



## A Rare Case of the Traumatic Dislocation of the Ocular Globe into the Maxillary Sinus: Case Report and Literature Review

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### Abstract

Dislocation of the globe is a rare event that results from severe trauma to the orbit, often causing orbital rim and wall fractures. Though associated globe rupture often necessitates enucleation, repositioning of the globe can be attempted in these cases if the globe is intact. The visual prognosis is poor, and the medical and surgical management is still a topic of debate. We herein describe an extremely rare case a 37-year-old man who presented a severe right-sided orbital fracture with dislocation of the globe into the maxillary sinus. The visual acuity was no light perception in his right eye. Though the visual prognosis in these cases is usually extremely poor and depends on the extent and duration of injury, preservation of the globe not only helps the patient recover psychologically from the trauma but also allows better cosmesis.

**Keywords:** Globe Dislocation, Orbital Trauma, Maxillary Sinus, Globe repositioning, Ocular trauma, Globe Luxation.

### Introduction

Ocular globe dislocation to the maxillary sinus is an uncommon but alarming phenomenon in which the eye protrudes beyond the orbital floor often alarming both patients and clinicians. Though rare, the condition demands immediate attention due to the risk of optic nerve damage and corneal exposure [1].

Although the terms dislocation and luxation are synonymous, Fowler [2] described the terms luxation and dislocation, repeating Barck's classification of displacement of the ocular globe:

1. Luxation refers to the protrusion of the eye between the eyelids, with spastic closure of lids behind the eye. It occurs spontaneously in the presence of exophthalmos. Most cases are due to shallow orbits.
2. Dislocation refers to displacement of the eye into the paranasal sinuses or nasal cavity and is due to trauma.
3. Avulsion refers to partial or complete severance of extraocular eye muscles and the optic nerve, or both, from the body.

Probably the first observation on dislocation of the ocular globe in the maxillary sinus, was in 1575 carried out by Hendrik Smet (1535-1614) who reported how a man could see through his nose after trauma [3] and later, Bernhard von Langenbeck (1810-1887) wrote the first report in 1867 on the treatment of dislocation of the ocular globe in the maxillary sinus, of a case treated in 1845 [4, 5].

Traumatic globe luxation and dislocation in any direction remains a rare entity, with only 109 cases reported as of 2021, predominantly affecting males [6]. Until 2025 the English literature has reported 43 cases of the paranasal sinuses globe dislocation [7].

This article explores the etiology, clinical presentation, management, prognosis of this condition and case presentation.

## Etiology and Risk Factors

The dislocation and luxation of the ocular globe may be traumatic, spontaneous, or iatrogenic. Traumatic causes of the dislocation include blunt force injury, while spontaneous luxation can occur in patients with craniofacial dysostosis [8] orbital tumors [9], infiltrative process as in Grave's disease [10], histiocytosis X [11], floppy eyelid syndrome [12], or connective tissue disorders such as Ehlers-Danlos syndrome [13]. Iatrogenic causes have been reported during forced eyelid retraction in ophthalmologic examinations or surgical and anesthetics procedures [14,15, 16].

Patients typically present with sudden-onset proptosis, eye pain, decreased visual acuity, and an inability to close the eyelids. The optic nerve may become stretched or compressed, posing a risk for ischemic optic neuropathy if the globe is not promptly reduced [17].

Diagnosis is primarily clinical, supported by the patient's history and physical examination. Imaging, particularly orbital CT, can be used to assess for fractures, optic nerve damage, or entrapment of extraocular muscles. The presence of afferent pupillary defect or complete ophthalmoplegia may indicate optic nerve involvement.

Method: Case report and literature review. The literature review was conducted in PubMed/MEDLINE and Google Scholar to identify studies published since 1575 through May 2025, using keywords including "orbital fracture", "paranasal sinus", "maxillary sinus", "ethmoid sinus", "globe luxation" and "globe dislocation" and its translation in Portuguese, Spanish and French literature.

## Results

We corroborate the work of Verges *et al.* [18] and Blair *et al.* [7] about sinus globe dislocation, where they summarized 43 cases of traumatic globe dislocations between 1970 and 2025.

We found only 5 cases in the literature between 1575 and 1970 [19, 20], and seven more cases in non-English literature since 1575, all of them towards the maxillary sinus [21, 22, 23, 24, 25, 26, 27].

