

# Challenging Management of Severe Traumatic Globe Luxation: A Rare Case Report

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## Abstract

**Introduction:** Globe preservation is usually preferred in globe luxation cases due to its psychological benefit and better cosmetic or prosthetic rehabilitation.

**Case Illustration:** A female teenager came with protruding left eye 1 day after a traffic accident. The patient was conscious with normal vital signs. The left eye was luxated anteriorly with full-thickness eyelid laceration, rupture of lacrimal canaliculi, and exposed area of extraocular muscles. The vision was no light perception. No orbital fracture and no optic nerve avulsion showed on the CT scan. Globe was intact, but all extraocular muscles were not identifiable. Under general anesthesia, lateral canthotomy and cantholysis were done, then the globe was repositioned back into the orbit. Eyelid lacerations were repaired, and finished by temporary blepharorrhaphy.

**Conclusion:** Eyeball saving was chosen in this case where the end result showed a successfully repositioned globe maintained by temporary blepharorrhaphy. Eyeball conservation is preferred even if the visual prognosis is poor and the eye could become phthisical.

Keywords: Traumatic globe luxation, globe reposition, canthotomy cantholysis

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## 1. Introduction

Traumatic complete expulsion of the eyeball is rare because of the protection offered by the orbit. Luxation of the eyeball is caused by a variety of reasons that increase the orbital pressure, which drives the eyeball forward and out of the palpebral fissure. The most common cause of globe luxation is a variety of ocular trauma. Traumatic globe luxation cases usually have a poor prognosis of vision due to the probability of combined optic nerve damage.

The surgery options for globe luxation are globe repositioning or enucleation, which should be decided based on the possibility of globe necrosis and the risk of ocular infection. Globe preservation is usually preferred over enucleation due to its psychological benefit and ease of cosmetic or prosthetic rehabilitation.

Globe repositioning surgery in traumatic globe luxation is usually needed to be done with lateral canthotomy and lateral cantholysis to help increase the orbital volume. Here we discuss a case of severe traumatic globe luxation with eyelid lacerations and its treatment of eyeball saving through globe repositioning surgery and laceration repair sutures.

## 2. Case Report

A female teenager came to the emergency unit with protruding left eye 1 day after a traffic accident. The patient was conscious, alert, and well-oriented to time, place, and person. The patient also showed normal vital signs. Ocular inspection showed anterior luxation of the left eyeball, with full-thickness medial upper and lower eyelid laceration involving the lid margin and rupture of lacrimal canaliculi (Figure 1). There was no perception of light in the left eye. The left eye anterior segment examination showed the conjunctiva was hyperemic with subconjunctival bleeding, the cornea was hazy with a positive fluorescein test, and the pupil was fixed and dilated. All extraocular muscles were not identifiable. There was no obvious abnormality in the patient's right eye.

Head and orbit CT scan revealed left eyeball luxation 2.2cm from the inter-zygomatic line, and a hyperdense lesion suggesting hemorrhage in the left eye. There were no orbital fractures and no optic nerve avulsion found from CT scan (Figure 2).

The patient underwent globe repositioning and eyelid repair surgery under general anesthesia. During exploration, the left globe was found to be intact with no wounds. However, all extraocular muscles were not able to be identified. Lateral canthotomy and cantholysis were done, then the globe was repositioned into the orbit by retracting the eyelids away from the globe using lid retractor followed by gentle posterior pressure on the globe (Figure 3-A). After the globe was repositioned, the left eyelid laceration was able to be explored more clearly (Figure 3-B).

The eyelid laceration was repaired using 6-0 polyglactin, and the lacrimal canaliculi rupture was repaired using silicone and 6-0 prolene suture. Lastly, the eyelids were opposed by a temporary blepharorrhaphy using 6-0 silk suture (Figure 3-C). Postoperatively, the patient was given antibiotic (intravenous and topical) and steroid (oral and topical).

The patient was discharged from the hospital 4 days after surgery with the condition of reduced left eyelid edema and blepharorrhaphy suture still intact. The patient then came to the outpatient clinic 10 days after surgery for a follow-up. From the patient's follow-up examination on the 10th day after surgery, there were no complaints of pain (Figure 4). The blepharorrhaphy suture was still intact and was then released.

