

A triad of endocarditis, endophthalmitis, and meningitis

Case Report

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Abstract: *Streptococcus pneumoniae* is an uncommon cause of infective endocarditis; it often requires prolonged antibacterial treatment and involves a high mortality rate. We report a rare case of pneumococcal endocarditis manifesting with unusual complications – meningitis and endophthalmitis. *Streptococcus pneumoniae* species grew from the cerebrospinal fluid. The diagnosis of native aortic valve infective endocarditis was confirmed after some delay by transesophageal echocardiography. The patient's eye was lost because of infective complications, but his life was saved following an aggressive antibacterial therapy in combination with an immediate aortic valve replacement.

Keywords: *Streptococcus pneumoniae* • Endocarditis • Meningitis • Endophthalmitis

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1. Introduction

Despite the fact that the most common pathogenic agents causing native valve infective endocarditis (IE) continue to be streptococci [1], after the development of penicillin *Streptococcus pneumoniae* became an uncommon cause of bacterial endocarditis in adults; however, its mortality rate is still high (35%–56%) [2–4]. Pneumococcal endocarditis is defined as an acute inflammatory infection; it can cause rapid valve destruction and often requires prolonged antibacterial treatment [3,5].

We report a rare case of unusual clinical manifestation of *Streptococcus pneumoniae* endocarditis. Primary presentation of IE was meningitis followed by endophthalmitis.

2. Results

A 41-year-old male patient initially reported a 5-day history of intermittent fever (38.0°C). He denied any recent

infection, injuries, or alcohol abuse. He was admitted to the Department of Infectious Diseases at the Lithuanian University of Health Sciences Hospital for acute meningitis. His blood tests showed leukocytosis – $16.4 \times 10^9/l$ (reference, $3.9 - 8.8$) – and elevated C-reactive protein (CRP) level at 238 mg/L (reference, $0 - 7.5$). The initial antibacterial treatment with intravenous ampicillin 4 g and dexamethasone 48 mg daily was started. The cerebrospinal fluid culture revealed *Streptococcus pneumoniae*, which is susceptible to penicillin, erythromycin, and cefotaxime.

Despite an initial 5-day antibacterial treatment for meningitis after admission, the predominant symptoms resulted from a worsening eye condition. Therefore, the patient was transferred to the Department of Ophthalmology. Bilateral conjunctival hemorrhages, swelling of the eyelids, and limitations of the eyeball movement were observed. His vision was severely impaired: he had become completely blind in the right eye; also, decreased visual acuity in the left eye had developed from diagnosed bilateral bacterial endophthalmitis. Together

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with intravenous antibiotic eye drops, solutions of tobramycin and dexamethasone were administered for the local treatment. At that stage of illness, laboratory findings revealed persistent leukocytosis $-15 \times 10^9/l$, anti-streptolysin O was of normal value, and CRP had been significantly reduced to 45 mg/L.

Persistence of meningeal symptoms necessitated repeated lumbar punctures, but the cerebrospinal fluid appeared to have been rendered aseptic through treatment with the combined antibacterial therapy. There was no further bacterial growth, either in the blood or in the *humor aquosus* (intraocular fluid) samples that had been repeatedly obtained during his hospital stay. Consequently, a new, more aggressive combination of antibacterial therapy was recommended by the microbiologist: vancomycin 1g b.i.d., metronidazole 500 mg t.i.d. and ceftriaxone 2 g b.i.d., with additional local antibacterial treatment for the eyes (ciprofloxacin, tobramycin and dexamethasone).

Because of the loss of visual function and presence of a potentially hazardous source of persistent infection as the panophthalmitis developed, enucleation of the right bulb was performed on the 6th day of hospital treatment. Diffuse posterior endophthalmitis of the left eye necessitated vitrectomy and retinopexy; the patient's light perception was preserved. The culture of the obtained vitreous body showed no bacterial culture growth.

On electrocardiogram, a new intermittent left bundle branch block was recorded. The invited cardiologist detected upon auscultation a grade 3/6 diastolic murmur that showed a high possibility of aortic regurgitation. Transthoracic, and later, transesophageal echocardiography confirmed the presence of severe aortic regurgitation with a floating vegetation (4.7 x 2.0 mm) on the right coronary leaflet of the aortic valve (Figure 1) and

a normal left ventricle with preserved ejection fraction of 55%. Thus, following 10 days of treatment, IE was confirmed as a primary source of spread infection.

The final diagnosis of acute *Streptococcus pneumoniae* endocarditis with potentially lethal complications of acute bacterial meningitis and endophthalmitis was established by a multidisciplinary team, which included a cardiac surgeon.

