CLINICAL VIGNETTE

Ultrasound Diagnosis of Retinal Detachment

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History

A 63-year-old male with primary angle closure glaucoma and retinal detachment of his left eye presented to the emergency department (ED) with decreased vision in his right eye. Four days prior to presentation he saw "little black spots" in his vision, as if there were "bugs flying around." The visual changes progressed to seeing only black and red spots on the day of presentation. He denied any ocular pain associated with the vision changes. He had no prior trauma, nor associated fevers, or headaches.

Physical Exam

The patient had unremarkable vital signs. His visual acuity decreased from a baseline of 20/40 to 20/200 at ED presentation. On ocular exam, his lids, lashes, and conjunctiva had no erythema, swelling or scleral injection. On slit lamp exam, there was no cell, flare, or hyphema noted. Fluorescein exam showed no epithelial defects or ulcerations. The fundoscopic exam was limited by lack of pupillary dilation and was non-diagnostic.

Imaging

As a result of the limited fundoscopic examination, an ED point of care ultrasound (POCUS) of the right eye was performed using a 13-6 MHz linear array transducer (Figure 1).

The ED bedside ultrasound revealed an opacity in the posterior chamber of the eye concerning for retinal detachment or vitreous hemorrhage.

ED Course

Ophthalmology was emergently consulted to confirm the ED POCUS findings of possible retinal detachment in the setting of acute vision changes. The ophthalmologist agreed with the diagnosis of an acute retinal detachment and scheduled the patient for emergent surgery.

Discussion

Patients with ocular complaints make up 2-3% of patients presenting to the emergency department and studies suggest that 11-15% of these patients are diagnosed with retinal detachments.[1,2] A retinal detachment is vision threatening and demands prompt recognition and surgical intervention. Retinal detachments occur in a highly age-dependent fashion, with most of the cases occurring after the seventh decade of life.[2] Patients with Myopia are at increased risk of developing retinal detachment and can present at a younger age.[3]

A retinal detachment begins with the separation of the posterior vitreous that includes one, or more, full thickness tears in the retina. Fluid from the vitreous cavity subsequently enters into the potential subretinal space. The retinal detachment is progresssively extended by vitreous currents formed by eye movements forcing fluid into this potential space.[2]

Patients with a retinal detachment will classically describe a sudden, painless, monocular visual impairment with the sensation of looking through a curtain, accompanied by flashes and floaters.[4] Evaluation of the patient with suspected retinal detachment starts with the visual acuity assessment, which is an eye "vital sign." In order to confirm the diagnosis an evaluation of the posterior chamber must be performed. The evaluation of the posterior chamber continues to be challenging as most providers do not feel comfortable with the direct ophthalmoscope exam.[5] An alternative to the fundoscopic exam is ED POCUS.

The first published ultrasonographic diagnosis of retinal detachment was made by Oksala and Lehtinen.[6] Studies suggest ED POCUS is a sensitive screening tool that is easily learned with minimal training.[4]

To perform the ultrasound the patient is first placed in a comfortable position and instructed to close their eyes. An adhesive transparent medical dressing can be used to keep the eye closed and to provide a protective barrier between the patient and the ultrasound probe. Upon applying the transparent dressing, it is important to iron out any air pockets that may have formed. A large amount of water-soluble ultrasound transmission gel should be applied to the patient's closed eyelid so that the transducer does not have to touch the eyelid. The high frequency linear ultrasound transducer is used as it provides the highest degree of resolution for a superficial structure like the eye. Once the eye is located in the sagittal plane the ultrasound probe is fanned back and forth in order for the entire globe to be evaluated. The probe is then rotated 90 degrees revealing the eye in the transverse plane. The eye is evaluated now in the second plane. Evaluating the eye in multiple planes increases the chance of finding an abnormality.

The normal globe should contain anechoic fluid. The normal retinal cannot be differentiated from the other choroidal layers. If an opacity is seen in the posterior chamber the differential for such a finding is retinal detachment or vitreous hemorrhage. Thinner opacities in the posterior third of the globe are more consistent with retinal detachment when compared to vitreous hemorrhage.

