Traumatic Globe Subluxation into the Paranasal Sinuses: A Case Report and Literature Review

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Introduction

Traumatic fractures involving the orbital floor or medial wall with complete globe displacement into the paranasal sinuses are rare, carrying high risks of permanent vision loss and persistent anatomical deformity despite appropriate surgical management. We report a case of traumatic globe displacement into the maxillary sinus, highlight management strategies, and perform a review of pertinent literature.

Methods and Materials

Case report and literature review. The literature review was conducted in PubMed/MEDLINE and Google Scholar to identify studies published through May 2024, using keywords including “orbital fracture,” “paranasal sinus,” “maxillary sinus,” “ethmoid sinus,” and “globe displacement. Non-English studies were excluded. Articles were evaluated for injury patterns, etiologies, prognosis, and management. The results were synthesized into a narrative review.

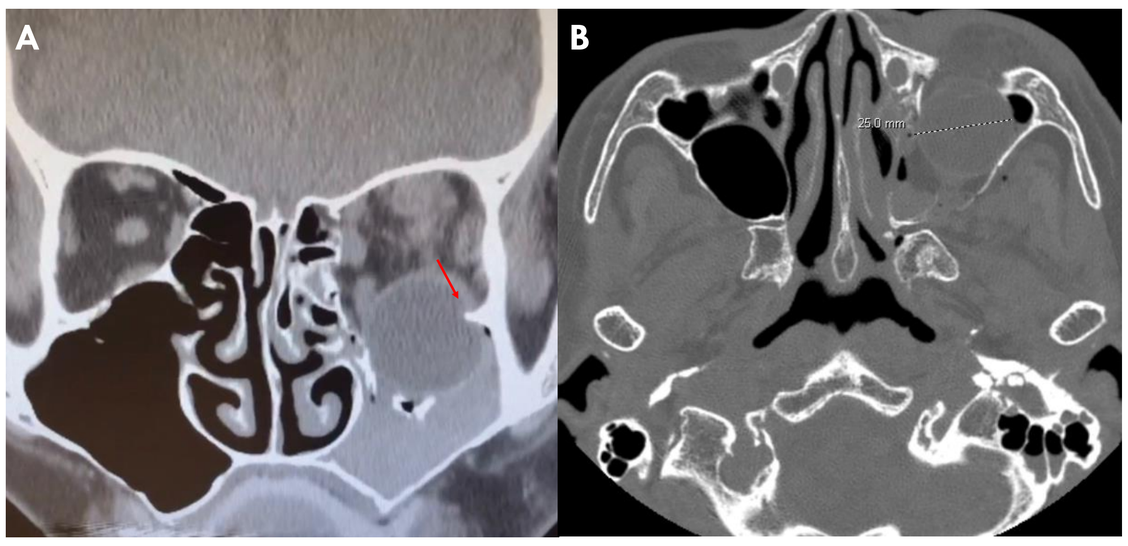

Figure 1. (A) Preoperative CT scan of the orbits demonstrates herniation of the left globe into the left maxillary sinus with possible impingement of the lateral orbital floor on the globe (red arrow). (B) Axial view of the orbits, demonstrating preserved globe volume.

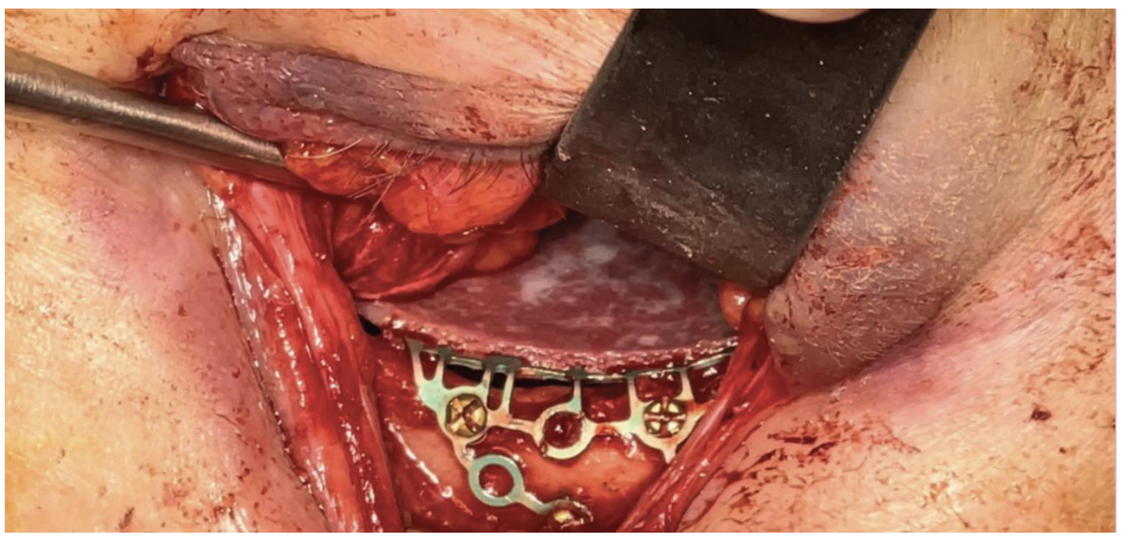

Figure 2. Intraoperative photograph demonstrating placement of a porous, polyethylene-coated titanium implant with fixation to the orbital rim for orbital floor repair.

