A case report of eustachian valve endocarditis due to *Salmonella typhimurium* in an AIDS patient

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Abstract

Introduction The eustachian valve is a normal remnant of the right valve of the sinus venosus, which directs blood in the embryo life from the inferior vena cava into the left atrium through the foramen ovale.

Case report We report a case of eustachian valve endocarditis (EVE) secondary to *Salmonella typhimurium* in a patient with acquired immunodeficiency syndrome (AIDS). The patient also had concomitant *Pneumocystis pneumonia*.

Discussion *Salmonella* bacteremia is one of the AIDS-defining illnesses, and many patients will have recurrent episodes. *Salmonella* endocarditis on the other hand is rare, but when present, it has a significant morbidity and mortality. EVE rarely requires surgical intervention, and the appropriate antibiotics are the treatment of choice.

Conclusions We recommend clinicians to consider obtaining an echocardiography in AIDS patients with *Salmonella* bacteremia to search for possible endocarditis, as it does change the treatment plan.

Keywords Endocarditis, eustachian valve, *Salmonella*

Introduction

The eustachian valve (EV) is a normal structure that is located between the inferior vena cava (IVC) and the right atrium. It directs blood flow from the IVC through the foramen ovale into the left atrium in the normal fetal circulation.¹ If it remains prominent in adults, it can potentially become infected, and be a site for vegetations which leads to infective endocarditis (IE).

EVE was first described in 1986 by Edwards et al.² A recent review of the literature by Kottam et al.³ showed that *Staphylococcus aureus* is the most common causative agent of EVE, although other organisms have also been found to cause this infection. Intravenous drug use was found to be the main predisposing factor.

In general, EVE responds well to appropriate antibiotic therapy, and rarely requires surgical intervention.³

Transesophageal echocardiography (TEE) is more sensitive than transthoracic echocardiography (TTE) to detect EVE.⁴

We report the case of a young woman with AIDS who was found to have EVE secondary to *Salmonella typhimurium*.

Case report

A 36-year-old woman with known history of human immunodeficiency virus (HIV) infection presented to our hospital with complaint of worsening non-productive cough for three weeks duration, accompanied with shortness of breath, which was present both on exertion and at rest. She also endorsed having subjective fevers, chills and night sweats for about the same time period.

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Review of system was positive for diarrhea for a few days, which had resolved three days prior to presentation.

The patient did report to the medical team that she has not been taking her antiretroviral therapy for the past three years.

Her vital signs on presentation included a temperature of 37°C, a heart rate of 120 bpm, a blood pressure of 120/79 mmHg, a respiratory rate of 20 breaths/min, and oxygen saturation of 87 percent on room air. Physical exam revealed a cachectic woman who was visibly dyspneic and using accessory muscles of respiration. Chest examination revealed scattered crepitations bilaterally. The rest of the exam was unremarkable.

Laboratory tests revealed a normochromic, normocytic anemia (hemoglobin 10.4 g/dL), leukopenia with a white blood cell count of 3.000 cells/mcL, and CD4 T helper cell count of 17/cmm (CD4 T helper percentage significantly decreased at 4%). HIV viral load at the time of presentation was 405.000 copies/mL.

All other biochemical and hematological parameters were within normal range. A chest X-ray showed diffuse interstitial infiltrates bilaterally.

Given the patient's clinical presentation and chest X-ray findings, there was a high suspicion for *Pneumocystis pneumonia* (PCP) and the patient was started on empiric trimethoprim-sulfamethoxazole (TMP-SMX), 5 mg/kg IV every 8 h and on prednisone 40 mg PO twice daily. (1,3)-beta-D-glucan results came back positive with a value of >500 pg/mL.

The patient was noted to have intermittent fever during her hospital stay. Two sets of blood culture were obtained on admission; they grew Gram-negative bacilli within 12 hours, and *Salmonella typhimurium* was later identified from both sets on the third day of the hospital stay.

Intravenous ceftriaxone 1 g q24h was added on the first day of hospital stay. A transthoracic echocardiography was performed on day two, which revealed a small vegetation attached to the EV close to the lateral wall of the right atrium. TEE, which was obtained on the following day, confirmed the diagnosis of EVE by showing a mass measuring 6.6×4 mm on the EV (Figure 1).

