CASE REPORT

Massive haemorrhagic pericardial effusion as the cardiac manifestation of Salmonella enteritidis infection in a severely immunocompromised patient

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SUMMARY

A 41-years-old gentleman was admitted for reduced effort tolerance with non-specific symptoms of weight loss and generalised body weakness. Chest X-ray (CXR) showed cardiomegaly. Echocardiography showed a large pericardial effusion with septation. Emergency pericardiocentesis was performed and pericardial fluid culture grew *Salmonella enteritidis (S. enteritidis)*. He tested positive for the retroviral disease, with a CD4 count of 10 cells/µL. Intravenous (IV) ceftriaxone was administered. A pericardial drain was inserted due to the rapid re-accumulation of pericardial fluid after the initial pericardiocentesis. He also had drainage of his left pleural effusion. He had a guidewire exchange of pericardial drain around 2 weeks after admission, with flushing performed whenever the flow was poor. A repeat echocardiogram showed early signs of constrictive pericarditis with residual pericardial effusion in which intra-pericardial fibrinolysis was considered. He was started on antiretroviral therapy (ART) and his condition remained stable. The pericardial drain was kept throughout his admission. Unfortunately, he developed severe sepsis and succumbed to it about a month post-admission.

INTRODUCTION

Acute pericarditis manifesting with massive haemorrhagic pericardial effusion is a potentially life-threatening condition that should be identified and treated early. Non-typhoidal *Salmonella* infection is a recognised but rare cause of pericarditis with pericardial effusion.

More than 200 serovars of *Salmonella* had been identified to have clinical implications in human.[1] The first case of non-typhoidal *Salmonella* pericarditis by *S. choleraesius* was reported in a 36-years-old woman in 1936. In 1961, seven other cases were reported infected by *S. typhimurium*, *S. parathyphi A*, *S. blegdam* and *S. Newport*. The majority of the cases involved children under 2 years of age.[2] In recent years, there have been reports of non-typhoidal *Salmonella* causing pericarditis with pericardial effusion, mainly in immunocompromised adult patients. We report a case of massive haemorrhagic pericardial effusion due to *S. enteritidis* pericarditis in a severely immunocompromised patient with an advanced retroviral disease.

CASE PRESENTATION

A 41-years-old man who was a non-smoker and non-alcohol drinker presented with unintentional weight loss of up to 8 kg, loss of appetite, lethargy, reduced effort tolerance, and unwell for 3 months. He was sexually active with multiple male partners.

He was admitted to a district hospital for symptomatic anaemia 1 week and was transfused with two pints of packed cells around 1 week before his current presentation.

However, his general condition did not improve after discharge, thus, he presented to our hospital, which is a tertiary referral hospital. His vital signs showed blood pressure of 120/72 mmHg, heart rate of 126 beats per minute, a temperature of 36.7°C and respiratory rate of 28 breaths per minute. On examination, he appeared cachectic-looking and had oral thrush and generalised macular rashes. Auscultation of his lung and heart revealed left lower zone crepitations with no audible murmur or pericardial rub.

Laboratory examinations showed pancytopenia with a white cell count of 2.77 x 103 µL predominantly neutrophil of 77%, haemoglobin of 7.9 g/dL, platelet of 40 x 103 µL and C-reactive protein (CRP) of 952 nmol/L. 12-lead electrocardiogram (ECG) showed ST-segment elevation at leads II, III, aVF and V2-V6 (Figure 1A). CXR showed cardiomegaly with a globular heart (Figure 1B). Bedside transthoracic echocardiogram (TTE) showed a massive pericardial effusion with septation, with the deepest pool of 4 cm (Figure 2A) and also left pleural effusion.

An emergency pericardiocentesis was performed and drained about 500 ml of haemorrhagic pericardial fluid. Pericardial fluid analysis showed a total protein of 63 g/L, lactate dehydrogenase (LDH) of 1,787 U/L and glucose level of <0.11 mmol/L. The ratio of pericardial fluid to serum protein and LDH were 0.84 and 3.64, respectively which indicate exudative pericardial effusion based on Light's criteria. His pericardial fluid grew *S. enteritidis*. Other investigations performed on the pericardial fluid such as cytology, acid-fast bacilli (AFB) and TB GeneXpert study were negative. His human immunodeficiency virus (HIV) and hepatitis B tests were positive. His CD4 cell count was 10 cells/µL.

