Endogenous Endophthalmitis Due to *Salmonella choleraesuis* in an HIV-positive Patient

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CASE REPORT

Endogenous Endophthalmitis Due to Salmonella choleraesuis in an HIV-positive Patient

ABSTRACT  Purpose: To report a case of endogenous endophthalmitis caused by the gram-negative bacterium Salmonella choleraesuis as a first sign of HIV infection in a patient from Thailand. Method: Case description and literature review. Results: A 54-year-old male without systemic complaints developed non-painful panuveitis in his left eye accompanied by high intraocular pressure. On investigation, HIV serology was found positive, and aqueous and blood cultures revealed the bacterium Salmonella choleraesuis. Despite aggressive treatment with antibiotics, the affected eye did not improve, and his visual acuity decreased to no light perception. Conclusions: Endogenous endophthalmitis with the non-typhoidal Salmonellae can occur in the absence of systemic symptoms in an immunocompromised host.

KEYWORDS  Endogenous endophthalmitis; Salmonella choleraesuis; immunosuppression; AIDS

INTRODUCTION

Endogenous endophthalmitis results from the hematogenous spread of microorganisms into the eye during septicemia, usually from a remote source such as an infected intravenous line or infected organs. The majority of patients have predisposing systemic risk factors such as a compromised immune system, chronic disease, or a history of intravenous drug abuse or internal catheters. In AIDS, endogenous fungal endophthalmitis with Candida or Histoplasma has been regularly reported, but bacterial endophthalmitis is not frequently encountered. In the past, occasional infections with Salmonella enteritidis, Salmonella typhimurium, Salmonella arizonae, Haemophilus alvei, and Salmonella london have been observed. We report here on a patient with a previously unknown HIV infection and endogenous endophthalmitis due to Salmonella choleraesuis.

CASE REPORT

A 54-year-old Thai male with no known underlying disease presented to his ophthalmologist with acute painless visual loss in his left eye over one month. The combined vitreous tap and intravitreal application of amikin 0.4 mg in 0.1
ml and vancomycin 1 mg in 0.1 ml had no beneficial effect and the cultures remained negative. The reason for negative culture was unknown, and the patient was referred to the University Hospital of Chiang Mai.

The patient had had no ocular complaints in the past, and his medical history was noncontributory. On general physical examination, we noted a well-nourished, afebrile man with general findings within normal limits. Ophthalmologic examination revealed a normal right eye, with full visual acuity, while visual acuity of his left eye was decreased to light projection. The anterior chamber exhibited 4+ dense cells with hypopyon and hemorrhage (Fig. 1). Multiple nodules were visible on the iris surface together with extensive posterior synechiae formation. Secondary cataract was noted and further evaluation of posterior segment was not possible. Intraocular pressure was 34 mmHg, and his left eye exhibited afferent pupillary defect. Ultrason sound biomicroscopy showed subhyaloid hemorrhage.

At that stage, the differential diagnoses included panuveitis or endogenous endophthalmitis, and bacterial and fungal cultures of the vitreous and aqueous were taken. No organisms were visible on direct Gram and KOH stain of the aqueous and vitreous aspirates. Intravitreal application of ceftazidime 2.25 mg in 0.1 ml and vancomycin 1 mg in 0.1 ml were given. Repeated blood cultures were also taken. Laboratory tests revealed normal blood cell counts, with decreased thrombocyte levels of 22,000/mm³. Renal and hepatic functions as well as the rheumatoid factor were within normal limits. Serological tests for Treponema pallidum and Toxoplasma gondii were negative. Radiological examination of the chest was normal. The hematologist was consulted to evaluate thrombocytopenia, and the patient was diagnosed with probable idiopathic thrombocytopenic purpura (ITP).

On the fourth day, the patient developed progressive complaints of eye pain, and, despite treatment with diverse pressure-lowering medications, high intraocular pressure persisted. On day 4, the cultures of the anterior chamber fluid and blood revealed a normal right eye, with full visual acuity, while visual acuity of his left eye was decreased to light projection. The anterior chamber exhibited 4+ dense cells with hypopyon and hemorrhage (Fig. 1). Multiple nodules were visible on the iris surface together with extensive posterior synechiae formation. Secondary cataract was noted and further evaluation of posterior segment was not possible. Intraocular pressure was 34 mmHg, and his left eye exhibited afferent pupillary defect. Ultrasound biomicroscopy showed subhyaloid hemorrhage.

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On the fourth day, the patient developed progressive complaints of eye pain, and, despite treatment with diverse pressure-lowering medications, high intraocular pressure persisted. On day 4, the cultures of the anterior chamber fluid and blood revealed *Salmonella choleraesuis*, but the cultures of the vitreous fluid remained negative, possibly due to previous administration of intravitreal antibiotics. Diagnosis of endogenous endophthalmitis was made, and the patient received intravenous ceftriaxone (2 gm per day). At that time, positive HIV serology and CD4 cell counts of 137/mm³ became known. After the administration of intravenous ceftriaxone for one week, his left eye showed a decrease in conjunctival redness, corneal edema, and various blood clots in the anterior chamber.

