



Traumatic Dislocation of the Globe into the Ethmoid Sinus

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Abstract

Traumatic globe dislocation into the paranasal sinuses is a rare condition. Globe displacement with preserved integrity can result in functional and cosmetic recovery with rapid and appropriate intervention. In this article, we discuss the presentation and treatment of globe dislocation into the ethmoid sinus in a 36-year-old patient who presented to the emergency department with the complaint of vision loss due to a fall.

Keywords: Globe dislocation, orbital trauma, ethmoid sinus

Introduction

Trauma-induced displacement of the globe outward, into the cranium, or into the paranasal sinuses is called traumatic dislocation. Although the risk of vision loss is high in these rare cases, it has been reported that favorable visual, functional, and aesthetic outcomes can be achieved with rapid and appropriate treatment.^{1,2}

Depending on the severity of the trauma, dislocation may be associated with pathologies that adversely affect prognosis, such as globe rupture and injury to the optic nerve, choroid, retina, and extraocular muscles.

Here, we aimed to present a case of traumatic globe dislocation into the ethmoid sinus and its treatment in a patient presenting with vision loss resulting from an impact to the eye.

Case Report

A 36-year-old woman presented to the emergency department complaining of loss of vision in her left eye after a fall. She reported that she stood on a chair in her home, lost

her balance, and fell, striking her left eye on a door handle. On examination, her right eye was intact but in the left eye she reported no light perception and only soft tissue was visible behind the eyelids, with no sign of the globe. As a diagnosis could not be established based on these findings, orbital computed tomography (CT) was requested. CT revealed a fractured medial orbital wall and intact globe dislocated into the ethmoid sinus (Figure 1a,b). The patient was admitted for emergency surgery. When the eyelid retractor was placed, the visible soft tissue was identified as conjunctiva (Figure 2a) and parting it revealed the temporal margin of the cornea deep on the nasal side (Figure 2b). Attempts were made to grasp the conjunctiva and limbus with forceps and pull the globe from its dislocated position, but it could not be moved. A Lynch incision (a curved skin incision over the medial orbital rim used to reach the medial wall of the orbit) was made to gain access to the upper edge of the medial orbital wall fracture (Figure 2c). The upper edge of the fracture line was enlarged slightly using a Kerrison punch. This freed the globe from the compressed bones and allowed it to be repositioned in the

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orbit by gentle intranasal digital manipulation. The operation was concluded after ensuring that intraocular pressure and the anterior segment structures were normal (Figure 2d).

The patient was started on postoperative intravenous antibiotic (1 g amoxicillin/200 mg clavulanic acid twice a day)

and methylprednisolone 1 g/day. On the first postoperative day, visual acuity of the affected eye was 0.3, subconjunctival hemorrhage was present, and fundus examination was normal (Figure 3). There was nearly complete limitation of eye movement in all directions, pupillary light reflex was intact,

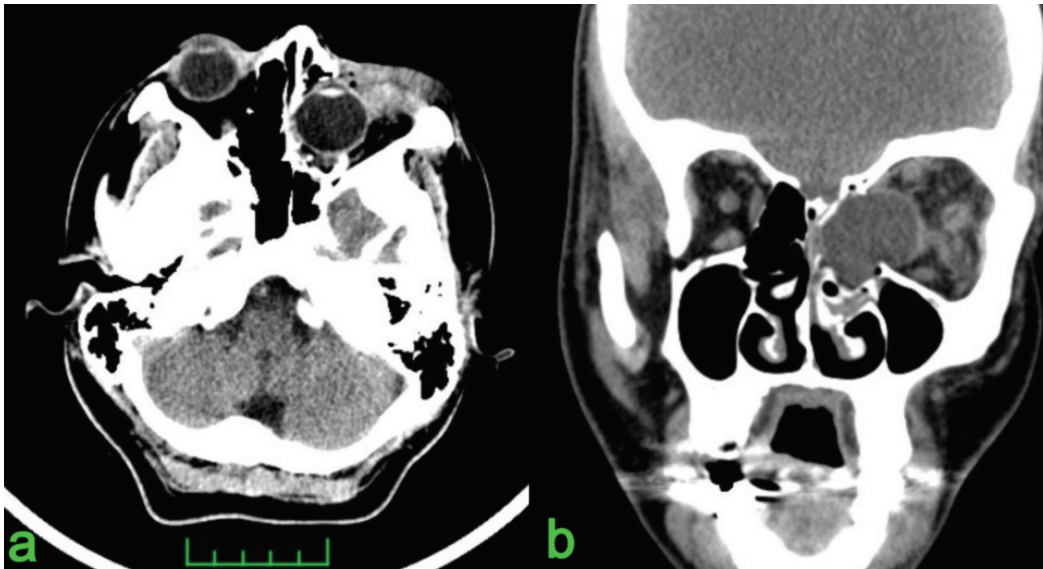


Figure 1. a,b) Computed tomography showing left globe dislocation into the ethmoid sinus and nasal cavity