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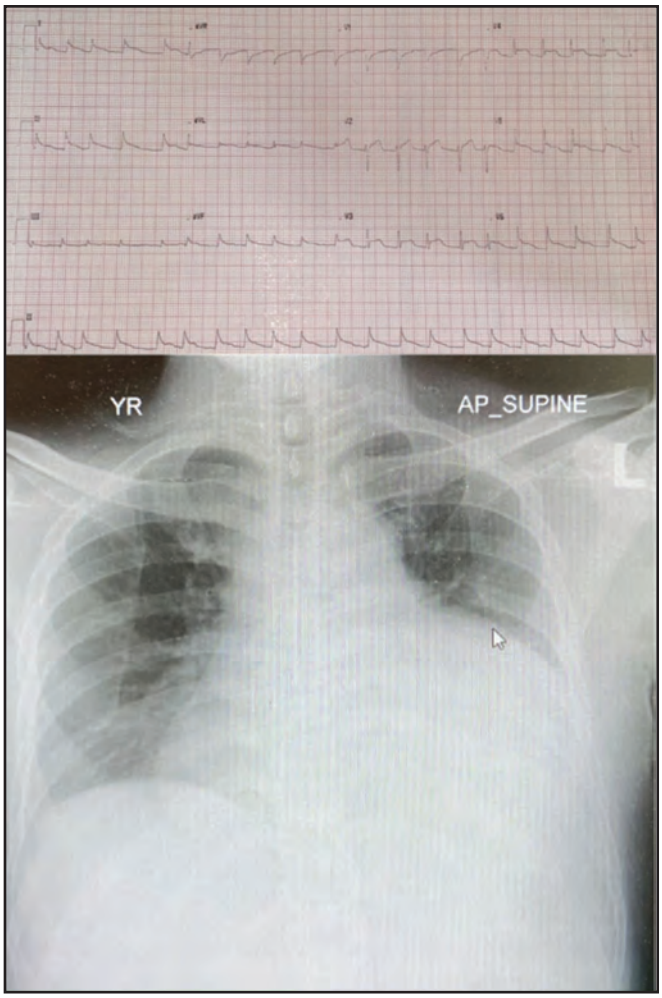

Fig. 1: (A) ECG showing ST-segment elevation at leads II, III, aVF, and V2-V6. (B) CXR showing cardiomegaly with a globular heart

He was given IV ceftriaxone for the treatment of S. enteritidis pericardial effusion. Pleural tapping on his left pleural effusion was performed on day 2 of admission, which drained out 500 ml of exudative haemoserous fluid. A pleural fluid study showed similar exudative features. There was no growth from the pleural fluid culture. Cultures taken from his blood, urine and stool were all negative. Around day 5 of admission, there was re-accumulation of both pericardial and left pleural effusion from repeated TTE. A second pericardiocentesis was performed and drained out 350 ml of haemorrhagic fluid which also grew *S. enteritidis*. In the same setting, a pericardial drain was inserted using a triple-lumen catheter in anticipation of rapid re-accumulation of pericardial fluid again. A pigtail catheter was also inserted for his left pleural effusion. Computed tomography (CT) scan thorax showed no pleuro-pericardial fistula, thus, the pleural pigtail catheter was removed 6 days later.

His pericardial catheter drained around 100-200ml of fluid daily for 1 week but subsequently reduced to less than 50 ml daily, prompting the cardiology team to perform a reassessment and guidewire exchange of his pericardial drain around 2 weeks post admission. He would undergo flushing of his pericardial drain as necessary when the drainage was poor. A repeated TTE was performed around 4 weeks post-admission and showed a reduction in pericardial effusion with evidence of organised effusion and shuddering of the septum, indicating early onset constrictive pericarditis (Figure 2B & C). Intra-pericardial fibrinolysis was planned but was postponed due to his persistently low platelet.

In addition to antibiotics, he was started on ART with oral tenofovir-emtricitabine and efavirenz on the 10th day of admission. IV antibiotics were changed from IV ceftriaxone to IV cefepime because of concerns about ceftriaxone-induced hyperbilirubinemia as his total and direct bilirubin level were increasing by four-fold from 30 µmol/L and 25 µmol/L to 114 µmol/L and 105 µmol/L respectively within 10 days of starting on IV ceftriaxone. As he remained clinically stable, the antibiotic was switched to oral trimethoprim-sulfamethoxazole for the continuation of treatment of his *Salmonella* infection. However, he developed severe sepsis on day 30 of admission with an episode of hypotension, hypoglycaemia and severe metabolic acidosis with haematochezia. IV antibiotics were then escalated to IV meropenem as he had a urine culture that grew extended-spectrum beta-lactamase *Proteus mirabilis*. He succumbed to death due to severe sepsis.

DISCUSSION

Massive haemorrhagic pericardial effusion due to non-typhoidal *Salmonella* pericarditis is a rare presentation. The occurrence of pericarditis can be due to the affinity of *S. enteritidis* to the pericardium. Patients who are immunocompromised were more likely to develop severe pericardial effusion with some presenting with cardiac tamponade.[3] Our patient had an advanced retroviral disease, which likely explains why he developed massive pericardial effusion.

The treatment modality for the pericardial effusion of such extent includes IV antibiotics and invasive procedures to drain the fluid.