In total, 55 cases were summarized of traumatic globe displacement into the paranasal sinus, including our case, (46 [83.64%]) in the maxillary sinus and (9 [16.36%]) ethmoid sinuses published between 1575 and 2025. The most common injury mechanism was motor vehicle accidents.

Traumatic optic neuropathy and vascular compromise were the most common mechanisms of vision loss. Postoperative follow-up data from 38 cases revealed 16 (42.1%) achieved final visual acuity better than no light perception.

## CASE PRESENTATION

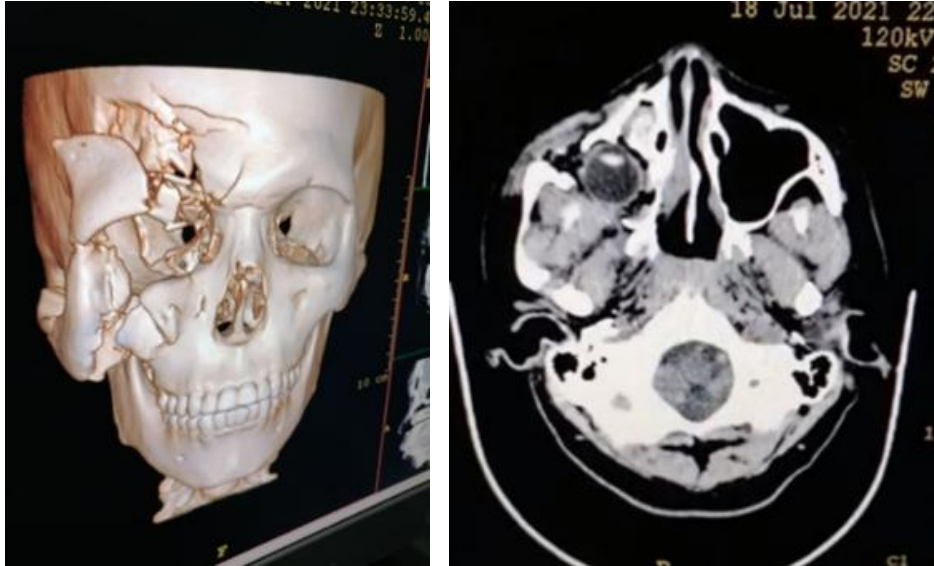
A 37-year-old man presented to the emergency service at a private center in 2021, with protrusion of the right eye and loss of vision due to an accident 2 hours earlier. Upon arrival he was well oriented and his general condition was stable.

In the clinical examination the patient presented a severe right-sided orbital fracture with dislocation of the globe into the maxillary sinus (fig. 1). The left globe was not visualized; only the conjunctiva was seen within the orbital cavity. There was also a deep laceration wound in the right side of the frontal region.



**Fig. 1. Clinical preoperative images: instrumental opening of the eyelid without evidence of the eyeball (anophthalmic traumatic right orbital cavity).**

CT scan revealed a comminuted fracture of the frontal bone, floor and lateral wall of the orbit with significant lateral displacement of the bone fragments. Depressed bone fragments from the fractured inferior orbital rim into the orbit were also seen. There was complete dislocation of the globe into the maxillary sinus (Figures 2) The globes were bilaterally intact with evidence of the discontinuity of the left optic nerve, inferior rectus, and lateral rectus muscle. Computerized tomography revealed complete transection of the ocular muscles and optic nerve.

