



# ***Pseudomonas aeruginosa* endophthalmitis caused by accidental iatrogenic ocular injury with a hypodermic needle**

**Cheng-wei Lu<sup>1</sup>, Ji-long Hao<sup>1</sup>, Xiu-fen Liu<sup>1</sup>,  
Ling-ling Liang<sup>1</sup> and Dan-dan Zhou<sup>2</sup>**

## **Abstract**

Iatrogenic traumatic endophthalmitis is a rare but serious ocular infection that can lead to severe vision loss. A 44-year-old man presented with pain and decreased vision in the right eye 4 hours after injury with a hypodermic needle during irrigation of his eye. Slit-lamp examination revealed a penetrating corneal puncture and iris hole in the right eye. Twenty hours later, his visual acuity had decreased to hand motion, and severe fibrinoid uveitis was noted. He immediately underwent irrigation of the anterior chamber and intravitreal antibiotic injection. The right eye became painful again, and emergent vitrectomy combined with lensectomy was performed along with intravitreal antibiotic administration. The patient remained stable during the 2-month follow-up. Standard practice should be adopted when irrigating the eye to prevent this type of injury, and emergent surgical intervention is very important to preserve visual function.

## **Keywords**

*Pseudomonas aeruginosa*, endophthalmitis, iatrogenic, hypodermic needle

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## **Introduction**

Iatrogenic traumatic endophthalmitis caused by a penetrating needle injury is a rare but serious ocular infection that can lead to severe vision loss. Ocular needle penetration as a complication of retrobulbar anesthetic administration at the time of surgery has been reported,<sup>1</sup> but endophthalmitis has not been reported. We herein report the first case of post-traumatic

<sup>1</sup>Department of Ophthalmology, the First Hospital of Jilin University, Changchun City, Jilin Province, China

<sup>2</sup>Department of Radiology, the First Hospital of Jilin University, Changchun City, Jilin Province, China

### **Corresponding authors:**

Dan-dan Zhou and Ji-long Hao, Department of Radiology, the First Hospital of Jilin University, No. 71, Xinmin St., Changchun, Jilin Province 130021, China;

Department of Ophthalmology, the First Hospital of Jilin University, Changchun, Jilin Province 130021, China.

Emails: zhoudan0928@sohu.com; lcwny800@sina.com



endophthalmitis following a visit to an ophthalmologist. Penetration of the globe occurred after a needle loosened from the syringe while irrigating the eye. Standard practice should be adopted during the procedure to prevent this type of injury.

## Case report

A healthy 44-year-old man presented with pain, watering, and decreased vision in the right eye 4 hours after injury with a hypodermic needle in another clinic. His eye had been injured with a hypodermic needle during irrigation after removal of a corneal foreign body by an ophthalmologist; the needle loosened from the syringe and injured the right eye. On examination, his visual acuity in the right eye was counting fingers. The intraocular pressure was 15 mmHg in the right eye, and there was no evidence of a relative afferent pupil defect. Slit-lamp examination revealed a temporal penetrating corneal puncture and iris hole in the right eye (Figure 1(a)). The anterior chamber was deep and quiet, and the cornea and lens remained clear. However, pupil dilation using tropicamide eye drops revealed a breached anterior capsule and localized cataract (Figure 1(b)). The results of both dilated fundal examination and B-scan ultrasonography were normal. Cefepime was administered intravenously at 30 mg/kg twice daily, and 0.5% levofloxacin eye drops were instilled six times per day. The patient was prepared for cataract surgery.

After 20 hours, the visual acuity in the affected eye had decreased to hand motion, and the eye had become painful; it was inflamed and had severe fibrin exudates in the anterior chamber, obscuring the pupil (Figure 1(c)). A 1-mm focus of hypopyon was present (Figure 1(c)). No fundus view was present. B-scan ultrasonography showed prominent vitritis with an attached retina. The patient was treated for endophthalmitis by immediate vitreous

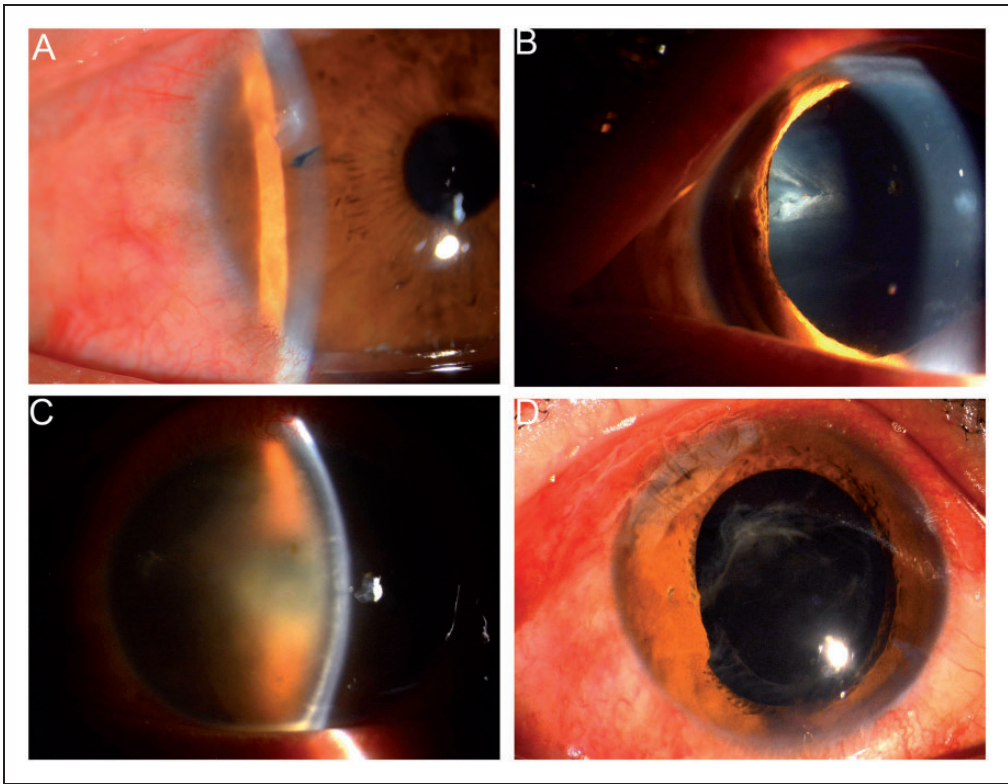
biopsy, irrigation of the anterior chamber, and intravitreal antibiotic therapy with vancomycin (1 mg/0.1 ml) and ceftazidime (2.25 mg in 0.1 ml) in the operating room. The previous doctor was contacted to obtain a first-hand account of the incident, and he confirmed that a needle had been dropped onto the patient's eye while using a syringe to irrigate the eye with normal saline. The incident had occurred before use of the needle; it was therefore presumed to be sterile.

