International Surgery Journal
Louis MA et al. Int Surg J. 2024 Nov;11(11):1890-1895
http://www.ijsurgery.com
pISSN 2349-3305 | eISSN 2349-2902

DOI: https://dx.doi.org/10.18203/2349-2902.isj20243251

Case Report

Tuberculosis pericarditis: a case report

Martine A. Louis[1]*, Arpana S. Singh[2], Shubham Bhatia[1], Sheppard C. Webb[1], Patrick K. Kiarie[2], Luke Keating[1], Kellyann K. Inniss[3]

[1]Department of Surgery, Flushing Hospital Medical Center, Flushing, New York, USA
[2]St. George's University School of Medicine, Grenada, West Indies
[3]Ross University School of Medicine, St. Michael, Barbados

Received: 12 September 2024
Accepted: 17 October 2024

***Correspondence:**
Dr. Martine A. Louis,
E-mail: mlouis2.flushing@jhmc.org

ABSTRACT

Tuberculosis (TB) is still prevalent in the world. In 2020, 1.5 million people died from TB.18 TB accounts for 4% of acute pericarditis. Tuberculous pericarditis (TBP) is due to hypersensitivity to tuberculin protein produced by *Mycobacterium tuberculosis* and develops in 1-2% of pulmonary TB cases, representing about 1-2% of extrapulmonary tuberculosis. Complications occur in the form of acute pericarditis (4%) and cardiac tamponade (7%), which may require life-saving invasive procedures. Tuberculous pericarditis has an overall mortality rate of 1.43 per 100 person-months over a median follow-up of 11.97 months. Risk factors include diabetes, substance use disorder, HIV-positivity, renal insufficiency, biological or immunosuppressive therapy, and exposure to regions with a high prevalence of tuberculosis. We present a 49-year-old diabetic male with a large complex pericardial effusion occurring three months after a diagnosis of TB pleurisy on antituberculosis drugs, which required pericardiocentesis and pericardial window in the context of cardiac tamponade. Cases of TB pericarditis in developed countries are rarely reported, and there are even fewer in the US. Along with a literature review of the road map for its accurate diagnosis and treatment, this case highlights the relevance of TB in the differential of pericarditis worldwide, even in developed countries.

Keywords: Tuberculosis, Pericarditis, Pericardial window, Pericardiocentesis, Pleurisy, Cardiac tamponade

INTRODUCTION

Tuberculosis (TB) is an infectious and prevalent disease in Africa, Asia, and Latin America. Wealthy countries have seen a significant decline in tuberculosis, but nearly two million deaths have been linked to active TB in developing countries. In developed countries, 80-90% of pericarditis cases in immunocompetent patients are considered to be idiopathic and viral in origin.[7] TB accounts for 4% of acute pericarditis Tuberculous pericarditis (TBP) caused by *Mycobacterium tuberculosis* is due to hypersensitivity to tuberculin protein.[2] TBP develops in 1-2% of pulmonary TB cases and accounts for about 1 – 2% of extrapulmonary tuberculosis. TBP is a lethal condition and can be complicated by purulent pericarditis or cardiac tamponade.[3] Rapid diagnosis and treatment can be lifesaving. We report the case of a patient with a recent history of pleural TB on antituberculous drugs who presented with a large complex pericardial effusion requiring pericardiocentesis and pericardial window. This case highlights the relevance of TB in the differential of pericarditis etiology in developed countries and reviews the road map for its accurate diagnosis and treatment.

CASE REPORT

A 49-year-old diabetic male presented to the emergency room (ER) with three days of progressive shortness of breath a productive cough without chest pain, fevers,

chills, hemoptysis, or night sweats. He denied any recent travel or sick contacts and was a previous smoker. Two months prior, he presented to the ER with similar complaints and was found to have a large left pleural effusion and underwent bronchoscopy and thoracocentesis. The acid-fast bacilli smears were negative three times, and the patient was discharged with outpatient follow-up. The *Mycobacterium tuberculosis* bacterium probe was positive, and he was started on rifampin, isoniazid, pyrazinamide, and ethambutol (RIPE) with vitamin B6 therapy. The patient failed to follow up.

