

Endogenous Endophthalmitis Caused by Group B *Streptococcus* Following Urinary Tract Infection

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Abstract

Background: Endogenous endophthalmitis is a condition where infection spreads hematogenously to the eye. Group B *Streptococcus* (GBS) is a rare causative microorganism of endogenous endophthalmitis. A case of endogenous endophthalmitis caused by GBS secondary to urinary tract infection (UTI) is reported.

Case Presentation: An 83-year-old male presented with decreased visual acuity, ocular pain, and headache in his right eye three days after experiencing lower back pain. Initial examination revealed light perception in visual acuity, intraocular pressure of 30 mmHg, hypopyon in the anterior chamber, and severe vitreous opacity in the right eye. There was no history of trauma or ophthalmic surgery. The patient had been self-catheterizing due to chronic ureteral obstruction. Aqueous and vitreous samples were collected and blood tests and a urine culture were performed for microbiological examination. On the same day as the initial visit, vitrectomy was performed. Intraoperatively, extensive retinal necrosis and total retinal detachment were observed. Gram-positive cocci were detected in the aqueous humor, and GBS was isolated from both vitreous and urine cultures. Blood tests showed elevated levels of inflammatory markers, with a C-reactive protein of 5.4 mg/dL, and undiagnosed diabetes mellitus was found. Intensive antibiotic therapy resolved the inflammation, although, visual acuity did not improve.

Conclusions: Endogenous endophthalmitis was caused by GBS occurred secondary to UTI. Systemic assessment is crucial for diagnosing endogenous endophthalmitis, and early and appropriate treatment is essential.

Keywords: Group B *Streptococcus*, Endogenous endophthalmitis, Urinary tract infection

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Introduction

Endogenous endophthalmitis is a severe ocular condition characterized by the hematogenous spread of infection to the eye. It typically occurs secondary to liver abscesses, urinary tract infections (UTIs), lung abscesses, infective endocarditis, and meningitis.¹ As the global population ages, there has been an increase in elderly individuals with urinary disorders. Consequently, the prevalence of endogenous endophthalmitis secondary to UTIs is expected to become more prevalent.

Streptococcus agalactiae, also known as β -hemolytic group B *Streptococcus* (GBS) is a gram-positive bacterium. GBS infections occur predominantly in elderly patients with underlying health conditions such as diabetes mellitus (DM), cardiovascular diseases, and cancer. Among GBS infections, endocarditis is the most common, followed by arthritis, cellulitis, and UTIs. However, there have been few reports regarding endogenous endophthalmitis caused by GBS.

Endogenous endophthalmitis has a worse prognosis compared to postoperative endophthalmitis.^{2,3} Early and adequate treatment can result in favorable visual recovery in

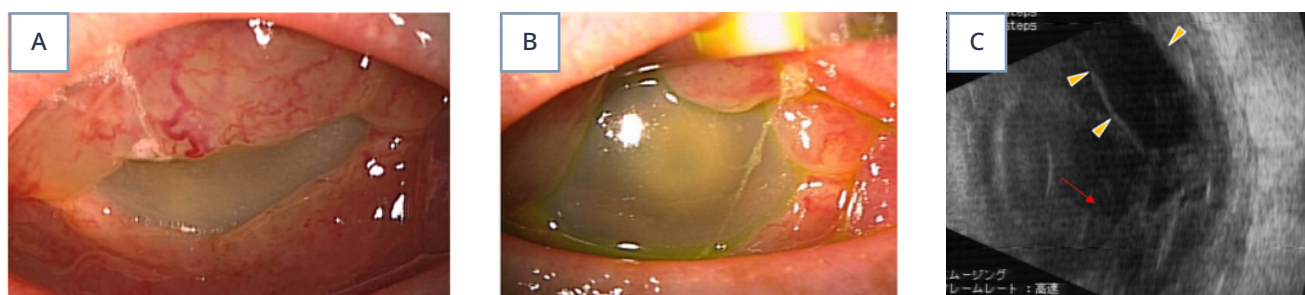
some cases.⁴ However, there have been few reports of endogenous endophthalmitis associated with UTIs caused by GBS.^{5, 6} Previous case reports and reviews have demonstrated that endogenous endophthalmitis caused by GBS generally shows poor visual prognosis.^{7, 8} This case report aims to present a case of endogenous endophthalmitis caused by GBS secondary to UTI.