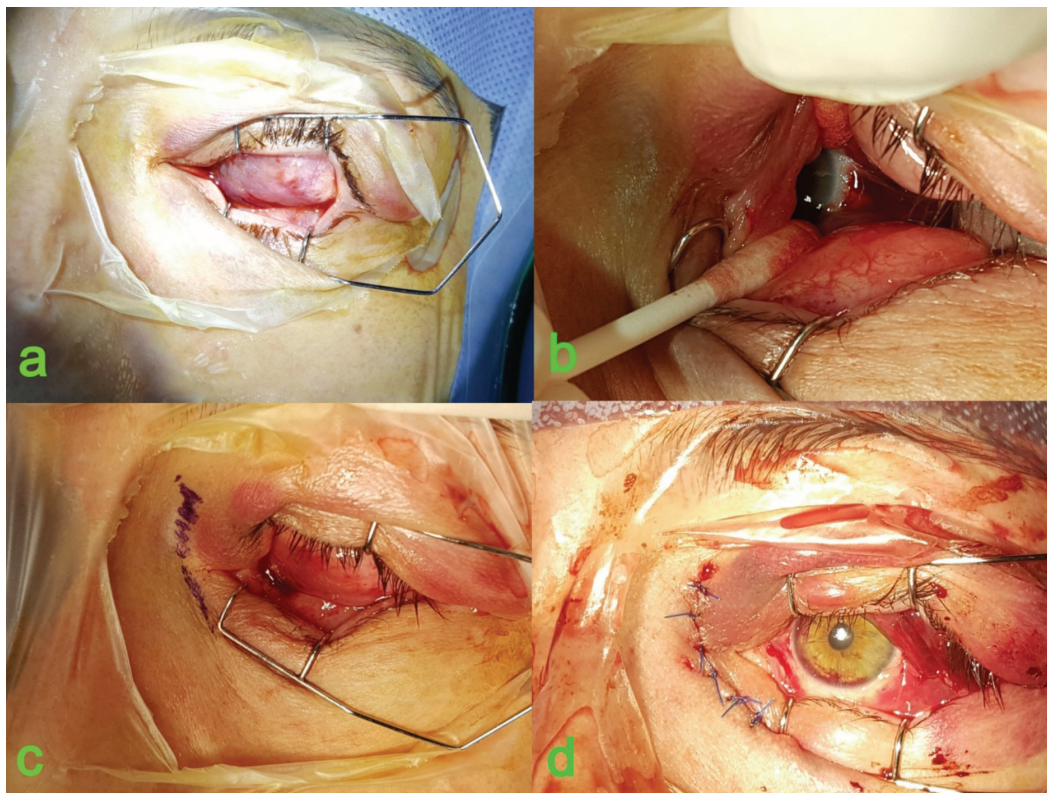


Figure 2. a) After the trauma there was no light perception in the affected eye and soft tissue was seen when the eyelids were parted. **b)** The soft tissue was identified as conjunctiva and when parted revealed the temporal cornea deep and nasal to the orbit. **c)** Lynch incision used to reposition the globe. **d)** The eye in its normal position at the end of surgery

and there was no relative afferent pupillary defect. Intravenous treatment was discontinued on day 3. At 1 week, visual acuity was 0.6 with some improvement in eye motility. At 1 month, visual acuity was 0.9 and the eye was orthophoric in primary position but showed -2 limitation of adduction and 2 mm enophthalmos. At 4 months, the patient underwent repair of the medial orbital wall defect through a transcaruncular approach using a Medpor implant. With its thin and flexible

structure, this porous, biocompatible polyethylene implant enables a large defect to be repaired through a small space. On postoperative CT, left eye enophthalmos and irregular medial orbital wall were observed (Figure 4a,b). At 6 months, visual acuity was 10/10 (with -1.75 cylinder, 160 axis) with 1 mm enophthalmos and -2 restriction on adduction (Figure 5). It was decided to continue follow-up. There were no changes in the patient's condition during the 3-year follow-up.



