

A Rare Case of Pericardial Salmonellosis in a Patient with Aneurysmatic Left Ventricle

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ABSTRACT

Cardiovascular manifestations of salmonellosis such as endocarditis, infected atheroma or aneurysms, myocarditis and pericarditis are uncommon, which can occur only in about 5% of bacteremia. Although the pericardium is rarely involved, the mortality rate is as high as 50%. We reported a case of pericardial salmonellosis in a patient with aneurysmatic left ventricle. A 62-year-old male patient presents to the emergency department with presentation of shortness of breath, febrile, diarrhea, chest pain and abdominal pain. He was known to have a history of ischemic heart disease, heart failure, and left ventricular aneurysm. On examination, patient was febrile, had tachycardia and tachypnoea. Physical examination revealed febrile 39°C, pulmonary rales, tenderness in right superior abdomen region. After three days of therapy there was no improvement. During hospitalization he complained of heaving shortness of breath, vital sign was being unstable, rhonchi and wheezing almost filled his lung, elevation jugular vein pressure, and no diminished heart sound. Treatment of diuretic had been administered but tightness does not improve. The patient then underwent echocardiography. Echocardiography revealed a massive pericardial effusion with sign of impending tamponade (RA RV collapse). An urgent pericardiocentesis was performed with the first aspirations obtained 475 cc. Pericardial fluid culture result *Salmonella* sp., antibiotic was administered based on the culture results, intravenous ceftazidime one gram twice daily and levofloxacin 750 mg once daily. After 5 days, patient's condition was improved. Unfortunately, patient suddenly suffered by convulsion and electrocardiography showed ventricular fibrillation (VF) and pulseless ventricular tachycardia (VT). The patient died caused due to malignant arrhythmia. This case illustrates that the important role of echocardiography in establishing the diagnosis of massive pericardial effusion in previously untreated patients with pericardial effusion with clinical presentation acute lung oedema. Echocardiography plays an important role in detecting rare complications of salmonellosis. An understanding of the potential cardiovascular complications caused by *Salmonella* infection is critical for both diagnosis and management.

Introduction

Salmonella, a non-sporing, Gram-negative, facultatively anaerobic bacillus, is the most well-known foodborne pathogen, causing a foodborne infection with prevalence of 93.8 million worldwide with a mortality rate of 155,000 every year.¹ The incidence rate of typhoid fever in Indonesia is 1.7 every 100,000 population.¹ Until today, 2500 serotypes of *Salmonella* have been identified.¹ Salmonellosis is an infection caused by *Salmonella* that involves the digestive tract. The clinical manifestations of salmonellosis range from common gastroenteritis (abdominal cramps and diarrhea), enteric fever (including typhoid fever) to a life-threatening febrile systemic illness that requires prompt antibiotic therapy. Salmonellosis most common form is a self-limiting and uncomplicated gastroenteritis. However, bacteremia is known to occur in 3-8% of cases and 1-5% cases could cause rarely salmonellosis manifestation in cardiovascular system.¹

Potential complications of salmonellosis manifestation in cardiovascular system include endocarditis, infected atheroma or aneurysm, myocarditis, and pericarditis. Purulent pericarditis is a rare complication of *Salmonella* infection accounting for less than 2% of all cases but has a significant high mortality rate.¹ We report a rare case of salmonellosis with coronary heart disease and left ventricular (LV) aneurysm.

Case presentation

A 62-year-old male patient presented to the emergency department with shortness of breath, febrile, chest pain and abdominal pain. He has had a history of ischemic cardiomyopathy, hypertension, and LV aneurysm. On examination, patient had fever, tachycardia, and tachypnea. Jugular venous pressure increased peripheral edema. Physical examination on admission revealed a blood pressure 100/60 mmHg, heart rate 106 per min, respiratory rate 30 per min and temperature 39°C, tenderness in right superior abdominal region. Chest X-ray showed cardiomegaly with cardiothoracic ratio 70% (Figure 1A). Electrocardiography (ECG) examination revealed a sinus rhythm tachycardia of 110 per min, left axis deviation (LAD), clockwise rotation (CWR), occlusion myocardial infarction (OMI) inferior and anterior (Figure 1B).