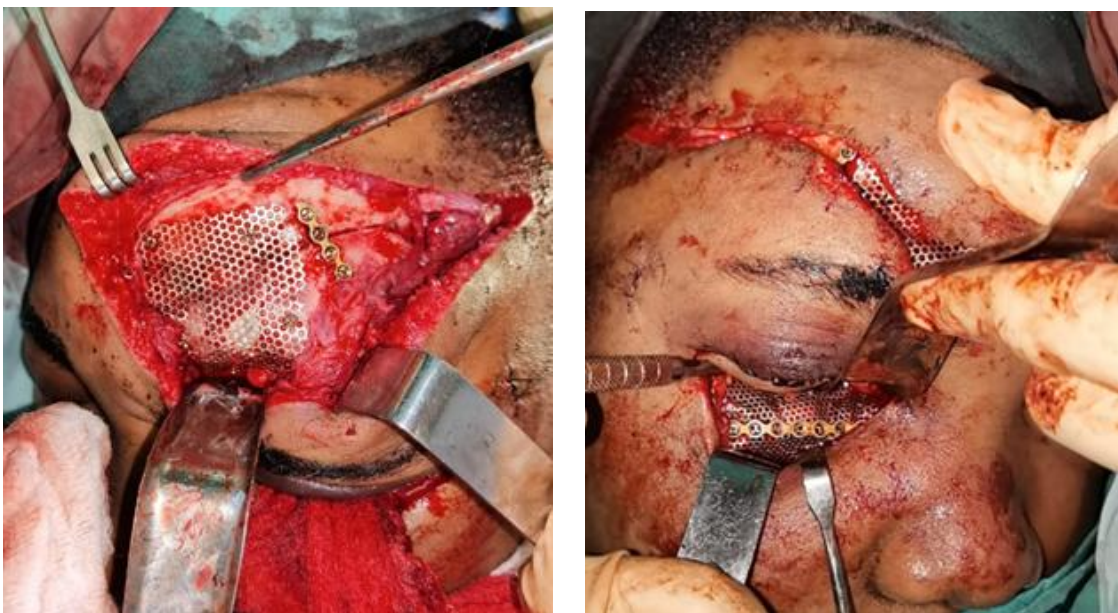


**Fig. 2.** Axial computed tomography showing fractures of the frontal bone, medial, inferior, and lateral walls of the right orbit the right globe completely dislocated into the maxillary sinus and loss of continuity of the optic nerve.

The patient was started on intravenous and topical antibiotics, steroids and eye lubricants. A surgical attempt to reposition the globe was done under general anesthesia 24 hours after the trauma. He was taken to the operating room on the second day of his admission to the hospital for globe repositioning, reduction of zygomatic fracture and orbital floor reconstruction.

Globe reduction was achieved using the finger through the maxillary sinus previous infraorbital approach, moistened with sterile normal saline, to apply gentle, opposing pressure at the lateral canthus. This controlled pull-and-push technique facilitated the return of the globe to the orbit.

Post-reduction, a thorough ophthalmologic examination revealed incomplete restoration of extraocular motility. Vision was not recovered, hypo-opthalmos and enophthalmos (fig. 3).



**Fig. 3.** Fractures reduced, orbital wall and frontal bone reconstruction.





**Fig 4. Right globe repositioned within the orbital cavity. Seven days later, hypo-opthalmos and enophthalmos.**

## Discussion

Luxation and dislocation of the eyeball can occur in all directions, mainly upward and downward, there are two types of globe displacement. The first type, the luxation, is when the globe is expelled from the orbit. The second, the dislocation, is when the globe dislodged into the paranasal sinuses [28]. even if cases of bilateral dislocation have been seen [29].

Morris *et al.* [29] described three theoretical theories behind globe luxation. The first theory is when a long object enters the medial orbit and uses it as a pivot to propel the globe forward. In the second theory, he describes a wedge-shaped object that enters the orbit medially and pushes the globe anteriorly by pressuring the eye against the lateral wall of the orbit until it exceeds the intraorbital pressure. The third theory is when there is a direct laceration of the optic nerve by a sharp object [30].

We postulated it could be a combination of mechanisms like Kreiner *et al.* described that the globe dislocation into the paranasal sinuses is due to the mechanism of blowout fracture, where the object is larger than the orbital rim, causing globe dislocation [31].

This, along with Morris *et al.*'s and Burns *et al.*'s theory, where there is a direct optic nerve transection due to a penetrating injury [30, 31]. Traumatic optic neuropathy and vascular compromise were the most common mechanisms of vision loss [18].

In an ideal situation, if the globe is intact, preservation and repositioning are the first treatments of choice [28]. This provides the patient a better functional, aesthetic, and psychological outcomes, especially when facing the traumatic event [32].

In this situation, blunt force does not damage the globe due to its numerous protective structures, such as a tough orbital rim, facial tissue, extraocular muscles, ligamentous tissue, and orbital fat [33].

However, although the globe is not damaged, the force is strong enough to dislodge the globe through the thin orbital wall [28]. Among the paranasal sinuses, the maxillary sinus is most commonly affected [28]. This is due to its large size and location close to the orbital cavity [34].

Statistical data from Kreiner *et al.* [28] shows that direct orbital trauma is the most common cause of traumatic globe dislocation with associated fractures of the medial and floor of the orbital wall [31].