Case Presentation

An 83-year-old male patient presented to our university hospital with complaints of decreased visual acuity and ocular pain in his right eye. The symptoms began 7 days prior to his initial presentation, with the onset of lower back pain. Three days later, he experienced a curtain-falling-like vision in his right eye, accompanied by eyelid swelling and ocular pain. The following day, as his visual acuity worsened and the pain persisted, he went to visit a local ophthalmology clinic. Corneal epithelial damage and inflammation in the anterior chamber were observed, leading to a diagnosis of orbital cellulitis. The patient was then referred to Kyoto Prefectural University of Medicine, Kyoto, Japan for further assessment. However, due to the weekend, the patient came to our hospital 3 days later. During this interim period, he was prescribed gatifloxacin eye drops 4 times daily and ofloxacin ointment twice daily.

On the initial visit to our hospital, the patient's visual acuity in the right eye was light perception, and intraocular pressure was 30 mmHg. Slit-lamp examination of the right eye revealed severe eyelid swelling, conjunctival hyperemia and edema, and severe inflammation accompanied by fibrin in the anterior chamber (Figure 1A and B). The retinal fundus was invisible due to fibrinous membranes at the pupil, and B-scan ocular ultrasonogram showed dense vitreous opacity and retinal detachment (Figure 1C). The patient had no prior history of ophthalmological consultations. His medical history included hypertension and benign prostatic hyperplasia. Additionally, the patient had been managing chronic ureteral obstruction through self-catheterization. However, he had been unable to urinate independently for approximately 5 days following the onset of back pain. A full-body CT scan revealed clear hydronephrosis of the left kidney, with findings suggestive of pyelonephritis. Blood tests showed elevated levels of inflammatory markers, with a C-reactive protein (CRP) of 5.4 mg/dL, and hemoglobin A_{1c} (HbA_{1c}) of 8.0%, indicating previously undiagnosed DM.

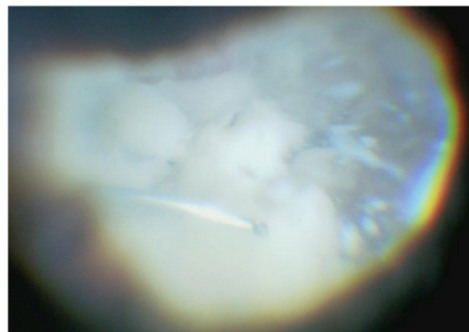
Figure 1. Anterior Segment Photograph and B-Scan Ocular Ultrasonogram



- A, The initial slit lamp examination and anterior photograph of the right eye. Conjunctival hyperemia, swollen eyelid, chemosis, and cornea edema were observed.
- B, In the anterior chamber, there were 4+ cells with fibrinous membranes, and posterior synechia.
- C, B-scan ocular ultrasonogram of the right eye revealed vitreous opacity (arrow) and retinal detachment (arrow head).

