



SCIREA Journal of Clinical Medicine

ISSN: 2706-8870

<http://www.scirea.org/journal/CM>

October 11, 2020

Volume 5, Issue 5, October 2020

## Mechanical Fall Resulting in a Retrobulbar Hematoma

Eduardo Mejia, Eric F. Reichman

Emergency Department, UT-Health, University of Texas Health Science Center at Houston –  
Medical School

### Correspondence & Reprints:

Eric F. Reichman, Ph.D., M.D.

Clinical Associate Professor of Emergency Medicine, Univ. of Texas Health Science Center at  
Houston-Medical School, 3907 Fielder Circle, Missouri City, Texas, 77459-6654

Phone: (281) 778-6614

Cell Phone: (713) 208-0540

E-mail: [Eric.F.Reichman@gmail.com](mailto:Eric.F.Reichman@gmail.com)

**Keywords:** Compartment syndrome, Retrobulbar hemorrhage, Intraocular pressure

### Abstract

An orbital compartment syndrome is an ophthalmic emergency characterized by an acute rise in orbital pressure that can cause damage to ocular and intraorbital structures. It can result in irreversible blindness if not reversed quickly. Decompression via a lateral canthotomy and

cantholysis is often required as a quick method to reduce intraorbital pressure and salvage the patient's sight. We present a 69-year-old male who fell from standing with a left eye retrobulbar hematoma on blood thinners. The hematoma resulted in increased intraocular pressure affecting the vision. The patient symptoms were relieved with decompression. This case highlights the lateral canthotomy and cantholysis in addition to the importance of repeat eye examinations for patients with changes in symptoms. This is the first case report and second time in the literature of apixaban causing a retrobulbar hematoma.

## **Introduction**

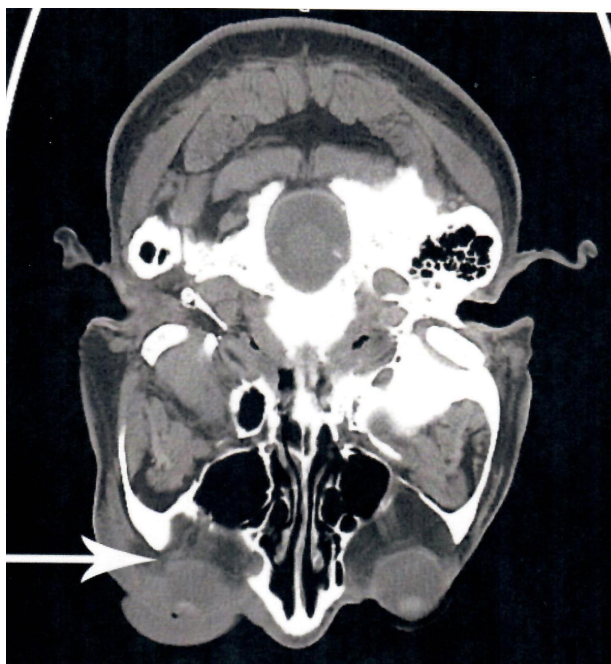
Acute orbital compartment syndrome is an acute elevation of intraorbital pressure that results in rapid eye dysfunction. Patients usually present with blurry vision, ocular pain, and proptosis. Clinical signs may include any combination of afferent pupillary defects, chemosis, decreased visual acuity, diminished retro-pulsion to manual pressure, elevated intraocular pressure (IOP), exophthalmos or proptosis, mydriasis, ophthalmoplegia, and retinal ischemia. (1-8)

Orbital compartment syndrome is described in multiple clinical settings. (1-8) Emergency Physicians usually encounter an acute post-traumatic retrobulbar hemorrhage with rapid loss of vision. It can also be seen in chronic diseases, following iatrogenic procedures, and with spontaneous hemorrhages.

Acute orbital compartment syndrome requires prompt recognition as irreversible loss of vision occurs without rapid treatment. (1-4) An immediate lateral canthotomy and cantholysis is indicated within one hour of injury to prevent permanent loss of vision. (1,4) Medical interventions for reducing IOP are not a substitute for a lateral canthotomy and cantholysis. They are an adjunct to the decompression from a lateral canthotomy and cantholysis.

Many patients are receiving direct oral anticoagulants (DOACs) for atrial fibrillation, deep venous thrombosis, pulmonary embolism, and prophylaxis. They do not require blood drawn for monitoring levels, heparin bridging till blood levels are adequate, and possible hospital admission when compared to warfarin.

## **Case Report**



**Figure 1: CT scan image showing the left eye retrobulbar hematoma (white arrow) and surrounding edema.**

A 69-year-old male presents with complaints of a left eyelid laceration and swelling from a mechanical fall from standing. There was no loss of consciousness. The patient has a history of atrial fibrillation taking daily aspirin and apixaban.

The vital signs were normal. The physical examination revealed left circumferential periorbital tenderness and swelling, a laceration above the left eye, and the bleeding controlled. Visual acuity was at baseline, intact extraocular movements, and IOP at 13 mmHg and 18 mmHg in the right and left eye, respectively. The remainder of the examination was normal. A CT scan of facial bones was ordered to rule out facial fractures given the tenderness to the maxillary and zygoma regions.

