when possible.

Figure 11.19  Intraoperative view (same patient as in Figure 11.7). Top left: Canthoplasty according to Ritleng, tightening of the lower tarsal strip with two sutures to the superolateral orbital rim. Top right: Result of the tightening manoeuvre (note the new orientation and form of the palpebral fissure). Bottom left: Malar implant in supraperiosteal position with intraorbital fat exposed. Bottom right: Fat repositioned over the superior part of the malar implant to smoothen this area (note the zygomaticofacial nerve).
Malar Augmentations other than Lipostructure®

MALAR IMPLANT

Many different shapes of malar implants are on the market. It is important to choose an implant which creates a harmonious augmentation of the full midface, not only the malar bone projection.

Intraoral, transconjunctival or subciliary approaches are possible. We commonly use the last one, with a skin/muscle flap and preperiosteal pocket. Fixation with 4/0 nylon is used in 50 per cent of the cases.

To avoid any arcus marginalis demarcation, in extensive augmentations and hollow eyes, we perform fat repositioning of the lower eyelid (see Figures 11.7 and 11.19).

ZYGMATIC SANDWICH OSTEOTOMY

The ‘zygomatic sandwich osteotomy’ (ZSO) as described by Mommaerts et al. is a modification of the zygomatic arch osteotomy, a technique introduced by Powell.

The ZSO is performed through an intraoral approach, with minimal subperiosteal tunnelling. A vertical osteotomy of the anterior maxillary sinus wall – lateral to the infraorbital nerve – is connected with a semihorizontal osteotomy, which travels from a point 4 mm beneath the infraorbital rim to the junction of the frontal and temporal processes of the zygomatic bone. Both these osteotomies transect the maxillary sinus walls and are executed with a reciprocating saw and finished with osteotomes. The vascularized zygomatic segment is rotated anterolaterally with the centre of rotation located in the temporozygomatic suture line. It is held in this position by a miniplate or spacer material. This technique provides a distinct anterolateral prominence, highlighting the malar bone in a symmetrical fashion.

Morbidity (e.g. oedema) and complications are lower compared to the use of malar implants. The ZSO can be performed as an isolated aesthetic procedure or it can be combined with other aesthetic or reconstructive procedures, such as orthognatic surgery, midface lifting or rhinoplasty.

Ancilliary Procedures

BOTULINUM TOXIN

To relax the orbicularis oculi muscles we like to inject botulinum toxin into the crow’s feet, one month before or 6 weeks after surgery. Four injection sites are used with 2.5 units of Botox® for each injection site.

We can change the position of the tail of the eyebrow by injecting the toxin into the ‘myotomy box’: superolateral portion of the orbicularis oculi muscle (one injection site: 2.5 units of Botox®). It blocks the action of the orbicularis oculi muscle which pulls down the eyebrow and thereby frees the antagonist action of the frontalis muscle. This radically changes the muscular balance.

FILLERS

Synthetic gels (Figure 11.20) are useful to fill the nasolabial folds. These gels are injected under local anaesthesia. We use different dermal and subdermal fillers (Aquamid®, NewFill®, Perlane®, Restylane®, Touchline®) before, during or after surgical procedures.

Figure 11.20 33-year-old woman before (a) and after (b) injection of the nasolabial folds with hyaluronic acid (Perlane®).
RESULTS

Our results have improved dramatically since we started utilizing the endoscope, both in the short term and in the long term. The superior cosmetic effect is confirmed above all by the remodelling of the eyebrows, the lengthening of the palpebral fissure, the better position of the lateral canthus, and more salient cheekbones. Figures 11.21 to 11.28 demonstrate representative results.

The key to the result is to dissect the orbicularis oculi muscle completely, to sever the sentinel vein and to release all ligaments, adhesions and septa of the temporal and periorbital

Figure 11.21 61-year-old patient before (left) and one year after (right) upper- and lower-lid blepharoplasty, endoscopic midfacelift, deep plane face/neck lift with short scars and Lipostructure®.
Insufficient dissection of the orbicularis oculi muscle may lead to inferior results on the eyebrow.

Sometimes additional botulinum toxin injections are necessary for correction of persistent horizontal frontal wrinkles and crow’s feet.

Complications are rare and healing time is reduced considerably when compared to the mask-lift technique. Prolonged lower-eyelid oedema is infrequent, but can take up to 8 weeks to resolve. The innervation of the lower portion of the orbicularis oculi muscle warrants special consideration.

Lower-eyelid paresis has been noted in 1.4 per cent of our patients, lasting between 2 weeks and 2 months. Sometimes we have noted postoperative spastic myoclonies of the lower eyelid, but a permanent palsy has never occurred. Good hydrodissection and inferior-medial-oblique orbicularis and malar fat pad dissection with blunt and smooth endodissectors save the innervation of the lower eyelid.

It is also important to have adequate postoperative follow-up to prevent exposed keratitis.

Frontal paresis is extremely rare and of short duration (one case, with duration 1 week). We have never experienced true paralysis of facial nerve branches.

When executing the myotomy box, one should use a low-grade bipolar endoscopic forceps far away from the skin flap. We have experienced three cases of unilateral eyebrow skin necrosis as a result of cauterization of the orbicularis oculi.
muscle too close to the skin. All three cases have been solved by healing with second intention.

When fat grafting (Lipostructure®) is performed for correction of the tear trough deformity, it is important to inject very deep, in contact with the periosteum of the orbital rim, deep to the orbicularis oculi muscle. As the eyelid skin is extremely thin, irregularities may develop if the fat is injected more superficially.
Figure 11.25  70-year-old patient before (left) and 5 years after (right) endoscopically assisted short-scar deep-plane face/neck lift, transconjunctival blepharoplasty (fat removal), Botox® injections of the forehead and Restylane® injections for the nasolabial fold and upper lip.

Figure 11.26  50-year-old patient before (left) and 1 year after (right) endomidface lift, Lipostructure® of the molar area, nasolabial fold, chin and mandibular line and Botox® injections in the glabellar area.
Figure 11.26 (Continued).

Figure 11.27 Oblique view of a 52-year-old patient before (left) and 1 year after (right) endoscopically assisted short-scar deep-plane face lift, Lipostructure® of the malar area and Botox® injection in the forehead and glabellar region (patient had already undergone a rhinoplasty and upper- and lower-lid blepharoplasty in the preoperative pictures).
CONCLUSION

Our philosophy is to treat the midface, peri-orbital and temporal areas as one entity. For the peri-orbital and midface area we favour an extraperiosteal plane of dissection. Emphasis is placed on the use of the endoscope, combined with fat grafting. As a result of video monitoring which magnifies the images of fat, nerves, muscles and vessels, the regional anatomy is better understood.

With the aid of new instruments, a very extended dissection can be performed with perfect control over muscles, nerve branches and vessels. This enables us to achieve major undermining through minor incisions, with less morbidity.

Key is effective and proper dissection, repositioning of the deep components and alteration of the muscle balance. This is in contrast with traditional techniques, based on skin resection and major skin traction, which will not lead to effective results in the long term.

We have to admit that in some patients there will always be a need for resection of excess skin. However, an endo-midface lift complemented with a deep plane short scar lift with skin resections exclusively around the ear produces better results. In this way, extensive endoscopic lifting calls for less cervicofacial lifting. Dissecting the parotid part and the cervical part to achieve a full lift after having dissected two-thirds of the face using endoscopy is the crowning achievement of this development.

REFERENCES


Figure 11.28 Frontal view of the patient in Figure 11.27.

Author Queries:
1. There are missing elements and questions in the reference list.