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Letter to Editor

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Ocular point-of-care ultrasound: the current evidence

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We read with interest the review article in volume 9 issue 5 *Journal of Acute Disease*, entitled "Using point-of-care ultrasound in ocular emergencies: a mini review" by Builes *et al.* Ocular point-of-care ultrasound (POCUS) is gaining popularity under the COVID-19 pandemic, as physicians are of close proximity to patients under normal practice with slit lamp and direct ophthalmoscope. With the help of POCUS, patients with ocular emergencies could be evaluated at a distance, without even a need to share mydriatic eye drops across patients. Therefore, we would like to update the current evidence on ocular POCUS usage.

While vitreous haemorrhage and retinal detachment (RD) are commonly encountered ocular emergencies, none are as acute as central retinal artery occlusion (CRAO), as the retina is not viable beyond 2 hours of ischemia. CRAO, also called ocular ischemic stroke, is associated with life-threatening systemic stroke. Thrombolytic therapy has well proven its benefits in treating ischemic stroke and coronary artery diseases. In CRAO, evidence is promising on the detection of the "retrobulbar spot sign", a hyperechoic structure within the occluded central retinal artery, with POCUS in the acute setting[1]. Nedelmann *et al.* demonstrated that patients with absence of the "retrobulbar spot sign" are more likely to benefit from thrombolytic therapy[2]; meanwhile, the presence of such suggests a calcified embolus, which is less likely to respond[2].

Meta-analysis published earlier revealed the usefulness of ocular POCUS in the diagnosis of posterior chamber abnormalities by emergency practitioners[3]. Propst *et al.* have proven its high sensitivity and specificity in the assessment of RD in adults[3]. In addition, promising results were demonstrated on the detection of vitreous hemorrhage, vitreous detachment, intraocular foreign body, globe rupture, and lens dislocation (Table 1); however, the confidence intervals were wide and required further evidence to support their applications[3].

Table 1. Meta-analysis results on ocular point-of-care ultrasound performance by emergency practitioners[3].

Intraocular pathology	Sensitivity	Specificity
Retinal detachment	94%	94%
Vitreous haemorrhage	90%	92%
Vitreous detachment	67%	89%
Intraocular foreign body	100%	99%
Globe rupture	100%	99%
Lens dislocation	97%	99%

Though RD detection with ocular POCUS is not difficult, knowledge on the types of RD (rhegmatogenous, tractional, exudative)[4] is essential since not all types require ophthalmic surgical treatments. In particular, exudative RD resulting from blood-retinal barrier breakdown is associated with systemic inflammatory, vascular, and neoplastic conditions. The culprit of the subretinal fluid needs to be properly dealt with, such as autoimmune disease-associated posterior scleritis (T-sign on B-scan), Vogt-Koyanagi-Harada disease (pockets of serous RD with subretinal sepatation), and choroidal tumours (Figure 1). Surgery is rarely indicated in exudative RD; yet ocular ultrasound B-scan is essential, even under the ophthalmologist care, to establish the underlying etiology.

Although ocular POCUS is helpful in diagnosing various ocular emergencies[3], limitations do exist when there is large difference in acoustic impedance across the intraocular structures. This is observed particularly in post-operative eyes filled with intraocular

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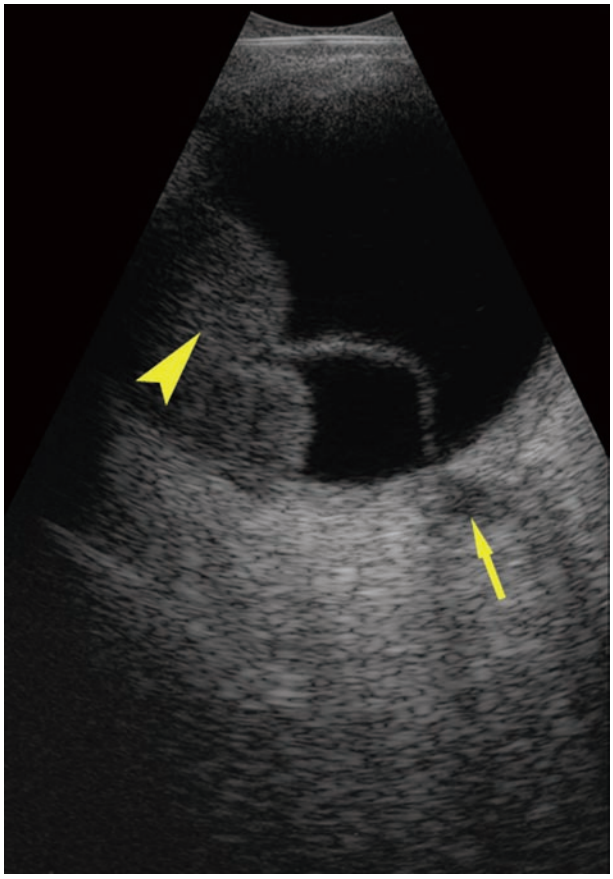

Figure 1. Ultrasound B-scan image of an eye with exudative retinal detachment secondary to choroidal tumour. Retina flap extending towards the optic nerve (right arrow) was observed adjacent to the dome shaped choroidal mass (left arrow).

gas or silicone oil[5], which ultrasound artefacts over the interface between the biological tissues and the implanted materials obscured the intraocular details.

In short, ocular POCUS could guide thrombolytic therapy in the top ocular emergency of CRAO[2]. Its role in RD detection is proven by meta-analysis[3], but visualization of the posterior chamber is compromised in gas or silicone oil filled eyes[5].

Conflict of interest statement

The authors report no conflict of interest.

Authors' contributions

C.P.S.H.: acquisition of data, drafting the article; S.C.L.A.: Concept and design of study, acquisition of data, revising article critically for important intellectual content; S.T.C.K.: revising article critically for important intellectual content.

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