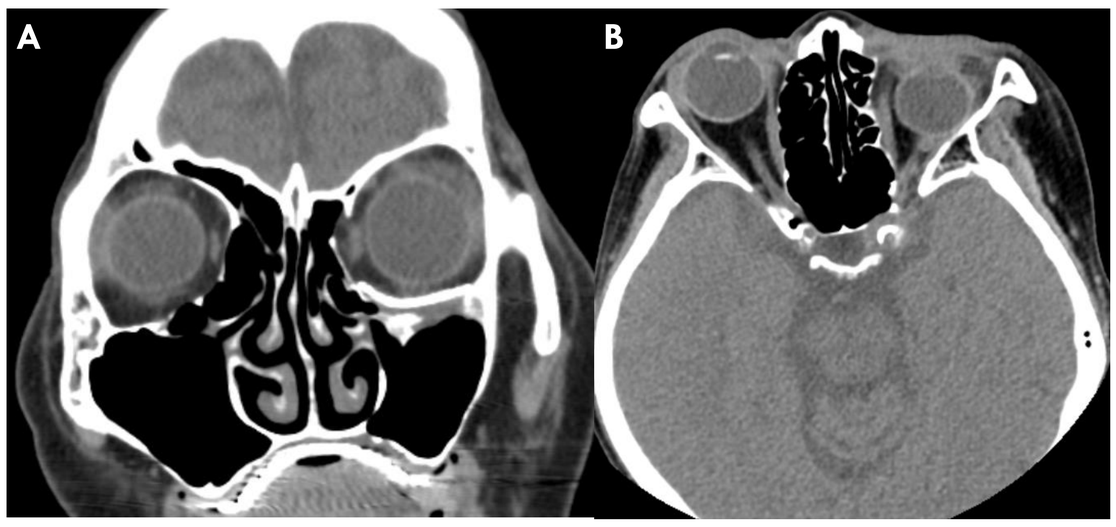

Figure 3. CT scans of the orbit at five-month follow-up, demonstrating good position of the left globe in the superior/inferior axis with chronic fracture deformity of the left orbital floor and medial wall (A) and persistent marked enophthalmos of the left eye (B).

Results

A 77-year-old female presented with an empty left orbit after a motor vehicle accident, exhibiting best-corrected visual acuity of 20/20 in the right eye and no light perception in the left. Examination showed significant displacement of the left globe into the maxillary sinus. CT imaging confirmed comminuted fractures of the left orbital floor and medial wall, with herniation of the globe into the maxillary sinus, extensive orbital hematoma, and transections of all extraocular muscles (**Figure 1**). Left globe volume and the optic nerve sheath complex were preserved, although the lateral aspect of the orbital floor appeared to exert mass effect on the globe. The patient underwent emergent surgical repair using a transconjunctival approach to reposition the globe and repair the orbital floor with a porous polyethylene-coated titanium implant (**Figure 2**). Postoperatively, the patient showed gradual vision improvement, achieving hand motion vision by postoperative day one and counting fingers vision by three weeks. The patient continued to experienced ptosis, motility deficits, and late enophthalmos, which progressed over three- and five-month follow-up visits (**Figure 3**). Subsequently, she underwent orbital floor and medial wall overlay using custom implant. Twelve months postoperatively, the patient had visual acuity of 20/40 but still experienced complete movement deficit and residual enophthalmos.

Literature review revealed 43 cases of traumatic globe displacement into the maxillary (34 [79.1%]) and ethmoid (9 [20.9%]) sinuses published between 1970 and 2024. The most common injury mechanism was motor vehicle accidents. Globe repositioning was attempted in 35 (81.4%) cases, with orbit reconstruction in 29 (67.4%) cases. Enucleation was performed in 4 (9.3%) cases. 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. However, all but one case (97.4%) experienced significant impairments in ocular motility and all had residual enophthalmos.

Discussion & Conclusions

Traumatic globe dislocation into the paranasal sinuses often results from severe blunt trauma, typically involving high-energy impacts. The literature suggests that rapid surgical intervention is crucial to optimize visual outcomes and prevent irreversible damage to the optic nerve and retinal structures. However, late complications such as enophthalmos and motility restrictions are common. Further research may help refine surgical techniques and improve long-term functional outcomes for these patients.

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