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Full Length Case Report

SECONDARY CORRECTION OF POST-TRAUMATIC MALAR DEPRESSION AND ORBITAL FLOOR DEFECT WITH ILIAC CREST ONLAY GRAFT AND TITANIUM MESH

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Zygomatic fracture results from direct impact on bone, causing fractures involving one or more of its processes. Injury that is more violent involves contralateral side maxilla, orbital part and sometime mandible. Immediate treatment necessitates open reduction and internal fixation, which sometimes leaves secondary defects like depression in the malar region or ocular deformities. Such defects are addressed secondarily either by re-fracturing and realigning the malunited fragments or by camouflage procedures using autologous and alloplastic materials. 25 years old male patient came with chief complain of facial asymmetry and numbness over cheek region since one and half year with a history of fall down injury and fracture of left zygomatic complex region, which was treated with, open reduction internal fixation. We noted depressed Zygomatic-malar and ocular areas. We did bone reconstruction procedure with iliac crest bone graft for orbital floor and used onlay graft and titanium mesh for malar region correction.

Key words: Secondary Correction, Malar deformity, Orbital floor defect, Iliac graft, Zygomatic complex fracture.

INTRODUCTION

Zygomatic fracture results from direct impact to the bone, which causes fractures at or about one or more of its processes. Direct blows usually first strike on a prominent portion of the face such as the malar eminence. Injury that is more violent will involve contralateral side maxilla (Le fort injuries), orbital part and sometime mandibular fractures (Booth *et al*., 2007). The facial deformity due to fractures is mostly treating in two manners. First, fixation of the fracture along with the reconstruction at the time of primary intervention and second, after complete healing of the fracture by reconstruction in second phase surgery either by grafting or re-fracture and repositioning (Gassner *et al*., 2003). However, there are conditions when precise primary correction is not possible and second stage surgery indicated for functional and cosmetic reasons. As camouflage, the perfect replacements in these cases are the tissues that are identical to the missing or deformed tissue. Autogenous tissue meets this criterion best (Staffenberg and Kawamoto, 1998). Augmentation of the zygomatic complex can be corrected by either autogenous or alloplastic onlay graft (Jones and Ching, 1995; Ranganath and Hemanth Kumar, 2011).

Case History

On clinical examination, we found malar depression on the left side as compare to normal side.

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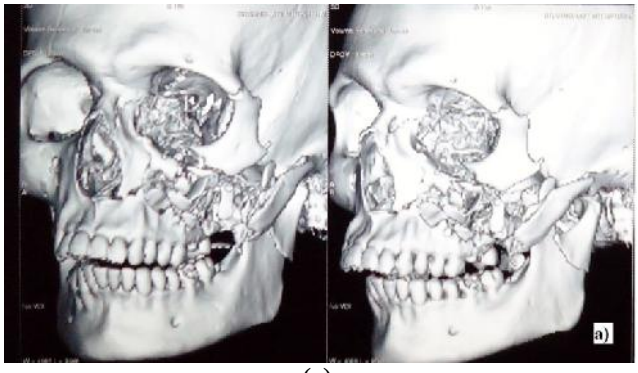
Due to orbital floor fracture, we found left eye globe inward, downward, and suggesting enopthalmous of left eye compare to right eye (Fig 1a, Fig 1b). Patient also complained of paresthesia on the infraorbital region, left lower eyelid, left nasal and left side upper lip region. According to patients past history, he was operated previously for the facial fracture before one and half year. Patient's older 3- dimensional Computed Tomography (CT) radiograph images revealed multiple fractures of the left zygoma, left zygomatic arch, left F-Z suture, left lateral pterygoid plate, lateral wall of left ethmoid bone, lacrimal bone, right frontal sinus, Left sub-condylar fracture of mandible and all the walls of maxillary sinus involving the alveolar arch (Fig 2a). Same time we noticed presence of Enopthalmous but no sign of diplopia in left eye. Patient treated by transosseous wires and mini plates.

