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Case report

Salmonella infective endocarditis in a young diabetic lady with device closure of PDA and VSD: A rare case report

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ABSTRACT

The risk of infective endocarditis remains a major concern in patients with congenital heart disease; nevertheless, use of devices and prostheses in corrective surgery may have contributed to an increased incidence. Infective endocarditis due to Salmonella species are infrequently reported, therefore, their clinical presentations, prognosis and optimal treatment guideline are poorly described in literature. Here, we report a case of an 18-year-old diabetic lady with history of device closure of Patent ductus arteriosus and closure of peri-membranous small Ventricular septal defect in the year of 2005 and 2018 respectively who presented to us with high-grade fever for 10 days without any focal symptom. She was initially diagnosed as a case of Enteric fever based on serological tests for Salmonella species, later Transesophageal echocardiography confirmed infective endocarditis. The patient was treated with combination of antibiotics for a total 6-week duration. Although very rare, Salmonella have a predilection for the heart valves, particularly mitral and aortic valves. Diagnosis may be difficult, blood culture is often negative and a Transesophageal echocardiography should be performed without delay particularly in high risk patients. In most cases Salmonella endocarditis can be successfully treated with antimicrobials alone.

Introduction

Salmonella species are important gram-negative bacterial pathogens that cause foodborne diseases in developed and developing countries. The fatality of salmonella is enhanced by its ability to invade, replicate and survive within the host cells by inducing its own phagocytosis [1]. Human infections ranging from mild gastroenteritis to severe invasive diseases. Bacteremia occurs in 3 % to 8 % of cases. Virtually any anatomical site may be seeded hematogenously by Salmonella. However, the involvement of the cardiovascular system is uncommon and most of the cases present as myocarditis (1–5 %) while infective endocarditis (IE) is very rare [2,3]. According to a review article, Salmonella is responsible for less than 0.01–2.9 % of bacterial IE cases [4]. The spectrum of cardiovascular infections due to Salmonella species other than myocarditis and IE include: mycotic aneurysms, cardiac-device infections, salmonella mediastinitis, salmonella pericarditis, salmonella infection of arteriovenous fistula etc. which are very rare as well [5]. The incidence of IE in patients with congenital heart disease (CHD) is higher than in general population. Generally, the more complex is the CHD the higher is the risk of IE. A history of IE itself is a significant risk factor for recurrence as well [6,7]. Here we report a case of a young diabetic lady with Salmonella IE with a background history of device closure of Patent ductus arteriosus (PDA) and closure of peri-membranous small Ventricular septal defect (VSD). In this case report we reinforce the importance of considering this diagnosis in high risk patients as well as considering Transesophageal echocardiography (TEE) early during workup. To the best of our knowledge, only a few cases of Salmonella IE have been reported from South-East Asia and ours is the first case reported from Bangladesh.

Case report

An 18-year-old Bangladeshi college-going student with Type-I Diabetes Mellitus (DM) got admitted to BIRDEM General Hospital on 27th March 2023 with high-grade intermittent fever for 10 days without any focal symptom. Empirically she was prescribed oral Ciprofloxacin and Cefixime by a physician but did not respond. She underwent device closure of PDA and closure of peri-membranous small VSD in the year of 2005 and 2018 respectively. She also had an episode of bacterial IE (Culture positive; growth of Pseudomonas) in 2016, treated with

