JACC: CASE REPORTS VOL. 4, NO. 19, 2022

CASE REPORT

ADVANCED

GLOBAL HEALTH REPORT

The Unusual Cause of Cardiac Tamponade

Mohd Khairi Othman, MD,[a,b] Zurkurnai Yusof, MD,[a,b] Siti Aisyah Hussin, MD,[a,b] Norashikin Samsudin, MD,[c,d] Alwi B. Muhd Besari, MD,[b,e] W. Yus Haniff W. Isa, MD[a,b]

ABSTRACT

We present a previously healthy young man with cardiac tamponade. He underwent emergency pericardiocentesis. The pericardial fluid was exudative, and *Salmonella* sp. was grown on both pericardial and blood cultures. Further investigations revealed that this patient had classical Hodgkin lymphoma, which explains his immunocompromised state predisposing him to this infection. (**Level of Difficulty: Advanced.**) (J Am Coll Cardiol Case Rep 2022;4:1288–1291)

CASE PRESENTATION

A 21-year-old male student presented to the emergency department with intermittent low-grade fever, shortness of breath, and palpitations of 1 week's duration. He had a history of regular kratom *(Mitragyna speciosa)* tea intake for the past 4 years. Apart from that, he also had reduced appetite and experienced some weight loss. He had no recent travel history, no contact with a tuberculosis patient, and no history of eating undercooked eggs or taking illicit drugs.

LEARNING OBJECTIVES

- To be aware that an unusual cause of cardiac tamponade is most often found in the immunocompromised patient.
- To highlight the importance of good clinical judgment for early intervention in cardiac tamponade.
- To be aware that cardiac tamponade can have a subacute onset, especially with an infective or malignant cause.

In the emergency department, his initial blood pressure was 96/72 mm Hg, his pulse rate 120 beats/min, his respiratory rate 25 breaths/min, and his oxygen saturation was 100% under high-flow oxygen therapy. His jugular venous pressure was elevated and distended with the presence of pulsus paradoxus, and his heart sounds were muffled. On auscultation of the lungs, breath sounds were reduced at the bilateral lower zones, and multiple matted cervical lymph nodes were palpable bilaterally.

Transthoracic echocardiography (**Figures 1 and 2,** Videos 1 and 2) showed a massive pericardial effusion with right atrial and right ventricular (RV) collapse during diastole. The chest radiograph (**Figure 3**) exhibited cardiomegaly with bilateral pleural effusions. His electrocardiogram (ECG) (**Figure 4**) showed sinus tachycardia, low ECG voltage, and electrical alternans.

From the [a]Cardiology Unit, Department of Internal Medicine, Hospital Universiti Sains Malaysia, Kelantan, Malaysia; [b]School of Medical Sciences, Universiti Sains Malaysia, Kelantan, Malaysia; [c]Department of Microbiology and Parasitology, Universiti Sains Malaysia, Kelantan, Malaysia; [d]Department of Pathology, Universiti Malaysia Sarawak, Kota Samarahan, Malaysia; and the [e]Department of Internal Medicine, Hospital Universiti Sains Malaysia, Kelantan, Malaysia.
The authors attest they are in compliance with human studies committees and animal welfare regulations of the authors' institutions and Food and Drug Administration guidelines, including patient consent where appropriate. For more information, visit the Author Center.

Manuscript received March 28, 2022; revised manuscript received June 27, 2022, accepted July 8, 2022.

ISSN 2666-0849 https://doi.org/10.1016/j.jaccas.2022.07.016

Emergency pericardiocentesis through the subcostal approach was done, and 500 mL of serous pericardial fluid was drained. Blood testing showed a white blood cell count of 23 $\times$ 10^9/L, a hemoglobin level of 10 g/dL, a platelet count of 471 $\times$ 10^9/L, and normal liver and renal function test results. The serum lactate dehydrogenase (LDH) level was 1,024 U/L. Pericardial fluid analysis showed the following: protein, 53 g/dL (range: 0.15-0.45 g/dL); glucose, 4.8 mmol/L (range: 2.2-4.4 mmol/L); and LDH, 1,024 U/L, which confirmed exudative fluid. His retroviral and hepatitis screening results were negative. Direct smear examination of the pericardial fluid was unremarkable. On review of pericardial cytology, there were no suspicious cells; hence no flow cytometry was performed. On McConkey agar, pericardial fluid culture and blood culture yielded non-lactose-fermenting colonies, and the Gram stain revealed gram-negative bacilli (**Figure 5**). The organism was identified as a *Salmonella* sp by a standard biochemical test, serotyping, and the VITEK 2 system (bioMérieux).