### 3. Discussion

Traumatic globe luxation is often caused by sudden violent shocks, violent beats, and the sudden reflex movement of the head in the opposite direction. All of those can cause the air to suddenly enter to the gap of orbital tissues and cause the orbital pressure to suddenly increase, causing the muscles, nerves, and other tissues to suddenly break or lose tension, so the eyeball protrudes to the orbital orifice.<sup>1</sup>

Enucleation is psychologically more traumatic and may be associated with a number of complications, such as ptosis, implant migration, implant extrusion, and socket contracture.<sup>2</sup> Therefore, enucleation should be the last procedure to be done on traumatic globe luxation cases, after all attempts for globe repositioning have failed.<sup>3</sup> The decision between enucleation and globe repositioning depends on two things: the possibility of eyeball necrosis and the risk of ocular infection. Ocular necrosis can happen when blood supply to the eyeball is compromised, usually in cases where the optic nerve and/or the extraocular muscles were partially or fully avulsed. As for the risk of infection, it is usually higher if the globe is not intact.<sup>2</sup> In this case, the optic nerve is not avulsed and the globe was still intact, but the extraocular muscles were not able to be identified. Globe repositioning is preferred in this case as an attempt to save the eyeball and reduce psychological trauma in this patient and her family.

Anterior globe luxation usually followed by contraction of orbicularis oculi, which can cause further anterior displacement of the globe.<sup>4</sup> Therefore, lateral canthotomy and cantholysis to increase intra orbital space are usually needed during luxated globe repositioning surgery.<sup>5</sup> The goal of canthotomy and cantholysis is to perform an adequate soft tissue decompression of the orbit by disinserting the lower eyelid from its periosteal attachments. For the procedure of lateral canthotomy and cantholysis, only two instruments are needed: A pair of blunt tipped scissors (e.g., Westcott or Stevens) and forceps with heavy teeth (e.g., Bishop Harmon or Adson). Sharp-tipped scissors must be avoided to minimize the chance of globe injury.<sup>6</sup>

The steps of performing lateral canthotomy is done by placing the scissors across the lateral canthus and then incise the canthus for about 1 cm full thickness (from conjunctiva to skin) (Figure 5-A). Forceps are not needed for this step. This step simply gains access to the inferior crux of the lateral canthal tendon. It provides very little soft tissue decompression.<sup>6</sup>

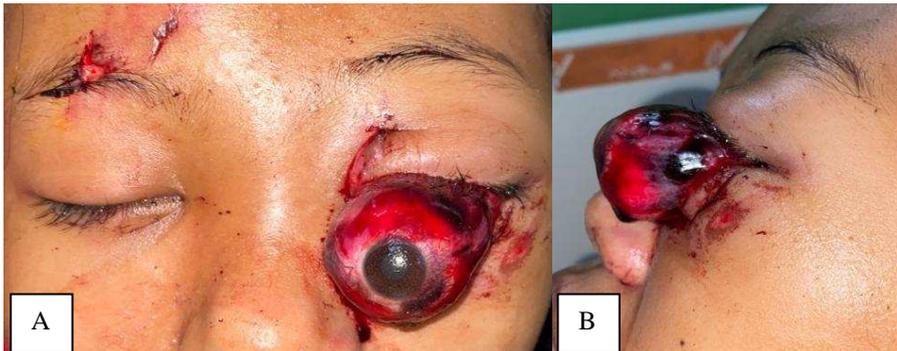
Lateral canthotomy is not enough to increase orbital space, therefore must be followed by cantholysis. The steps of performing cantholysis is done by grasping the lower eyelid at the inner edge of the incised canthus with a toothed forceps, with the patient supine, traction should be directed upward, toward the ceiling (Figure 5-B). Scissors need to be placed in an open position just beneath the skin, with the tips pointing toward the tip of the nose, then begin to cut (Figure 5-C). As the canthal tendon is released, the eyelid should come completely away from the globe.<sup>6</sup>

