# Isolated Pure Orbital Blowout Fracture - A Rare Case Report

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## Abstract

**Rationale:** An orbital fracture is said to be a pure blowout when it affects only one internal orbital wall and does not compromise the orbital rim. Pure blowout fracture of the orbital floor without any other associated facial bone fracture is uncommon. **Patient Concerns:** The patient with a history of assault presented with complaints of blurring of vision and diplopia. **Diagnosis:** Computed tomography of paranasal sinus scans and ophthalmologic examination confirmed the right orbital floor fracture. **Treatment:** Herniated orbital contents were retrieved and the orbital floor was reconstructed with titanium mesh under general anaesthesia. **Outcomes:** The patient was followed up regularly for six months and showed no signs of any visual disturbances. **Take-away Lessons:** Although orbital floor fractures are commonly associated with zygomaticomaxillary complex and midface fractures, it is uncommon as an isolated finding in facial trauma. It can be easily misdiagnosed and left untreated, which can give rise to future complications.

**Keywords:** Blowout orbital fractures, open reduction and internal fixation of orbital fractures, orbital fractures, orbital reconstruction, pure blowout

## Introduction

The term "pure blowout" was coined by Regan and refers to a fracture of the floor or medial wall of the orbit without the fracture of the orbital rim.[1] These fractures cause entrapment of orbital soft tissue structures resulting in enophthalmos and restriction of ocular movements. They differ from impure blowout fractures wherein the infraorbital rim is also involved along with the orbital floor. Diplopia, enophthalmos, dystopia, infraorbital nerve paraesthesia, and soft tissue entrapment resulting in ocular movement restriction are common symptoms of this fracture.[2,3]

Although all pure orbital blowout fractures need not be treated, absolute indications for the reconstruction of the orbital floor are diplopia with muscle entrapment, enophthalmos, and a large defect.[4]

Orbital fractures are common findings in most zygomaticomaxillary complex (ZMC) fractures and midface fractures. Incidence of orbital fractures in combination with those of the zygomaticomaxillary and naso-orbito-ethmoid complexes is 57.4% of facial injuries. However, isolated orbital pure blowout fracture with other facial bone fractures account for 21.4%.[5] Although common in the paediatric population, isolated medial orbital floor fractures are said to be uncommon in adults.[6]

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We are presenting a unique case of isolated pure orbital blowout fracture without the involvement of any other facial bones and successful management of the same.

## Case Report

A 40-year-old male patient with an alleged history of assault was reported at the Department of Oral and Maxillofacial Surgery of JSS Hospital, Mysore. The patient had complaints of swelling concerning the right eye and blurred vision. The patient had no medical comorbidities.

On clinical examination, it showed orbital ecchymosis, periorbital oedema, subconjunctival haemorrhage, and mild tenderness in the infraorbital region. Diplopia and enophthalmos were noted concerning the right eye. No

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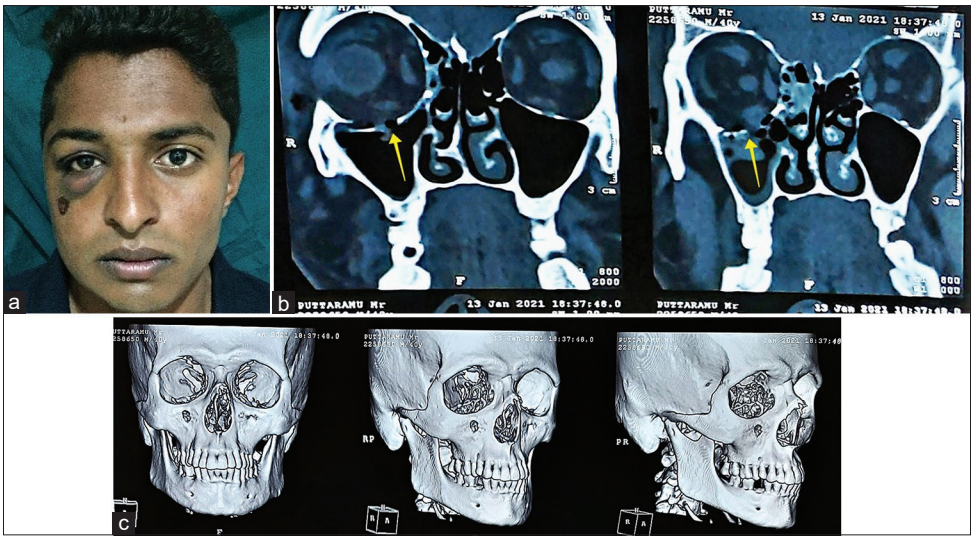

**Figure 1:** (a) Preoperative clinical image of the patient. (b) Preoperative CT showed herniation of periorbital soft tissue into the maxillary antrum. (c) Preoperative 3D CT showed intact orbital rim. CT: Computed tomography

restriction in ocular movements was noted. These clinical findings were confirmed by an ophthalmologist. Computed tomography (CT) scans revealed soft tissue swelling with multiple foci of air noted in the right preseptal and periorbital regions and fracture of the floor of the right orbit and herniation of orbital contents to the maxillary sinus [Figure 1].

The patient was taken up for surgery on the fourth day after the incident and underwent orbital floor repair under general anaesthesia. A corneal shield was used to protect the cornea during the operative procedure. An infraorbital approach was employed to access the orbital floor. The herniated soft tissue was retrieved and the orbital floor defect was covered with a butterfly titanium mesh and screws [Figure 2]. A forced duction test yielded a negative result, indicating that movement of the globe was unaffected. The closure was done using vicryl (3-0) and prolene (4-0).

