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# BILATERAL ENDOGENOUS ENDOPHTHALMITIS FROM *STREPTOCOCCUS PNEUMONIAE*

Daniel A. Brill, MD, Nathan D. Farley, MD, Desiree C. Albert, MD, Therese M. Sassalos, MD, Amit A. Sangave, MD, Uday R. Desai, MD

**Purpose:** To report a case of bilateral endogenous endophthalmitis from *Streptococcus pneumoniae* with devastating sequelae.

**Methods:** Interventional case report.

**Results:** A 56-year-old man presented with acute bilateral blurred vision and floaters with fever and hemodynamic instability. Previously, he was diagnosed with acute otitis externa and reported manually extracting several of his own teeth. He underwent a vitreous tap and intravitreal antibiotic injections. Blood and vitreous cultures were positive for *S. pneumoniae*. The patient later developed life-threatening medical sequelae. His final visual acuity was no light perception in the right eye and 20/25 in the left eye.

**Conclusion:** Diagnosing endogenous endophthalmitis early is essential to initiating a systemic evaluation for potentially life-threatening medical conditions, including sepsis, endocarditis, and osteomyelitis. A high degree of suspicion, expeditious treatment, and interdisciplinary collaboration are essential to maximizing patient outcomes.

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*From the Department of Ophthalmology, Henry Ford Hospital, Detroit, Michigan.*

Infectious endophthalmitis is an ophthalmologic emergency with high morbidity and poor visual outcomes. Infectious endophthalmitis is separated into two categories, exogenous and endogenous, based on the route of infection. Exogenous endophthalmitis occurs by the introduction of microorganisms from external routes, including penetrating trauma, eye surgery, and corneal ulcers. Endogenous endophthalmitis (EE) occurs by hematogenous spread of a microorganism from one site in the body to another. Microorganisms more commonly affect the right eye because of the more direct hematogenous spread through the right carotid artery.[1] Endogenous endophthalmitis comprises approximately 2 to 8% of endophthalmitis cases.[2,3] As a result, demographics, treatment protocols, and outcomes have largely been examined through case series and single case reports.[4] Previous retrospective studies have shown fungal organisms to be more common pathogens than bacterial in culture positive cases.[5,6] Within bacterial EE, *Staphylococcus aureus* is the most common organism in the developing world. Gram-negative species are known to be more common in the Asian population.[4–6] *Streptococcus pneumoniae* is only found in 0% to 5% of all EE cases.[6–8] Bacterial EE is usually unilateral, with bilateral disease occurring in just 12% to 14% of patients.[6,7] Endogenous endophthalmitis is associated with systemic risk factors, such as recent surgery, urinary tract infections, endocarditis, gastrointestinal tract infections, immunosuppressive diseases and therapies, and chronic immune-compromising illnesses.[4–6,9]

## Case Report

A 56-year-old African American man presented to the ophthalmology clinic after waking up with blurred vision and floaters in both eyes. His ocular history was notable for a right eye cataract extraction 6 months prior. His medical history included hyperlipidemia,

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Reprint requests: Daniel A. Brill, MD, Department of Ophthalmology, 2799 West Grand Boulevard, Detroit, MI 48202; e-mail: dbrill1@hfhs.org

hypertension, and poorly controlled diabetes mellitus Type 2. He had a 17.5 pack-year smoking history.

Of note, 6 days before presentation, he was diagnosed with acute otitis externa of his right ear. He was prescribed ciprofloxacin–dexamethasone otic suspension, but he did not start treatment. The patient denied intravenous (IV) drug use, but did not have urine toxicology screening completed. He also reported manually extracting several of his own teeth approximately 1 week before presentation.

On examination, visual acuity was 20/30 in the right eye and 20/40 in the left eye. Intraocular pressure, pupils, and confrontation visual fields were normal. There was anterior chamber cell and flare in both eyes, but the rest of his anterior examination and dilated fundus examination was unremarkable. He was prescribed prednisolone acetate 1% topical drops to both eyes for presumed bilateral anterior uveitis.

Later that day, the patient returned to the emergency department with shortness of breath, fever (38.2°C), tachycardia (108 bpm), hypertension (155/80 mmHg), and leukocytosis (13,900 leukocytes and 90% neutrophils). He was given IV fluid resuscitation. Blood cultures were drawn. Chest x-ray and chest computed tomography were unremarkable. Broad-spectrum IV antibiotics were started, and he was admitted to the hospital for work-up and management of sepsis.

The next day, his visual acuity was found to have rapidly declined to hand motion in the right eye and 20/100 in the left eye. Bilateral hypopyon was present with poor visualization of his fundi because of profound vitritis. He was diagnosed with bilateral endophthalmitis. Specific etiology for infection was uncertain, but presumed endogenous in nature given systemic signs of sepsis, bilaterality, and lack of recent ocular surgery or trauma. The patient underwent urgent vitreous tap of the right eye followed by intravitreous injections of vancomycin (1 mg), ceftazidime (2.5 mg), and dexamethasone (1 mg) in both eyes.