On exam, he had bilaterally decreased breath sounds and leg edema. His heart rate (HR) was 110 bpm, and oxygen saturation (O2 Sat) was 80%, which responded to non-invasive ventilation (non-rebreather oxygen mask). Laboratory results showed elevated lactate of 3.11, low white blood cell count (WBC) of 3.8, neutrophils 62, BUN/Creatinine of 12/0.4, and albumin of 3.1.

Chest radiograph revealed bilateral vascular congestion, edema, and pleural effusions with underlying atelectasis/infiltrates. Computerized tomography (CT) of the chest and abdomen showed a large complex pericardial effusion with pericardial thickening, bilateral loculated pleural effusions with pleural thickening, and liver cirrhosis.

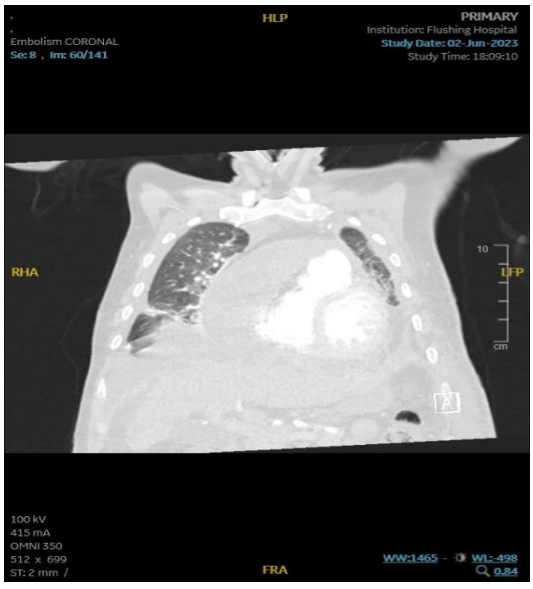

Figure 1: CT chest on initial presentation.

An echocardiogram revealed a 60% large pericardial effusion, and bedside pericardiocentesis was unsuccessful. He was started on ceftriaxone, doxycycline, and furosemide and transitioned to a high-flow nasal cannula (HFNC). On hospital day 3, a right chest tube thoracostomy was performed. On hospital day 4, he became hypoxic and hypotensive, was intubated, and transferred to the critical care unit. Bedside pericardiocentesis was again unsuccessful.