Four hours later, the right eye had become painful, and the anterior chamber showed a redevelopment of a severe fibrinous reaction. Emergent vitrectomy combined with lensectomy was performed along with the administration of intravitreal antibiotics (vancomycin, 1 mg/0.1 ml; ceftazidime, 2.25 mg in 0.1 ml). Multiple patchy retinal hemorrhages were noted during the vitrectomy. Postoperatively, the patient was treated with intravenous ciprofloxacin at 750 mg twice daily, levofloxacin eye drops hourly, tobramycin eye drops hourly, and 1% atropine eye drops twice daily. Culture of the vitreous biopsy grew *Pseudomonas aeruginosa*, which was sensitive to ceftazidime.

On the sixth postoperative day, the best-corrected visual acuity improved to 20/200 and the intraocular pressure was 20 mmHg in the right eye. The anterior chamber was quiet (Figure 1(d)), and B-scan ultrasonography findings were normal. Fundus examination of the right eye showed a decrease in the patchy retinal hemorrhages. During the 2-month follow-up, the patient remained clinically stable and his best-corrected visual acuity improved to 40/200.

## Discussion

Irrigation of the eye with a syringe is a common procedure in ophthalmology clinics. However, nonstandard practice may lead to severe eye injury during the



**Figure 1.** Slit-lamp photograph of the right eye. (a) Corneal puncture and iris hole upon initial presentation. (b) An anterior capsule puncture is noted with a dilated pupil. (c) Severe fibrin exudates in the anterior chamber obscuring the pupil and a 1-mm focus of hypopyon developed 20 hours after the injury. (d) The anterior chamber was quiet with a dilated pupil on postoperative day 6.

procedure. Hypodermic needles are often the cause of penetrating eye injuries and a potential source of microorganisms. The small, nonpainful nature of such injuries decreases the suspicion of endophthalmitis, resulting in inadequate treatment and management. Our patient developed exogenous endophthalmitis that was acquired through the ocular penetrating injury, which led to severe vision impairment. Therefore, safe and standard practice of eye irrigation should be advocated. Intravenous giving set or use of a syringe without a needle should be recommended. To the best of our knowledge, this is the first reported case of exogenous *P. aeruginosa* endophthalmitis

associated with accidental hypodermic needle injury during eye irrigation.

*Pseudomonas aeruginosa* is a gram-negative bacterium that is widely present in the environment. *Pseudomonas aeruginosa* endophthalmitis is typically a rapidly progressive, sight-threatening condition that demands immediate therapeutic intervention.<sup>2</sup> The ability of *P. aeruginosa* to invade tissues depends on its production of extracellular enzymes and toxins that break down physical barriers and damage host cells, its resistance to phagocytosis, and the host's immune defenses.<sup>3</sup> Multi-drug resistance is the feature that contributes to the increased virulence of *P. aeruginosa*.

Its multi-drug resistance and production of toxins can lead to adverse effects on the final disease outcome and visual acuity in patients with ocular infections.<sup>4</sup>

Early detection and treatment are the best ways to improve the final visual outcome in patients with *P. aeruginosa* endophthalmitis. One study showed good availability of the active drug when injected intravitreally either alone or in combination with vancomycin.<sup>5</sup> However, reports describing the clinical use of intravitreal antibiotics are limited.<sup>6</sup> In the present case, the interval between trauma and presentation was less than 1 day, and intravitreal antibiotics were administered immediately. Our patient showed no response to the intravitreal antibiotics, and worsening of symptoms warranted further therapeutic procedures. Therefore, emergent surgery was performed and was effective for the endophthalmitis in this patient. Endophthalmitis with a potentially infected crystalline lens will typically require removal of the lens. Vitrectomy is required for endophthalmitis in patients with very severe conditions such as refractory and uncontrolled *P. aeruginosa* infection. The present case suggests that immediate surgical intervention is necessary to preserve visual function in patients with refractory *P. aeruginosa* endophthalmitis.

In conclusion, our patient was successfully treated for *P. aeruginosa* endophthalmitis caused by iatrogenic penetration of the eye with a hypodermic needle. Timely treatment and management in such refractory cases is very important to avoid severe visual impairment. Standard practice should be followed to prevent this type of injury during invasive procedures.

## Declaration of conflicting interest

The authors declare that there is no conflict of interest.

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