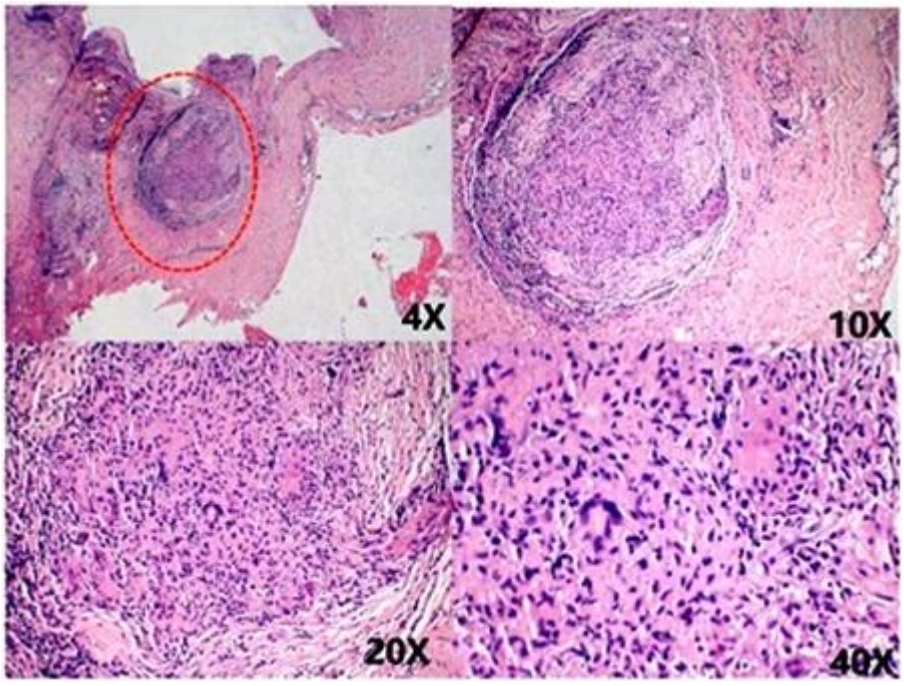
Tuberculous (TB) pericarditis with tamponade is a relatively rare manifestation of extrapulmonary tuberculosis and a major cause of cardiovascular death and morbidity. Even with an aggressive anti-TB regimen, 30-60% of patients may require a surgical pericardiectomy for constrictive pericarditis. Several articles have reported the co-occurrence of COVID-19 and TB pericarditis with massive pericardial tamponade.

Mycobacterium tuberculosis has a preference for oxygen-rich tissues, so the lungs are a primary site of infection. Bacilli can reach the pericardium through hematogenous spread, lymphatic dissemination, or direct extension from a contiguous focus of infection, such as the lungs, mediastinal lymph nodes, or the spine.

In the pericardium, bacilli trigger an inflammatory response leading to the formation of granulomas, nodular inflammatory lesions that characterize TB. Granulomas erode the pericardium and cause an influx of protein-rich fluid into the pericardial space. This results in pericardial effusion. The bacilli may further induce necrosis and release more debris into the pericardial space, resulting in a thicker, more “constrictive” pericardial effusion and constrictive pericarditis. The host’s immune response influences progression from pericardial effusion to constrictive pericarditis.



It is assumed that severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) can cause the reactivation of latent TB. This assumption is consistent with the theory of interaction

between the first and the second intracellular pathogens (viruses, bacteria, fungi, or protozoan parasites), which infect the same host cell simultaneously. T-cell exhaustion facilitates the reactivation of latent intracellular pathogens, leading to potentially severe consequences.
https://discovermednews.com/the-presence-of-concurrent-intracellular-pathogens-can-lead-to-t-cell-exhaustion-and-potentially-severe-consequences/