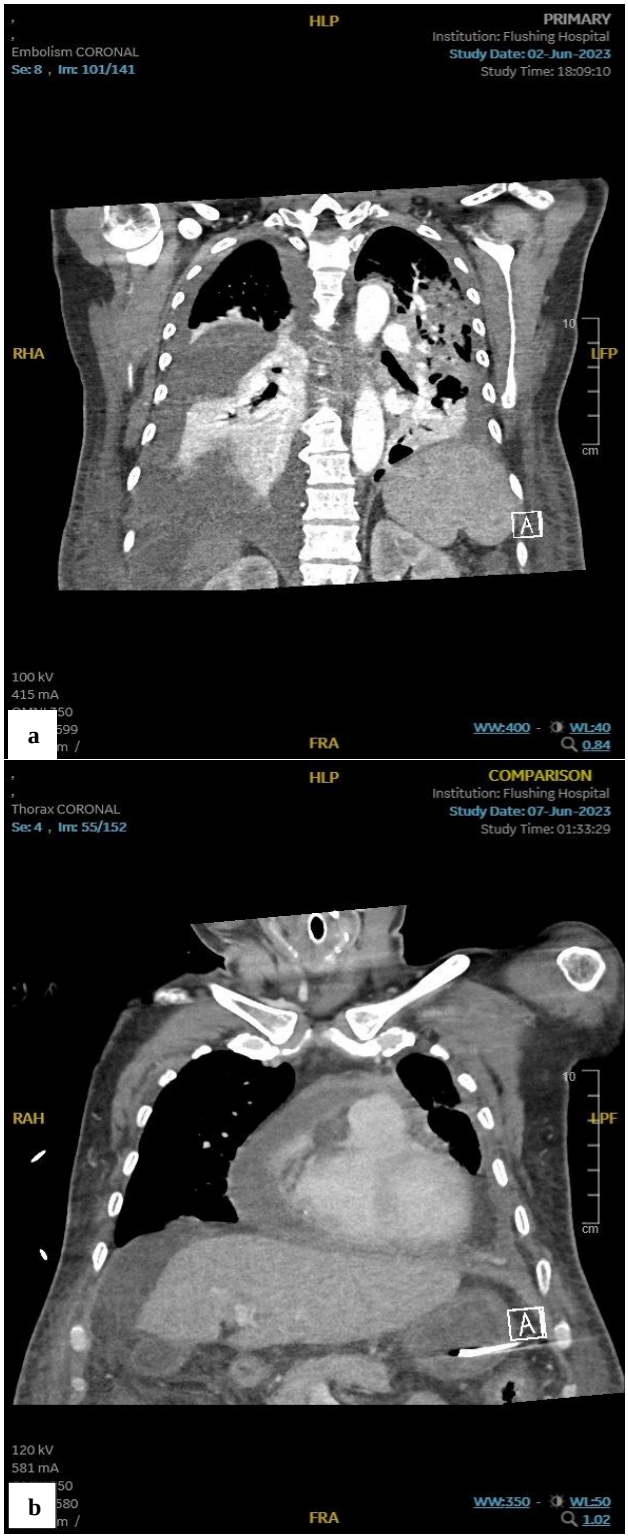

Figure 2 (a & b): CT chest post attempted pericardial drain placement.

He was assigned to a sister institution where he underwent an image-guided large pericardiocentesis by Interventional Radiology (IR) with aspiration of 205 ml of serosanguinous fluid. At that time, the chest tube was removed. The patient was transferred back to our center. On the 3rd day post IR drainage, a repeat echocardiogram

showed a recurrent pericardial effusion with concerns for cardiac tamponade. The patient was taken to the operating room for a pericardial window and excisional pericardial biopsy. 400cc of serous fluid was drained, and a 28 Fr chest tube was placed for pericardial drainage.

