

CASE REPORT

Management of Extensive Blowout Fracture of Combined Orbital Floor and Medial Wall: A Challenge in Reconstruction

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ABSTRACT

Orbital blowout fractures are common sequelae of blunt trauma to periorbital region. Combined orbital floor and medial wall fractures are more complicated than either alone, because there may not be adequate peripheral bony support for standard implants. The transition zone between orbital floor and medial wall is difficult to visualize intraoperatively and makes even more difficult to visualize in dissection further posteriorly. In our case, patient sustained orbital blowout fracture with herniation of periorbital tissue in maxillary sinus as well as ethmoidal sinus. After undergoing successful orbital reconstruction surgery, eyeball was repositioned to its original position. There was no enophthalmos and patient had no restriction in eye movement and perception to light was similar in both the eyes. Pupillary reflex to light was brisk and similar in both the eyes.

Keywords: Blowout, Enophthalmos, Eyeball, Maxillary sinus.

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INTRODUCTION

Orbital fractures are common sequelae of blunt trauma to the periorbital region and have been occurring more frequently because of the increasing number of traffic accidents, industrial accidents, social activities and violence.^{1,2} It can be associated with various ocular and extraocular injuries, and failure of prompt recognition and treatment of these injuries may result in significant cosmetic and functional problems, such as enophthalmos, restriction in ocular motility and ocular dystopia.³ The current definition includes any internal orbital wall fracture without involvement of the rim but usually

refers to the floor and medial wall. These fractures may be associated with corneal, eye globe, intracranial, optic nerve, and eyelid injuries.⁴⁻⁶ Orbital reconstruction is very challenging when transition area between the orbital floor and medial wall is missing. Under these circumstances, the surgeon may reconstruct the defect using two separate plates, one for the medial wall and another for the orbital floor. The other option is to use the preformed orbital plate. In our case, we have done reconstruction of the right orbit with preformed orbital plate.

CASE REPORT

A 35-year-old male patient reported to private hospital in Kolkata, after sustaining orbital injury due to road traffic accident. Patient reported to hospital 5 days after the injury with complain of visual disturbance, sunken eyeball. Patient had periorbital swelling over the right eye, multiple repaired lacerated wounds. On clinical examination, there was a major enophthalmos, chemosis, diplopia, subconjunctival hemorrhage and restricted movement of right eye (Figs 1 and 2). There was a sluggish papillary reflex over right eye and visual acuity in both the eyes was similar. Computed tomography (CT) of facial area revealed fracture of medial wall of right orbit and fracture of right lamina papyracea with herniation of periorbital content into the ethmoidal sinus. Floor of the orbit was also fractured along with herniation of orbital contents into maxillary sinus. There was a major medial shift of entire globe (Fig. 3).

Surgery was performed for orbital repair and eyeball repositioning. Patient was placed on operating table in supine position under general anesthesia via orotracheal intubation. Patient was draped and prepared under standard surgical protocol. Lateral canthotomy and cantholysis were performed. Incision was deepened through skin, muscle, lateral canthus and conjunctiva. Transconjunctival incision performed till medial canthus. Periosteum identified incised. Subperiosteal dissection performed posteroinferiorly and medially. Fracture was identified. Medial canthal ligament was identified and preserved. Prolapsed flap from nasoethmoidal cavity reposed into orbit with push and pull technique.

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Fig. 1: Patient with major enophthalmos, chemosis, multiple lacerated wounds



Fig. 2: Subconjunctival hemorrhage of right eye

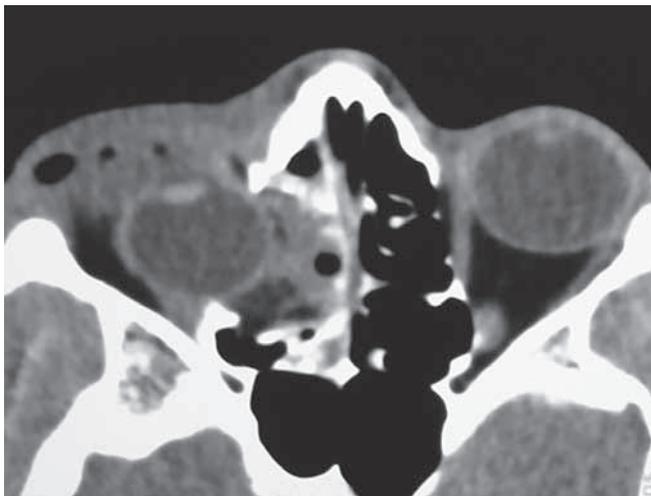


Fig. 3: Fracture of medial wall of right orbit and fracture of right lamina papyracea with herniation of periorbital content into the ethmoidal sinus



Fig. 4: Preformed titanium orbital mesh secured through transconjunctival approach covering floor and medial wall defect