Based on clinical and radiographic examination, we decide to lift the floor of the orbit to correct the eye level. There was scare mark present on the left side of cheek region. We have done 3-Dimentional CT scan to know the extension of the defect and all routing investigation also performed for operate under General anaesthesia. After clinical and radiographic analysis patient's radiograph shows the presence of mini plates, over fronto-zygomatic suture and left ramus and transosseous wiring over zygomatic arch, and zygoma. The defect over left zygomatic buttress and Zygomatic malar region were noted in the pre-operative 3-Dimentional CT scan (Fig 2b). The surgery was performed under General anesthesia. Lignocaine hydrochloride with adrenaline 2% injection was injected in the left palpebral conjunctiva and on the lateral canthus. Traction sutures taken in lower eye lead.

(a)

(b)

Fig. 1a. Preoperative front view of scar and depressed Zygomatic malar. Fig. 1b. - Preoperative Lateral view



(a)

(b)

Fig. 2a. Previous 3D CT shows multiple fractures. Fig. 2b. Previously operated for pan facial fractures, shows miniplate and trans-osseous wiring, defect over Zygomatic buttress region also noted

With the help of no. 15 BP blade incision was placed on the palpebral conjunctiva extending laterally by incising the lateral canthus (Fig 3a). Then layer- wise desiccation done by incising tarsal plate. The plane of dissection was below the orbicularis oculi muscle. The septum was dissected to reach the periosteal layer covering the infra orbital rim and dissected away to reach floor of the orbit with lateral canthotomy. The incision was further extended into the scar mark of the previous surgery for placing the titanium mesh over the malar region (Fig 3b). The plate and wires placed during previous surgery were identified in the depressed area and removed.

Simultaneously, Cortico-cancellous Iliac bone graft was harvested from the inner table of anterior iliac spine of right iliac bone and closer was done with 2-0 silk. Doomed shape and curvature was given to titanium mesh for replicating anatomical shape of the zygomatic bone and malar process and fronto-zygomatic process. To protect Infraorbital nerveanother curve given in accordance with position of the infraorbital foramen. Approximately 1 x 1 cm bone graft placed under the periosteum of the orbital floor without any fixation through transconjuctival approach to re-contour. Then mesh was fixed with 6mm x 1.5 mm screw at Fronto-zygomatic process, medially at the Zygomatic - maxillary region and laterally at the Zygomatic malar region. Then, bone grafts were pushed below to the mesh followed by small hole in the maxillary and Zygomatic bone (Fig 3c). Layer wise suturing done, first at the palpebral of Subconjuctival region with 6-0 vicryl, followed by lateral canthus. Then, lateral extension sutured with the 4-0 vicryl and skin sutures were taken by 4-0 Proline.

Fig. 3a. Intra-operative shows trans-conjunctival incision to reach floor of orbit. Fig. 3b. Intra-operative shows extension of the incision to expose defect over Zygomatic malar region. Fig. 3c. Titanium mesh fixation done 1.5x4mm titanium screw

Post-operatively injectable antibiotics (combination of amoxicillin with clavurinic acid 625 mg and Metronidazole 100cc/ 400mg three time a day) , Analgesics (Inj. Dynapar 75 mg tree time a day), Antacid (Inj. Rantac 75mg Two time a day) and for eye Getifloxacin eye drops – Three times a day and Glytears eye drops- tree time a day were prescribed. Immediate post-operative edema, bleeding, oozing were noted but it was within normal periphery. Post-operative eye vision, movement and reflexes were normal.