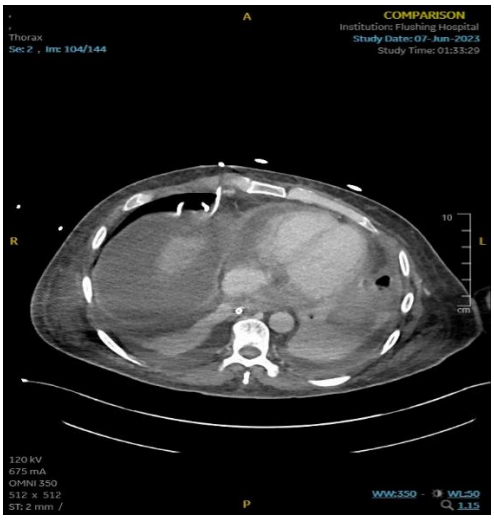

Figure 3: IR guided pigtail placement

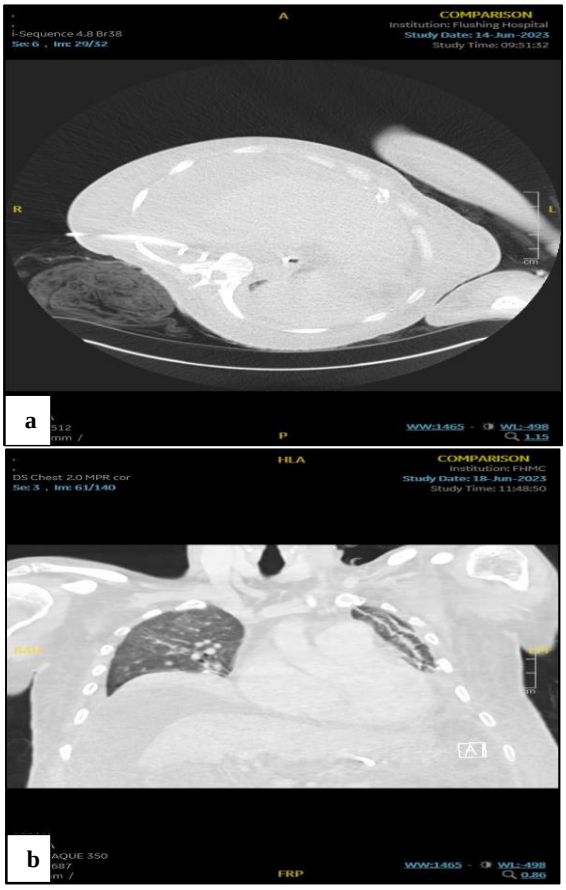

Figure 4 (a & b): Follow-up CT chest with resolution of pericardial effusion.

Postoperatively, a daily echocardiogram was performed, and pericardial drainage gradually decreased to 30 cc by day 7; 24 hours later, the pericardial chest tube was removed. His condition continued to improve, and he was extubated postoperative day 11. Fluid cultures were collected from the pericardial and pleural drains, and the pericardial biopsy results were negative. However, adenosine deaminase (ADA) levels in the pericardial and pleural fluid were elevated. The patient was continued on RIPE, amikacin, and Levaquin. On hospital day 46, the patient was discharged on RIPE, vitamin B6 treatment, steroid taper, and bactrim for *Pneumocystis jiroveci* prophylaxis. The patient was lost to follow-up.

DISCUSSION

In developed countries, 80–90% of pericarditis cases in immunocompetent patients are idiopathic and viral in origin. Less common etiologies include neoplasia (4.7–7.0%), TB (3.9–4.7%), autoimmune disease (1.7–10.2%) and purulent pericarditis (0.3–1.0%).[7] TB remains a concern amongst developing nations and causes about 60% of significant pericardial effusion.[5] TBP caused by *M. tuberculosis* is found in 1% of autopsied cases of TB and 1–2% of pulmonary TB.[2] TBP reflects a delayed hypersensitivity reaction to tuberculin protein. Initial support for this pathogenesis was found in an experiment involving the injection of tuberculin into the pleural cavities of guinea pigs, with the development of a large protein-rich pleural effusion. Within 24 hours, polymorphonuclear leukocytes primarily respond, followed by macrophages peaking at 96 hours, and finally lymphocytes. Research shows polymorphonuclear leukocytes play a role in defense against tuberculous bacilli.[18]

TB accounts for 4% of acute pericarditis and 7% of cardiac tamponade.[2,3] Effusive pericarditis, defined as pericardial effusion associated with thickened pericardium, occurs in 50–70% of TBP in HIV-negative and over 90% in HIV-positive patients.[4] TBP should be considered in patients from regions with high TB prevalence. Factors warranting consideration of TBP include diabetes, substance use disorder, biological or immunosuppressant drug treatment, HIV-positive status, renal insufficiency, and/or dialysis.[4] Early diagnosis is crucial to prevent complications. Research shows that 30–60% of TBP is complicated by constrictive pericarditis, with effusive-constrictive pericarditis occurring due to reduced compliance of the inflamed pericardium and is characterized by persistently elevated right-sided atrial pressure. In these patients, a diastolic knock may be detected, and an early third heart sound is heard on auscultation.[15]

The symptomatology of TBP is variable and nonspecific.[1] The European Guidelines on diagnosing tuberculous pericarditis specify that scores >6 highly indicate TBP.[4] Scoring includes fever (1 point), night sweats (1 point), weight loss (2 points), globulin level> 40 g/l (3 points), and peripheral leukocyte count <10×109 (3 points).[4] Typical chest pain is sudden, severe, and worsens with

inspiration, coughing, and swallowing but improves with leaning forward or sitting upright.[7] Dyspnea is most often observed amongst patients with larger pericardial effusions, estimated to be greater than 500 ml on echocardiogram. It is associated with a higher mortality rate and the need for pericardiectomy.[1]