From the very beginning of the patient's treatment, the diagnosis of IE was masked by prevalent infectious complications (meningitis and endophthalmitis). Cardiac surgery for acute IE was needed; therefore, an aortic valve replacement was done with a St. Jude Medical mechanical 27-mm prosthesis, and use of the vancomycin-ceftriaxone combination was extended.

The total duration of antibacterial therapy was continued for more than 6 weeks (45 days). The 41-year-old male patient recovered successfully, but his right eye was lost.

3. Discussion

The clinical manifestation of *Streptococcus pneumoniae* infection depends on the primary focus of the infection and the presence of bacteremia. According to Sextonet al., pneumococcal meningitis is a rather common and severely suppurative complication of this infection [6]. In addition, Lee et al. have reported gram-positive cocci as the second causative microorganism in endogenous endophthalmitis, which in most cases represents metastasis from a distant focus of infection [7]. *Streptococcus pneumoniae* endocarditis is more likely to develop in the patients with diabetes mellitus, suffering from pneumonia, AIDS, and especially in persons suffering from alcohol abuse and liver cirrhosis [5,6].

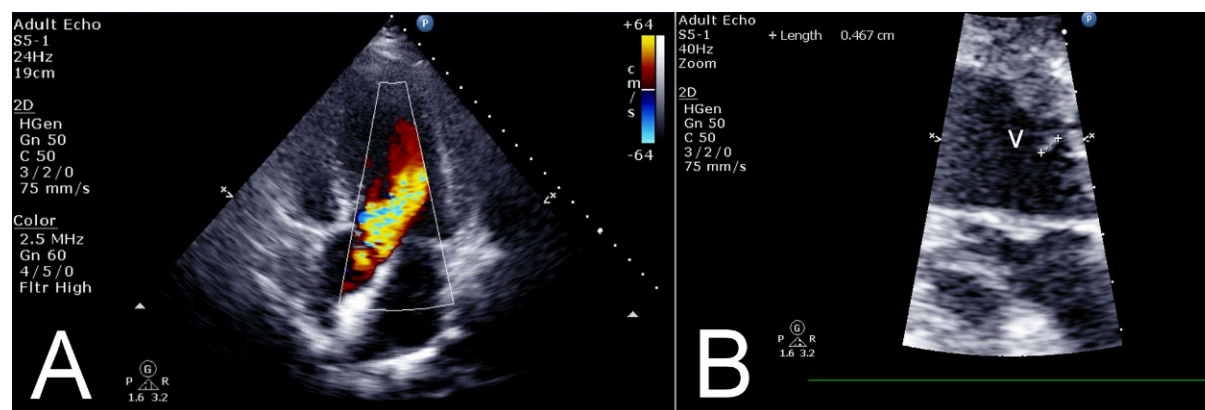


Figure 1. A. Transthoracic echocardiography: an apical five-chamber view with color Doppler showing regurgitation through the aortic valve. B. Transthoracic echocardiography: parasternal long-axis view showing the aortic valve with a floating vegetation (V) (4.7 x 2.0 mm) on the right coronary leaflet.

However, none of these factors that could have led to an immunocompromised state was identified in the present case.

Pneumococcal infection usually manifests as pneumonia, followed in frequency by meningitis [8]. It could also manifest as the Austrian syndrome – a triad of meningitis, endocarditis, and pneumonia [9]. In this case, meningitis was the primary presentation of infection, followed by a possible undetected bacteremia. The patient's 5-day fever with no antibiotic treatment may have instigated the further spread of infection.

Endogenous endophthalmitis could result from bacteremia directly from a septic microembolization, the source of which could be an infected valve; infectious agents could also spread via the meninges [7]. Neurologic events are the most frequent complications in patients with infective endocarditis: patients presenting with these conditions require intensive care on admission as they also can contribute to a severe prognosis [10].

According to Adolf W. Karchmer, the interval between the development of bacteremia and the onset of IE is not longer than 2 weeks (in 80% of cases) [3]. In the present case, any abnormal cardiac findings were revealed on the patient's first clinical examination, and

the antibiotic therapy was administered to ensure the control of severe meningitis. IE diagnosis was made according to the modified Duke criteria [5,11].

An adequate antimicrobial therapy with well-timed surgery is required to lower mortality rate in this life threatening condition [5,12]. The benefit of an early surgery has been scientifically proven [5,13], but in this case it was elective because of the suppurative endophthalmitis that ended in enucleation of the eye bulb.

4. Conclusion

This paper presents a rare case of pneumococcal endocarditis manifesting with unusual complications – meningitis and endophthalmitis. *Streptococcus pneumoniae* was thought to be treated properly, but physicians should be aware of the risk of multiple organ damage despite microbiologically proven antibacterial therapy.

Conflict of interest

No conflict of interest to declare.

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