The postoperative period was uneventful with immediate improvement of diplopia. The patient was followed up regularly for six months and showed no signs of any visual disturbances. The postoperative CT scan was taken to evaluate the degree of reduction, and it showed a well-adapted mesh in place [Figure 3].

## Discussion

A blowout fracture is an orbital fracture involving any internal orbital wall with entrapment of soft tissue components, which limits ocular movement and causes diplopia and enophthalmos, and is caused by a traumatic force to the orbital rim or soft tissues.[7] There are two categories of orbital blowout fractures, pure and impure based on the involvement of the orbital rim; the latter involves the orbital rim.

An orbital blowout fracture can occur in isolation or as a more complex craniofacial fracture pattern. Assault, motor vehicle

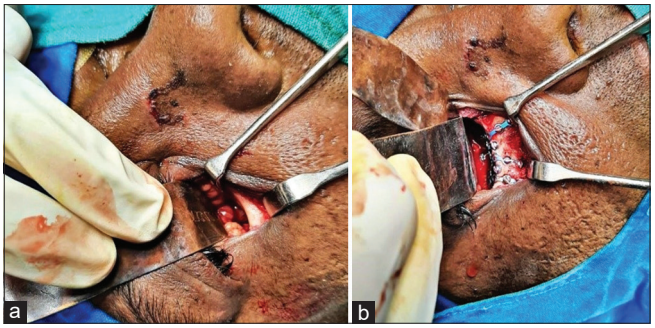

**Figure 2:** (a) Intraoperative picture showing intact orbital rim. (b) Reconstruction with titanium mesh

collisions, falls, and sports injuries are the most common causes of these injuries.[4] Most commonly noted features of orbital blowout fractures include periorbital oedema, subconjunctival haemorrhage, diplopia, enophthalmos, extraocular muscle entrapment, and restriction of eye movement. Indications for surgery can be enophthalmos (>2 mm), extraocular muscle entrapment with diplopia, hypoglobus, large floor fractures (>50%), and oculocardiac reflex.[5]

Our patient had an intact orbital rim with herniation of orbital content into the maxillary sinus in a trap door pattern. Reconstruction of the orbital floor was planned for him due to signs of diplopia, enophthalmos, and hypoglobus. Infraorbital approach was chosen to approach the fracture site due to the advantages such as inconspicuous incision, possibility of convenient reduction and fixation, and minimal iatrogenic wound.

Tong *et al*. conducted a 10-year retrospective survey of surgically treated orbital floor fractures in which there were 142 impure fractures among 189 patients accounting for 75.1% of patients. Forty-seven pure orbital blowout fractures was accounting for 24.9% of patients. The ratio of patients with

**Figure 3:** Postoperative CT showed well-aligned mesh in place. CT: Computed tomography

impure orbital blowout fracture to those with pure orbital floor fracture was exactly 3:1.[8]

Kamala *et al*. conducted a retrospective study between the years 2009 and 2014 on the prevalence of maxillofacial fractures among the population of Kolhapur, India. A total of 1190 patients were analysed, of which 123 cases of orbital blowout fractures were noted.[9] In another study conducted by Patil *et al*. for the analysis of the pattern of orbital fractures, in Aurangabad, India, the orbital floor was the most commonly affected site with up to 73.8% of total patients with orbital fractures.[6] In both studies, data regarding the prevalence of pure orbital blowout fractures are not available.

Retrospective chart analysis of all 597 cases of zygomatic complex fractures operated in our institution between January 2011 and October 2021, there were 63 cases of orbital floor fractures, in which 5 cases of pure orbital blowout fracture along with mandibular fractures and only 2 cases of pure orbital blowout fractures without any other maxillary or mandibular fractures was noted. This signifies that isolated pure orbital blowout fractures without any associated facial bone fractures are not a common finding in facial injuries.

The patient was taken up for surgery four days posttrauma to allow for the decrease in oedema.

The goal of orbital defect reconstruction is to restore orbital volume, function, and appearance. Various autogenous, allogenic, and alloplastic materials have been employed to reconstruct the defect of the orbital floor, each with its own set of benefits and drawbacks.

In the present case, titanium mesh was used to reconstruct the orbital floor to avoid the morbidity of a donor site. Another reason is that the mesh can be contoured more easily to adapt to the intricate contours of the internal orbit, resulting in more optimal reconstruction.[10]

No postoperative complications were seen in this case.

This study finds its uniqueness in demonstrating that, although orbital floor fractures are commonly associated with ZMC and midface fractures, it is uncommon as an isolated finding in maxillofacial trauma. The prevalence of isolated pure orbital floor fractures is 13.3%.[7] It can be easily misdiagnosed and left untreated, which can give rise to future complications. Management of orbital floor fractures can be challenging and should be addressed due to the impact on vision.

Future perspectives such as advances in maxillofacial/orbital imaging, the introduction of orbital endoscopy, intraoperative computer-guided navigation, and mirror image overlay techniques, and improved implant designs have all resulted in a reconsideration of time-honoured techniques and guidance.

## Conclusion

Although several studies have been conducted to analyse the prevalence of orbital floor in maxillofacial fractures, data regarding the prevalence of isolated pure orbital blowout fracture without involving other facial fractures are not available. This case report is an initial step to studying the prevalence of isolated pure orbital blowout fracture.

### Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given his consent for his images and other clinical information to be reported in the journal. The patient understands that name and initials will not be published and due efforts will be made to conceal his identity, but anonymity cannot be guaranteed.

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Nil.

### Conflicts of interest

There are no conflicts of interest.

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