Our patient was diabetic and in acute distress with shortness of breath requiring noninvasive ventilation. He was pale, tachycardic, and febrile with a pericardial rub, muffled heart sounds, and jugular venous distension without palpable lymphadenopathy. Though he did not meet European Guidelines, based on other symptoms and physical examination findings, TBP cannot be ruled out. TB and TBP can be confirmed by positive acid-fast staining and sputum PCR.[2,3] Culture of aspirated pericardial fluid remains the gold standard for diagnosing TBP.[2] 2004 diagnosis guidelines included positive culture for *M. tuberculosis*, effusive pericarditis, and positive culture from another site, positive tuberculin skin test and pericardial effusion diagnosed as lymphocytic exudate.[4] Pericardial effusions are limited in their biochemical evaluation. Light's criteria differentiate pleural effusions into transudative and exudative. The criteria for fluid exudate are pleural fluid/serum protein ratio >0.5 and/or pleural fluid/serum lactate dehydrogenase (LDH) ≥0.6 and/or pleural fluid LDH ≥2/3 upper reference limit and fluid LDH >300 U/l.[6] Our patient's pericardial effusion demonstrated an LDH=370 U/l, consistent with an exudative effusion.

In 2022, Dybowska et al, proposed a 3 step diagnostic algorithm for TBP. Firstly, confirmation of large pericardial effusion, defined as an echo-free space exceeding 20 mm, behind the posterior wall of the left ventricle, on echocardiogram.[4,5] Fibrinous strands on the visceral pericardium are typical but not specific for TBP.[15] In effusive-constrictive pericarditis, the echocardiogram typically shows pericardial effusion between thickened pericardial membranes and may show bi-ventricular dysfunction.[15] Chest X-ray shows an enlarged cardiac shadow in over 90% of cases and can demonstrate lucency over the left heart border and anterior mediastinum, suggesting pneumopericardium.[3] Active pulmonary TB is seen in 30% of cases, and pleural effusion in 40-60%.[14] CT demonstrates pericardial collection.[15]

Secondly, pericardial fluid volume and clinical condition determine threats of a cardiac tamponade requiring urgent decompression. Recurrent tamponade after pericardiocentesis requires surgical placement of a pericardial drain. Finally, step 3 emphasizes confirming the tuberculous etiology of pericarditis.[4] This can be done through Direct Ziehl test staining for TB, culture, interferon-gamma, ADA, lysozyme in pericardial fluid, and pericardial biopsy positive for mycobacterium tuberculosis.[5]

Other criteria include a pericardial friction rub, elevation of biomarkers, and ECG changes such as diffuse ST-segment elevation, PR segment depression, and widespread T-wave inversion.[7] The presence of microvoltage (i.e., complexes <5 mm in limb leads and <10 mm in precordial leads) suggests a large pericardial effusion.[14] Acute pericarditis is associated with increased serum biomarkers for myocardial injury. A mild increase in serum cardiac troponin I (TnI) in the absence of elevations of CK-MB was reported in 32% of patients.16

While NSAIDs are the mainstay therapy for viral or idiopathic pericarditis, anti-TB therapy also reduces mortality in TBP.[7] Antibiotic therapy has been shown to increase survival in TB pericarditis dramatically, and RIPE for two months and INH/RIF for four months is highly effective.[2] Though TB is treatable, approximately 1.3 million people died from TB in 2012. A potential explanation is the spread of drug-resistant TB, likely secondary to the amplification of resistance patterns through incorrect treatment and transmission. The first line of anti-TB drugs includes RIPE and streptomycin, a regimen with high cure rates but not indicated in multidrug-resistant (MDR) TB.

