


Cardiac tamponade as the first presentation of thymoma: A case report during COVID-19 pandemic

Proceedings of Singapore Healthcare
Volume 31: 1–4
© The Author(s) 2022
Article reuse guidelines:
sagepub.com/journals-permissions
DOI: 10.1177/20101058211048956
journals.sagepub.com/home/psb


Nirmalatiban Parthiban¹  and Huzairi Sani² 

Abstract

We report a case of neoplastic cardiac tamponade, a life-threatening condition, as the initial presentation of an anterior mediastinal malignancy. A 69-year-old gentleman with no known history of malignancy presented to the emergency department with shortness of breath, reduced effort tolerance and chronic cough. Clinically, he was not in distress but tachycardic. He was subjected to echocardiography which revealed large pericardial effusion with tamponade effect. Pericardiocentesis drained 1.5 L of haemoserous fluid. CECT thorax, abdomen and pelvis revealed an anterior mediastinal mass with intrathoracic extension complicated with mass effect onto the right atrium and mediastinal vessels. Ultrasound-guided biopsy histopathology examination revealed thymoma. Due to locally advanced disease, tumour resection was not possible, and patient was referred to oncology team for chemoradiotherapy. We report this case study not only due to the rarity of the case but also to highlight its diagnostic challenge due to the COVID-19 pandemic.

Keywords

Cardiac tamponade, pericardiocentesis, thymoma

Introduction

Neoplastic pericardial disease is usually seen in terminal cases of malignancy, and for a majority of patients, it remains undiagnosed during their life. Cardiac tamponade as an initial manifestation of an undiagnosed malignancy is uncommon and a fatal presentation. Recently, Camille et al study reported a significant increase in the number of avoidable cancer deaths as a result of diagnostic delays in the novel coronavirus (COVID-19) pandemic due to prioritization of clinical services to preserve hospital capacity.¹ Besides, in response to the COVID-19 pandemic, essential medical services such as echocardiography are significantly altered with non-urgent cases are deferred until the COVID-19 real-time polymerase chain reaction (RT-PCR) test is available.² We report a timely case study not only due to the rarity of the case but also to emphasize the importance of having high index suspicion among physicians of its highly fatal presentation and to highlight its diagnostic challenge due to the pandemic. The relevant literature is also reviewed here.

Case report

69-years-old gentleman, cigarette smoking history of 40 pack-years, with medical history of type-2 diabetes mellitus

and hypertension presented with dyspnoea and reduced effort tolerance for the past 1 month. He also had non-productive cough for the past 1 year. The patient denied other heart failure, abdominal or constitutional symptoms. On clinical examination, blood pressure: 155/85 mmHg, pulse rate: 100 bpm, respiratory rate of 22 breaths per minute, afebrile, SpO₂ 96% without oxygen supplement, with normal JVP but muffled heart sounds. There were signs of pleural effusion at the lower zone of the left lung. There were bilateral pedal oedema up to the mid-shin. Abdominal examination was unremarkable. Electrocardiogram (Figure 1(a)) showed low voltage QRS complexes but no electrical alternans. Chest X-ray (Figure 1(b)) showed globular heart, left-sided pleural effusion and widened mediastinum. Due to concern regarding COVID-19 infection in the setting of his respiratory symptoms, a nasopharyngeal swab for RT-PCR was sent

¹Department of Internal Medicine, Hospital Selayang, Selangor, Malaysia

²Cardiology Unit, Department of Internal Medicine, Faculty of Medicine Universiti Teknologi MARA, Sungai Buloh Campus, Selangor, Malaysia

Corresponding Author:

Nirmalatiban Parthiban, Department of Internal Medicine, Hospital Selayang, Batu Caves, Selangor 68100, Malaysia.
Email: nirmalatibanparthiban@gmail.com



