EARLY DETECTION OF TRAUMATIC RETROBULBAR HEMORRHAGE USING BEDSIDE OCULAR ULTRASOUND

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CASE REPORT

A 35-year-old man with no prior medical history presented to the Emergency Department (ED) with left eye pain and blurry vision 1 h after blunt traumatic injury from a direct punch. On examination, he was afebrile with a blood pressure of 119/73 mm Hg, a regular heart rate of 52 beats/min, and a Glasgow Coma Scale score of 15. Physical examination revealed proptosis and significant periorbital edema. Complicated lacerations of the upper and lower eyelids were present medial to the lacrimal punctum, with obvious involvement of the canalicular system. Elevation of the eye was absent and painful. Visual acuity was 20/25 on the right and 20/30 on the left. No pupillary abnormality or resistance to retro pulsion of the globe was present.

Bedside ocular ultrasonography of the left orbit was performed and demonstrated a thin anechoic stripe posterior to the globe, suggesting an early retrobulbar hemorrhage (RBH) (Figure 1). Further imaging identified hypoechoic fluid collections posterior to this stripe, indicating RBH (Figure 2). Ophthalmology was consulted and within 30 min of the ultrasound, a maxillofacial computed tomography (CT) scan confirmed retrobulbar stranding consistent with RBH causing proptosis of the left globe (Figure 3). There were also multiple orbital floor fractures, lamina papyracea fractures, and hemorrhage of the ethmoid air cells. Ophthalmology determined that there was no indication for emergent lateral canthotomy and inferior cantholysis because the patient had a normal-appearing optic disc and normal intraocular pressure (23 mm Hg on the right and 18 mm Hg on the left), secondary to anatomic decompression from large orbital floor fractures. The patient was discharged with...
ophthalmology re-evaluation the following day. Referrals were made to oculoplastics for laceration repair and otolaryngology for surgical management of facial fractures.

DISCUSSION

Traumatic RBH is a vision-threatening emergency in patients with facial or orbital trauma. Without prompt treatment, permanent blindness can occur within 90 min of injury (1–3). Orbital compartment syndrome results from hemorrhage causing increased intraorbital pressure and arteriovenous compression, leading to impaired retinal perfusion and optic nerve ischemia. Immediate orbital decompression by lateral canthotomy and inferior cantholysis is required to preserve or restore vision (1–4). To optimize chances for complete retinal recovery, decompression should be carried out within 60–90 min of injury (5,6). Partial recovery has been accomplished within 3 h of traumatic injury (4). Although this ophthalmologic emergency presents most frequently in the ED, discussion is nearly absent from the Emergency Medicine literature.

Presenting signs include impaired visual acuity, restricted extraocular movement, and painful proptosis with resistance to retropulsion. Afferent pupillary defect, swollen or pale optic disc, and elevated intraocular pressure may also be seen (1–4). Although RBH is a clinical diagnosis, identification can be challenging in the context of extensive facial trauma, altered mental status, and limited lid retraction caused by periorbital edema. Confounding injuries and medical comorbidities may delay diagnosis or cause patients to minimize ocular complaints.

Bedside ultrasound allows rapid evaluation of potential RBH in patients with a limited examination or early hemorrhage without severe symptoms. RBH appears as a black or anechoic structure within the hyperechoic retrobulbar area just posterior to the globe, and may distort the posterior aspect of the eye (7–9). CT can confirm diagnosis; however, when CT is delayed or unavailable, the risk of vision loss increases and ultrasound is a valuable adjunct (7,8,10).

Ocular ultrasound can be performed with a linear array transducer, such as the one used in this case, at a frequency of 7.5–10 MHz. The eye is best scanned through a large amount of gel over the patient’s closed eyelids so the transducer does not contact the eyelids. A thin barrier, such as Tegaderm (3M Company, St. Paul, MN), should be placed over the closed eye to prevent irritation or infection. The operator’s hand should be braced against the forehead or nasal bridge to avoid placing pressure on the eye. The globe is then scanned in both short and long axes with the eye in a neutral position (7,8). Ocular ultrasound should be avoided if a globe rupture is apparent.

CONCLUSIONS

To the best of our knowledge, only three ultrasound images of RBH have been published. Two were examples of RBH with a single hypoechoic area posterior to the globe, but there were no case details and neither was confirmed by CT (7,11). The third case involved severely elevated intraocular pressure and very late-stage conical deformation of the globe, but did not demonstrate a classic hypoechoic collection on ultrasound (12).
Our sonographic image of RBH demonstrates a thin anechoic stripe just posterior to the globe with retrobulbar hypoechoic collections and confirmatory CT. If our case had increased orbital pressure treated with canthotomy and cantholysis, the fluid collections may have changed in size or depth. One case report captured dramatic normalization of globe contour postcanthotomy using ultrasound (12). Using these sonographic findings adds to the clinical examination to rapidly detect early RBH and expedite emergent decompression.

SUPPLEMENTARY DATA

Supplementary data related to this article can be found online at http://dx.doi.org/10.1016/j.jemermed.2014.12.074.

REFERENCES