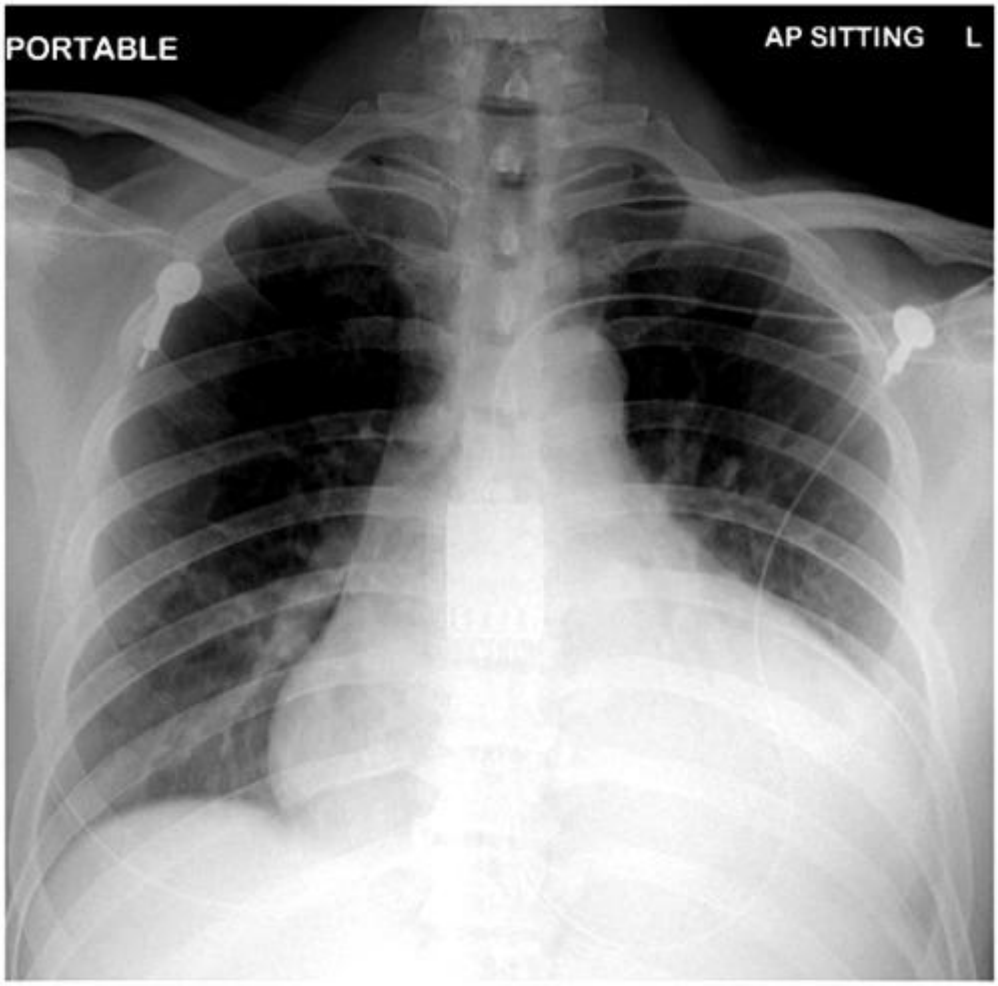
This theory is illustrated by the interaction between the human immunodeficiency virus (HIV) and *Mycobacterium tuberculosis*. It is estimated that one-third of global HIV mortality is due to the reactivation of *Mycobacterium tuberculosis,* triggered by HIV. In HIV-infected individuals, TB causes more than 85 % of pericardial effusions. Also, HIV alters the natural history and outcome of TB pericarditis, making HIV-associated TB a more aggressive disease with more severe myocardial involvement.

1st Case Report

A man aged 47 years presented with a productive cough, pleuritic chest pain, and fever for two days. Vital signs were: blood pressure 130/83 mmHg, heart rate 104 beats/min, oxygen saturation 97%, and respiratory rate 16/min. A chest radiograph showed left-sided lower zone retrocardiac opacities. His nasopharyngeal swabs tested positive on reverse transcription polymerase chain reaction (rt-PCR) for SARS-CoV-2.