In this case, despite the medial eyelid laceration, the intra orbital space was still not enough for the luxated globe to be repositioned, so lateral canthotomy and cantholysis were done before giving further posterior pressure on the globe until it was repositioned inside the orbit. Result of this case's surgery showed successfully repositioned globe into the orbit, which was maintained by a temporary blepharorrhaphy suture. Another case of traumatic globe luxation reported by Pujari et al noted that orbital wall fracture without fragment displacement into the orbit helped in proper repositioning of the globe.<sup>7</sup>

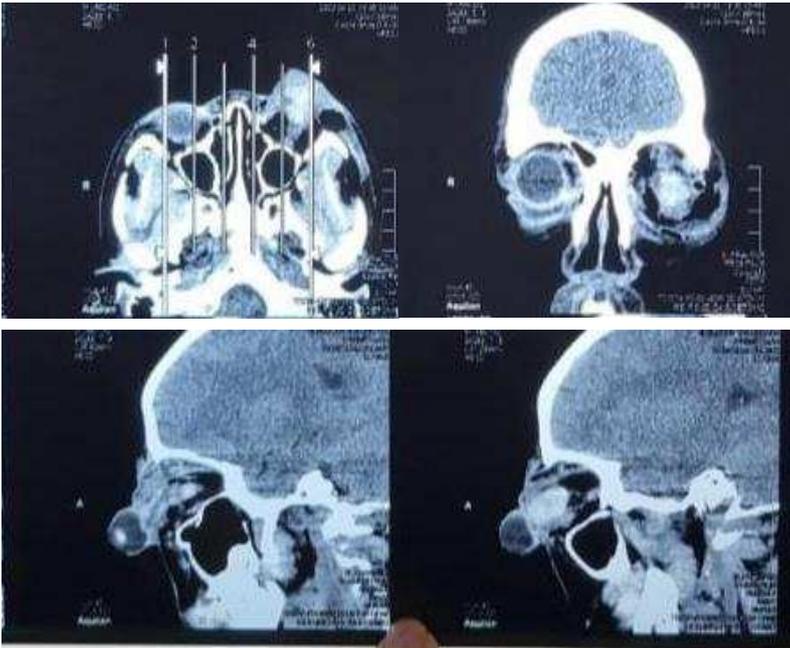
There is still a risk of phthisis bulbi after globe repositioning in traumatic globe luxation cases. If the dislocated eyeball has no light perception, is associated with serious infection, the structure of the eyeball is severely damaged, and more than three eye muscles are completely broken; even if the injured eye is surgically repositioned, it is inevitable that the anterior segment of the eyeball will be ischemia.<sup>1</sup> The ischemia of the eyeball can eventually cause the eye to become phthisis. This information needs to be told to the patient and her family for better expectation of future prognosis. The patient in this case did develop left eye phthisis bulbi despite successfully repositioned luxated eyeball. This could be due to the severe globe damage and

ischemia caused by prolonged surgery management and also by the trauma itself which causes extraocular muscles damage that compromised the globe's vascularization. In contrary, there were other cases of post trauma globe protrusion reported by Gupta et al<sup>8</sup> and Osman et al<sup>9</sup> that resulted in good visual acuity and ocular movements, probably because of an early and correct intervention, as well as fortunate intact condition of optic nerve and extraocular muscles.