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injectable Vancomycin, Gentamycin and Ceftazidime. Following admission, she was found febrile, tachycardic with just palpable spleen. Other systemic examinations including fundoscopy revealed no abnormality. Biochemically she was found ESR 50 mm in 1st hour, CRP 98.8 mg/L and Procalcitonin 7.8 ng/ml. No organism was isolated from blood and urine cultures. Salmonella serology revealed TO: 640, TH: 640, BO: 160, BH: 80 titers. Urine microscopy revealed hematuria with 25 % dysmorphic cells. Abdominal ultrasound showed enlarged spleen (159 mm). ECG revealed sinus tachycardia. Chest radiograph showed cardiomegaly. From high index of suspicion, TEE was done and revealed vegetations in left ventricle and on tip of right coronary cusp (Fig. 1). We finally diagnosed her as a case of Salmonella IE. Hospital treatment regime included injectable Ceftriaxone 2 gm 12 hourly for 14 days followed by 1 gm 12 hourly for next 14 days along with Gentamicin 8 mg/kg body weight and Moxifloxacin 400 mg daily for 14 days. Fever subsided from 8th day of starting injectable Ceftriaxone. Following discharge, she completed oral Cefixime 200 mg and Linezolid 600 mg 12 hourly for 14 days. She followed-up after 3 weeks and was found to have improved general well-being with normal ESR and CRP levels. Repeat TEE didn't reveal any vegetation. During the course of treatment, no complication related to the prescribed medications was reported.

Discussion

According to a review article, Salmonella species are rarely responsible for IE. From 1976 to 2014, a total of 87 cases of typhoid and nontyphoid Salmonella IE were reported, which included 42 cases in 1976–1984, 30 cases in 1986–2002, and 15 cases in 2003–2014, with the mean age of 50–60 years and male predominance (58.6 %) [4]. Although our reported case is a young female. The overall prognosis of 87 reported cases of Salmonella IE was grave with a mortality rate of 42.5 % [4]. From another review article, valve perforation, valve ring abscess, atrioventricular wall perforation and rupture of the cusps occurred in a significant number of cases [5]. However, in our case such complications were absent and she had a good response to medical management. Typically, vegetations in IE involve cardiac valves and involvement of non-valvular structures is less common unless there are intracardiac devices or prior cardiac injury causing endocardial damage. Vegetations can also form as mural thrombi attached to the ventricular wall in the presence of underlying endocardial damage or stasis of blood flow. From a review, native valve endocarditis caused by Salmonella most commonly involved the mitral valve (36.6 %), followed by the aortic valve (16.6 %) [5]. We found another similar case report of a 25-year-old man with salmonella IE with evidence of aortic valve disease and vegetations [6]. Notwithstanding, our patient had vegetations in left ventricle along with aortic valve, which is consistent with her background history of cardiac surgery and episode of IE. Most patients with Salmonella IE have preexisting CHD or valvular abnormalities. Another common underlying comorbidity is DM. A prior history of IE itself is a significant risk factor for recurrence as well. All of these risk factors are present in our case. The etiology, clinical features, complications, basis for diagnosis and treatment of IE in CHD patients don't differ from those in acquired cardiac disease. Right-sided IE is more frequent in CHD patients [7]. However, in our case left-sided involvement was noted. IE is significantly more common in haemodialysis (HD) patients. Although the causative pathogen is generally Staphylococcus aureus, we found a case report of a 68-year-old woman on HD who developed IE with Salmonella enteritidis [8]. IE due to Salmonella species was also reported in a 7-year-old girl with sickle cell anemia [9]. From a review article, fever (100 %), murmurs (40 %), cardiac failure (30 %), central nervous system emboli (13 %), pericarditis (10 %) and heart block (3 %) were the most common clinical findings in patients with Salmonella IE. Leukocytosis greater than 12,000 cells/mm3 was found in 45 % of cases. Break-through and relapsing bacteremia were important clues for the diagnosis of salmonella IE. Except fever, all these findings were absent in our case. Diagnosis of salmonella IE is supported by echocardiographic imaging in most cases. Valve dysfunction and vegetation are the most common findings. TTE is less sensitive than TEE for the diagnosis of salmonella IE. Left ventricular angiography is a useful technique to assess ventricular anatomy. Gallium-67 citrate scan, technetium-99 leukocyte scintigraphy have been used successfully to diagnose salmonella infection associated ventricular aneurysms. Although experience is scarce, MRI of the heart may be a useful diagnostic technique [4,5,10]. Ceftriaxone is the drug of choice for salmonellosis and is given at a dose of 2–6 g/day [6,11]. However, the optimal treatment for Salmonella valvular or mural endocarditis is not clearly defined. According to a study, the mortality rate of patients with valvular endocarditis managed by medical therapy alone was higher (27.2 %) than patients managed by surgery and medical therapy (15.0 %). However, it couldn't be excluded that the likelihood that patients with medical therapy alone were too ill to receive cardiac surgery [4,5]. Our patient made complete recovery with medical therapy alone. Antibiotic choice, dosage and duration in Salmonella IE are poorly described in the literature. From extensive literature review we found that, most cases were managed with combination of parenteral antibiotics which included, Ceftriaxone, Cefepime, Meropenem, Gentamicin, Amikacin, Levofloxacin, Clindamycin and Penicillin for a variable duration ranging from 2–6 weeks with favorable outcome in most of the cases. However, physicians should be aware of the relevant complications, therefore, making appropriate decision for surgical interventions [4–6,8–11].

