

CASE REPORT

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A role of point-of-care ultrasound in the emergency department diagnosis of vision loss due to traumatic cataract

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Abstract

Background Ocular complaints, including acute or subacute vision loss, are commonly encountered in emergency departments (ED). These potentially time-sensitive complaints are difficult to diagnose and evaluate without adequate, specialized equipment and expertise. Additionally, a thorough evaluation often requires a more extensive and specialized physical exam, imaging, and ophthalmologic consultation, all of which may not be readily available in the acute setting.

Case presentation This case report presented a patient in the emergency department with the chief complaint of vision loss. Point-of-care ultrasound (POCUS) using the 10-MHz-linear-array probe, in the ocular setting, demonstrated calcification of the lens, a finding consistent with cataract in the right eye.

Conclusions The use of POCUS can expedite the accurate identification of vision threatening pathology, such as cataracts, and streamline ED disposition and plan of care.

Keywords Vision loss, Cataract, Emergency department, Point-of-care, Ultrasound

Background

Ocular complaints, specifically acute vision loss, are commonly encountered in the emergency department (ED) [1]. Typically, time-sensitive pathologies are difficult to diagnose without adequate, specialized equipment and expertise readily available [2]. Additionally, thorough evaluation often requires a more extensive and specialized physical exam, imaging, and consultation with a specialist [3, 4]. The recent advent in use of ocular point of

care ultrasound (POCUS) in the ED has shown to be of great clinical utility when attempting to diagnose various ocular pathologies that are both acute and chronic in nature [1, 2, 5–7]. Many uses of ocular POCUS in the ED have been described, and some of which have developed well-established clinical protocols, especially with regard to pathologies often seen with posterior chamber abnormalities. These include retinal detachment, vitreous hemorrhage, retinal artery occlusions, traumatic retrobulbar hematoma, and others. However, the use of ocular POCUS to evaluate suspected cases of cataracts has not been well-reported in the literature [1, 2, 5–9]. One retrospective study that evaluated a cataract detection and treatment campaign found that in the evaluation of medium to severe opacities of the lens of the eye, 77.5% of eyes examined revealed evidence of vitreous detachment, a finding that could explain the initial presenting symptom of poor vision [10]. It should be noted that

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cataract could be due to aging or ocular trauma, POCUS allowed for the assessment of these opacities in a manner that would otherwise require the expertise of a specialist. Additionally, POCUS can also simultaneously assess for other ocular pathologies, such as retinal detachment and vitreous hemorrhage. In a similar fashion, we find value in describing the utility of POCUS by examining the case of an elderly male who presented to a regional ED with a chief complaint of subacute, right-sided vision loss. The specific findings noted on the POCUS exam helped the ED physician's discussion with the consulting ophthalmologist to expedite further management and disposition planning.

Case presentation

A 67-year-old Hispanic male with no reported past medical history presented to the ED with the chief complaint of 3 months of right eye vision loss. The patient stated his vision loss started after a blade of grass was caught in his eye, prompting him to rub the affected eye. He reported the initial itching sensation improved; however, his vision loss continued to deteriorate. He denied eye pain, discharge, floaters, flashers, or diplopia. In the ED, physical examination was notable for opacification of the right lens, visual acuity of 20/40 on the left, and only light perception on the right, with no blink to threat appreciated. POCUS using the 10-MHz-linear-array probe, in the ocular setting, demonstrated calcification of the lens, a finding consistent with cataract in the right eye (Fig. 1). Consensual pupillary light response of the right eye was also visualized using the ultrasound probe. Importantly, there was no evidence of retinal detachment or vitreous

hemorrhage and the optic nerve measurements were within normal range. Anterior segment testing using slit-lamp was performed without any cells in flare. Furthermore, no fluorescein uptake was noted, and eye pressures were within normal range.

Ophthalmology was consulted, and the case was reviewed; they believed that given the patient's history, clinical presentation, physical examination, and ultrasound findings, symptoms were most likely secondary to a mature cataract of the right eye. Outpatient ophthalmology follow-up for formal diagnosis, possible cataract extraction, and intraocular lens implantation was recommended. Follow-up communication with the patient revealed that he had been evaluated and received his formal diagnosis from the ophthalmologist in the outpatient setting.

Discussion and conclusions

A cataract is a partial or total opacification of the crystalline lens of the eye, and it is the most common cause of visual impairment worldwide [11]. In adults, cataracts are most commonly age-acquired, with presenile cataracts presenting around age 45–55 years and senile cataracts manifesting after this range [11, 12]. Age-related cataracts have been estimated to affect 17 million people worldwide with blindness, contributing to almost half of all causes of blindness [4, 13–15]. However, in the assessment of acute or chronic vision loss, a number of other potential causes must first be ruled out as they may be iatrogenic, associated with other ocular or systemic disease, inflammatory, or induced by ocular trauma [14, 16, 17].