The 16S molecular test confirmed *Salmonella enterica* subspecies *enterica* serovar *enteritidis*. It was susceptible to ampicillin, ceftriaxone, and trimethoprim-sulfamethoxazole.

Before culture and sensitivity testing, empirical antibiotic therapy with intravenous piperacillin-tazobactam, 4.5 g 3 times daily, was given for 3 days, and then it was changed to intravenous ceftriaxone, 2 g twice daily for 2 weeks, after pericardial fluid and blood culture isolated *Salmonella enterica*. The patient was subsequently under the care of a hematologist for his classical Hodgkin lymphoma. He received a diagnosis of disseminated nontyphoidal salmonellosis. Because he had multiple matted cervical lymph nodes, fine-needle aspiration cytologic examination of a cervical lymph node was done and showed a lymphoid neoplasm. Subsequently, excisional biopsy confirmed classical Hodgkin lymphoma. The patient was discharged with a regimen of oral trimethoprim-sulfamethoxazole, 2 tablets twice daily for a total duration of 4 weeks. Repeat echocardiography 4 weeks later showed minimal residual pericardial effusion, and chemotherapy for classical Hodgkin lymphoma was initiated.

DISCUSSION

The pericardium is a sac surrounding the heart that contains 20 to 60 mL of ultrafiltrate, and it is relatively stiff.[1] In patients with acute cardiac tamponade, the pericardium is rapidly filled by approximately 200 to 300 mL of fluid, and symptoms are more acute in onset.[1] Conversely, in patients with subacute cardiac tamponade, the pericardium sac is slowly filled with up to 1 to 2 L of fluid, and symptoms are more insidious.[1] Because of this pathophysiology, our patient's presentation was subacute, rather than the acute onset of cardiac tamponade, although the amount of pericardial fluid was massive. Cardiac tamponade is an emergency that requires early detection and recognition from clinical findings and is confirmed by echocardiography, as shown in our patient's clinical presentation. Urgent pericardiocentesis is mandatory in patients with cardiac tamponade to improve RV function and increase venous return.[1] The pericardiocentesis approach is varied; however, the safest approach is the subcostal approach.[1]

Salmonella infection usually involves the gastrointestinal tract and is significant. Nontyphoidal extraintestinal *Salmonella* infection is less prevalent compared with intestinal nontyphoidal *Salmonella* infection.[3] Extraintestinal nontyphoidal *Salmonella* infection commonly occurs in the meninges, the musculoskeletal system, and the urinary tract. In contrast, pericardial involvement is low, reported as <2%.[2] *Salmonella* infection as a cause of cardiac tamponade in Malaysia is rare.[4] Although the prevalence is low, nontyphoidal *Salmonella* pericarditis or tamponade has a high mortality.

In Kelantan, Malaysia, kratom has been used as a homemade supplement drink for energy, and kratom ingestion is a possible reason that this patient with an undiagnosed immunocompromised condition contracted salmonellosis. According to an article by

