

# Prophylactic Midface Lift in Midfacial Trauma

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## Abstract

The objective was to review our favorable experience in the use of prophylactic midface lifts in the setting of severe midfacial trauma. A retrospective review of a consecutive series of patients undergoing prophylactic midface lifts at the time of definitive fracture repair in a County Hospital Level 1 trauma center was done. All patients undergoing midface lifts at the time of fracture repair by the senior author from July 1998 to July 2012 were included in this review. A total of 72 patients (58 males, 14 females, average age: 36.2 years) were available for review. Sixty-three patients had a minimal follow-up of at least 3 months. No complications felt to be related to the midfacial suspension were noted. There were no instances of frontal nerve paralysis or palsy. There were no patients with ectropion. Patient midfacial symmetry was evaluated by two blinded facial plastic surgeons. It was felt to be excellent in 53 patients, good in 9, fair in 1, and poor in none. The force of trauma necessary to elicit a severe midfacial fracture and the subsequent subperiosteal dissection required to expose the fractures for rigid fixation result in severe laxity of the midfacial soft tissue envelope. Failure to suspend and support these soft tissues will result in significant facial asymmetry. Prophylactic endoscopic midface suspension appears to be a safe and effective method of largely eliminating this problem and should be considered in the setting of severe midfacial fractures.

## Keywords

- ▶ midface lift
- ▶ maxilla fractures
- ▶ facial trauma
- ▶ facial deformity
- ▶ endoscopic surgery

Fractures of the midface can be of variable patterns and severity. In 1901, Le Fort classified midface fractures as I, II, or III resulting in a floating palate, a central midface triangular fracture, or total craniofacial separation respectively.<sup>1</sup> Because many midface fractures do not follow exactly along the patterns described by Le Fort, other authors have classified fractures as horizontal or vertical and have urged describing each individual fracture on both sides of the face.<sup>2,3</sup> Another common fracture pattern that involves part of the midface is the “tripod” fracture that involves the lateral orbital rim, inferior orbital rim, zygomaticomaxillary buttress, and zygomatic arch. Fractures of the maxilla can cause malocclusion and elongation or flattening of

the midfacial region. Fractures of the zygoma can cause decrease in facial projection and width, trismus, and malposition of the globe with or without diplopia.<sup>4,5</sup>

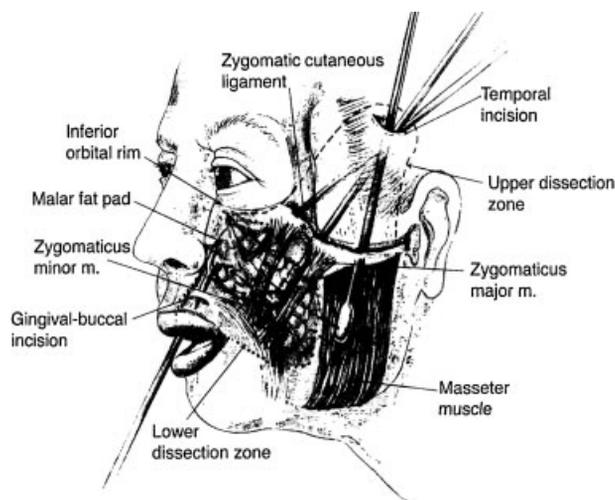
Repair of zygomaticomaxillary complex (ZMC) fractures requires wide exposure to allow for precise reduction and rigid fixation. Severe injuries require greater exposure utilizing incisions that provide greatest access to the fractures such as the transconjunctival, upper gingivobuccal, and hemicoronal incisions. Subperiosteal dissection is performed widely, elevating the periosteum medially to the pyriform aperture, superiorly over the inferior orbital rim, and laterally over the medial aspect of the zygomatic arch with release

of the soft tissue attachments of the master muscle superiorly. After rigid fixation, the soft tissue envelope is redraped without any fixation to the underlying facial skeleton. Yaremchuk and Kim reported complications of these approaches where soft tissue attachments were thoroughly dissected including ectropion (4%), lateral canthal displacement (77%), and cheek ptosis (47%).<sup>6</sup>

For minimally displaced fractures, using an upper gingivobuccal approach retains the major periosteal attachments of the midface. However, with increasing severity of fractures and wider surgical exposure, the broad elevation of the skin/soft tissue envelope can result in cosmetic deformity. The senior author has appreciated many midface fractures with excellent postoperative osseous reduction but persistent facial asymmetry due to overlying soft tissue ptosis. In this article, we review our favorable experience with the use of prophylactic endoscopic midface lifts in severe midfacial trauma that requires three- to four-point fixation.