Echocardiography showed no deformities valve, cardiac chamber dimensions normal left atrium, left ventricular dilated (LVIDd 6.9 cm), normal right atrium, normal right ventricular, (RVDB 2.3 cm); decreased left ventricular systolic function (EF by teich 32%, by MOD A4C 29%, by MOD A2C 25%, by biplane 29%) (Figure 2A). Abnormally relaxed diastolic function. Decreased RV systolic function (TAPSE 1.3 cm) anteroseptal aneurysmatic LV segmental analysis (B) Infer-septal (B), septal (A), anterior (A), inferior (A) lateral (A) another segment hypokinetic; eccentric LVH LVMI 135.73.

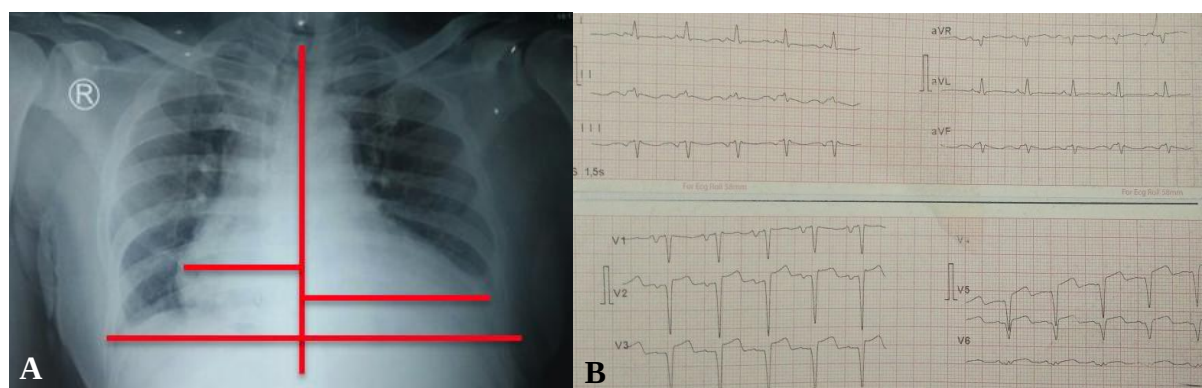


Figure 1. Chest X-ray (A) and electrocardiograph (B) of patient in the emergency department

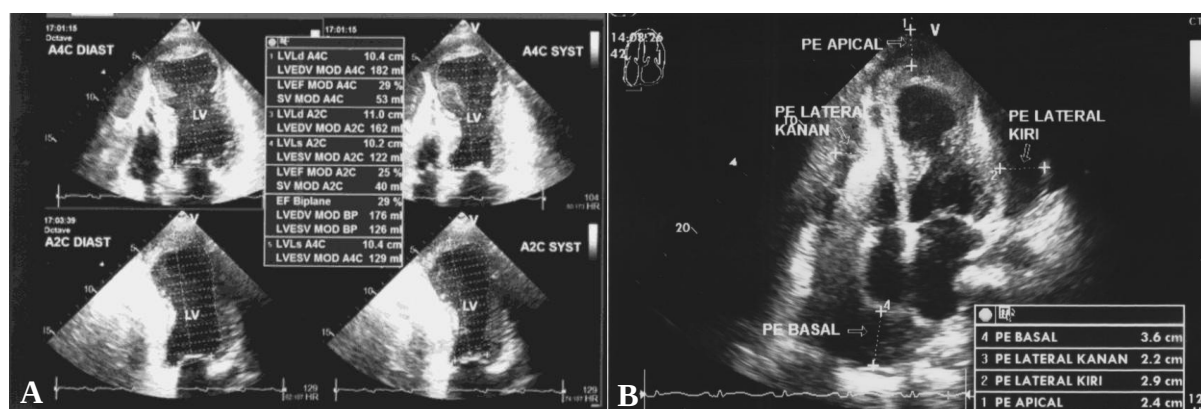


Figure 2. Initial left ventricular echocardiography in the emergency department (A) and echocardiography evaluation revealed massive pericardial effusion (B)

After 3 days of therapy, no clinical improvements and patient complained of sudden severe shortness of breath, unstable vital signs, rhonchi and wheezing almost in all areas of lungs,

increased jugular venous pressure, and no reduction in heart sounds. Diuretic therapy was given but the dyspnea did not improve. Evaluation of echocardiography showed a massive pericardial effusion basal (3.6 cm), posterior (3.1) cm, left lateral (2.9 cm), inferior (2.5 cm), apical (2.4 cm), right lateral (2.1 cm), anterior (2.1 cm) with disturbing tamponade (RA RV collapse) (Figure 2B).