Therefore, the ceftriaxone dose was increased to 2 g q24h. Follow up blood cultures remained negative, and the patient's shortness of breath and hypoxia improved significantly on the third day of her hospital stay.

On day six of admission, she was switched to ciprofloxacin orally 500 mg twice daily and discharged home to complete 4 weeks of treatment, in addition to her PCP therapy of prednisone 40 mg PO daily (days 6-10) then 20 mg PO daily (days 11-21), and TMP-SMX 2 DS tablets PO three times daily for total of 21 days, followed by one tablet PO daily for secondary PCP prophylaxis until her CD4 count is > 200 cells/cmm for > 3 months.

Review of the literature

We reviewed PubMed for cases of EVE using the keywords: endocarditis, eustachian valve, *Salmonella*. Thirty articles were retrieved from the literature search.

Table 1. Clinical features of reported cases of eustachian valve endocarditis

Characteristics	Patients (N=31)
Predisposing factors	
Intravenous drug use	13
Central line	8
Pacemaker or AICD	2
Pneumonia	1
Rheumatic mitral valve	1
Poor dentition	1
Acute cholecystitis	1
Intrauterine device	1
Preterm	1
None	2
Organism	
<i>Staphylococcus aureus</i>	18
<i>Klebsiella pneumoniae</i>	2
<i>Staphylococcus hominis</i>	1
<i>Streptococcus viridans</i>	1
<i>Enterobacter cloacae</i>	1
<i>Escherichia coli</i>	1
<i>Proteus vulgaris</i>	1
<i>Actinomyces israelii</i>	1
<i>Actinomyces turicensis</i>	1
<i>Candida albicans</i>	1
Not reported	3

AICD - automatic implantable cardioverter-defibrillator.

Figure 1. Transesophageal echocardiogram, bicaval view showing the vegetation on the eustachian valve.

EV – eustachian valve; LA – left atrium; RA – right atrium; SVC – superior vena cava.

To our knowledge, our case presents the first case of EVE secondary to *Salmonella typhimurium*.

Intravenous drug use was found to be the most common predisposing factor accounting for 42% of the cases, followed by the presence of central lines and pacemakers/AICDs (automatic implantable cardioverter-defibrillators). *Staphylococcus aureus* was found to be the most common causative organism responsible for 58% of the cases, followed by *Klebsiella pneumoniae*.

Discussion

Recurrent *Salmonella* bacteremia is one of the AIDS-defining illnesses that indicates a severely immunocompromised host.⁵ In the literature, many AIDS patients are noted to have recurrent episodes of *Salmonella* bacteremia indicating that AIDS affects their ability to eradicate and clear this infection.⁶ The risk decreases significantly when patients adhere to highly active antiretroviral therapy (HAART).⁷

Thus, patients with *Salmonella* bacteremia and advanced HIV infection should be monitored closely after completing the treatment

to evaluate for possible recurrence, which may present as bacteremia or as a localized infection. Secondary prophylaxis should be considered for those patients, of probably 6 months or longer of antibiotics, although the value of this intervention has not been established and the potential benefit must be weighed against the risks of long-term antibiotics exposure.⁸

Endocarditis secondary to *Salmonella* species is uncommon, but when present, the overall prognosis is guarded with a mortality rate reported in a recent study of 42.5%.⁹

Conclusions

In conclusion, EVE is rare and can be easily missed if not searched for. It is usually easily seen by transthoracic echocardiography, but in some cases, a transesophageal echocardiography is required.¹⁰

It follows a benign course in the majority of patients, and surgery is rarely needed. Medical therapy with appropriate antibiotics is the recommended treatment of choice, similar to tricuspid valve endocarditis.^{3,10}

We suggest obtaining echocardiography in compromised hosts with *Salmonella* bacteremia to evaluate for possible endocarditis as although rare, it carries a significant morbidity and mortality rate.

Consent: Written informed consent was obtained from the patient for publication of this case report and any accompanying images.

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