A RARE CASE OF SALMONELLA ENDOCARDITIS

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ABSTRACT
Salmonella enterica are the rod-shaped gram-negative bacterial species that have a rare predilection towards damaged endothelium leading to serious cardiac complications, including infective endocarditis (IE). Infective endocarditis is a serious complication and, in most cases, proves fatal. Among 16 large case series only 87 cases being reported in 16 large case series spanning from 1976 to 2014. We present a unique case of infective endocarditis in a 59-year-old African American male due to Salmonella enterica serovar Typhi infection. With a history of alcohol, tobacco use, marijuana use, and intravenous drug abuse, this patient presented to the emergency department with altered mental status for two days. Vital signs showed hypotension, tachypnea, tachycardia with fever. Exam noticeable for coarse breath sounds bilateral, and heart rate and rhythm were regular. Labs showed Hb 3g/dL, WBCs 20x103 /mm3, platelets 522x109/mm3, creatinine 1.87 mg/dL, serum bicarbonate of 12 mmol/L. On arterial blood gas, PaO2 was 79 mmHg, and PaCO2 was 24 mmHg. Computed tomography of the chest showed multiple septi. Both blood culture and urine cultures came out positive for Salmonella. Initially, the patient was started on intravenous fluids and blood units along with intravenous antibiotics. Transthoracic and transesophageal echocardiography were negative for vegetations but showed moderate tricuspid regurgitation. The patient was diagnosed with Salmonella Typhi endocarditis and treated appropriately. Subsequently, his infection resolved.

INTRODUCTION
Salmonella typhi are the rod-shaped gram-negative bacterial species with numerous serotypes, causing foodborne infection among humans and animals. They are the estimated source of 1.2 million infections, 23,000 hospitalizations, and 450 deaths annually in the USA. Infective endocarditis (IE) is a rare extraintestinal manifestation of Salmonella, typhoidal or nontyphoidal, with only 87 cases being reported in 16 large case series spanning from 1976 to 2014. We present a case of infective endocarditis in a 59-year-old patient secondary to Salmonella Typhi infection.

CASE
A 59-year-old African American male with a history of alcohol, tobacco use, marijuana use, and intravenous drug use (IVDU) presented to the emergency department with altered mental status for two days. The patient reported a dry cough, which was associated with shortness of breath. The patient also reported a weight loss of 30 pounds over three months. The patient denied dizziness, chest pain, lightheadedness, hematochezia, hematemesis, melena, or any history of chronic obstructive pulmonary disease (COPD), tuberculosis, or occupational exposure. On arrival, the patient had a blood pressure of 90/55 mmHg, a pulse rate of 108, a temperature of 100.6 degrees Fahrenheit, and a respiratory rate of 24 breaths per minute. Cardiovascular examination showed a regular rate and rhythm with no added heart sounds. There were coarse breath sounds bilaterally on respiratory auscultation. No skin rashes were observed. On mental examination, the patient appeared confused and was disoriented to time. There were no tremors, hallucinations, or signs of delirium tremens. Initially, the patient was given adequate fluid resuscitation as per the sepsis protocol that improved his blood pressure. Intravenous vancomycin and cefepime were administered after drawing samples for cultures. His initial laboratory reports showed severely low hemoglobin of 3.5 g/dL, hematocrit of 13.2, white blood cell count of 20 x 103 /mm3, an elevated platelet count of 522 x109/mm3. Serum creatinine was elevated with a value of 1.8 mg/dL with baseline unknown. The patient's PO2 was 79, and PCO2 was 24 with a bicarbonate level of 12 mmol/L. Procalcitonin was elevated to 176 ng/ml, and lactic acid was 3 mmol/L. Liver function tests, serum electrolytes, amylase, lipase, ethanol, and ammonia levels were within normal limits. Urinalysis was suggestive of urinary tract infection. The patient also received packed red blood cells given low hemoglobin and hematocrit. He was admitted to the intensive care...
unit (ICU) for further care. His prolactin, lactic acid, hemoglobin and hematocrit, urine output, and renal function were continuously monitored. Computed tomography (CT) of the chest without contrast showed multiple pulmonary nodules indicating septic emboli versus centrally necrotic metastatic disease. CT of the head, abdomen, and pelvis without contrast did not show any significant abnormalities. The patient underwent transthoracic echocardiography (TTE) and transesophageal echocardiography (TEE) that showed moderate tricuspid regurgitation. However, both were negative for any vegetations. Blood and urine cultures were positive for Salmonella. The patient was found to have severe sepsis due to urinary tract infection versus infective endocarditis versus B/L pneumonia. The patient was treated empirically for Salmonella endocarditis. He was started on ceftriaxone, doxycycline, and levofloxacin according to the bacterial sensitivity with the addition of bicarbonate drip along with thiamine and folate. Sequential Compression Device (SCD) was prescribed for deep venous thrombosis (DVT) prophylaxis. The patient fully recovered and was discharged with ceftriaxone and levofloxacin on the 24th following the admission. The patient underwent endoscopy and colonoscopy during hospitalization, which revealed evidence of multiple polyps and non-bleeding angioectasia and hence was advised to follow-up with a gastroenterologist to rule out causes for anemia. On his follow-up visit two weeks later, the patient reported no active complaints except mild diarrhea.

