

CASE REPORT

Lateral canthotomy and cantholysis in a child with head trauma: a case report

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ABSTRACT

Background: Ocular compartment syndrome (OCS) is a severe ophthalmological emergency that should be diagnosed and treated immediately to prevent permanent loss of vision. It is usually caused by a retro-orbital bleed that increases intraorbital pressure and threatens the patient's vision. This paper aims to present a rare case of OCS and the procedure of lateral canthotomy and acantholysis.

Case Presentation: We present a 13-year-old boy who presented with facial injuries caused by a motorbike accident. The patient had vomited multiple times and was fully conscious. The patient had profound signs of increased intra-orbital pressure, which was found to be 70 mmHg. A significant right peri-orbital edema and ecchymosis of the right eye were present. The diagnosis of OCS was made, and lateral canthotomy with acantholysis procedure was performed. After the procedure, the pressure dropped, and vision was saved. Upon opening the eye, a flat retina, pale macula, and disc with intact venous pulsation were observed.

Conclusions: This study highlighted the importance of diagnosing OCS as an ophthalmological emergency. Moreover, we discussed how to perform the sight-saving procedure of lateral canthotomy and cantholysis.

Keywords: Ocular compartment syndrome, intra-orbital pressure, lateral canthotomy, cantholysis, hematoma, eye trauma.

Introduction

Ocular compartment syndrome (OCS) is a serious ophthalmological emergency that should be diagnosed and treated immediately to prevent permanent loss of vision. It is usually caused by a retro-orbital bleed that increases intraorbital pressure and threatens the patient's vision. Retrobulbar hemorrhage is a vision-threatening emergency often necessitating immediate lateral canthotomy to preserve vision [1]. Prompt recognition and appropriate treatment of this ocular emergency are imperative for timely management, determining the outcome [2]. The diagnosis of this condition is mainly clinical, and early recognition of the condition is essential to avoid permanent damage to the vision.

OCS is a rare yet serious sight-threatening condition that requires prompt diagnosis and treatment in the emergency department. The treatment includes a simple minor surgical procedure, using equipment that is usually in emergency departments, that helps relieve retro-orbital pressure and alleviate the ischemic pressure on the patient's retina optic nerve [1]. In this report, we described a case of child with OCS for which lateral canthotomy and acantholysis was performed.

Case Presentation

A previously healthy 13-year-old boy was brought to the Pediatric Emergency department. The patient was involved in a motorbike accident where he was not wearing a helmet; he had fallen on his head against a metal pole; he had vomited multiple times. Upon arrival to the emergency department, he was fully conscious as his Glasgow Coma Scale Score was 15/15 on arrival. A prominent right peri-orbital edema and ecchymosis prevented the patient from opening his right eye (Figure 1).

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Pediatric ophthalmology was consulted as both right upper and lower lids were severely congested and bruised. The eye was completely shut due to the severe swelling.

Lens and cornea were clear with restricted movement in all gaze, intraocular pressure (IOP) was 70 mmHg, measured using I-Care, and was very tense digitally. A brain and facial computed tomography scan found right multiple skulls and facial bone fractures with intra and extra-axial hematoma, right maxillary hemosinus, and right peri-orbital hematoma with intact globe extraocular muscles. The pediatric ophthalmologist decided to perform a lateral canthotomy and cantholysis under aseptic technique with conscious sedation (Figure 2A and B). Immediately post canthotomy/cantholysis, IOP went down to 45 mmHg; later again, after 30 minutes, IOP was measured and was found to be 30 mmHg (Figure 3). Upon opening the eye, a full dilated retina was possible where a flat retina, pale macula, and disc with intact venous pulsation was observed.

Discussion

Like other parts of the body, eyes are affected even by a slight change in pressure which would start by adaptation, but eventually, it would affect its function

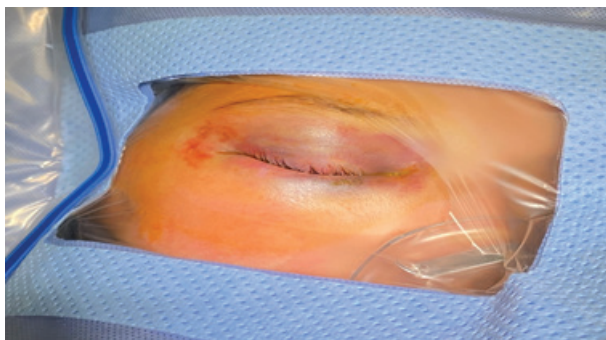


Figure 1. Pre-procedure presentation of the right eye of the patient.

