• Letter to the Editor •

Acute *Bacillus cereus* endophthalmitis caused by ocular perforation injury and occult intravitreal cilium implantation: a case report

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Dear Editor,

We present a case of acute *Bacillus cereus* (*B. cereus*) endophthalmitis in a patient with an intraocular perforation injury combined with occult intravitreal cilium implantation. *B. cereus* endophthalmitis is a severe intraocular infection commonly caused by post-traumatic injuries. It often leads to significant vision loss or even eye loss within 12-48h[1]. The presence of an intraocular foreign body (IOFB) increases the risk of infection, while early surgical removal of IOFBs can prevent endophthalmitis, some IOFBs are difficult to detect preoperatively. The Medical Ethics Review Board of West China Hospital of Sichuan University waived application for a clinical study because this was a retrospective report of a single patient based on imaging and because no human experimentation was involved. The patient provided written informed consent to use the imaging data for publication.

Case Report A 52-year-old male presented to the Ophthalmology Department with a wire wound to his left eye. About 1h earlier, the patient had pulled a coiled wire, which bounced and entered his left eye. He experienced immediate pain and blurred vision, but no bleeding. He had no history of ocular surgery or trauma. Best-corrected visual acuity was 20/20 in his right eye and 2/20 in his left eye. The anterior and posterior segments of the right eye were normal. The superior part of the cornea of the left eye showed a longitudinal full-layer perforation of about 3 mm with good involution (Figure 1A). The depth of the anterior chamber in his left eye was about 2.5 mm; although rupture of the capsule membrane of the upper lens was faintly observed, there was no crystal cortex overflow (Figure 1B). The retina was faintly visible, with the peripheral part not clearly seen. Computed tomography (CT) examination of his eyes showed no obvious IOFB. His left eye was subjected to emergency corneal wound suturing. Eight hours later, the patient began to experience severe pain in his left eye, with eyelid edema, chemosis, corneal opacity, extensive flocculent exudation in the anterior chamber, and hypopyon (Figure 1C). B-ultrasonography showed increased vitreous echogenicity and suspicious linear IOFBs around the vitreous body (Figure 1D). Emergency pars plana vitrectomy (PPV) was performed, followed by administration of the intravitreal antibiotics vancomycin (1 mg/0.1 mL) and amikacin (0.4 mg/0.1 mL). During this operation, the damaged lens and almost the entire vitreous body were removed. Due to corneal edema and heavy turbidity, the fundus structure could not be seen clearly (Figure 1E), making complete vitrectomy and the removal of IOFBs impossible. After the surgery, the vitreous cavity was filled with balanced salt solution. Postoperatively, topical administration of 0.3% moxifloxacin eye drops was performed every hour. The patient's condition was closely monitored for any changes. Because the symptoms of intraocular infection did not improve significantly after 24h (Figure 1F), he was again administered intravitreal pharmacotherapy. Four days after emergency vitrectomy, an intraocular fluid culture suggested *B. cereus* infection. Ocular B-ultrasound examination indicated increased vitreous density and suspected retinal detachment. Although these findings indicated a need for vitrectomy, the persistence of serious corneal turbidity and edema prevented the performance of vitreous surgery. Local anti-inflammatory treatment with tobramycin/dexamethasone eye drops (4 times/day) was continued. The corneal edema subsided 7d after the first

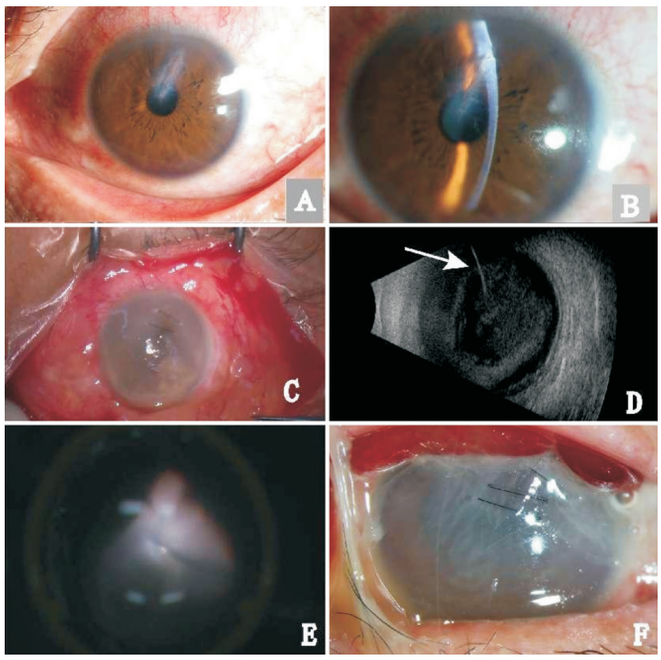

Figure 1 Views of the left eye of the patient A, B: The superior part of the cornea had a longitudinal full-layer perforation of about 3 mm with good involution; C: Eight hours later, the eye had developed endophthalmitis, with conjunctival edema and congestion, corneal turbidity and edema, large anterior chamber exudation, and hypopyon; D, E: B-ultrasonography (D) showing increased vitreous echogenicity and suspicious linear intraocular foreign bodies, and the fundus (E) could not be seen clearly during the operation; F: Two days after surgery, the cornea could not be fully seen due to eyelid swelling, and corneal edema was severe, with a tendency toward corneal dissolution.