The patient's blood and vitreous cultures both grew *S. pneumoniae*. Transesophageal echocardiogram revealed an aortic root vegetation. Possible etiologies of his *S. pneumoniae* endocarditis include otitis externa and tooth extraction. With coordination between cardiology, infectious disease, and internal medicine teams, he was transitioned to IV ceftriaxone therapy for endocarditis treatment. In addition, he was treated topically with moxifloxacin, difluprednate, and atropine eye drops in both eyes. At time of discharge 10 days later, visual acuity remained light perception in the right eye and improved to 20/40 in the left eye.

For long-term treatment of endocarditis, the patient received 3 months of IV ceftriaxone, full mouth extraction, and an aortic valve replacement. Nevertheless, he later required a triple coronary artery bypass graft and also developed lumbar osteomyelitis. His visual acuity in the right eye further declined to no light perception because of interval development of a chronic retinal detachment, but fortunately he improved to 20/25 in the left eye.

## Discussion

Our patient's medical sequelae demonstrate the importance of early detection of EE as an indicator of severe, potentially devastating systemic disease. His rapid progression of disease and poor outcome in the right eye highlight the fulminant nature of *Streptococcus* species in endophthalmitis.

Despite the increasing volume of research, challenges remain in the diagnosis and treatment of bacterial EE. Previous retrospective studies show that incorrect diagnosis of EE occurs in up to 50% of cases.[4] Our patient presented with decreased visual acuity, floaters, fever, and vitreous haze, some of the most common clinical features in bacterial EE.[2] Other prominent symptoms include hypopyon, vitreous exudates, visible arteriolar septic emboli, necrotizing retinitis, perivascular hemorrhages with inflammatory infiltrate, panophthalmitis, corneal infiltrates/ulceration, and uveal tissue abscesses.[2,7]

The prognosis of EE is poor, frequently resulting in complete vision loss. *Streptococcal* endophthalmitis carries a particularly poor prognosis, as approximately 40% of patients have no remaining vision, and 25% of patients require enucleation or evisceration.[8] Currently, there are no established guidelines regarding management of EE. As first-line treatment, most experts recommend performing a vitreous tap followed by injection of intravitreous antibiotics ("tap and inject"). The role and timing of other treatment modalities, including pars plana vitrectomy, remain unclear.[8–10] A recent retrospective case series regarding management of culture-positive *Streptococcus* endophthalmitis showed no improved visual outcome with early vitrectomy performed within 48 hours of presentation.[8] However, more aggressive intervention, including pars plana vitrectomy, perhaps can be considered given our patient's poor outcome in the right eye, despite prompt management with a tap and inject.[4,8–10]

There are few ophthalmologic diagnoses that are truly life-threatening. Diagnosing EE early is essential to initiating a systemic evaluation for potentially lethal medical disorders. In addition, our patient's disease progression highlights the visual consequences of EE. Fortunately, his left eye responded to treatment and improved from 20/100 to 20/25. We believe our emergent, collaborative efforts led to saving his left eye and ultimately his life. Continued efforts to quickly diagnose and treat patients with EE are essential to maximizing both ophthalmologic and systemic outcomes.

**Key words:** bacterial, case report, endogenous, endophthalmitis, otitis externa, *Streptococcus pneumoniae*, tooth extraction.

## References

1. Greenwald MJ, Wohl LG, Sell CH. Metastatic bacterial endophthalmitis: a contemporary reappraisal. Surv Ophthalmol 1986;31:81–101.

2. Novosad BD, Callegan MC. Severe bacterial endophthalmitis: towards improving clinical outcomes. Expert Rev Ophthalmol 2010;5:689–698.
3. Chee SP, Jap A. Endogenous endophthalmitis. Curr Opin Ophthalmol 2001;12:464–470.
4. Sadiq MA, Hassan M, Agarwal A, et al. Endogenous endophthalmitis: diagnosis, management, and prognosis. J Ophthalmic Inflamm Infect 2015;5:32.
5. Connell PP, O'Neill EC, Fabinyi D, et al. Endogenous endophthalmitis: 10-year experience at a tertiary referral centre. Eye (Lond) 2011;25:66–72.
6. Schiedler V, Scott IU, Flynn HW Jr, et al. Culture-proven endogenous endophthalmitis: clinical features and visual acuity outcomes. Am J Ophthalmol 2004;137:725–731.
7. Jackson TL, Paraskevopoulos T, Georgalas I. Systematic review of 342 cases of endogenous bacterial endophthalmitis. Surv Ophthalmol 2014;59:627–635.
8. Yonekawa Y, Chan RV, Reddy AK, et al. Early intravitreal treatment of endogenous bacterial endophthalmitis. Clin Exp Ophthalmol 2011;39:771–778.
9. Kurniawan ER, Rocke JR, Sandhu SS, Allen PJ. Predictors of visual outcome and the role of early vitrectomy in streptococcal endophthalmitis. Clin Exp Ophthalmol 2017;46:424–431.
10. Group Endophthalmitis Vitrectomy Study. Results of the Endophthalmitis Vitrectomy Study—a randomized trial of immediate vitrectomy and of intravenous antibiotics for the treatment of postoperative bacterial endophthalmitis. Arch Ophthalmol 1995;113:1479–1496.