Globally, MDR–TB is present in 3.8% of new TB patients and 20% of previous patients, most commonly found in Eastern Europe and Central Asia.[18] Due to weak sterilizing activity, second-line TB drugs take 18-24 months to be effective in MDR-TB patients. Recently, research has focused on developing new anti-TB drugs. Though MDR poses challenges for treatment, complete resolution is possible with early identification of resistance.[19]

Indications for invasive procedures include cardiac tamponade, suspected purulent, tuberculous, neoplastic pericarditis, and persistent symptomatic pericardial effusion despite medical therapy.[7] Echocardiographic- or fluoroscopic-guided needle pericardiocentesis remains the treatment of choice to evacuate pericardial fluid and alleviate cardiac tamponade. When possible, especially with pericardial effusions greater than 1 cm, pericardiocentesis remains essential to approaching patients with suspected TBP.[10]

One study of 240 South African patients with effusive TBP comparing outcomes of pericardiocentesis to pericardial window concluded that open drainage was less likely to require repeat pericardiocentesis than initial bedside pericardiocentesis. Furthermore, with advances in technology and technique, subxiphoid pericardiotomy with pericardial biopsy is an even safer procedure.[13] The study also reviewed 30-day readmission and one-year outcomes of consecutive TBP over six years. Patients had echo-guided pericardiocentesis and drainage via an indwelling pigtail catheter and received standard antituberculosis regimens. Two patients developed fibrous constrictive pericarditis after receiving adjuvant corticosteroid therapy.

One-year all-cause mortality was 17.3%. 30-day and one-year all-cause mortality was higher among HIV-positive than HIV-negative patients.[14] The treatment of effusive constrictive pericarditis is problematic because pericardiocentesis does not relieve impaired filling of the heart. However, antituberculosis drugs are indicated, and serial echo should be performed during management. Our patient had a large effusion based on the initial echocardiogram, pericardiocentesis, and pericardial window drainage. Pericardial biopsy showed acute and chronic inflammation of the fibroconnective tissue but the negative staining pattern for fungal organisms and AFB.

In general, indicators of poor outcomes in acute pericarditis include fever >38℃, subacute onset, immunodepression, trauma, oral anticoagulant therapy, myopericarditis, severe pericardial effusion, cardiac tamponade, and lack of response to aspirin or NSAIDs after at least one week of treatment. These patients require admission for monitoring and a specific etiologic search.[7] Specifically, in TBP, albumin level is considered a predictive prognostic factor. A study of 87 patients with TBP showed that hypoalbuminemia in HIV-uninfected patients is an independent predictor of unfavorable outcomes. This finding was echoed by another study that identified albumin of less than 3.2 g/dl as a risk factor for HIV-infected patients with tuberculosis. Moreover, in cardiovascular disease, size of the pericardial effusion-small (50-100 ml), moderate (100-500 ml) or large (>500 ml) can also predict outcomes.[1]

TBP is rare, and atypical presentations merit mention: the development of a fistula between the esophagus and pericardial effusion as a complication of tuberculous pericardial effusion. Stents for TB-related OPF should be considered for sepsis control before invasive surgery in combination with anti-TB treatment.[3] In addition, TB-COVID-19 co-infection has been described. Among 1,272,728 patients who underwent testing for COVID-19, 4996 (0.4%) were diagnosed with TB-COVID-19 coinfection.[17] Another notable atypical case was a 23-year-old COVID-19 positive male with acute lymphoblastic leukemia, cough, and fever for two days, who deteriorated and expired despite the start of RIPE medications.