**DISCUSSION**

The genus Salmonella resides in humans and animals’ intestines and is transmitted through the fecal-oral route. Salmonella Typhi and Paratyphi are serovars of the Salmonella enterica subspecies enterica that are human-restricted and cause typhoid and paratyphoid fever. However, salmonella species have a rare predilection towards damaged endothelium, which can lead to severe cardiac complications such as endocarditis, aneurysms, myocarditis, among others. Salmonella cytolethal toxin is responsible for enhancing macrophages’ adhesion and translocation through endothelium lining and using phagocytosis of itself inside the macrophage, causing the bacteria to move inside the subendothelial space. This unique virulence mechanism may explain the predilection for Salmonella species to infect cardiac structures.

Salmonella endocarditis is a rare disease with most cases caused by Salmonella choleræus, Salmonella typhimurium, and Salmonella enteritidis, although many serotypes have been implicated. These organisms have an affinity for abnormal heart valves. This epidemiology of Salmonella Typhi shows only 200-300 cases reported in the USA annually, with 80 percent of cases in travelers returning from endemic areas. Similarly, Typhi infective endocarditis is very rarely seen in the USA. Our patient was in his late 50s and had no preexisting cardiac abnormalities, was an intravenous drug user (IVDU) and did not report any recent symptoms of typhoid fever. No typical vegetations were seen on imaging but had moderate tricuspid regurgitation and septic emboli bilaterally on his lungs' imaging. It is not known if this tricuspid regurgitation preceded the current infection. However, he fulfilled the criteria for infective endocarditis, as stated in the modified Duke's criteria. The diagnosis of infective endocarditis is seldomly straightforward, with textbook presentations and often finding absent. If a patient is at an early stage of the infection or is IVDU, chances are there will be limited manifestations of infective endocarditis. IVDU is more likely to have right-sided abnormalities and present with pulmonary septic emboli.

There is little reported on the recommended treatment of Salmonella typhi endocarditis. The recommended therapy in one published review is ceftriaxone or a fluoroquinolone intravenously for 4–6 weeks. Alternate therapy for susceptible strains is chloramphenicol, ampicillin, or co-trimoxazole for 4–6 weeks. Our patient was treated with ceftriaxone and levofloxacin and showed recovery on his follow up visit.

Most Salmonella cases are known to cause myocarditis or pericarditis, succeeding bacteremia from a gastrointestinal infection. Therefore, it is recommended to routinely evaluate patients with typhoid fever for these complications.

**CONCLUSION**

In conclusion, it is of utmost importance to consider infective endocarditis in a patient who presents with an altered state of consciousness and has a history of IVDU.

**REFERENCES**

3. https://www.cdc.gov/salmonella/general/