## Methods

This is a retrospective review of a consecutive series of patients undergoing prophylactic midface lifts at the time of fracture repair by the senior author from July 1998 to July 2012. Institutional review board (IRB) approval was obtained for this study from JPS hospital. All midface fractures requiring three or more points of fixation underwent prophylactic midface lift. Intraoperatively, once the fracture has been reduced and plated, a small access incision is made in a posttrichial fashion on the ipsilateral temporal fossa. Dissection is taken down to the deep temporal fascia. Under endoscopic guidance, a periosteal elevator is used to bluntly dissect from the temporal region into the subperiosteal midface pocket (→Figs. 1, 2). Nonresorbable suture is then passed from the midface soft tissue pocket at the malar eminence to the deep temporal fascia (→Fig. 3). Generally, two such sutures are used to allow a broader, more natural elevation of



**Fig. 1** Zones of dissection through the temporal incision and gingivobuccal incision during the endoscopic midface lift. (Reprinted with permission from Defatta and Ducic.<sup>15</sup>)



**Fig. 2** Completion of subperiosteal midface elevation with connection of posttrichial and gingivobuccal incisions. (Photograph used with patient consent.)

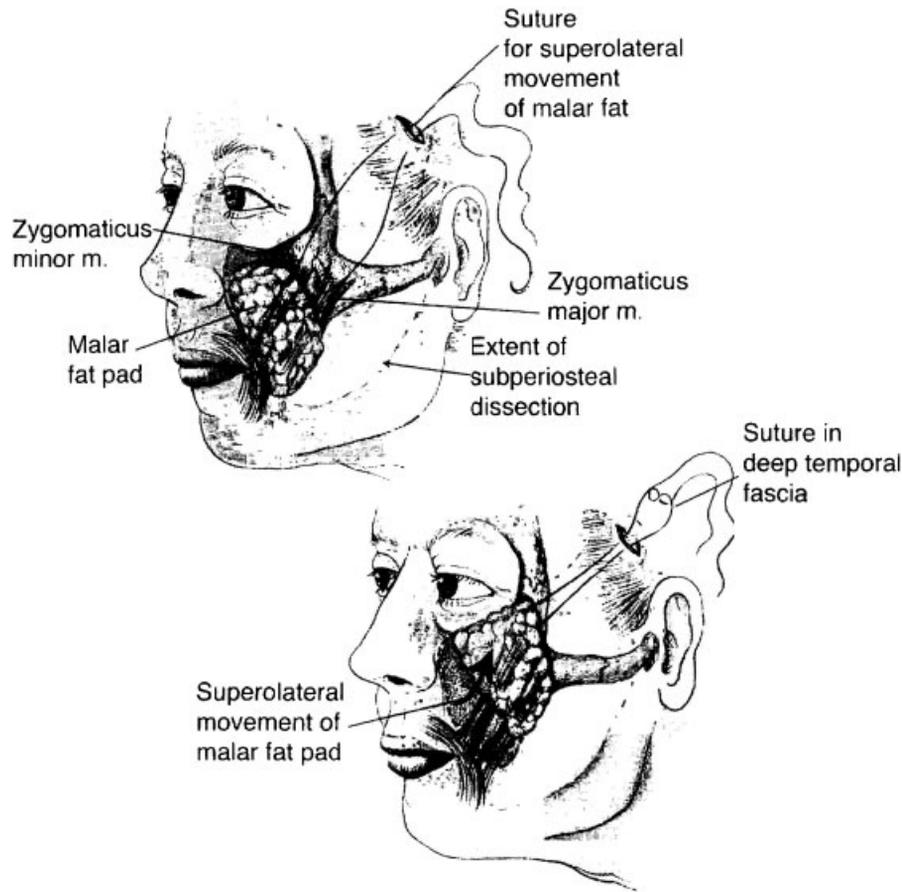
the midface. The goal is to support and suspend the midface not beyond the patient's premorbid state in unilateral cases (→Figs. 4, 5) and symmetric suspension in bilateral cases. Postoperatively, cheek ptosis was evaluated at a minimum follow-up of 3 months by two blinded facial plastic surgeons. Results were graded on the following scale: excellent, no significant difference between the two sides; good, mild difference between the two sides (noticeable); fair, difference between the two sides readily noticeable; poor, severe difference between two sides for which further surgery is required.