Upon return from radiology, approximately 4 hours after the fall, the patient reported increased pain and swelling in left eye along with visual disturbances. A small retrobulbar hemorrhage was visualized on CT scans with no proptosis (Figure). Repeat examination noted increased periorbital swelling and the IOP was 51 mmHg in left eye and 14 mmHg in right eye. The left eye visual acuity was limited to seeing figures and shadows. The right eye visual acuity was 20/30. The remainder of the repeat eye examination was normal.

A left eye lateral canthotomy and cantholysis was performed by the emergency physician. The IOP decreased to 31 mmHg after decompression. Ophthalmology was then consulted. Their

examination noted the left eye IOP was 18 mmHg 1.5 hours later with a visual acuity of 20/50. The laceration was stitched. He was admitted for observation and reevaluated by ophthalmology the next morning. Examination showed a normalization of visual acuity, a normal left eye, and no bleeding. The patient was discharged home with follow-up.

## **DISCUSSION**

The orbit is a closed space within the bony orbit. The medial and lateral canthal tendons fix the eyelids to the orbital rim. The lateral canthal tendon is located posterior and inferior to the lateral canthal fold. It originates from the tarsal plates and attaches to the zygoma. It is Y-shaped with the superior crus from the superior tarsal plate and the inferior crus from the inferior tarsal plate.

An increase in intraorbital contents results in an elevation of intraorbital pressure. IOP elevation correlates with the degree of intraorbital pressure elevation. (2) The globe moves forward to partially accommodate some of the elevation in intraorbital pressure resulting in ocular pain and proptosis.

The exact mechanisms by which an orbital compartment syndrome causes blindness is unknown. (1,5,6) The common theory is that the elevated intraorbital pressure leads to irreversible optic nerve and retinal ischemia. Irreversible ischemic injury to the retina may occur within 90 minutes of vascular insufficiency. Additional theories are that direct mechanical compression or longitudinal traction on the optic nerve contributes to the loss of vision.

Ultrasound can be used to diagnose a retrobulbar hemorrhage after trauma. (7) It allows for the quick evaluation of the orbit. Do not perform an ultrasound if an open globe is suspected. The hemorrhage may be confirmed by CT scan if ultrasound is not available and there is time before the procedure.

There are no contraindications to a lateral canthotomy and cantholysis except a ruptured globe. Permanent loss of vision may result if untreated. Prior to this procedure one must address the patient's airway, breathing, circulation, and any life-threatening injuries. Consider the use of procedural sedation, if not contraindicated, to prevent patient movement injuring the globe during the procedure.

The procedure is simple to perform. (1,2,5,8) Clean the eyelids and surrounding skin and apply povidone iodine solution. Chlorhexidine solution can be used if a patient reports iodine allergy. Use chlorhexidine with care to ensure it does not contact the eye. Irrigate the lateral canthal fold region. Identify the lateral canthal fold using sterile technique. Inject local anesthetic solution with epinephrine subcutaneously. This will anesthetize all tissue from the canthal fold to the orbital rim. Use caution to avoid inadvertent needle puncture of the eye.

Insert a straight mosquito hemostat into the lateral canthal fold and advance it until the orbital rim is encountered. Clamp the hemostat to compress the tissue for approximately one minute. This will limit any bleeding. Remove the hemostat and cut all the tissue layers along the lateral canthal fold to the orbital rim with an iris scissors to perform the lateral canthotomy. A disposable hot cautery pen, if required, can be used for hemostasis. An assistant can use a Desmarres retractor to elevate the upper eyelid or separate the eyelids in cases of significant periorbital and eyelid edema.

Grasp the cut end of the lower eyelid and retract it outward. Identify the lateral canthal tendon. A pad of adipose tissue is often seen in the superficial fascial plane and the lateral canthal tendon lies just posterior. Divide the lateral canthal tendon vertically at its midportion to perform the lateral cantholysis and transect the inferior crus of the tendon.

The lateral canthotomy and cantholysis results in an immediate decrease in IOP. Recheck the intraocular pressure. A persistent elevated IOP requires the exploration of the lateral canthal tendon region to make sure that the inferior crus has been completely transected. If it was transected completely, transect the superior crus. The resolution of afferent pupillary defects, proptosis, and restoration of visual acuity occurs over hours to days. (8)

Obtain a timely Ophthalmologic consultation for a thorough eye examination and possible repair. Repair of the lateral canthal fold and canthal tendon is controversial. The wounds made often heal by secondary intention without complications. (8)

This is a rare procedure that is a challenge because of abnormal anatomy resulting from trauma, lack of familiarity, and time constraints. Many complications can be prevented by reviewing the procedure before it is performed, knowing and identifying the anatomic landmarks, and using care in performing the canthotomy and cantholysis to prevent eye injury.

The initial trauma, whose incidence is primarily falls followed by motor vehicle collisions, causes the retroorbital bleeding and hematoma formation. (9) Delayed retroorbital bleeding is rare and never reported in the literature based on a Medline search. There has only been one case of apixaban causing a retroorbital hematoma and this was in a case series. (9) This is the first case report in the literature of apixaban causing a retroorbital hematoma.

Our patient on apixaban and aspirin developed a small delayed retrobulbar hematoma after the initial examination. It is also possible that it existed and evolved in radiology. The retrobulbar hematoma that was visualized on CT scans. Despite its small size, the patient became symptomatic. The examination must be repeated if anything changes or if the patient has new complaints. Performing a complete repeat examination is worth the time spent. This was the case with our patient whose vision was saved and returned to baseline.

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