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Case Series

Traumatic globe luxation- A case series

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ABSTRACT

Background: Traumatic globe luxation is a very rare clinical condition. It usually presents after severe trauma to orbit often causing wall fracture and severe globe damage which entails enucleation.**Results:** A retrospective interventional case series of three patients presenting to emergency room (ER) with globe luxation accompanied by varying clinical presentation over years 2017-23.**Conclusion:** Globe luxation is a rare condition often requiring multidisciplinary approach. In spite of the visual prognosis being very poor appropriate management and follow-up can lead to better preservation of cosmesis.This is an Open Access (OA) journal, and articles are distributed under the terms of the [Creative Commons Attribution-NonCommercial-ShareAlike 4.0 License](https://creativecommons.org/licenses/by-nc-sa/4.0/), which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.For reprints contact: reprint@ipinnovative.com

1. Introduction

Traumatic globe luxation is a very rare clinical presentation and can be caused by multiple factors that increase the pressure behind the globe cause it to protrude outside the orbital walls. Traumatic injuries to the eyeball are most commonly seen after Road traffic injuries (RTA)¹ and RTAs are also most common cause of craniomaxillofacial trauma.^{2,3} The mechanism of causation is presumed to be caused by sudden violent shocks or large foreign body in between eyeball and orbit followed by movement of head in the opposite side causing air to enter this gap following which the pressure inside the orbit increases. This raised pressure causes muscles, tissues to suddenly break propelling the eyeball forward.^{4,5} Sometimes using the nasal bridge as support.⁶ The eyelids behind the luxated globe spasmodically close.⁷ An orbital blow out fracture will act like a pressure valve in which the force of the blow will be absorbed by the ocular adnexa and compression of air within the paranasal sinuses causing the eye to totally luxate into the maxillary sinus.⁸ This

prolapse into the maxillary or ethmoid sinus can also be explained by the hydraulic theory.² Depending on the extent of luxation it can be classified into sub-luxation and total luxation. Subluxation is displacement of the equator of the eyeball outside the palpebral fissure with the eyelids shut behind. Total luxation is when the globe detaches from the orbital orifice and completely displaces out or sometimes into the maxillary sinus.⁴ Avulsion implies that the extra ocular muscles and optic nerve that have been partially or totally severed from the globe.⁷ Optic nerve avulsion represents most severe complication related to traumatic globe luxation.⁹ A severe forced medial rotation of globe forced the temporal portion of optic nerve to tearaway.¹⁰ Here we describe 2 cases of globe subluxation and 1 case of total globe luxation all of which had avulsion component associated as well. Consent was taken from all the patients.

2. Case Series

2.1. Case 1

A 42-year male presented to the ER with a history of injury to the left eye with the horn of a bull. He presented to us

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36 hours after trauma. Patient complained of sudden loss of vision, pain and bleeding in left eye following ocular trauma. Visual acuity in left eye was no perception of light, and the right eye was 6\6. Anterior segment examination in Left eye revealed completely prolapsed hypotonous globe with surrounding necrosed tissue (Figure 1 A, B). The lower lid had full thickness lid laceration, subconjunctival haemorrhage was noted along with areas of tissue necrosis towards temporal and superior aspect of the globe. CT scan head showed complete luxation of left globe (Figure 1 C) with total disruption of optic nerve, superior rectus, superior oblique muscle, lateral and medial rectus muscles. It also showed displaced fracture of superomedial wall of left orbit. Enucleation was performed as left eye was hypotonous with necrosis (Figure 1 D, E & F) and lower eyelid reconstruction for the lid defect. A month later lower fornix reconstruction was done as there was a symblepharon formation followed by ocular prosthesis (Figure 1 G).



Figure 1: A & B): Prolapsed hypotonous globe with surrounding necrosed tissue; C): CT scan image of complete luxation of globe; D & E): intraoperative images of enucleation procedure; F): Enucleated globe with optic nerve stump; G): Ocular prosthesis post fornix reconstruction

2.2. Case 2

A 62-year-old female presented to ER following a RTA with head and facial injuries. Primary suturing of the facial injuries were done somewhere else and she presented to us after 20 hours of trauma with of vision loss in left eye. On examination left eye had no perception of light and right eye vision was correcting to 6/6 on refraction. Anterior segment findings in the left eye showed absence of eye ball in orbital cavity and sutured surrounding periocular lacerated wounds.