Once the diagnosis of retinal detachment is suspected based on history, physical exam, and imaging, Ophthalmology should be consulted. If the diagnosis is confirmed the three principal methods for reattachment of the retina are scleral buckling, vitrectomy, and pneumatic retinopexy.[2]

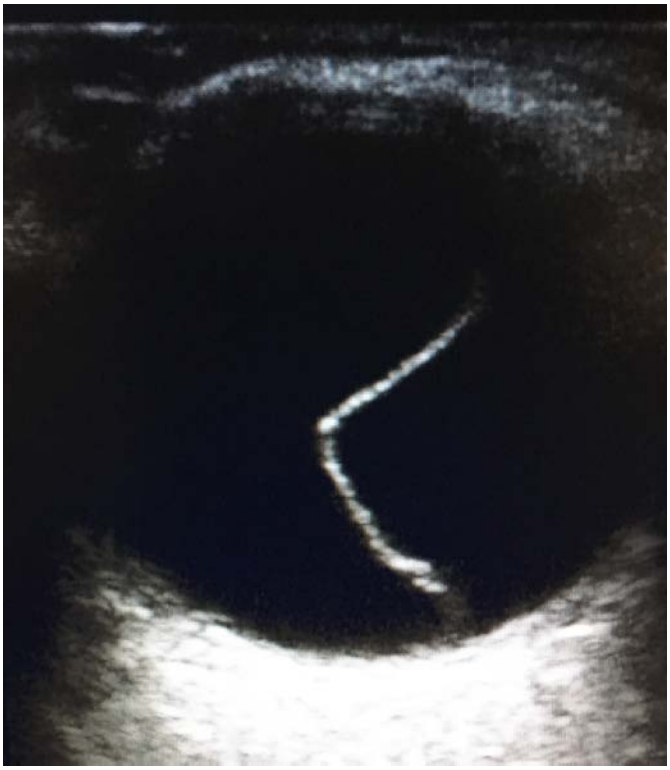

Figure 1: Ocular ultrasound revealing an opacity in the posterior chamber consistent with a retinal detachment.

REFERENCES

1. **Walker RA, Adhikari S**. Eye Emergencies. In: Tintinali JE, Kelen GD, Stapczynski JS, eds. *Tintinali's Emergency Medicine: A Comprehensive Study Guide*, 7th ed. New York: McGraw-Hill; 2011. p. 1517-1549.
2. **D'Amico DJ**. Clinical practice. Primary retinal detachment. *N Engl J Med*. 2008 Nov 27;359(22):2346-54. doi: 10.1056/NEJMcp0804591. Review. PubMed PMID: 19038880.
3. **Jaffe NS**. Complications of acute posterior vitreous detachment. *Arch Ophthalmol*. 1968 May;79(5):568-71. PubMed PMID: 5646033.
4. **Vrablik ME, Snead GR, Minnigan HJ, Kirschner JM, Emmett TW, Seupaul RA**. The diagnostic accuracy of bedside ocular ultrasonography for the diagnosis of retinal detachment: a systematic review and meta-analysis. *Ann Emerg Med*. 2015 Feb;65(2):199-203.e1. doi: 10.1016/j.annemergmed.2014.02.020. Epub 2014 Mar 27. Review. PubMed PMID: 24680547.
5. **Mackay DD, Garza PS, Bruce BB, Newman NJ, Biousse V**. The demise of direct ophthalmoscopy: A modern clinical challenge. *Neurol Clin Pract*. 2015 Apr;5(2):150-157. PubMed PMID: 26137422; PubMed Central PMCID: PMC4404284.
6. **Oksala A, Lehtinen A**. Diagnostics of detachment of the retina by means of ultrasound. *Acta Ophthalmol (Copenh)*. 1957;35(5):461-7. PubMed PMID: 13497646.

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