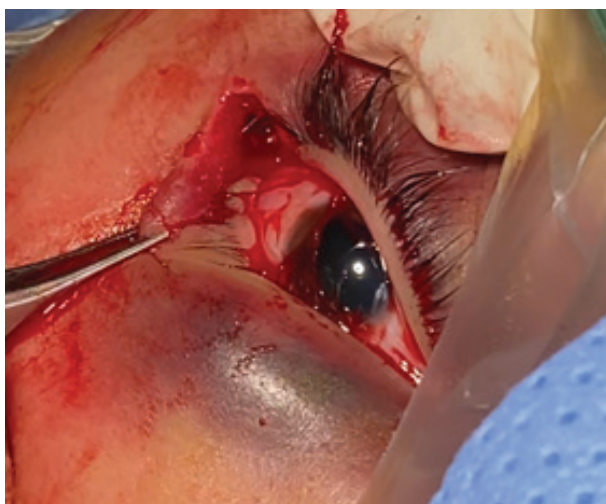


Figure 2. Presentation of the eye post cutting lateral canthus

as the eye is surrounded by seven bony structures that play an essential role in the protection of the eye from any injury. At the same time, it builds a hard bony cavity, which would resist any expansion behind or around the eyeball. The only place for the eyeball to adapt to pressure is by protrusion forward “proptosis” through the eyelid, limited by the lateral and medial canthus.

The canthus ligament is attached from the eyelid tarsal plate to the orbital rim, which forms a safety-like net that prevents the eyeball from advancing. As pressure increases, like in the presented case of retrobulbar hemorrhage, the eyeball does not have the room to adjust to the rise in pressure, which unfortunately affects the blood perfusion of the vessels and would finally affect the optic nerve and retina vessels. Retinal ischemia lasting more than 90–120 minutes might cause irreversible blindness; hence early detection of such an ophthalmological emergency and providing effective treatment is critical [3,4].

Other cases that could lead to increased ocular pressure includes; retro-orbital foreign body or mass, generalized edema from third space of the fluid as in case of burn or massive fluid resuscitation, spontaneous retro-orbital bleeding from arteriovenous malformation nearby, extraverted contrast, spinal surgery in the prone position, or disseminated intravascular coagulation [1].

Symptoms become more evident as pressure starts to rise. It might begin with a mild headache, ocular pain, nausea and vomiting, blurred vision, reduced ocular movements, proptosis, and visual loss. The examination of the affected eye would depend on the degree of compartment syndrome. It might include ecchymosis of eyelids, chemosis, subconjunctival injection, ophthalmoplegia, proptosis, afferent pupillary defect to light (Marcus Gunn pupil), central retinal artery occlusion, papilledema, optic atrophy, cherry red macula, reduced visual field, and visual acuity.

It is also essential to consider other critical differential diagnoses when assessing patients with suspected OCS. Many clinical conditions could mimic this ophthalmological emergency, such as orbital floor



Figure 3. The wide opening of the eyelids post the canthotomy and cantholysis. Intact globe.

fracture, Graves' disease, ocular retinoblastoma, and direct optic nerve injury.

Lateral canthotomy is indicated when IOP is > 40 mmHg (normal IOP is 10–21 mmHg), similarly as in the presented case and especially when there is an associated afferent pupillary defect [5].

One of the important contraindications which should be ruled out is the eye globe rupture. It is difficult, especially with an uncooperative child, but lateral canthotomy cannot be delayed as it might permanently affect the vision. This way, careful clinical examination is made possible, looking for a loss of eyeball contour, hyphemia, abnormal pupil shape, and exposed uveal tissues [6]. Other contraindications are the risk for infection, significant hemorrhage, especially in patients with coagulopathy, or direct damage to the eye globe from the procedure itself.

Before starting, should have all the equipment in advance so that no delay could occur during the procedure itself. This includes surgical drapes, a sterile field with sterile gloves and gown, dressing pack and suture kit, normal saline for cleaning the skin, Lidocaine 1%, and a syringe for injection of the anesthetizing agent. The procedure starts by obtaining consent from the patient or the legal guardian with a detailed explanation of the procedure, indications, and possible complications. The procedure should be done in a pain-free environment by providing local anesthesia or proceeding by sedation if the patient is uncooperative. The patient is preferably positioned in a supine position with the head elevated 15–20 degrees. Be sure that the patient's head is held in a stable position to prevent sudden movement, injuring the eye or surrounding structure. Cleaning and sterilization of the lateral canthus are done. After identification of the area and injecting lidocaine with epinephrine for more hemostasis. The needle is directed outward away from the eye globe to reduce the possibility of ocular penetration. A homeostat could be placed on the lateral canthus before cutting to give some homeostasis. Using sterile scissors, cut the lateral canthus till the lateral orbital rim is reached. Now the lateral canthus is visible, which is divided into superior and inferior crus. At first, the inferior crus is cut to allow the eye globe and the lower eyelid to protrude anteriorly and inferiorly. After which the IOP is measured, if it is still > 40 mmHg, then there is a need to cut the inferior and superior crus as well producing the cantholysis.

As with any other minor surgical procedure, there is a risk of infection and hemorrhage, and mechanical injury of the globe. These complications are rare and respond to therapy, while prolonged retinal ischemia does not. Lateral canthotomy wounds heal well without suturing or significant scarring [7].

Conclusion

Although it is a rare procedure, lateral canthotomy and cantholysis is a bedside procedure that every emergency physician should learn and should be done timely to treat high IOP. It is a simple procedure that could prevent irreversible vision loss.

List of Abbreviations

IOP Intraocular pressure
OCS Ocular compartment syndrome

Conflict of interest

The authors declare that there is no conflict of interest regarding the publication of this case report.

Funding

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Consent of publication:

Informed consent was obtained from the parents of the patient.

Ethical approval

Ethical approval is not required at our institution for an anonymous case report.

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