## Results

A total of 72 patients (58 males, 14 females, average age: 36.2 years) were available for review between the specified study period. No complications felt to be related to the midfacial suspension procedure were noted. There were no instances of frontal nerve paralysis or palsy. There were no patients with ectropion. Patient midfacial symmetry was felt to be excellent in 53 patients, good in 9, fair in 1, and poor in none. As an example of the favorable outcome with this technique, →Fig. 6 shows the preoperative appearance of a patient with severe midfacial trauma whereas →Fig. 7 shows a long-term follow-up photograph of the patient following internal fixation and midface lifting.

## Discussion

ZMC fractures refer to traumatic disruption of the four buttresses that make up the ZMC: zygomaticomaxillary, frontozygomatic, zygomaticosphenoid, and zygomaticotemporal. This type is the second most common facial fracture after nasal bone fractures with most resulting from assaults, falls, and automobile crashes.<sup>7</sup> Many classification schemes have been developed over the years to describe the severity



**Fig. 3** Endoscopic suturing of the malar fat pad to the temporalis to achieve a superolateral movement of the midface. (Reprinted with permission from Defatta and Ducic.<sup>15</sup>)

of injury to the ZMC. Though each offers different language to describe the injury pattern, it becomes apparent that ZMC fractures encompass a wide range of clinical scenarios. For example, a nondisplaced zygomatic arch fracture can be managed nonoperatively with good results. Alternatively, ZMC fractures encompassing three of four buttresses can mandate operative repair and be difficult to restore the functional and aesthetic actions of the midfacial skeleton even with good anatomic osseous reduction.<sup>7,8</sup>

Complications from ZMC fractures can result from the initial fracture and/or operative repair. Many important anatomic structures are associated with these injuries, and typical complications include diplopia, orbital entrapment, infraorbital nerve damage, and trismus. Repair of these fractures varies from surgeon to surgeon; however, the review of the literature by Mesleman and Kellman states that the important principles of ZMC repair are to treat each fracture individually and to attempt to fixate the fracture with the least amount of plating



**Fig. 4** Patient with severe left midfacial fractures after ORIF of bony fractures. (Photograph used with patient consent.)



**Fig. 5** Same patient after left endoscopic midface lift. (Photograph used with patient consent.)



**Fig. 6** Preoperative appearance of the previous patient.

and soft tissue disruption.<sup>7</sup> Soft tissue disruption leads to postoperative complications that have become more recognized and avoided by reconstructive surgeons over the past 30 years. Common approaches to ZMC fractures include gingivobuccal, transconjunctival, and hemicoronal incisions. When these are combined to expose severe injuries, it can lead to extensive subperiosteal dissection of the entire midface soft tissue envelope. Complications have been reported from these approaches including ectropion, lateral canthal displacement, subcutaneous atrophy, excessive bulk, and cheek ptosis.

Cheek ptosis is the inferior displacement of the malar skin pad resulting from complete loss of periosteal attachments to the underlying facial skeleton. Four important features seen in midface aging include (1) gradual ptosis of the cheek skin below the inferior orbital rim with descent of the attenuated lower eyelid skin, creating a skeletonized appearance with infraorbital hollowness; (2) descent of the malar fat pad, with loss of the malar prominence; (3) deepening of the tear