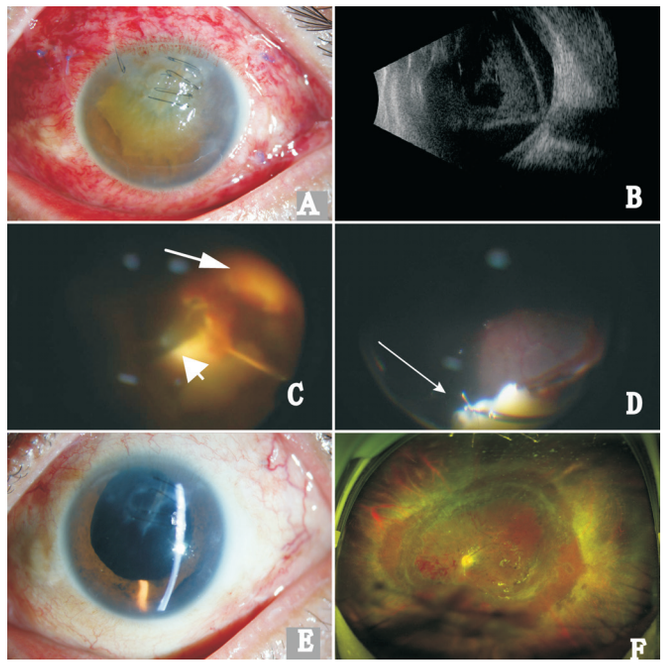

Figure 2 Follow-ups of the patient A: Seven days after the first pars plana vitrectomy, corneal edema subsided after anti-infective and anti-inflammatory treatments; B-D: B-ultrasound (B) indicating a funnel-shaped retinal detachment, annular necrosis of the peripheral retina (C; long arrow) and retinal detachment (C; short arrow), a cilium (D) at the far retinal periphery, with the tip being partially embedded in the retina and the shaft protruding into the vitreous cavity inferiorly; E, F: Two months after surgery, the inflammation in anterior segment had subsided and retinal reattachment with a large scar around the periphery, and a retinal defect.

vitrectomy (Figure 2A), but ocular B-ultrasound indicated retinal detachment (Figure 2B). A second PPV was performed, during which a large amount of yellowish white turbidity was observed in the vitreous cavity, along with annular necrosis of the peripheral retina and retinal detachment (Figure 2C). A cilium was observed at the far retinal periphery under the scleral indentation at the 11-o'clock position, with the tip of the cilium being partially embedded in the retina and its shaft protruding into the vitreous cavity inferiorly (Figure 2D). During the PPV, the cilium was removed with IOFB forceps. The detached retina was successfully restored during vitreous surgery and combined with silicone oil tamponade. The patient was subsequently treated with topical tobramycin/dexamethasone and levofloxacin eye drops. After discharge, the patient was followed-up regularly in the outpatient department. Examination of his left eye 3mo after surgery showed a visual acuity of hand movement, an intraocular pressure of 12 mm Hg, subsiding of intraocular inflammation, and good retinal reattachment (Figure 2E-2F).

DISCUSSION

B. cereus is the most frequently isolated microorganism in patients with post-traumatic endophthalmitis following open globe injury[2]. The visual outcome of posttraumatic *B. cereus* endophthalmitis is generally poor, with many patients requiring evisceration despite treatment[3]. Despite immediate initiation of intravitreal pharmacotherapy and vitrectomy, these eyes developed corneal infiltrates, scleral and uveal tissue necrosis with hyphemia, brownish exudates in the anterior chamber and necrotizing retinitis within hours[4]. Preventing intraocular infection after open ocular trauma is therefore necessary. Timely and comprehensive assessment of ocular perforation injury and initiation of treatment can avoid the development of endophthalmitis.

The most common methods of detecting IOFBs are thin-slice CT scan and X-rays, both of which are very sensitive to metal or other IOFBs with high-density signals. These methods, however, are inadequate to detect small, non-metallic IOFBs. Although magnetic resonance imaging (MRI) might detect non-metallic IOFBs, such as those made of wood, plastic, and glass[5-6], MRI is difficult to apply to patients with ocular trauma, as they require emergency examination and surgery. The time required for MRI is longer, and the possibility of metallic IOFBs must first be eliminated. Although ocular

B-ultrasound and ultrasound biomicroscopy have a good ability to detect small non-magnetic IOFBs, these methods are contraindicated in patients with open ocular trauma, as the risk of ocular injury and even intraocular infection may be increased during the examination.

Slit-lamp examination is also important in fully evaluating wound conditions, including crystal injury, and fundus conditions after mydriasis. Lens injury, contaminated wounds, and IOFBs have been found to increase the risk of posttraumatic endophthalmitis[1-2,7-8]. Prophylactic administration of intravitreal antibiotics at the time of primary repair in eyes with high-risk characteristics has been reported to reduce the risk of posttraumatic endophthalmitis[7]. However, intravitreal vancomycin can cause hemorrhagic occlusive retinal vasculitis, resulting in severe vision loss, and the rates of endophthalmitis may be affected by techniques for administering intravitreal antibiotics[9-11]. Early therapeutic PPV and IOFB removal may achieve better visual outcomes[12]. Intraocular conditions in patients with highly suspected IOFBs and lens injury may be assessed during vitreous surgery, which can detect hidden IOFBs and remove them, thereby reducing the risk of infection[13].

In conclusion, findings in this patient suggest that hidden IOFBs, such as eyelashes, may be present in patients with ocular perforation injury, especially in patients with a definite lens injury. Patients diagnosed with *B. cereus* endophthalmitis have a poor prognosis, even if this condition is treated. Strict adherence to treatment guidelines, multiple intraocular injections of antibiotics and PPV surgery may improve patient outcomes.

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