Preformed titanium orbital mesh placed covering floor and medial wall defect and fixed with 2×6 mm monocortical screws (Fig. 4). During insertion, orbital mesh was rotated in order to be placed properly along with inner orbital wall contour. Intraocular closure was performed with vicryl 5-0 and facial laceration were closed using prolene 6-0. Merocel was placed over right nasal cavity. Postoperatively, there was a marked improvement in vision over right eye and gradually there was loss of diplopia. Two months postoperatively, when patient was seen in outpatient department, significant improvement was noticed. There was no enophthalmos and patient had no restriction in eye movement and vision was similar in both the eyes (Figs 5 and 6). Pupillary reflex to light was brisk and similar in both the eyes. Two months postoperative, CT scan showing repositioned right side eyeball with reconstructed orbital floor and medial wall (Fig. 7).



Fig. 5: Two months postoperatively, patient had no enophthalmos

DISCUSSION

The term 'blow-out fracture' was coined in 1957, when Smith and Regan¹ described the mechanism of injury.



Fig. 6: Two months postoperatively, patient had no restriction in eye movement

They produced an impact on the orbital soft tissues of a cadaver, increasing hydraulic pressure, and causing the thin, internal walls to fracture.⁷ Soft tissues were displaced or incarcerated, correlating with enophthalmos and restricted motility. Fujino later disputed this theory and proposed that a direct compression force or buckling force transmitted via the orbital rim was the causative factor for orbital floor fractures.⁸ This theory of bone conduction or 'tsunami' mechanism of injury was first proposed by LeFort and Lagrange at the turn of the century. Erling et al recently resurrected an older theory on the etiology of orbital fractures that was first described by Pfeiffer in 1943. They proposed that the responsible mechanism of fracture is direct globe-to-wall contact; i.e. posterior movement of the globe, in response to an external force, results in a fracture upon direct contact with an orbital wall.^{9,10}

Orbital blowout fractures most often occur following blunt trauma to the periorbital region.^{1,2} In our case, patient sustained multiple facial injury from road traffic accident. During the accident handle of the two wheeler had hit the patient's right eye in an oblique fashion. Blowout fracture occurs at weakest area of the orbit those

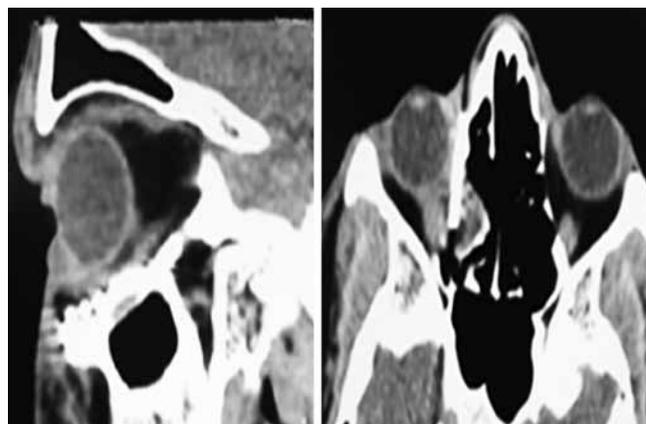


Fig. 7: Two months postoperatively, CT scan showing eyeball repositioning and reconstructed floor and medial wall of orbit

are floor and medial orbital wall. Lamina papyracea of the ethmoid is the weakest point of medial orbital wall where fracture is more likely to occur. If the fracture is large, enophthalmos is anticipated and surgery is usually performed within the first 2 weeks. Enophthalmos may be obvious at the time of presentation, or it may be masked by edema or hematoma. If surgery is delayed until enophthalmos is apparent, greater degree of soft tissue incarceration, with presumably greater intrinsic

damage and subsequent fibrosis result in poorer motility outcomes despite complete release of soft tissue. Goals of treatment in floor and medial orbital wall fracture are reduction of herniated orbital soft tissues and complete reconstruction of orbital walls. Combined floor and medial wall fractures are more complicated than either alone, because there may not be peripheral bony support for standard implants. The transition zone between the medial orbital wall and the orbital floor is difficult to visualize intraoperatively. This becomes even more difficult to visualize in dissection further posteriorly. Repair of the transition zone between medial orbital wall and floor is vital and determines the position of the orbital contents and the globe. Reconstruction options include a metallic implant or mesh fixed to stable orbital rim. The MEDPOR channel implant employs a similar principle, and is technically easier to use, because it does not have sharp edges that can snag soft tissue. Another option is a tailored floor-medial wall sheet that relies on anterior, lateral, posterior and superior stable bone.¹¹

CONCLUSION

The degree of soft-tissue displacement relative to bone fragment distraction, as depicted in preoperative CT scans, should be considered in the timing of surgery. Incisions, soft-tissue handling, and implant material, thickness, and positioning can all affect the functional and esthetic outcomes.¹¹

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