(a)

(b)

Fig. 4a. Post-operative front view shows changes on level of eye and scar reduction. Fig. 4b. Post-operative inferior view shows elevation of the malar and Zygomatic malar contour nearby normal level

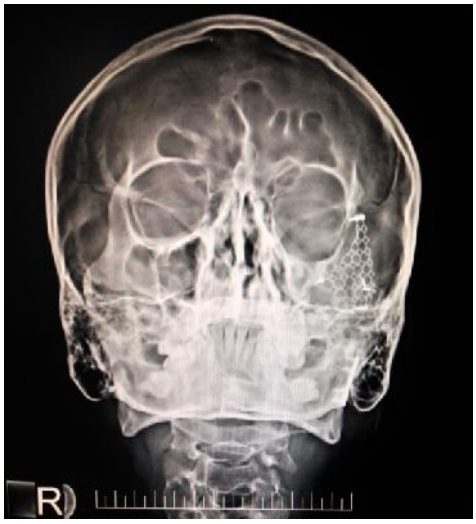


Fig. 5. Post- operative 1and half years radiograph

The paresthesia was decrease by next 8 day of post-operative. (Fig 4a, 4b). Regular follow up maintain at 6 months of interval. (Fig 5).

DISCUSSION

The most common indications for open reduction and internal fixation of orbito-zygomatic fractures are facial asymmetry, trismus, orbital deformities (i.e., enophthalmos, hypophthalmus), and diplopia (Kamadjaja and Pramono, 2008).

These signs and symptoms usually indicate a sufficient displacement of the zygomatic bone or orbital floor to warrant surgical management. Malposition of the zygoma results in loss of the malar prominence and increased facial width. If considerable mal-rotation exists, the defect in the lateral orbital wall leads to orbital enlargement and enophthalmos. Skeletal reconstruction is the basis of primary and secondary management of complex type of fractures.

In primary repair, main aim stood for an exact restoration of the pre-injury facial skeleton by perfectly reducing the displaced fragments into their anatomical position. On the other hand, an anatomically reduced facial skeleton supporting scarred and thickened soft tissues may create an unfavorable external appearance. So, always overcorrection require in secondary correction (Hammer and Prein, 1995).Primary repair can only be performed up to 21 days post injury, after that, delayed repair techniques are required (Carr and Mathog, 1997). Osteotomy technique alone can be used for up to 4 months post injury for repair. After this, bone grafts are required because of osseous healing and resorption. Onlay grafting, which is simpler and faster than repositioning and inlay grafting, is our preferred method for late repair.[9] We have change our treatment plan for this patient by allowing soft tissue settle minimum for 6 month to undertaking secondary reconstruction by “let the soft tissue allow to settle”. For orbital floor reconstruction, it requires first to correct skeletal deformity. Secondary muscle correction is required later. In view of the patient’s chief complain we did malar and orbital floor reconstruction.

Primary correction will lead by reduced the malposition skeletal elements into their anatomical position, with rigid internal fixation by support the thickened and scarred soft tissues in such a way as to create a normal external appearance so that shrinkage and malposition will be not occurred. However, certain areas require overcorrection, especially the naso-orbito-ethmoid and the supraorbital area. Minor contour irregularities smoothed by grinding or with onlay bone grafts (Hammer and Prein, 1995).

For reconstructing bony defect materialsusually used are (Neovius and Engstrand, 2010):

- Bone grafts
- Biomaterials
- Combined bone grafts and biomaterials.

Iliac bone, fibula bone, scapular bone, ribs, retromolar triangle area, maxillary tuberosity, and symphysis of mandible are most common sites for bone grafts used in oral and maxillofacial surgery reconstruction. For the better used to minimize the bone resorption combine used of the bone material and alloplastic mesh or plates (titanium) are used. In our case we used iliac bone graft and titanium mesh for reconstruction of the Zygomatic malar prominence and for orbital floor we placed only thick, about 1 cm, iliac bone. Bone loss typically follows cases with significant displacement owing to resorption when poorly vascularized or mal-aligned fragments (Carr and Mathog, 1997). In this case; we favor passive insertion of cortico-cancellous grafts below the titanium mesh, thereby preventing compressive loads from potentially inducing bone resorption.

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