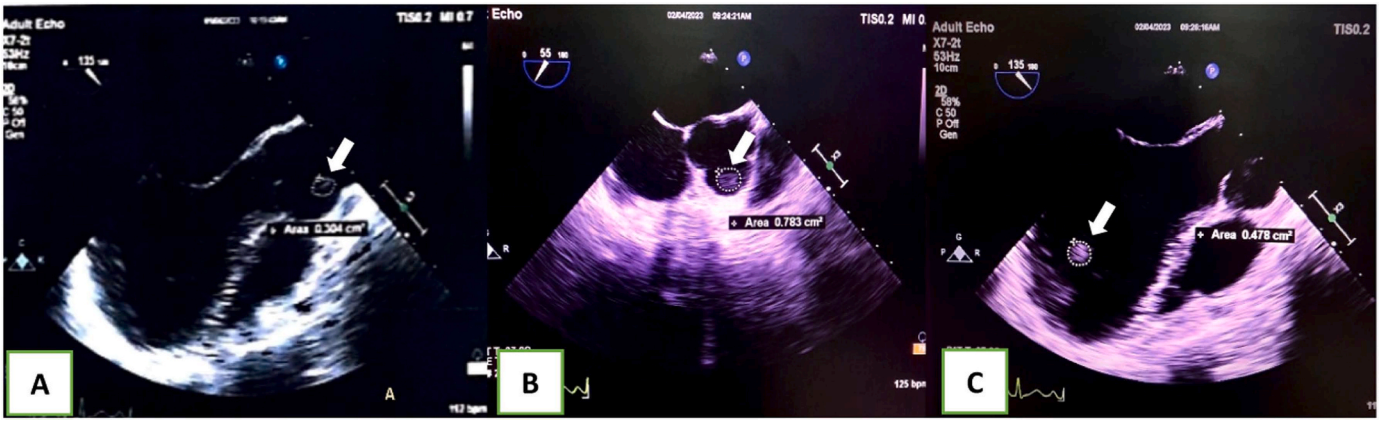

Fig. 1. TEE showing small fluffy vegetations [white arrows] (A) mid esophageal long axis view, on the tip of right coronary cusp (0.304 cm^2); (B) mid esophageal short axis view, on the tip of right coronary cusp (0.783 cm^2), (C) mid esophageal long axis view, in the left ventricle (0.478 cm^2): suggestive of possible infective endocarditis.

CRediT authorship contribution statement

Md. Mehedi Hasan: Writing – original draft, Visualization, Software, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Fariha Fairouz:** Writing – original draft, Resources, Data curation. **Amit Banik:** Data curation. **Md. Jubaidul Islam:** Validation, Supervision, Methodology, Investigation, Conceptualization. **Jamal Uddin Ahmed:** Writing – review & editing, Validation, Supervision, Methodology, Investigation, Conceptualization.

Consent

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

Ethical approval

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

Author contributions

Md. Mehedi Hasan and Fariha Fairouz were involved in manuscript writing and literature review. All authors were involved in evaluation and management of the case. Md. Jubaidul Islam and Jamal Uddin Ahmed critically reviewed the manuscript. All authors approved the final submission.

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Declaration of Competing Interest

None.

Appendix A. Supporting information

Supplementary data associated with this article can be found in the online version at doi:10.1016/j.idcr.2024.e02039.

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