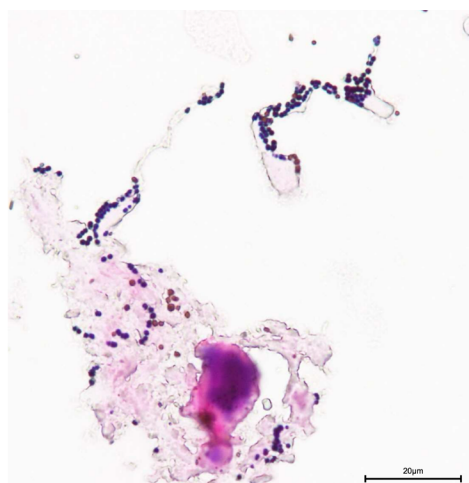
Based on these examinations, the patient was diagnosed with endogenous endophthalmitis secondary to UTI. On the same day, we performed vitrectomy, irrigating with vancomycin (1 mg/0.1 mL) and ceftazidime (2.25 mg/0.1 mL). Intraoperatively, the vitreous was filled with white materials, and extensive retinal necrosis was observed (Figure 2). Gram-positive cocci (3+) were identified in samples from the aqueous humor, vitreous fluid, and urine (Figure 3). Culture tests of both the vitreous fluid and urine specifically isolated *Streptococcus agalactiae*. Antibiotic susceptibility tests showed favorable results, with the bacteria being sensitive to various antibiotics including fluoroquinolones. Levofloxacin 1.5% eye drops and betamethasone 0.1% eye drops were administered topically. Ceftriaxone sodium hydrate was administered intravenously for 2 weeks. Despite prompt surgical intervention and intensive treatment, which successfully alleviated ocular pain and reduced inflammation, visual acuity did not improve. Ultimately, the patient experienced a complete loss of light perception.

Figure 2. Intraoperative Findings



The extensive necrotic retina and total retinal detachment were observed.

Figure 3. Gram Staining of Samples From Vitreous Fluid



Gram positive cocci was detected from vitreous fluid.

Discussion

A case of endogenous endophthalmitis has been presented caused by GBS secondary to UTI. The patient was initially diagnosed with orbital cellulitis due to severe eyelid swelling and ocular pain. However, a detailed medical history revealed that the patient had experienced lower back pain and had been unable to urinate through self-catheterization for several days before the initial presentation. Intensive treatments, including surgical intervention, rapidly reduced the inflammation. However, the patient ultimately experienced blindness.

Endogenous endophthalmitis has been reported to have a worse prognosis compared to postoperative endophthalmitis.^{2, 3, 9} UTIs account for 5 to 17.5% of primary causes in endogenous endophthalmitis, especially in immunocompromised patients.^{1, 9, 10} *Klebsiella*, *E. coli*, and *Candida* are microorganisms causing UTIs and subsequent endogenous endophthalmitis. While GBS endogenous endophthalmitis is relatively rare, it is more commonly associated with septic arthritis rather than UTI in reported cases.^{4, 11} There have been only a few case reports associated with GBS-related endogenous endophthalmitis, which showed complete vision loss in 60% of cases.^{7, 8} Another report demonstrated that 7 out of 15 cases that underwent vitrectomy experienced complete vision loss,⁸ suggesting that the clinical prognosis of GBS-related endogenous endophthalmitis is particularly poor.

This case demonstrated a significant delay of 3 days between the initial visit and the referral to our hospital, which might have led to the poor prognosis.¹² Additionally, the presence of untreated DM can exacerbate ocular inflammation, potentially leading to retinal necrosis. In fact, it has been reported that half of the patients with endogenous endophthalmitis caused by UTIs also suffered from DM.¹³ These complex underlying conditions may be involved in the poor prognosis, despite immediate surgical intervention and intensive antibiotic treatment. This case has emphasized the critical importance of considering different diagnoses and implementing early diagnosis and treatment, particularly in elderly patients.

Previous reports have indicated that the pathogenicity of GBS can vary depending on its serotype.^{14, 15} Among GBS serotypes, III, Ia, and Ib are known to exhibit the highest virulence. Type III is particularly associated with late-onset meningitis in neonates, while serotypes Ia and Ib are primarily responsible for early-onset GBS infections. This case did not determine the specific serotype of the GBS strain responsible for the endophthalmitis. However, there have been a few reports of cases in which patients with poor initial visual acuity subsequently experienced recovery of visual outcomes,⁸ suggesting that certain GBS serotypes may be involved in a better clinical outcome.

Conclusions

Endogenous endophthalmitis caused by GBS remains a rare condition. However, there is an increased risk from systemic conditions, particularly UTIs in elderly populations. This case has highlighted the importance of considering GBS as a potential cause of severe ocular complications secondary to UTIs. Early diagnosis and appropriate treatment in managing endogenous endophthalmitis are crucial.

Additional Information

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