CONCLUSION

TBP is a rare manifestation of TB. Early diagnosis is essential to prevent mortality and morbidity. Diagnosis with CT imaging and echocardiography can expedite treatment. Anti-TB drug regimens should be started early, and risk factors and/or markers of poor clinical outcomes should prompt pericardiocentesis or pericardial window/biopsy. Importantly, our case is a reminder that nonspecific symptoms such as dyspnea, cough, and fever in large pleural effusion warrant consideration of TBP in differential diagnosis.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: Not required

REFERENCES

1. Jung IY, Song YG, Choi JY, Kim MH, Jeon WY, Oh DH, et al. Predictive factors for unfavourable outcomes of tuberculous pericarditis in human immunodeficiency virus–uninfected patients in an intermediate tuberculosis burden country. BMC Infectious Dis. 2016;16(1):2062-5
2. Denk A, Kobat MA, Balin SO, Kara SS, Dogdu O. Tuberculous pericarditis: a case report. Le Infezioni in Medicina. 2016;24(4):337–9.
3. Sidhu KK, Seyfi D, Lau NS, Yeo D. The rare case of oesophago-pericardial fistula secondary to pulmonary tuberculosis. J Surg Case Reports. 2022(9):422.
4. Dybowska M, Błasińska K, Gątarek J, Klatt M, Augustynowicz-Kopeć E, Tomkowski W, et al. Tuberculous pericarditis-own experiences and recent recommendations. Diagnostics. 2022;12(3):619.
5. Dybowska M, Szturmowicz M, Błasińska K, Gątarek J, Augustynowicz-Kopeć E, Langfort R, et al. Large pericardial effusion—diagnostic and therapeutic options, with a special attention to the role of prolonged pericardial fluid drainage. Diagnostics. 2022;12(6):1453.
6. Kopcinovic LM, Culej J. Pleural, peritoneal and pericardial effusions-a biochemical approach. Biochemia Medica. 2014;3:123-37.
7. Imazio M, Trinchero R. Triage and management of acute pericarditis. Int J Cardiol. 2006;118(3):286-94.
8. Giordani AS, De Gaspari M, Baritussio A, Rizzo S, Carturan E, Basso C, et al. A rare cause of effusive–constrictive pericarditis. ESC Heart Failure. 2021;8(5):4313-7.
9. Nanyoshi M, Amano S, Fujimori T, Sano C, Ohta R. Tuberculous pleurisy diagnosed from massive pleural effusion in an older patient with no history of tuberculosis. Cureus. 2022.
10. Jeon D. Tuberculous pleurisy: an update. tuberculosis and respiratory diseases. BMJ. 2014;76(4):153.
11. Isiguzo G, Du Bruyn E, Howlett P, Ntsekhe M. Diagnosis and management of tuberculous pericarditis. Current Cardio Rep. 2007;22(1)1254.
12. Reuter H, Burgess LJ, Louw VJ, Doubell AF. The management of tuberculous pericardial effusion: experience in 233 consecutive patients. Cardiovasc J S Afr. 2007;18(1):20-5.
13. Trautner BW, Darouiche RO. Tuberculous pericarditis: optimal diagnosis and management. Clin Infect Dis. 2001;33(7):954-61.
14. Mayosi BM, Burgess L, Doubell A. Tuberculous Pericarditis. Circulation, 2005;112(23):3608–16.

15. Haqs IU, Davies DR, Yao R, Bratt A, Sinak LJ, Singh M. Effusive-constrictive tuberculosis pericarditis with biventricular systolic dysfunction. CASE. 2022;6(5):212–7.
16. Srivastava S, Sharad N, Ningombam A, Kumar D, Malhotra R, Mathur P. tuberculous pericarditis in a patient with COVID-19. 2023. J Applied Lab Med. 2023;8(3):645-8.
17. Vorster MJ, Allwood BW, Diacon AH, Koegelenberg CF. Tuberculous pleural effusions: advances and controversies. J Thorac Dis. 2015;7(6):981-91.
18. Seung KJ, Keshavjee S, Rich ML. Multidrug-resistant tuberculosis and extensively drug-resistant tuberculosis. Cold Spring Harb Perspect Med. 2015;5(9):17863.

Cite this article as: Louis MA, Singh AS, Bhatia S, Webb SC, Kiarie PK, Keating L, et al. Tuberculosis pericarditis: a case report. Int Surg J 2024;11:1890-5.