Since his visual acuity allowed no light perception and the intraocular pressure remained uncontrolled, enucleation surgery was planned. Intravenous ceftriaxone (2 gm per day) for 14 days followed by oral ciprofloxacin (400 mg per day) for four weeks were planned as treatment; however, the enucleation surgery had to be postponed because of very low platelet levels (4,000/mm³) despite the repeated platelet infusions and intravenous immunoglobulin medication. During the weeks that followed, the inflammation in his left eye became inactive and revealed features of early atrophy, and bacterial cultures from blood became negative. The patient was discharged in a good general condition and enucleation was not performed.

**DISCUSSION**

We report on a patient who was unaware of his HIV-positive status with CD4 cell counts of 137/mm³, who was in a good general condition but suffered from an endogenous endophthalmitis caused by the gram-negative bacterium *Salmonella choleraesuis*.

Bacterial endophthalmitis is not frequently encountered in persons infected with HIV and/or AIDS. The major pathogens seen in AIDS-related endogenous endophthalmitis are fungi, and occasionally endophthalmitis caused by unexpected rare bacteria has been reported.

*Salmonellae* make up a large genus of gram-negative bacilli within the family Enterobacteriaceae. The antigenic classification or serotyping of *Salmonella* used today is a result of extensive studies of antibody interactions with bacterial surface antigens. This resulted in the identification of over 2,000 *Salmonella* serotypes, most of which were named after the cities where they were defined, but usually *Salmonellae* are subdivided into two broad categories on the basis of host preference and disease manifestation in man. *S. typhi*, *S. paratyphi A, B and C* are primarily host adapted to humans and cause typhoid fevers. The second group includes so-called non-typhoid serotypes, among which is also *S. choleraesuis*. *S. choleraesuis*, the swine-adapted serotype, has commonly caused enteritis in pigs, but may be isolated from other animals, including humans. Infections with non-typhoid *Salmonella* serotypes most often result in self-limited acute gastroenteritis that does not require antimicrobial therapy. However, *S. choleraesuis* is one
of a small number of non-typhoid *Salmonella* species that have virulence plasmids. These virulence plasmids are very frequently associated with bacteremia and disseminated infection in humans. This non-typhoid *Salmonella* serotype is extremely invasive and can cause protean manifestations in humans, including acute gastroenteritis, bacteremia, and extra-intestinal localized infections involving many organs. Bacteremia is particularly common and persistent among infants, the elderly, and patients with severe underlying infection or immunosuppression (eg., transplant recipients and HIV-infected patients).9

*Salmonella* infections in immunocompetent persons are frequent. According to the best estimates of the World Health Organization (1995), at least 16 million new cases of typhoid fevers occur annually, with approximately 600,000 deaths. In the United States, non-typhoid *Salmonella* serotypes affect approximately 2 million to 3 million persons and cause 500 to 2000 deaths each year.10,12 Serotype *choleraesuis* is an infrequent serotype isolated from human immunocompetent sources in Canada and the United Kingdom. However, the epidemiological pattern in Asian countries differs greatly from that observed in Europe and the US. In Thailand, during the period 1988 to 1993, the serotype *choleraesuis* was the 10th most common serotype to cause salmonellosis in humans.10 This highly invasive serotype was of particular concern in Taiwan. A previous study had found that bacteremia was the main manifestation of the human infection caused by *S. choleraesuis* (78%).13 Furthermore, various types of extraintestinal localized infections were common, and most patients had pre-existing underlying diseases.

HIV-infected individuals have been shown to have a high risk of acquiring *Salmonella* infections, and bloodstream invasion is markedly more prevalent in HIV-infected patients than in immunocompetent ones.14 Bacteremia is the most common manifestation of salmonellosis in these patients, and when recurrent it is considered an AIDS-defining illness. Recurrent *Salmonella* infections in immunocompromised persons produce a high mortality rate and usually CD4 cell counts of <100/mm³.14,15 Our patient had a higher CD4 positive count and therefore possibly milder manifestations of the systemic infection in contrast to his severe eye involvement. Disseminated infections with non-typhoidal *Salmonellae* were recognized early in the HIV epidemic.14 From the intestine, non-typhoidal *Salmonellae* can reach the bloodstream via lymphatics,

**FIGURE 1** Left eye at presentation (one month after the onset of symptoms). Anterior chamber exhibited 4+ cells and hyphema with plasmoid aqueous and 1-mm hypopyon. Iris surface showed multiple nodules, and extensive posterior synechiae were also present as well as secondary cataract.
Salmonellae can occur in an immunocompromised host, even in the absence of systemic symptoms; they also illustrate how an analysis of intraocular fluids was decisive in making the correct diagnosis of infectious intraocular disease.

REFERENCES