

CASE REPORT

Ophthalmology

A case of endogenous endophthalmitis after a mild dental infection

Hunter Hoopes BS¹  | Nicole Cloutier DO²¹ Kansas City University, Kansas City, Missouri, USA² Department of Emergency Medicine, Centerpoint Medical Center, Independence, Missouri, USA**Correspondence**

Hunter Hoopes, BS, Kansas City University, Kansas City, MO 64106, USA.

Email: hchoopes@kansascity.edu**Funding and support:** By *JACEP Open* policy, all authors are required to disclose any and all commercial, financial, and other relationships in any way related to the subject of this article as per ICMJE conflict of interest guidelines (see www.icmje.org). The authors have stated that no such relationships exist.**Abstract**

Endophthalmitis is a rare but severe vision threatening disease that most often occurs in patients with a recent history of ophthalmic surgery or penetrating trauma to the eye. Often these patients have underlying risk factors or are immunosuppressed. We present a case of endogenous endophthalmitis in an otherwise healthy male after a tooth extraction. This case highlights the importance of early recognition of emergent eye conditions and “red flags” with a thorough history and physical examination.

KEYWORDS

conjunctivitis, corneal transplant, dental extraction, endogenous, endophthalmitis, infection, keratitis, ophthalmology

1 | INTRODUCTION

Endophthalmitis is a rare and potentially devastating ophthalmic emergency that can rapidly progress to blindness if not treated promptly.¹ It is easy to overlook an emergent ophthalmic condition without a careful history and physical examination. Endophthalmitis can be classified as exogenous or endogenous based on the route of transmission of the offending organism. Most cases of endophthalmitis are exogenous and are caused from penetrating trauma or after recent ophthalmic surgery.^{1,2} Endogenous endophthalmitis is defined by hematogenous spread from an infection elsewhere in the body and is much less common.³

Most of the published literature about endogenous endophthalmitis comes from case reports because of how rarely it occurs.³ Cases of endogenous endophthalmitis have been reported in patients with bacteremia, endocarditis, malignancy, indwelling catheters, abdominal abscesses, and intravenous drug use.^{1,3,4} Many of these patients had predisposing risk factors, such as previous eye surgery, immunocompromised state, malignancy, or diabetes. Some cases have

demonstrated endogenous endophthalmitis in immunocompetent patients.^{1,3,4} Endogenous endophthalmitis has also been reported after dental procedures such as routine cleaning or a dental implant.^{5,6} When endogenous endophthalmitis develops after a dental procedure, it has been postulated to be from a transient bacteremia that seeds the eye without causing systemic symptoms.⁶ An extensive literature review showed only a single case of endogenous endophthalmitis reported from a dental infection, although that case was from a severe dental infection complicated by an abscess.⁴ This case describes a healthy middle-aged man with no ophthalmic surgical history who developed rapidly progressive endogenous endophthalmitis after a mild dental infection and within 3 days had almost complete vision loss.

2 | CASE

A 49-year-old non-smoking male presented to the emergency department with right eye pain, redness, consensual photophobia, and vision loss. Several years before he had idiopathic angle closure glaucoma in the right eye but had no sequelae. He did not wear contacts, had no

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FIGURE 1 Image of the patient's eye at his dentist office 2 days before his emergency department visit. There is conjunctival injection and, on careful examination, perhaps a small fluid collection developing in the anterior chamber. However it is difficult to determine based on this image, which was taken by the patient's wife at his dentist appointment

other medical conditions, and took no daily medications. One week before he developed a dental infection in his right upper first molar and right upper second bicuspid. He had these teeth extracted and was started on amoxicillin 2 days before coming to the ED. He was not on prophylactic antibiotics before the procedure. At his dentist appointment he briefly mentioned that he had right eye redness and pain but did not elaborate further with his dentist. The patient was told it was most likely uncomplicated conjunctivitis (Figure 1) but otherwise had no formal exam of his eye. Unfortunately, the day after his dentist appointment he developed purulent discharge from the right eye and hypopyon. He developed progressive vision loss the next day and decided to go to the ED.