The right eye showed periocular ecchymosis and rest was normal. CT scan of maxillary sinus showed displacement of the left hypotonic eyeball with hemosinus (Figure 2 A). Optic nerve appeared partially transacted and oedematous. Commuted fractures of roof of the orbit, floor of the orbit, medial wall of maxillary sinus and nasal septum were noted. Patient was taken up for globe reduction into orbital cavity and orbital floor reconstruction along with oral and maxillofacial surgery team via cul-de-sac approach. The globe was repositioned in the orbital cavity and Primary Enucleation of the left eye was done as the eye was flaccid and hypotonous (Figure 2 B, C, D & E).

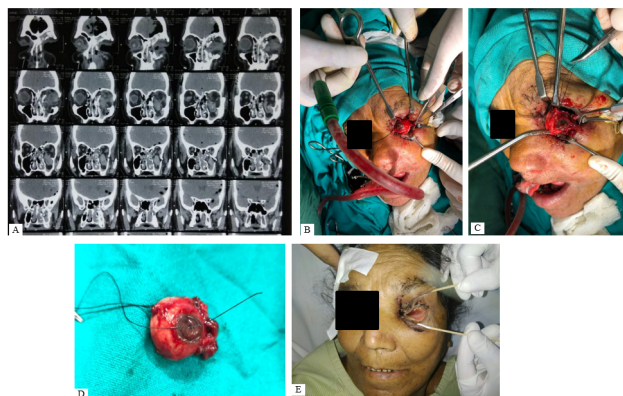


Figure 2: A): CT scan shows displacement of left hypotonic eyeball in maxillary sinus; B, C, D): Intraoperative procedure images of globe reduction in orbital cavity and enucleated globe; E): Post op image of the patient

2.2.1. Case 3

A 39-year male presented to the ER with a history of RTA sustaining injuries on the head, face and right eye presented to us 10 hours after trauma. Patient complained of sudden loss of vision in Right eye following ocular trauma. On examination visual acuity in the right eye was no light perception, and left eye was 6\6. Anterior segment examination in Right eye showed luxated globe with total hyphaema. The globe was temporally rotated and the nasal equatorial region was seen (Figure 3 A, B). CT report showed complete luxation of Right globe with total disruption of optic nerve. Patient was taken up for Primary enucleation as the eye ball structure was severely damaged (Figure 3 C, D).

3. Discussion

Traumatic globe luxation besides its rarity has a very dramatic presentation¹¹ in its wake that can be quite disturbing to both the clinician and the patient. The management needs to be swift and prompt if one plans to save the globe to preserve vision, globe contour and cosmesis. All our cases were as a result of severe violent



Figure 3: A): Completely luxated globe; B): Enucleated globe; C): Post op image of the patient

trauma to the eye. The mechanism of injury in our first case was a bull horn inserting in between the eyeball and the orbit causing air to enter the orbit forcing the contents out and avulsing the muscles and the optic nerve. This also resulted in fractures of the orbital wall. In our second case a coup type of force pushed the eye ball behind followed by a counter-coup force causing the eye ball to move forward along with this the narrowing of the posterior orbit due to fractures and a fracture in floor of orbit causing compression and transmission of forces inferiorly had caused the globe to luxate completely into the maxillary sinus causing a total luxation with avulsion of muscles and nerves. Similar coup and counter coup force theory can be seen to produce the globe luxation in the third case but the fractures of the medial wall caused the globe to rotate temporally and out.

A step wise approach would greatly enhance the ability of the surgeon to take the best decision. After stabilizing the patient systemically, depending on extent of luxation conservative techniques like lateral canthotomy and cantholysis may be attempted which may facilitate in bedside reposition of eye ball.⁴ Hypertonic agents like Mannitol can be used to reduce the intraocular pressure. Globe protection till definitive surgery with Amniotic membrane graft and customized surgical eye shield using sterilized stainless steel surgical bowls.² Eyeball exploration to tag all the avulsed muscles and lid repair must be attempted. In case of associated orbit fracture involvement of the maxillofacial team to reposit the fractured walls followed by attempt to reposit the globe

should be tried. The most important problem that needs to be dealt with is if the globe can be preserved, all the studies.^{2,8,9,11} Suggest that one must try to reposition the globe even in cases where there is no light perception and the optic nerve is completely avulsed. Preserving eyeball is of great importance to patient's appearance and psychology. The conditions under which one might consider primary enucleation is when the luxated eyeball has no perception of light and is associated with serious infection, structure of eyeball is completely damaged and more than three muscles are completely avulsed as this can cause significant ischemia. We had to go for primary enucleation in all our three cases as there was severe infection in the first case and severe globe damage in the other two cases.

4. Conclusion

Traumatic globe luxation's are caused by severe force causing huge damage to the eyeball, adnexa and orbit. This condition needs a multisystem evaluation and management with the primary goal to preserve the eyeball unless there are reasons to consider primary enucleation.

5. Source of Funding

None.


6. Conflict of Interest

None.

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