After three days of hospitalization, his condition worsened. There was no evidence of heart failure or tamponade. ECG showed sinus tachycardia with normal QRS complexes. Laboratory tests demonstrated absolute monocytosis and an elevated level of C-reactive protein. On a repeated chest radiograph, the heart size was markedly increased. He initiated remdesivir as a part of an ongoing trial.

The transthoracic echocardiogram showed a hyperdynamic left ventricle with a left ventricular ejection fraction of 65%, the right atrial collapse, diastolic collapse of the right ventricle, and 3.5 cm of pericardial effusion. The effusion contained fibrin deposits adhering to the myocardium. Pericardiocentesis yielded 900mL of haemoserous fluid. Cytology was negative for malignancy. The PCR test of pericardial effusion was negative for adenovirus, enterovirus, and SARS-CoV-2.



Original illustration from the article of Wong et al.

PCR test of the pericardial fluid was positive for *Mycobacterium tuberculosis*. The level of adenosine deaminase in the pericardial fluid was significantly elevated. The authors stated that these findings in the pericardial fluid, in the absence of coagulopathy, malignancy, and autoimmune etiologies, are pathognomonic of TB involvement. The patient initiated an anti-TB regimen comprising rifampicin, isoniazid, ethambutol, and pyrazinamide. Subsequent echocardiography demonstrated the resolution of the effusion. The symptoms improved markedly, and the patient was discharged after two weeks of the anti-TB regimen. Four weeks after discharge, a chest X-ray showed a resolution of pericardial effusion and residual left retrocardiac consolidation.

This article was published in the European Heart Journal – Case Reports.

Journal Reference

Wong SW, et al. Tuberculous pericarditis with tamponade diagnosed concomitantly with COVID-19: a case report, *European Heart Journal- Case Reports*, Volume 5, Issue 1, January 2021, ytaa491 (Open Access) https://doi.org/10.1093/ehjcr/ytaa491

2nd Case Report

The authors presented a case of TB pericarditis with cardiac tamponade diagnosed simultaneously with COVID-19.

A man aged 52 years with chronic kidney disease who was not on hemodialysis was admitted with shortness of breath, fluid overload, and hypoxemia. He tested positive for SARS-CoV-2 and was treated with steroids, remdesevir, tocilizumab, and hemodialysis.

On day 60 of hospitalization, he deteriorated with stupor and hypotension. Echocardiography showed a new large circumferential pericardial effusion with right ventricular diastolic collapse and increased respiratory variation in peak E-wave mitral inflow velocity, consistent with tamponade physiology. An emergency pericardiocentesis was performed, and hemodynamic instability was resolved immediately after aspiration of 750 milliliters of frank pus. Empiric antibiotics were given initially.

The pericardial fluid was positive for acid-fast bacilli and adenosine deaminase. Anti-TB therapy was started. Subsequent echocardiography demonstrated a reaccumulated pericardial effusion, but there was no tamponade, suggesting a partial response to the anti-TB treatment. However, the patient's condition further deteriorated with the development of septic shock and cardiac arrest.

This article was published in the Chest.

Journal Reference

Khosa JK et al. Tuberculous tamponade with a twist: a case of TB and COVID-19. Chest. 2022 Oct; 162(4): A553. (Open Access)
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9548719/

Conclusion

In these two case reports, individuals diagnosed with COVID-19 developed TB pericarditis and pericardial tamponade. The authors suggested that COVID-19 could trigger an inflammatory response that serves as a nidus for TB reactivation. Therefore, clinicians

should incorporate TB into the differential diagnosis in patients with viral infection, pericarditis, and tamponade.

Serial echocardiography and imaging techniques, including computed tomography, may be appropriate, particularly in young patients who deteriorate at an alarming rate. However, the gold standard for confirming TB pericarditis is the identification of *Mycobacterium tuberculosis* in the pericardial fluid or tissue.