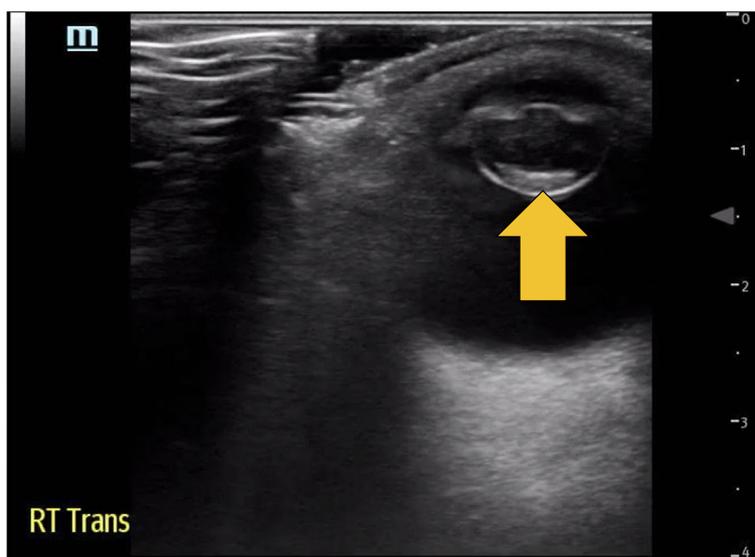


Fig. 1 Transverse view of the right globe demonstrating a hyperechoic density, as seen at the arrow tip, consistent with a cataract

For any patient who presents to the ED with complaints of visual disturbances, examination should include, but is not limited to, external exam, visual acuity testing, visual field testing, pupillary exam, and extra-ocular movements. Additionally, slit-lamp exam, ophthalmoscopy, and intraocular pressure testing should be performed [7].

Although cataracts are commonly seen in the ED, a formal diagnosis is traditionally given after thorough evaluation by an ophthalmologist [2]. With regard to symptomatology, it is dependent on the location of the cataract (nuclear vs cortical vs posterior subcapsular), but may include reports of glare, such as halos around lights, particularly at night, requiring more light to improve the ability to see well. Untreated, the patient will eventually complain of a painless blurring of vision [11]. Other symptoms such as photophobia, monocular diplopia, and myopic shift, may be found depending on the anatomical distribution of the opacities [11].

Diagnosis is often based on slit-lamp examination after pupillary dilation; however, there has been a growing amount of research documenting the clinical utility of ocular ultrasound in identifying ocular pathology in patients with acute vision changes or eye trauma [2, 5, 7, 8]. Examples of such pathology include retinal and vitreous detachments, central retinal artery occlusion, vitreous hemorrhage, ectopia lentis, papilledema, optic neuritis, and globe rupture [2, 8]. POCUS provides a quick, accurate, and well-tolerated, noninvasive tool for evaluation of vision threatening pathology [1, 2, 8]. These findings, in conjunction with specialist consultation, allowed for a more rapid and streamlined disposition and plan of care [8].

In the case of our patient who had described an inability to see out of his right eye for 3 months, rapid bedside POCUS of his globe provided a quick and accurate diagnosis of cataracts with a possible etiologic relation to trauma, consistent with both his subjective report of present illness and our objective physical exam findings. Additionally, POCUS also simultaneously assessed for other ocular pathologies, such as retinal detachment and vitreous hemorrhage. Ultimately, following discussion with ophthalmology, the decision was made to discharge the patient home with instructions to follow up in the outpatient setting for further management of his cataract.

Conclusions

Surmounting evidence in recent literature documents that emergency medicine practitioners can use POCUS to accurately identify vision threatening pathology such as retinal or vitreous detachments, vitreous hemorrhage, and as seen in our case, cataract formation. Of note, ocular ultrasound is not intended to replace the role of the

ophthalmologist for definitive diagnosis of these conditions, but it may serve as an adjunct to help emergency medicine practitioners improve care for patients with ocular symptoms.

Abbreviations

ED Emergency department
POCUS Point-of-care ultrasound

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Not applicable

Authors' contributions

CAT participated in literature review, obtaining IRB approval, obtaining patient consent for publication, and manuscript preparation. JM participated in the patient encounter, and performance of ultrasound imaging. JWC, DF, CCN, FD, MMN participated in literature review, and manuscript preparation. All authors read and approved the final manuscript.

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Availability of data and materials

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Declarations

Ethics approval and consent to participate

Approval and consent for this case report was obtained through Arrowhead Regional Medical Center Institutional Review Board, under the following case-study reference number #23-08. The study was performed in accordance with the ethical standards as laid down in the 1964 Declaration of Helsinki and its later amendments or comparable ethical standards. Written informed consent was obtained from all participants and from a parent and/or legal guardian.

Consent for publication

Consent for publication was obtained from subject of the report, with copy available for review, if requested.

Competing interests

The authors declare no competing interests.

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