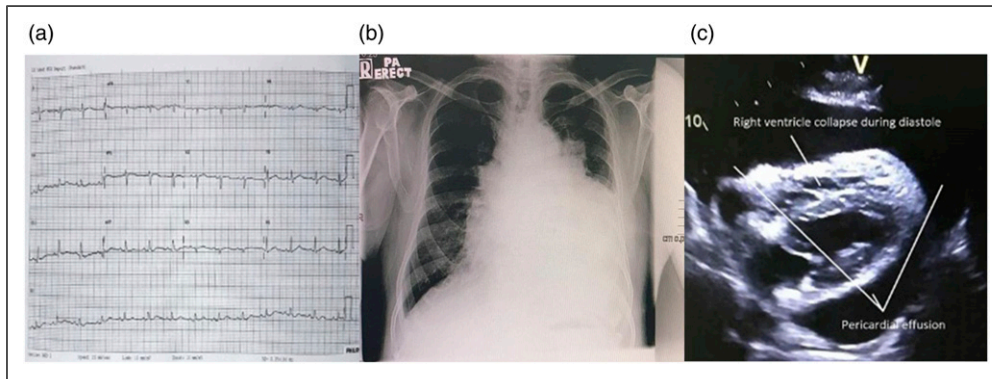


Figure 1. ECG (a) showing low voltage complexes. Chest radiography (b) demonstrating globular-shaped heart with loss of left costophrenic angle. Transthoracic echocardiogram (c) showing large pericardial effusion with tamponade effect.

Table 1. Blood Investigations on Presentation.

Test	Results	Test	Results
White cell count ($10^9/L$)	8.72	Total protein (g/L)	79
Haemoglobin (g/L)	11.5	Aspartate aminotransferase (IU/L)	56
Platelet ($10^9/L$)	256	Alanine aminotransferase (IU/L)	13
Urea (mmol/L)	3.8	Albumin (g/L)	34.1
Sodium (mmol/L)	140	Prothrombin time (s)	13.3
Potassium (mmol/L)	3.1	International normalized ratio	1.0
Creatinine (mmol/L)	85	Activated prothrombin time (s)	44.7
Creatinine kinase (IU/L)	60	C-reactive protein (mg/L)	11.3
Lactate dehydrogenase (U/L)	426	ESR (mm/hr)	40

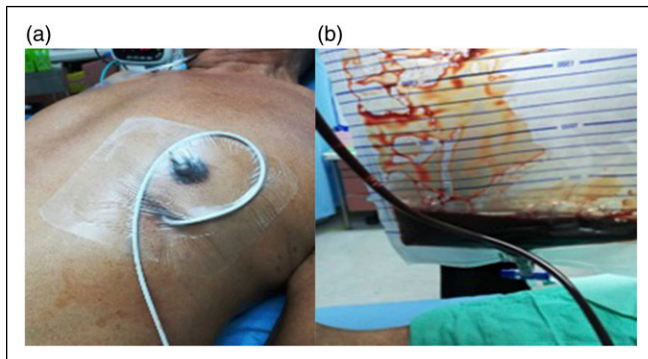


Figure 2. Pericardiocentesis-apical approach (a). Hemerosous pericardial fluid (b).

which came back as negative after 48 hrs. [Table 1](#) shows the blood investigations during the admission.

Transthoracic echocardiogram ([Figure 1\(c\)](#)) was performed after RT-PCR result showed global large pericardial effusion with tamponade effect on the right ventricle. A significant accumulation of fluid in the pericardial space reduces the total volume that the four cardiac chambers can contain which can compromise the haemodynamic stability due to the underfilling of the ventricles. Large pericardial effusion is associated with elevated intrapericardial pressure. As a result, the lower right ventricular pressure compared to the left ventricular pressure leads to diastolic collapse of the right ventricular free wall which is observed in our patient. This large pericardial effusion appeared as ‘swinging heart’

on an echocardiogram in which the position of the heart changes within the pericardial space. In some, this may appear as electrical alternans on electrocardiogram (ECG). Although the echocardiography showed features of tamponade, the patient appeared to be stable (normal blood pressure and not in shock).

Immediate pericardiocentesis using apical approach ([Figure 2\(a\)](#)) was performed, and approximately 1500 ml of hemerosous pericardial fluid was drained over 24 hrs. Staining of the fluid for acid-fast bacilli was negative, as were bacterial cultures. Pericardial fluid cytology examination was negative for malignant cells. Repeated echocardiogram after removal of catheter did not show any accumulation, and patient remained asymptomatic.

As part of the investigations, we proceeded with contrast enhanced computed tomography of the thorax, abdomen and pelvis (CECT TAP). CECT TAP ([Figure 3\(a\)](#)) revealed anterior mediastinal mass with intrathoracic extension with mass effect onto the right atrium. The mass was seen to encase the mediastinal vessels compressing the right brachiocephalic vein and superior vena cava. There was no evidence of distant metastasis. Ultrasound-guided biopsy ([Figure 3\(b\)](#)) of the anterior mediastinal tumour revealed the presence of singly dispersed p63+ epithelial cells within immature T lymphoid cells suggestive of thymoma (Type B1). Patient was referred to cardiothoracic team for further management. However, due to locally advanced disease, surgical resection was not possible, and patient was referred to oncology team for urgent chemoradiotherapy.