Vital signs upon arrival to the ED included a pulse of 99 beats per minute, blood pressure of 209/133 mmHg, respiratory rate of 16 breaths per minute, and temperature of 97.8°F. He was in obvious distress secondary to severe pain in the right eye. On physical examination he had severe chemosis and hypopyon (Figure 2). He also had ciliary flush and haziness of his cornea that obscured any visualization of the pupil or fundus. Fluorescein staining showed extensive corneal uptake from severe keratitis (Figure 3). His average intraocular pressures over several readings were 48 mmHg in the right eye and 20 mmHg in the left eye. Visual acuity was intact to light perception only. Extraocular muscles were intact and painless.

Ophthalmology was not available so immediate arrangements were made to transfer the patient to a nearby ED where an ophthalmologist had agreed to see the patient upon arrival. Initial lab studies were significant for a mild leukocytosis of 12.5×10^9 cells per liter (SI units, normal range $4\text{--}11 \times 10^9$ cells per liter) and computed tomography (CT) scan of orbits without contrast showed an abscess along the anterior aspect of the globe measuring 1.2×0.6 cm. There was mild preseptal soft tissue swelling but no preseptal cellulitis or orbital infiltration. There was also no involvement of the extraocular muscles or optic



FIGURE 2 Image of the patient's eye upon admission to the emergency department. There is obvious hypopyon and corneal haziness with chemosis and ciliary flush

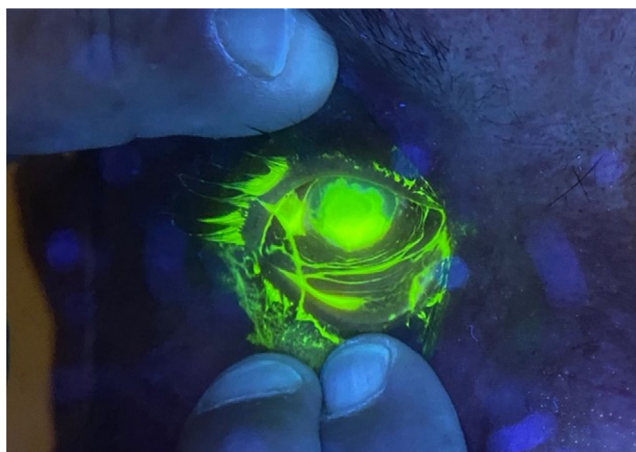


FIGURE 3 Wood's lamp examination with fluorescein staining revealed extensive corneal fluorescein uptake consistent with severe keratitis

nerve sheath. There was no evidence of contiguous dental infection from the teeth to the orbit leading to a preliminary diagnosis of endogenous endophthalmitis.

After transfer, the patient was seen and evaluated by ophthalmology and discharged home with close follow-up and prescriptions for tobramycin ophthalmic solution, vancomycin ophthalmic solution, and oral valacyclovir. He also was given latanoprost, dorzolamide-timolol, and brimonidine ophthalmic solutions to reduce his intraocular pressure. At his next day follow-up appointment, his intraocular pressure reduced to 20 mmHg in the right eye and 20 mmHg in the left eye, and an ocular ultrasound of the eye showed improvement of the abscess. Unfortunately, he still did not have any improvement of his vision. The following day his intraocular pressure increased to 29 mmHg and clinically appeared to have worsening of his infection. Cultures from a corneal biopsy performed by ophthalmology were positive for *Pseudomonas aeruginosa*. Moxifloxacin ophthalmic solution and oral

acetazolamide were added to his regimen. Ultimately, he was scheduled for an emergent corneal transplant and never regained vision in the eye.

