

THE ROLE OF POINT-OF-CARE-OCULAR ULTRASOUND IN TRAUMATIC EYE INJURY

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Abstract

Ocular trauma remains a significant cause of eye blindness. Disruption or violation of the globe's integrity can lead to an ocular emergency that usually jeopardises the vision. Early identification of this condition can fasten the management process to give the patients the best and most appropriate treatment. We described the role of point-of-care ultrasound (POCUS) in diagnosing globe rupture in the Emergency Department.

Keywords: Ocular Injury, Globe Rupture, POCUS, Emergency Department

Introduction

Ocular injuries are a frequent reason for patients to visit the emergency department (ED) with approximately 203,000 open globe injuries occurring each year in different parts of the world (1). A high frequency of vision loss has traditionally been linked to posterior segment damage and globe rupture. Ocular trauma accounts for 30-40% of cases of monocular blindness (2).

The diagnosis is quite challenging in a hectic Emergency Department (ED). However, a focused history and ocular examination aided by point-of-care ultrasound (POCUS) will expedite the early detection of globe rupture and facilitate timely management of this dangerous complication, especially in a resource-limited setting.

Case Presentation

A 16-year-old girl presented with multiple laceration wounds over the face, bilateral eye pain and bleeding from the nose following a motor vehicle accident. Patient was a front-seat passenger, not wearing seatbelt when the car skidded and collided with the signboard at the roadside. Her head hit the dashboard and the windscreen broke into pieces.

On examination, her vital signs showed blood pressure 130/85 mmHg, pulse rate 100 bpm, respiratory rate 20 bpm, temperature 36.4°C and oxygen saturation 99% on room air. Her Glasgow Coma Scale (GCS) was E4V5M6. CNS

examination revealed no focal neurological deficit. There were multiple laceration wounds over the face. She had difficulty opening her eyes. Thus, challenging to perform direct eye examination. Her visual acuity was 6/12 on the right and perception of light was on the left. Bedside POCUS showed loss of normal spherical shape of left eye with hyperechoic within, flattening of the anterior chamber and decreased globe size (Figure 1) the right eye showed a normal spherical shape (Figure 2). Otherwise, there were no sonographic features of vitreous haemorrhage or lens dislocation.

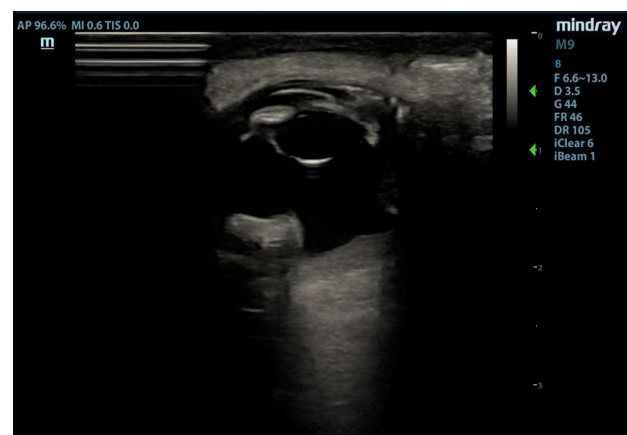


Figure 1: Left eye with hyperechoic lesion within (red arrow)

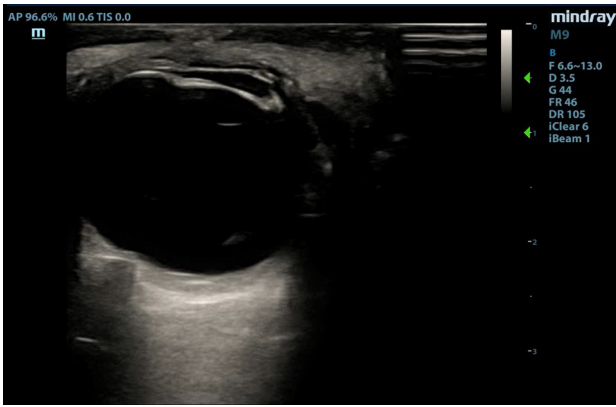


Figure 2: Right eye

From the history and examination with the aid of bedside POCUS, there was a clinical concern of globe rupture. Therefore, the eye shield was placed, and ceftriaxone was administered. Subsequently, the computed tomography (CT) brain showed the left eye globe collapsed and loss of its spherical shape with intrinsic hyperdense attenuation within in keeping with globe rupture. The right globe appears normal (Figure 3). The ophthalmology team was consulted, and the patient was immediately sent to the operation theatre for repair.