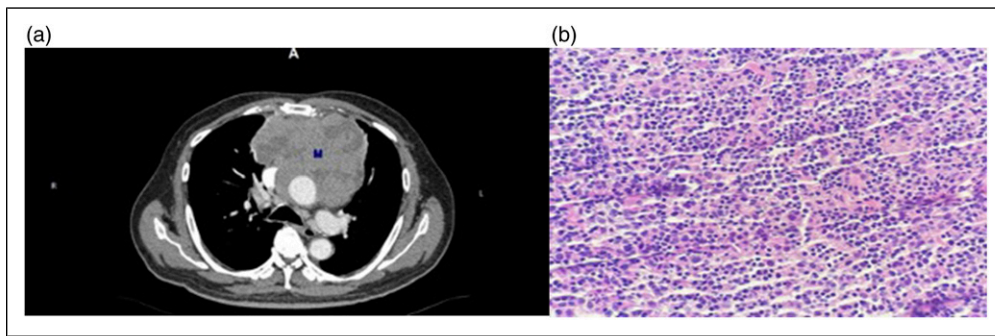


Figure 3. CECT TAP (a) shows anterior mediastinal mass with intrathoracic extension. The presence of singly dispersed p63+ epithelial cells (b) within immature T lymphoid cells suggestive of Thymoma (Type B1).

Discussion

Neoplastic pericardial disease presenting as cardiac tamponade is an uncommon presentation of any malignancy. In autopsy studies, malignant cardiac tamponade accounts about 30% of cases, but it is much rarer to identify tamponade during the lifetime.^{3,4} A retrospective study reported the incidence of pericardial disease to be the presentation of unrecognized underlying malignancy is about 7.5%.⁵ Another similar study reported the likelihood of finding a neoplastic disease with the initial presentation of pericarditis or a small pericardial effusion is only 4–7%, although this increases to 23–33% for large pericardial effusions.⁶ 28-day mortality in patients with malignant cardiac tamponade is 33% with mean survival around 144 days.⁷ The overall incidence of thymomas is rare with only 0.15 cases per 100,000 being identified, and pericardial tamponade is a rare initial manifestation of thymoma.⁸

The pathophysiology of the neoplastic pericardial disease is thought to be predominantly through regional lymphatic invasion as described in Fraser hypothesis.⁹ Others would be direct mediastinal invasion and hematogenous spread. The pathophysiology of malignant pericardial effusion in this case likely due to the local invasion and direct extension of the tumour into the pericardium.

The symptoms for malignant pericardial effusion are non-specific, mostly clinically silent and asymptomatic and usually determined by the volume of the pericardial effusion, the rate of accumulation and the elasticity of the pericardium. This patient had a feature of early tamponade though his presentation was not drastic but rather subtle as large effusions are better tolerated if the rate of accumulation is slow and the pericardial elasticity is high. Other symptoms that have been reported include exertional dyspnoea progressing to orthopnoea, chest discomfort and pain. Excessive tiredness and palpitation due to reduced cardiac output are not unusual presentations.¹⁰

Clinical signs in the setting of acute rise of pericardial pressure include elevated JVP with diminished or absent y descent and Kausmaul sign, a paradoxical elevation in the jugular venous pressure during inspiration may be seen. Other clinical signs that may suggest haemodynamic instability in cardiac tamponade include pulse paradoxus which is an exaggerated drop of greater than 10 mmHg in systolic pressure during inspiration, muffled heart sounds, hypotension and narrow pulse pressure. The classical triad (Beck's triad) which is hypotension, tachycardia and muffled heart sounds seldom seen in neoplastic pericardial tamponade as they are subacute onset. ECG may show low voltage complexes and in some

electrical alternans. Chest x-ray may show enlarged cardiac silhouette and those with concomitant pleural effusion as seen in our patient may strongly suggest malignancy.¹¹