Figure 3. On postoperative day 1 there was eyelid edema, subconjunctival hemorrhage, and complete limitation of eye movement in all directions

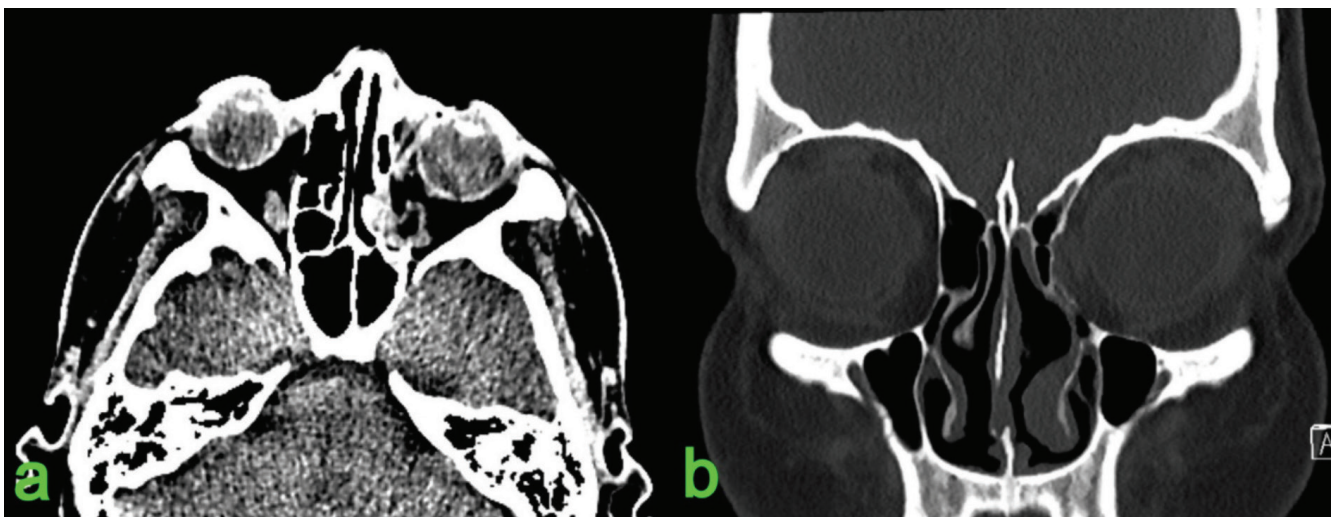


Figure 4. a,b) Computed tomography after left globe repositioning and medial wall repair showing enophthalmos and irregularity in the medial wall



Figure 5. At 6 months after the trauma, the left eye shows orthophoria in primary position, enophthalmos, and limitation of adduction

Discussion

In blowout fractures caused by blunt trauma, the globe remains in the orbit despite displacement of the orbital soft tissue and muscle structures toward the adjacent sinus cavities. However, in rare cases of severe trauma and possibly involving a different mechanism, the globe can be dislocated from the orbit to the adjacent cavities.³ This is also described in the literature as traumatic herniation or subluxation of the globe.^{4,5} Dislocation into the maxillary sinus is most common, followed by the ethmoid sinus.² Even less common is dislocation into the frontal sinus⁶ and the anterior cranial fossa behind the orbit.⁷ No cases of globe dislocation into the sphenoid sinus have been reported. With traffic accidents and blunt trauma, the globe is often dislocated intact through a wide fracture line in the medial and inferior walls of the orbit. In our case, a blunt object (doorknob) penetrated nasally from the caruncle and fractured the medial wall without damaging the globe, likely compressing and carrying the globe with it through the fracture before exiting again.

At initial examination, the appearance of an anophthalmic socket when the eyelids are parted and the fact that the patient often has no light perception suggest a catastrophic injury such as traumatic evisceration. Performing orbital CT is absolutely necessary for an accurate diagnosis. Although visualizing the displaced globe in the adjacent sinus cavity on CT confirms the diagnosis, knowing how to intervene and doing so rapidly are crucial for anatomical and visual prognosis of the eye. Visual prognosis is determined by the trauma severity, affected ocular structures, and timing of treatment.⁸ An unusual position caused by globe displacement may cause temporary or permanent loss of function due to avulsion, compression, crushing, or stretching of the optic nerve. In addition, damage to the central retinal artery and chorioretinal tissues are other pathologies that should be kept in mind in case of vision loss.^{1,9} Ramstead et al.¹⁰ reported a patient with globe dislocation into the maxillary sinus after a rodeo fall whose visual acuity remained at 0.1 despite successful globe repositioning, due to associated choroidal rupture and submacular hemorrhage. Blindness and visual impairment to

the level of light perception have been reported in 46% of documented cases.³ The fact that all patients reported to have visual improvement underwent globe repositioning on the same day demonstrates the importance of rapid intervention.

In conclusion, rapid globe repositioning indisputably contributes to visual rehabilitation in eyes with visual potential by relieving stress on the optic nerve and central retinal artery. An acceptable cosmetic result can also be achieved by restoring eye movements and orbital volume.

Ethics

Informed Consent: Obtained

Peer-review: Externally peer reviewed.

Authorship Contributions

Surgical and Medical Practices: Z.O., G.Ş., O.K., Concept: Z.O., Design: Z.O., G.Ş., Data Collection or Processing: Z.O., Analysis or Interpretation: Z.O., G.Ş., O.K., Literature Search: Z.O., Writing: Z.O.

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