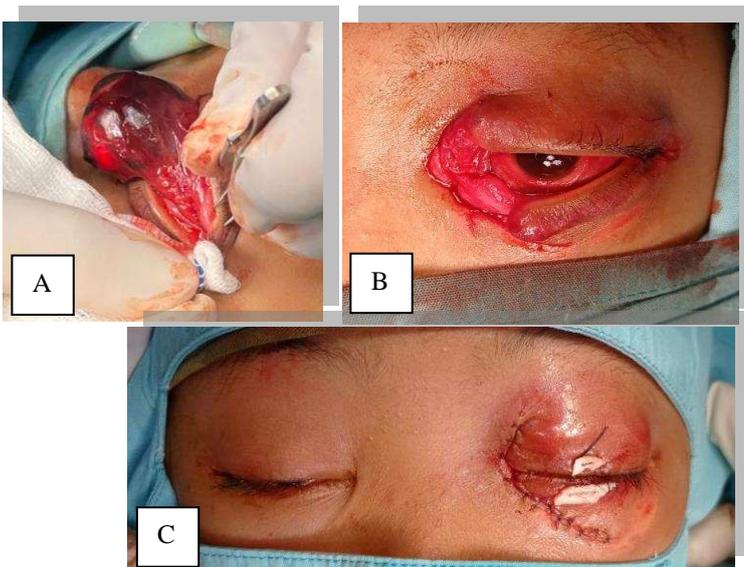
In cases of traumatic globe luxation, choosing eyeball saving over enucleation and attempting every effort to preserve the eye as a cosmetically acceptable organ can help patients in two main ways; firstly, the fact that the patient did not have to sacrifice an organ after such severe accident can have an enormous impact on the patient rapid recovery from the psychological trauma of the incident; secondly, the patient would be easily fitted an ocular prosthesis with better motility if the eye ultimately become phthisical.<sup>10</sup> Therefore, for long time management, the patient in this case is planned for possibility of undergoing correction surgery for the left eyelid and also for possibility of using ocular prosthesis.



**Figure 1.** (A) Preoperative photograph of the patient showed left luxated globe from anterior view and (B) lateral view. Courtesy of Dr. Soetomo General Hospital



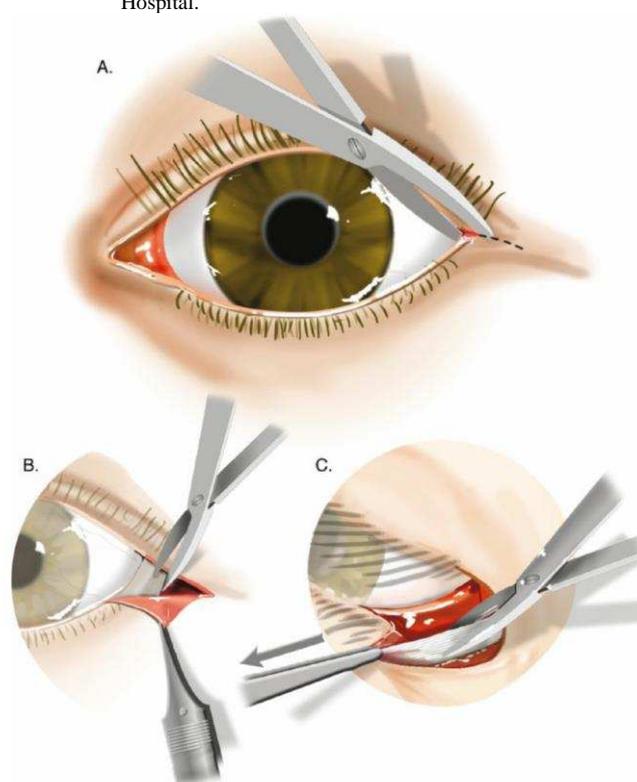
**Figure 2.** Head and orbit CT scan showed left eyeball luxation 2.2cm from inter-zygomatic line and no optic nerve avulsion. Courtesy of Dr. Soetomo General Hospital.



**Figure 3.** (A) Lateral canthotomy and cantholysis during globe repositioning surgery (B) Intraoperative photograph after the globe was repositioned inside the orbit and lower eyelid laceration with lacrimal canaliculi rupture. (C) End result of surgery; eyelid laceration sutured using 6-0 polyglactin and both eyelids were opposed by temporary blepharorrhaphy using 6-0 silk. Courtesy of Dr. Soetomo General Hospital.



**Figure 4.** Examination on the 10th day after surgery: the blepharorrhaphy suture was released. Courtesy of Dr. Soetomo General Hospital.



**Figure 5.** Lateral canthotomy and cantholysis. A: Lateral canthotomy. B: The lateral lower eyelid is grasped with toothed forceps. C: The eyelid is pulled anteriorly, scissors pointed toward the patient's nose, and then the lateral canthal tendon is cut.<sup>6</sup>

## Conflict of Interest

None

## Acknowledgments

None.

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