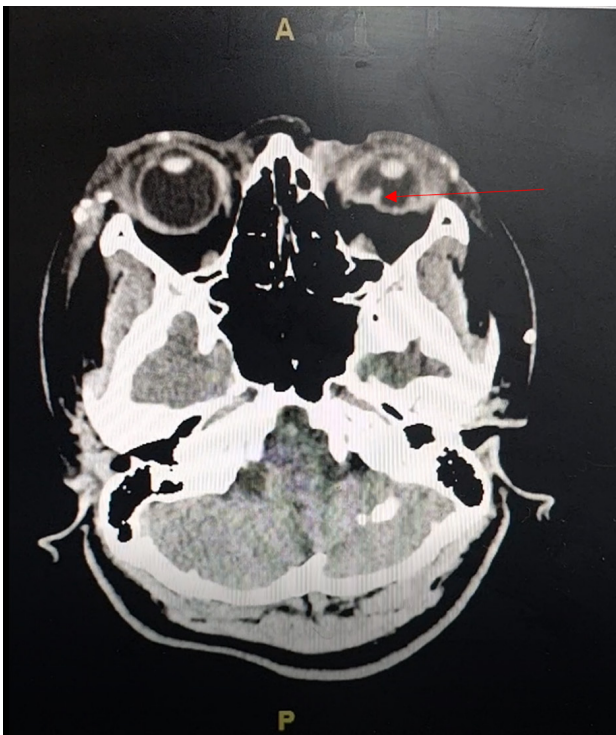


Figure 3: Loss of normal eye architecture on left eye with hyperdense attenuation within (red arrow)

Discussion

Globe rupture is an ophthalmologic emergency requiring prompt recognition and rapid definitive management to

maximize functional outcomes (3). Globe rupture occurs when the integrity of the outer membranes of the eye is disrupted or destroyed by blunt or penetrating trauma. In this case, the patient’s accident caused the windscreen to break into pieces and splash into her eyes, leading to this injury.

Beside ultrasound is a common tool in ED that widely available, low cost and easy to use. A few findings consistent with globe rupture include decreased anterior chamber (AC) depth or collapse that may contain layering, homogenous echogenic debris consistent with hyphema, loss of spherical contour, posterior scleral buckling and intraocular or periocular air (4). The findings in this case are compatible with the globe rupture, disrupting normal globe architecture and hyperechoic lesion within.

Over the years, emergency medicine has extensively used POCUS and become part of the mandatory training. POCUS has been used as an extension of physical examination. For example, POCUS could assist physicians in detecting potential cases of globe rupture when direct examination is impossible. It allows direct visualisation of main eyeballs injuries including retinal detachment (RD), lens dislocation and increased ICP measurement. Ocular ultrasound has 100% accuracy in detecting RD and is more accurate than CT in diagnosing vitreous haemorrhage (4). However, CT is the primary imaging modality to evaluate ocular trauma. It allows for three-dimensional viewing of the orbital bones, soft tissue, and ocular structures and helps assess various trauma-related pathology (5).

Despite limitations, for suspected ocular trauma, POCUS can be used by trained healthcare providers, allowing for timely diagnosis without delaying intra-facility transport, especially in resource-limited settings where other advanced imaging techniques such as CT or MRI are unavailable. Thus, urgent referral to the appropriate team can be done promptly.

Surgical intervention for globe rupture is still the mainstay of treatment. However, delaying surgical intervention could negatively affect final vision and raise the chance of developing postoperative endophthalmitis (6). Fortunately, the ophthalmologist pushed the patient immediately to OT for emergency repair. The patient has progressed well and is still under regular ophthalmology appointments until now. Her visual acuity in the left eye improved from light perception to counting fingers. Unfortunately, her left eye is complicated with traumatic cataract.

Conclusion

A high index of clinical suspicion and thorough physical examination are crucial to help the physician identify this catastrophe sequelae of ocular trauma. Furthermore, using POCUS could help in early recognition and fasten the management process to give patients the best and most appropriate treatment.

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Competing interests

The authors declare that they have no competing interests and do not receive any financial support.

Ethical clearance

Informed consent was obtained from the patient for inclusion in this report. Research and ethics committee approval for case reports is not a requirement according to Medical Research and Ethics Committee and Institute for Clinical Research Malaysia.

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