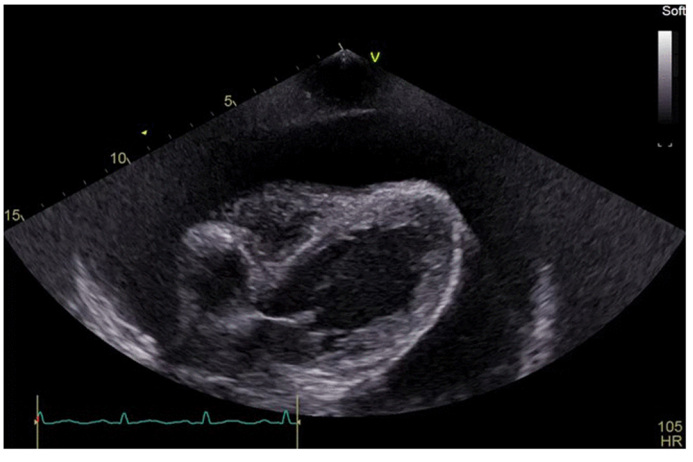
ABBREVIATIONS AND ACRONYMS

ECG = electrocardiogram

LDH = lactate acid dehydrogenase

RV = right ventricular

FIGURE 1 Subcostal View Showing Massive Global Pericardial Effusion With Right Ventricular and Right Atrial Collapse During Diastole



JACC: CASE REPORTS, VOL. 4, NO. 19, 2022
OCTOBER 5, 2022:1288–1291

FIGURE 2 Short-Axis View on the Aortic Level Showing a Right Atrial Indentation During Diastole

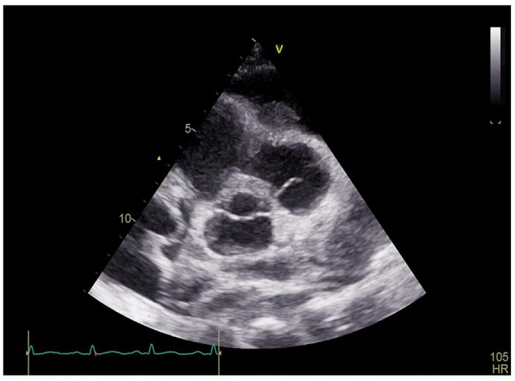
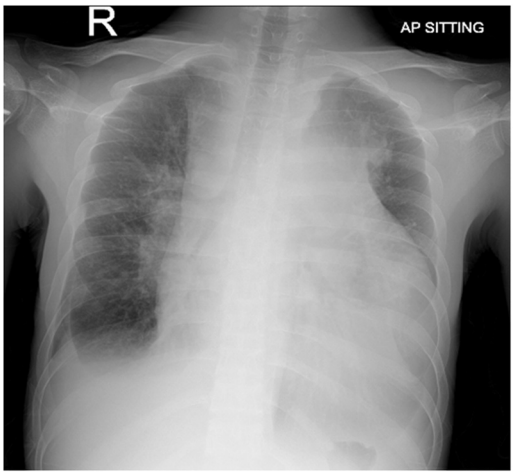


FIGURE 3 Globular Heart Shadow With Bilateral Pleural Effusion



AP = anteroposterior; R = right.

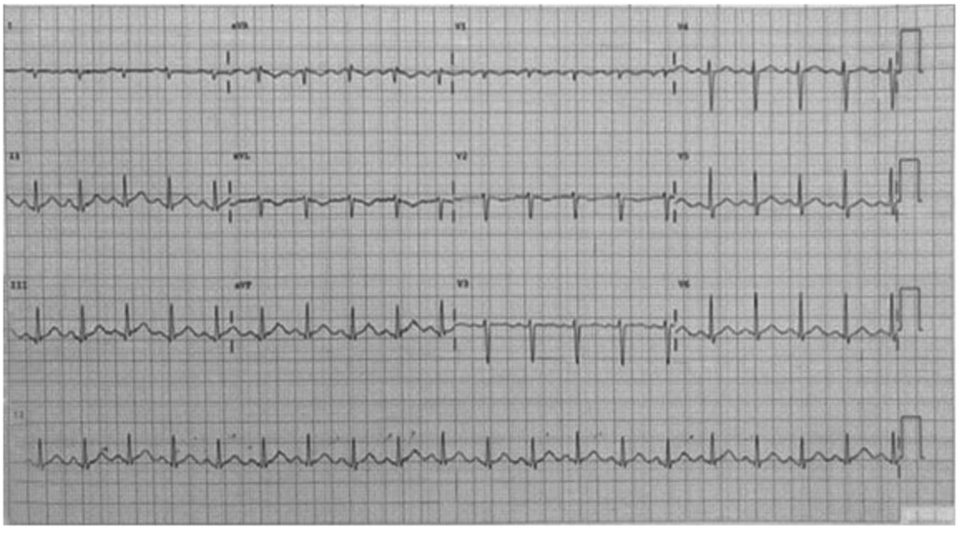
the U.S. Food and Drug Administration in 2018, there was an outbreak of salmonellosis from multiple strains linked to kratom and its products.[5] The investigation led to mandatory recall of all kratom and its products from the market.