**Fig. 7** Long-term postoperative appearance of previous patient following ORIF and bilateral midfacial lifting.

trough; and (4) exaggeration of the nasolabial fold.<sup>9</sup> The soft tissue changes seen in many trauma patients who have undergone repair of facial fractures follow these same features of midface aging. Prior studies have shown that problems of soft tissue volume can be dealt with lipotransfer or other injectables.<sup>10</sup> However, cheek ptosis does not respond to fillers alone. Phillips et al noted ptosis in soft tissues in the region of the midface, with resultant loss of zygomatic projection and fullness in the region of the nasolabial fold. They described suturing the free edge of the previously dissected zygomatic periosteum to the orbital rim through a subiliary incision after facial fracture repair.<sup>11</sup> Gruss et al confirmed that reattachment of the soft tissue to the reconstructed skeleton provides the final link in comprehensive one-stage reconstruction of complex facial fractures.<sup>12</sup> McRae and Frodel also stressed that by definition if wide subperiosteal dissection is performed, there is an obligatory ptosis of these released midfacial tissues. They recommended that the soft tissues be resuspended by elevating the midface periosteum to the orbital rim and the lateral facial and temporal soft tissues to the temporal region.<sup>4,13</sup> Finally, Yaremchuk and Kim showed that 8/17 patients who had complete maxillary degloving during orbital fracture repair had postoperative cheek pad displacement. In the same study, 0/20 patients who had the same fracture repair followed by resuspension of the cheek soft tissues to the inferior orbital rim had cheek pad displacement.<sup>6</sup>

A midface lift is another technique to resuspend the malar skin after severe facial fractures. With the advent of improved instrumentation, endoscopic midface lifts have become a standard procedure in the arena of cosmetic facial surgery. Generally, a temporal access incision with or without an adjunctive upper gingivobuccal incision is used to allow midfacial soft tissue elevation. Dissection in the temporal region proceeds along the deep temporal fascia and connects to the maxillary portion of the dissection. Complete periosteal release must be achieved at the level of the inferior orbital rim, pyriform, and over the masseter. Once adequate mobilization has been achieved, nonresorbable suture suspension of the deep aspect of the released midface is achieved to the deep temporal fascia.<sup>5</sup>

Described complications of endoscopic midface lifts exist, with one of the most serious being paresis or paralysis of the frontal branch of the facial nerve. This can be avoided by marking Pitanguy's line and by carefully identifying the deep temporal fascia as the plane of dissection in the temporal area. Also, cautery in the area of the sentinel and bridging veins should be avoided to prevent thermal injury to the frontal branch. Inferiorly, along the entire surface of the zygomatic arch, care is taken to enter the subperiosteal plane. Distortion of the lateral canthus and ectropion are also possible complications caused by the superolateral pull of the midfacial and temporal tissues. This can be avoided by leaving a 1-cm cuff of tissue including periosteal attachments around the lateral canthus. Also, extensive subperiosteal midfacial dissection as described previously allows less tension when the midface is suspended superolaterally. Facial asymmetry, hematoma, infection, and alopecia are other described complications of endoscopic midface lifts.<sup>14,15</sup> Endoscopic midface suspension

does not add significantly to the length or cost of these procedures as the bulk of the dissection is performed necessitating only a few extra minutes to perform the temporal elevation and suture application.

Our study shows good results from use of the endoscopic midface lift technique to prevent cheek ptosis. Excellent cosmetic results were seen in 53/72 cases with no complications from the midface lift procedure reported. Nine patients had a good outcome and one patient had a fair outcome. No patient required additional surgery to correct facial asymmetry after prophylactic midface lift.

The data gained from a consecutive series from a single surgeon is the major strength of this paper. Only severe midface fractures were included, specifically those requiring three or more points of fixation limiting a potential selection bias. Weaknesses of the study include the lack of a standardized reporting scale for cheek ptosis requiring subjective reporting of results. Future research in this area should expand on selection criteria to determine which patients will likely suffer postoperative cheek ptosis and therefore undergo a prophylactic midface lift procedure. The senior author Y.D., through experience, has suggested that the extensive midfacial scar contracture following injury may counteract the ptosis present in the normal aging process. Given the lack of literature and objective methodology, this point could be a potential investigative reference for upcoming research wherein the midfacial appearance of trauma patients could be compared with that of nonaffected age-matched individuals.

## Conclusion

Severe ZMC fractures are associated with complications such as ectropion, lateral canthus displacement, and cheek ptosis. Cheek ptosis results from extensive subperiosteal dissection during operative repair. Endoscopic midface lift produces excellent results in preventing cheek ptosis in most patients in our study. We would recommend consideration of this

technique or other suspension techniques to ensure favorable aesthetic outcomes.

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