5-22-2020

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American Journal of Emergency Medicine xxx (xxxx) xxx

Contents lists available at ScienceDirect

American Journal of Emergency Medicine

journal homepage: www.elsevier.com/locate/ajem

Retinal detachment with subretinal and vitreous hemorrhages causing secondary angle closure glaucoma diagnosed with ultrasound

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A 90-year-old female with a past medical history of trigeminal neuralgia and age-related macular degeneration (AMD) presented with a four-day history of a left-sided headache, nausea, and vomiting. Regarding her left eye, she reported intermittent flashes of light over the past month and complete vision loss for four days. She denied a history of diabetes, hypertension, anticoagulant use, or ocular trauma. Her ocular history included the use of reading glasses and bilateral cataract surgery forty-five years ago.

She was unable to describe the vision in her left eye prior to symptom onset, stating that "it has been blurry for a while". She was uncomfortable. Her left eye was diffusely injected with a cloudy cornea and a fixed, mid-dilated, and non-reactive pupil. The vision in her unaffected right eye was 20/200 with an intraocular pressure (IOP) 16 mmHg; her left eye had no light perception (NLP) with an IOP of 56 mmHg.

She was immediately started on an IOP-lowering regimen of dorzolamide, brimonidine, and latanoprost; ophthalmology was emergently consulted. A bedside ultrasound was performed by an ultrasound fellowship-trained emergency medicine physician using a high-frequency linear probe on a Sonosite X-porte. The scan demonstrated a large area of mixed echogenicity within the subretinal space and vitreous cavity consistent with both subretinal and vitreous hemorrhages. In addition, there was a flap tethered to the optic nerve concerning for an associated retinal detachment.

On slit lamp examination, the ophthalmologist noted the left anterior chamber to be flat with a bulging iris and a detached retina, visible through the pupil through the posterior chamber. The right eye showed geographic atrophy, consistent with AMD. Given a concern for altered mental status, a CT head without contrast was performed, which demonstrated lentiform hyperdensities within the left globe which appeared to converge at the optic disc, concerning for a hemorrhagic retinal detachment.

The patient was admitted with concern for secondary acute angle closure glaucoma. Her medication regimen was continued with the addition of prednisolone acetate and atropine, 8 h after initial triage. While inpatient, she noted continued headaches, refractory to home carbamazepine. An MRI orbit with and without contrast was performed, revealing blood products in the left globe and irregularity of the choroid/retina consistent with a retinal detachment. Her pain was controlled with oral hydrocodone/acetaminophen. Ultimately her vision was deemed unsalvageable given her age, length of symptoms, and lack of light perception. At time of discharge, her left eye's IOP was 49 mmHg.

Acute angle-closure glaucoma (AACG) occurs when there is insufficient aqueous humor outflow from the anterior chamber through the trabecular meshwork due to mechanical obstruction. Symptoms classically can be precipitated by dilating the pupil, either through physiologic means or medications, such as sympathomimetics or anticholinergics.

Hemorrhagic retinal detachment precipitating AACG has classically been associated with AMD, anticoagulant use, hypertension, diabetes mellitus, and trauma [1,4-7,10].

Both subretinal and vitreous hemorrhages can induce secondary AACG, increasing the pressure in the posterior segment of the eye, thereby causing anterior displacement of the lens/iris diaphragm [3,5]. An increase in the posterior segment pressure pushes the vitreous and the lens forward, closing the angle, and precipitating angle closure glaucoma [9]. Atropine can serve as an adjunct medication in cases of AACG secondary to increased posterior segment pressures.

Atropine relaxes the ciliary body, creating a dilatory effect on the pupil that is classically contraindicated in primary AACG; the pupil's dilation further closes the angle, delaying aqueous humor outflow, and exacerbating IOP. In secondary AACG, this ciliary body relaxation, however, can posteriorly displace the lens and can aid in lowering IOP.

Point-of-care ultrasound can be performed quickly without need for a consult service, is inexpensive, and has repeatedly shown no increased risk of radiation to the patient [8]. In a systematic review and meta-analysis by Gottlieb et al., ultrasound was found to be 94% sensitive and 96% specific for the diagnosis of retinal detachment; moreover, subgroup analysis found no statistical significantly differences when comparing scans from emergency department (ED) providers to non-ED providers [2]. Additionally, while CT and MRI can aid in the diagnosis, studies have shown that they have poorer spatial resolution and can have limited role in the study of the vitreous, retina, and choroid [1].

Overall, the visual prognosis is extremely poor with secondary AACG. Reversal of anticoagulation should be initiated when appropriate. Early surgical repair (laser/open iridotomy or sclerotomy with evacuation) or enucleation for pain control serve as further, more definitive measures.

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https://doi.org/10.1016/j.ajem.2020.05.050

Conflicts of interest and sources of funding

No external funding was secured for this manuscript.

The authors have no financial relationships or conflicts of interest to disclose.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.ajem.2020.05.050.

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