Antibiotic treatment based on the culture and sensitivity report is the mainstay of non-typhoidal *Salmonella* pericarditis presenting with pericardial effusion. Those with less extensive pericardial effusion responded better with antibiotics treatment only.[2,4] The use of cephalosporin and quinolone group of antibiotics in the treatment of Salmonella pericardial effusion has been described.[5] Most antibiotics are administered through IV and orally. However, there has been a case report on the use of intra-pericardial antibiotics for the treatment of acute purulent pericarditis caused by *Staphylococcus aureus* infection.[6]

Needle pericardiocentesis is essential for diagnosis and offers symptomatic relief in the management of pericardial effusion. However, a high rate of fluid re-accumulation could happen, as seen in our patient, which calls for the consideration of other treatment modalities. Hence, an indwelling pericardial catheter was inserted to drain out the rapidly accumulating pericardial fluid to prevent the need for repeated needle pericardiocentesis. A study has shown that

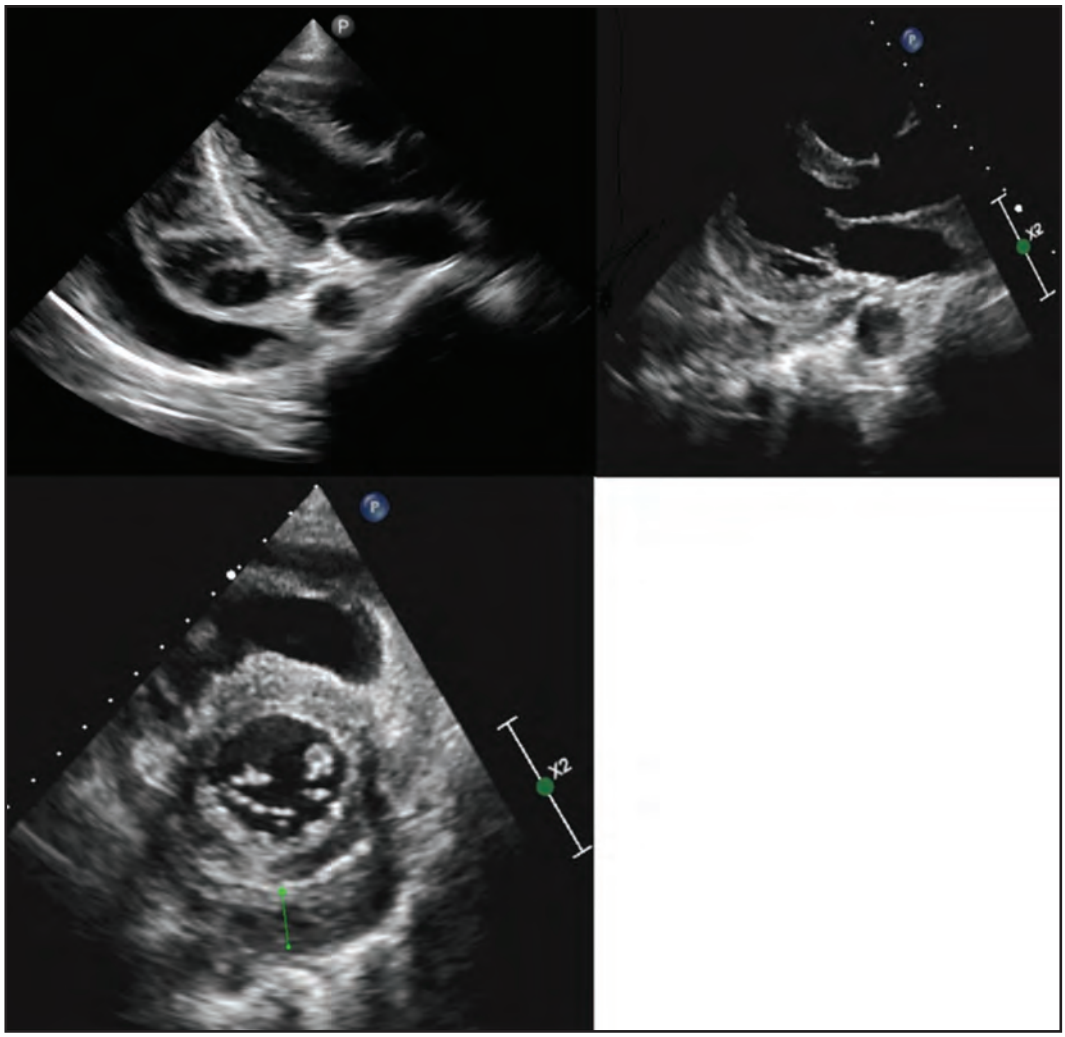

Fig. 2: (A) Parasternal long axis view showing septated pericardial fluid at the posterior pericardium (white arrow). Pleural effusion was also seen (dotted arrow). (B) Parasternal long axis view and (C) short axis view showing organised pericardial effusion

pericardial catheter placement is a safe alternative to needle pericardiocentesis without increasing the risk of arrhythmia.[7] Our patient experienced poor drainage from his pericardial catheter despite changing to a new catheter through guidewire exchange, likely due to the presence of septation in his pericardial fluid which was seen on TTE. There might be a role of intra-pericardial fibrinolysis in such a situation.