Pericardiocentesis was immediately performed with the first aspiration obtained 475cc (Figure 3). The pericardial fluid culture confirmed *Salmonella* sp. Based on antibiotic sensitivity test, intravenous ceftazidime one gram twice daily and levofloxacin 750 mg once daily were administered. After 5 days of routine pericardial fluid aspiration and administration of antibiotics, the patient's condition improved. A total of 3000 cc of pericardial aspirates was aspirated from the pericardial sac. However, on day 11 the patient had seizures and the ECG rhythm revealed showed ventricular fibrillation and pulseless ventricular tachycardia (VT-VT). The patient was subsequently declared dead with a malignant arrhythmia reason for death.



Figure 3. Pericardiocentesis procedure and the result

Discussion

Salmonella sp. is a member of the Enterobacteriaceae family, a gram-negative, flagellated facultative anaerobic bacterium with O antigen or somatic antigen, H antigen or flagella antigen, and Vi antigen or superficial antigen. *Salmonella* causes two diseases in humans known as salmonellosis: enteric fever, which is caused by bacterial invasion of the bloodstream, and acute gastroenteritis, that is caused by contaminated infection or intoxication.^{2,3} Ingested *Salmonella* survive gastric acid defenses and then invade the mucosal lining of the small and large intestine. The organisms multiply intracellularly after infecting the epithelium, then spread to the mesenteric lymph nodes and throughout the body via the systemic circulation. Some species could infect the spleen, liver, bone, gallbladder, meninges, and other organs.⁴ After invading the gastrointestinal track, the bacteria induce an acute inflammatory response, may be able to produce cytotoxins that inhibit protein production, and induce the epithelial cells produce and release a variety of proinflammatory cytokines and these may also be potentially cause intestinal damage.^{5,6}

Bacteremia is rare in patients with salmonellosis of the gastrointestinal tract and bloodstream infections are more common in immunocompromised patients.^{7,8} *Salmonella* sp. has the potential to adhere to the endothelium and cause damage. Infected atheroma, aneurysm, myocarditis, and pericarditis are all potential cardiovascular complications. Endocarditis, both valvular and nonvalvular, is the most frequent cardiovascular involvement, with underlying

valve abnormalities being the most predisposing factor for development. The most common complication after endocarditis is secondary endovascular infection, such as an infected aneurysm or atheroma.

Although *Salmonella* is often confined to the gastrointestinal tract, infections involving additional locations can also occur, resulting in a distinct clinical presentation. Endocarditis, myopericarditis, and endovascular infection are all symptoms of cardiovascular salmonellosis, which is a relatively unusual extraintestinal manifestation. Pericarditis often presents with cardiac or pulmonary symptoms, but typical signs of pericardial disease such as pulsus paradoxus or the presence of friction rubs may not be present in our patient. Pericarditis-related ECG abnormalities are also uncommon.⁹

Cardiologists should be aware of *Salmonella* sp. ability to infect atherosclerotic vasculature, in particular in people who have atherosclerosis risk factors, as well as cardiac consequences such as pericarditis and myocarditis - even in those who have no predisposing risk factors. This understanding enables and allows investigations, diagnosis and management of uncommon but preventable complications.⁴

The most prevalent pathological conditions involving the pericardium are pericarditis and pericardial effusion. The causative factor can be infectious or non-infectious. Virus infection is the most common cause of infectious disease. Although viral infections are usually benign, purulent, or bacterial pericarditis has the potential to give rise to catastrophic or life-threatening infections. Purulent pericarditis is described as an infection that is localized to the pericardial cavity and produces purulent fluid under microscopical and macroscopical examination or is secondary to another infectious condition. The following are some of the pathogenic mechanisms that might lead to pericardial cavity invasion: hematogenous spread; focus extension on the myocardium; piercing injury or surgery; and sub diagrammatic focal extension.¹⁰

An echocardiographic examination needs to be performed right away to confirm diagnosis. This assessment can also be utilized to identify the status of cardiac tamponade and guide pericardiocentesis. To assess the characteristics of a pericardial effusion, laboratory tests are required. Purulent material from pericardial effusion was characterized by exudate, polymorphonuclear cell predominance, elevated LDH and low glucose levels. Gram stain and culture, hematocrit testing, biochemistry, and cytology are all required further examination.¹¹

Conclusion

Although involvement of other organs in *Salmonella* sp. infection is rare, involvement of cardiovascular system often fatal. This case highlights the importance of having a comprehensive understanding of pericardial salmonellosis to enable planning the investigations, diagnosis and management of uncommon but preventable complications.

Ethical clearance

Written informed consent for publication was sought from each patient.

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