Globe dislocation with associated optic nerve avulsion is also not commonly seen due to the tortuous intraorbital portion of the optic nerve, which allows room for maneuvering. When it happens, it is likely due to a few reasons. The first is the

forward thrust of the globe, causing associated optic nerve avulsion. The second is due to the sudden rise in intraorbital pressure, and the third is due to direct trauma to the optic nerve [34].

Imaging studies of the head and orbit are required to determine the extent of damage, especially the integrity of the bony orbit, which has a bearing on the surgical management. The other important factors are the status of the extraocular muscles and optic nerve and the integrity of the globe. The timing of surgery is crucial in such cases. Delay in intervention worsens the prognosis due to a multitude of factors.

In traumatic cases of globe dislocation, management is primarily surgical and should be done as early as possible as delays in surgical intervention can cause compromised blood supply to intact optic nerve and the oedema of the lids, soft tissue and conjunctival chemosis will make the repositioning of globe difficult [35].

In cases where the optic nerve is damaged or avulsed, cosmetic concerns become important and, in such cases, we prefer to do globe repositioning along with reattachment of avulsed muscles [29].

Prompt repositioning of the globe has advantages over primary enucleation: first, the patient does not have to go through the psychological stress of losing an organ; and second, ocular prosthesis fits a physical eye better [35]. Enucleation is resorted only when either the integrity of the globe cannot be restored or globe repositioning is not possible due to anterior ischemia [37].

The variety of therapeutic techniques available highlights the absence of a single, universally effective protocol, since the results are directly linked to the particularities of the trauma and the anatomical area involved. Surgical conduct in the face of traumatic displacement of the eyeball still generates divergences in the literature. However, there is a consensus among most specialists regarding the importance of performing ocular repositioning in the orbital cavity early, aiming at better clinical outcomes [33, 38].

In our case, the patient had a globe dislocation into the maxillary sinus with an associated optic nerve avulsion. Even though there was an associated maxillary wall fracture, the globe was displaced inferotemporally through the lateral orbital wall.

The choice of surgical approach is conditioned by a series of factors, including the type and extent of the fracture, the resources available at the institution, the surgeon's experience and preference, as well as the patient's clinical condition and specific complaints.

Although the primary objective in the treatment of orbital floor fractures is the patient's full recovery, it is essential that the surgeon selects appropriate therapeutic strategies and is able to manage possible complications, such as infections, changes in ocular function and even the oculocardiac reflex, thus ensuring a favorable outcome regardless of the technique adopted [39, 40].

Two techniques have been reported in the literature regarding the repositioning of the eyeball to its ideal position: direct traction of the globe with the aid of an instrument and manual repositioning of the globe through the trans maxillary approach (Caldwell-Luc access) [28].

Urgent repositioning of the globe is the cornerstone of management. Manual reduction techniques involve gentle retraction of the eyelids while the patient looks down, allowing the eye to slip back into the orbit [28]. In refractory cases, lateral canthotomy may be required. Lubrication and patching may be used post-reduction to protect the cornea.

In certain situations, enucleation and prosthesis implantation were the treatments of choice, while in others, globe repositioning was the preferred treatment [29, 31, 32, 33, 34].

With prompt treatment, most cases resolve without lasting visual impairment. However, delays in intervention can result in optic nerve damage, corneal ulceration, or permanent vision loss. Patients with anatomical predispositions may require surgical correction or be counseled on avoiding provocative maneuvers [41].

## Conclusion

Dislocation of orbital contents and tissue entrapment occurs in different degrees depending on the dimensions of the orbital floor fracture, but it is extremely unusual to observe the entire prolapse into the maxillary sinus [39].

It is almost exclusively described as a result of large orbital fractures (blow-out fractures of the orbital floor) or surgical procedures involving extensive maxillary or orbital resections.

The vision-threatening condition requires rapid diagnosis and intervention. Awareness of predisposing factors and proper emergency management can significantly improve outcomes.

Continued documentation and reporting are needed to understand the full spectrum of etiologies and best practices for treatment. Our case is number 46 published worldwide since 1576 about dislocation into the maxillary sinus.

Though the visual prognosis in these cases is usually extremely poor and depends on the extent and duration of injury, preservation of the globe not only helps the patient recover psychologically from the trauma but also allows better cosmesis.

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