In the patient with nontyphoidal salmonellosis with pericarditis, there is no clear evidence on the duration of antibiotic given to the patient on the basis of guidelines. Trimethoprim-sulfamethoxazole had good bioavailability with good tissue penetration; hence this patient received this medication for 4 weeks after receiving intravenous ceftriaxone for 2 weeks. The patient underwent long-term chemotherapy for his classical Hodgkin lymphoma. Cholecystectomy would be considered if disseminated nonthypoidal salmonellosis recurs.

CONCLUSIONS

Cardiac tamponade is a life-threatening condition in which early recognition and intervention are

FIGURE 4 Electrocardiogram Showing Sinus Tachycardia With Low Electrocardiographic Voltage and Electrical Alternans



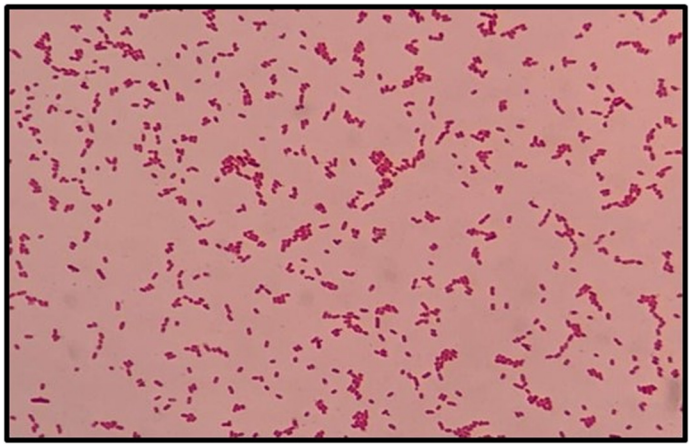
mandatory. This case describes a young patient with undiagnosed classical Hodgkin lymphoma who presented with subacute cardiac tamponade secondary to salmonellosis bacteremia, a rare cause of exudative pericardial effusion.

FUNDING SUPPORT AND AUTHOR DISCLOSURES

The authors have reported that they have no relationships relevant to the contents of this paper to disclose.

ADDRESS FOR CORRESPONDENCE: Dr Mohd Khairi Othman, Internal Medicine Department, Universiti Sains Malaysia, Kampus Kesihatan, 16150 Kota Bharu Kelantan, Malaysia. E-mail: mohdkhairiothman87@usm.my.

FIGURE 5 Gram-Negative Bacilli on Gram Stain



REFERENCES

1. Imazio M, de Ferrari GM. Cardiac tamponade: an educational review. *Eur Heart J Acute Cardiovasc Care*. 2021;10(1):102–109.

2. O'Mahony D, Peikarz RL, Bandettini WP, Arai AE, Wilson WH, Bates SE. Cardiac involvement with lymphoma: a review of the literature. *Clin Lymphoma Myeloma*. 2008;8(4):249–252.

3. Sudhaharan S, Kanne P, Vemu L, Bhaskara A. Extraintestinal infections caused by non-typhoidal *Salmonella* from a tertiary care center in India. *J Lab Physicians*. 2018;10(4):401–405.

4. Low QJ, Teo KZ, Thien LK, Lim TH, Cheo SW. Cardiac tamponade: experience from a Malaysian district hospital. *J R Coll Physicians Edinb*. 2020;50(4):387–391.

5. FDA investigated multistate outbreak of Salmonella infections linked to products reported to contain kratom. U.S. Food and Drug Administration. 2018. Accessed June 20, 2022. https://www.fda.gov/food/outbreaks-foodborne-illness/fda-investigated-multistate-outbreak-salmonella-infections-linked-products-reported-contain-kratom

KEY WORDS cardiac tamponade, classical Hodgkin Lymphoma, massive pericardial effusion, salmonellosis

APPENDIX For supplemental videos, please see the online version of this article.