Retrobulbar Hematoma from Warfarin Toxicity and the Limitations of Bedside Ocular Sonography

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The following case describes a 26-year-old female who presented to the emergency department with a nontraumatic retrobulbar hematoma associated with warfarin toxicity. The application and limitations of focused bedside ocular sonography for this condition are discussed.  

INTRODUCTION
Nontraumatic RBH occurs rarely and has been associated with arteriovenous malformations,1 following thrombolysis,2 Type IV Ehlers-Danlos Syndrome,3 seizures,4 vomiting,5 following attempted strangulation,5 and in a pregnant woman treated with subcutaneous heparin.6 To our knowledge this is the first case report of a RBH associated with warfarin toxicity.

CASE REPORT
A 26-year-old female presented to the emergency department (ED) with a chief complaint of left eye pain for the preceding three hours. After multiple episodes of emesis over 24 hours, the patient developed left eye pain and progressive swelling. She had a complicated medical history, including the recent diagnosis of deep venous thrombosis with associated pulmonary embolism 12 days prior, and initiation of warfarin therapy. Her past medical history included empyema, urosepsis, borderline personality disorder, pseudoseizures, chronic lymphadenopathy, peripheral neuropathy, and fibromyalgia.

The physical exam was remarkable for slight left eye proptosis, left periorbital edema without evidence of trauma and an inferiorly displaced left gaze. Extraocular movements of the left eye were limited in attempted rightward gaze. Visual acuity seemed unchanged, as demonstrated by correct finger counting at four feet (the patient did not wear her contact lenses during the evaluation). Visual fields were intact. Intraocular pressure (IOP) was 30 mm Hg on the left, and 18mm Hg on the right. A focused bedside ocular ultrasound (Figure 1) was performed by an emergency ultrasound fellow. The ultrasound fellow had previously performed approximately 500 bedside ultrasound examinations and 15 ocular ultrasound evaluations. The findings of this examination were documented in real-time as: “compared to the asymptomatic eye there is evidence of slight proptosis and slight fullness of the soft-tissue in the retro-orbital region. There is no clear evidence of RBH, vitreous hemorrhage or retinal detachment.” Non-contrast head computed tomography (CT), obtained approximately 45 minutes after the bedside ultrasound, demonstrated a large left RBH with associated proptosis (Figure 2). No repeat ultrasound examination was performed following the head CT.

Following ophthalmology evaluation, the patient was admitted for reversal of her coagulopathy (INR 25) and observation. She subsequently developed worsening vision, an afferent papillary defect, and an increase in her IOP, which persisted following lateral canthotomy. She ultimately underwent a left orbitotomy for drainage of her RBH and relief of her orbital compartment syndrome.

DISCUSSION
We believe this is the first case report of a nontraumatic RBH associated with warfarin toxicity. Our patient also had vomiting, which may have been a causative factor.5 Similarly, nontraumatic RBH has been reported in other situations...
association with sudden elevation of cranial venous pressure and venous congestion (self-strangulation, induced by labor and scuba diving), and systemic diseases associated with bleeding tendencies (coagulopathy from liver disease, scurvy). In the elderly it has been postulated that vascular lesions, such as atherosclerosis or small aneurysms, could cause seemingly spontaneous hemorrhage, although a subacute presentation is more suggestive of venous bleeding. Occasionally, no associated etiology is found.

Without prompt recognition and treatment, RBH can lead to complications such as secondary optic atrophy, secondary strabismus, permanent choroidal folds, infection, hematoma enlargement and vision loss. Bedside ocular ultrasound is an appealing modality for rapid identification of this emergent condition and may obviate the need for CT scan if the diagnosis can be made.

In this case, the CT scan demonstrates a fairly significant RBH (Figure 2), yet the focused bedside ultrasound (Figure 1) failed to demonstrate a hyperechoic fluid collection in the retro-ocular region, as expected based on previous reports. Interestingly, in the emergency medicine literature no reports describe the sonographic diagnosis of RBH in a clinical setting. In 2000, Blaivas described the expected sonographic findings in a case series of ocular pathology identified with bedside ultrasound, although a specific case detailing the diagnosis of RBH was not reported. Also in 2000, an abstract published by Estevez et al. described accurate identification of simulated retrobulbar hematomas in bovine models with sonography, although the specific findings were not revealed. CT scan was used as a gold standard and the sonographers correctly identified 15/18 hematomas (83%) and 4/4 orbits without hematomas.

In this case, potential explanations for the paucity of findings on bedside ultrasound include: 1) incomplete evaluation of the retro-ocular region, 2) subsequent progression of the RBH following the ultrasound, 3) inexperience of the sonologist and 4) echogenicity incompatible with visualization of the RBH. These possibilities will be explored in further detail.

Incomplete ultrasound evaluation of the retro-ocular structures is possible considering the eccentric location of
In patients with proptosis and suspected retrobulbar hemorrhage, timely orbital decompression is essential to preserve the ocular nerve and visual acuity. While bedside ultrasound may be useful when positive, the diagnostic accuracy of this modality requires further investigation.

**Video 1.** Video in axial plane of the left (symptomatic) orbit with audio narrative available at www.westjem.org.

**Video 2.** Video in sagittal plane of the left (symptomatic) orbit with audio narrative available at www.westjem.org.

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**REFERENCES**