3 | DISCUSSION

This case highlights the importance of early differentiation of benign eye conditions versus true emergencies. It also shows how quickly ocular infections can progress. In the days preceding this patient's ED visit, his eye condition appeared relatively benign. Within 3 days, it progressed to fulminant endophthalmitis and blindness. Early diagnosis and treatment of emergent eye conditions, such as endophthalmitis, are critical to prevent devastating outcomes. If the patient had presented to the ED sooner, treatment may have eliminated the infection and prevented his blindness. However, because of the relatively benign initial appearance of his eye as seen in Figure 1, it could have been easily overlooked without a thorough history and physical examination.

Therefore, it is important to review the "red flags" associated with eye complaints to differentiate the benign from emergent eye conditions. Some of these red flags include vision loss, severe unilateral pain, pupil irregularity, elevated intraocular pressure, or consensual photophobia.^{2,7} Although this patient presented to the ED with fulminant endophthalmitis, a careful history revealed that he did have consensual photophobia and severe eye pain at his dentist appointment. If he had sought medical attention sooner, these red flags would have indicated the need for a more thorough evaluation. In any patient that presents to the ED with complaint of a red eye, it is essential first and foremost to obtain a thorough history to elucidate these red flags. In patients where there is concerning history, it is essential to perform visual acuity and close examination of the pupils and pupillary responses.^{2,7} Fluorescein staining and ocular tonometry are also useful diagnostic tools in patients with a concerning history to rule out eye emergencies.^{2,7}

A unilateral red eye with ipsilateral soft tissue or dental infection is another red flag that needs to be identified. Despite the patient's dental infection being relatively mild, it most likely spread hematogenously into the eye without producing profound symptoms of bacteremia. Because his eye symptoms began before his dentist appointment, it had most likely spread before having the teeth extracted. The bacteremia associated with endogenous endophthalmitis can be transient without systemic symptoms. Often blood cultures are negative in these patients making it hard to confirm the diagnosis with certainty.⁸ CT findings reinforced the diagnosis of endogenous endophthalmitis in this patient and showed no contiguous spread of the dental infection to the eye. From an emergency physician's standpoint, determining whether it is endogenous or exogenous is not nearly as important as identifying red flags and ensuring the patient can be seen quickly by ophthalmology. Therefore, a dental or sinus infection with ipsilateral eye symptoms should raise concern and necessitate a thorough evaluation of the eye.

Unfortunately, although amoxicillin can be a good option to cover many oral organisms, it was insufficient to cover *Pseudomonas*

aeruginosa, which caused this patient's devastating infection. *Pseudomonas aeruginosa* is a rare cause of endogenous endophthalmitis. Most documented cases have been related to *Streptococci sp.*, *Staphylococcus aureus*, *Escherichia coli*, or in East Asia *Klebsiella pneumoniae*.⁸ When *Pseudomonas aeruginosa* has been isolated as a cause of endophthalmitis, some studies suggest that 92% of cases are associated with visual acuity outcome less than 20/400.⁸ Most cases of exogenous endophthalmitis include coagulase negative *Staphylococci*, *Staphylococcus aureus*, or *Streptococci sp.* although cases have been documented where *Bacillus sp.* or fungi are the causative organisms.⁸

In conclusion, the recognition of red flag symptoms is essential to differentiate emergent ophthalmologic conditions from benign conditions in the ED setting. Many eye complaints that present to the ED are straightforward and stem from benign causes but sometimes the early presentation of dangerous ophthalmologic conditions appears innocuous. The emergency physician's responsibility is to recognize the early signs and symptoms of true ophthalmic emergencies and immediately consult with ophthalmology. This case demonstrates how rapidly endophthalmitis can progress and why early diagnosis and treatment and a thorough ophthalmologic examination is essential on every patient that presents to the ED with an eye complaint.

CONFLICTS OF INTEREST

There are no conflicts of interests to disclose

ORCID

Hunter Hoopes BS  <https://orcid.org/0000-0001-7524-5131>

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