This could be considered in a setting without cardiothoracic service. There were surgical interventions such as pericardial window, pericardiotomy or pericardiectomy which could only be done by the cardiothoracic surgeons. However, there is no definite timing for each of these interventions.

Intrapericardial fibrinolysis in the treatment of exudative pericarditis is associated with lower morbidity compared to pericardiectomy and is less invasive.[8] There is still no definite answer regarding the best time to perform intra-pericardial fibrinolysis, which will have the best prognostic outcome. It could be either administered early when the initial echocardiogram showed evidence of septation or fibrin, or later to allow sufficient time for the antibiotic to take effect and when the evidence of constrictive pericarditis is more apparent.

Our patient seemed to improve with the treatment of IV antibiotics and pericardial drain, which has a 92% treatment success rate based on a case series of 12 adult patients.[9] However, given his severe immunocompromised state, there was always a risk of keeping the pericardial drain too long, in addition to flushing the catheter whenever the drainage was poor. This probably predisposed him to secondary bacterial infection, which could have resulted in him developing severe sepsis. However, all his repeated cultures at the time of his deterioration and demise were negative.

CONCLUSION

Non-typhoidal *Salmonella* pericarditis could present with massive haemorrhagic pericardial effusion in an immunocompromised host, as seen in our case report. It warrants a high index of clinical suspicion for early diagnosis and prompt treatment with IV antibiotics and pericardiocentesis with or without pericardial drain. It is

equally important to manage other risk factors such as patient's underlying immunocompromised state and pericardial catheter care which increase the patient's risk of secondary infection, resulting in poor clinical outcomes.

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DECLARATION OF CONFLICTING INTERESTS

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

REFERENCES

1. Cohen JI, Bartlett JA, Corey GR. Extra-intestinal manifestations of Salmonella infections. Medicine (Baltimore) 1987; 66: 349-88.
2. Levin, HS, Hosier, DM. Salmonella pericarditis: Report of a case and review of the literature. Ann. Intern. Med 1961; 55: 817.
3. Pace F, Fanfarillo F, Giorgino F, Baratta L. Salmonella enteritidis pericarditis: case report and review of the literature. Ann Ital Med Int 2002; 17(3): 189-92. PMID: 12402668.
4. Aziz A, Jafri W, Jawed TA, Shaikh A, Farooqui B, Ashfaq MK, Ul Haq N. Salmonella hadar pericarditis. Ann Saudi Med 1993; 13(1): 85-7. doi: 10.5144/0256-4947.1993.85. PMID: 17588001.
5. Chand G, Jhaj R, Sanam K, Sinha P, Alexander P. Pericardial salmonella with cardiac tamponade and ventricular wall rupture: A case report. Ann Med Surg (Lond) 2016; 7: 83-6. doi: 10.1016/j.amsu.2016.03.024. PMID: 27141304; PMCID: PMC4840289.
6. Abdelnabi M, Almaghraby A, Saley Y, El Sayed A, Rizk J. Acute purulent pericarditis treated conservatively with intrapericardial fibrinolysis and intrapericardial and systemic antibiotics. Proc (Bayl Univ Med Cent) 2021; 34(4): 498-9. doi: 10.1080/08998280.2021.1889297. PMID: 34219937; PMCID: PMC8224196.
7. Cook S, Cortellini S, Humm K. Prospective evaluation of pericardial catheter placement versus needle pericardiocentesis in the management of canine pericardial effusion. J Vet Emerg Crit Care (San Antonio) 2021; 31(1): 11-7. doi: 10.1111/vec.13030. Epub 2020 Dec 4. PMID: 33274832.
8. Augustin P, Desmard M, Mordant P, Lasocki S, Maury JM, Heming N, Montravers P. Clinical review: intrapericardial fibrinolysis in management of purulent pericarditis. Crit Care 2011; 15(2): 220. doi: 10.1186/cc10022. PMID: 21575282; PMCID: PMC3219308.
9. Saddler K, Castro-Lainez MT, Deliz-Aguirre R, Muñoz J, Aguilar Espinal JA, Sierra-Hoffman M, Chandna H, et al. Nontyphoidal *Salmonella* purulent pericarditis presenting with pericardial tamponade in a patient on infliximab therapy. IDCases. 2019; 15: e00500. doi: 10.1016/j.idcr.2019.e00500. PMID: 30788216; PMCID: PMC6370545.