Transthoracic echocardiography findings of the thickened pericardium with evidence of right ventricular diastolic collapse are the gold standard for the diagnosis of tamponade. Given its wide availability and key role as a bedside test, echocardiography is the most affected cardiac imaging modality in COVID-19 pandemic due to limited expert staff availability and the risk of periprocedural transmission between patients and staff, with international organizations calling for preprocedural COVID-19 RT-PCR test in haemodynamically stable patients.¹² Our patient appeared to be haemodynamically stable upon admission and fell into the category of non-urgent in-patient echocardiography, and COVID-19 RT-PCR was indicated in view of his respiratory symptoms. However, echocardiography that was done in a timely manner showed cardiac tamponade which in fact could be fatal if the diagnosis was missed and early intervention was not made. Therefore, we recommend that early echocardiography should be considered in patients presenting with features of cardiac failure even if they are haemodynamically stable during this pandemic.¹³ Each centre should consider policies review for safe operation of echocardiography practice especially for patients who are waiting for COVID-19 PCR as the average time to receive PCR result is about 24–48 h and it is predicted it can go up to a week due to significant demand in testing.

CT and MRI are other modalities that may be useful in evaluating pericardial structures, detecting haemorrhagic or loculated effusions and detecting the presence of a primary tumour or metastatic lesions within lung parenchyma.

The management options include pericardiocentesis, pericardiectomy and the creation of pericardial window. Pericardiocentesis essentially safe under echocardiogram and provides symptomatic relief, and fluids can be sent for cytologic examination.¹⁴ Pericardiectomy may be indicated if pericardiocentesis fails but has high operative risks.¹⁵ For recurrent neoplastic pericardial effusion, the creation of permanent pericardial window to allow drainage of fluids into pleura or peritoneal cavity is another therapeutic option. Intrapericardial antineoplastic and radiation therapies are other modalities depending on the underlying neoplasm.

Conclusion

Neoplastic cardiac tamponade, a life-threatening condition, is uncommon as initial presentation of undiagnosed malignancy. The clinical suspicion of malignant cardiac tamponade is crucial

among haemodynamically stable cardiac failure patients due to non-specific symptoms and signs. The case study also highlights the importance of policy review for safe use of echocardiography among patients who are screened for COVID-19. Timely pericardiocentesis can be life-saving.

Practice points

1. Cardiac tamponade is a rare initial presentation of undiagnosed malignancy.
2. One should maintain high index of suspicion for cardiac tamponade and consider requesting for urgent echocardiography evaluation for haemodynamically stable patients with features of cardiac failure during this COVID-19 pandemic.
3. Urgent review on the standard operating procedures of echocardiography during COVID-19 pandemic to include patients who are going to be screened for COVID-19 or waiting for COVID-19 RT-PCR results for safe practices while maintaining excellent patient care.

Acknowledgements

The authors would like to acknowledge medical department of Hospital Selayang and Faculty of Medicine UiTM for supporting the submission of the case report. Our utmost gratitude goes to our colleagues, supervisors and family members for their active guidance and encouragement.

Author Contributions

NP and HS are responsible for collection of data, drafting and revising the manuscript.

Declaration of Conflicting Interests

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

Funding

The authors received no financial support for the research, authorship, and/or publication of this article.

Ethical approval

Ethical approval for this case was obtained from Medical Research and Ethics Committee (MREC).

Informed consent

Informed consent was obtained from the patient for his information to be published in this article.

Availability of data and materials

The data that support the findings of this study will be available from the authors upon reasonable request.

ORCID iDs

Nirmalatiban Parthiban  <https://orcid.org/0000-0001-9790-3537>
Huzairi Sani  <https://orcid.org/0000-0002-3883-5746>

References

1. Camille M, James S, Melanie M, et al. The impact of the COVID-19 pandemic on cancer deaths due to delays in diagnosis in England, UK: A national, population-based, modelling study. *Lancet Oncol* 2021; 22: 309–320.
2. Parker WR, Linda L, Timothy JW, et al. Utilization and appropriateness of transthoracic echocardiography in response to the Covid-19 Pandemic. *J Am Soc Echocardiogr* 2020; 33: 690–691.
3. Spondick DH. Acute cardiac tamponade. *N Engl J Med* 2003; 34: 684–690.
4. Burazor I, Imazio M, Markel G, et al. Malignant pericardial effusion. *Cardiology* 2013; 124: 224–232.
5. Shomron BH, Ijan B, Victor G, et al. Large symptomatic pericardial effusion as the presentation of unrecognized cancer: A study in 173 consecutive patients undergoing pericardiocentesis. *Medicine* 2006; 85: 49–53.
6. De Ceuninck M, Demedts I and Trenson S. Malignant cardiac tamponade. *Acta Cardiol* 2013; 68: 505–507.
7. Maham AM, Monica B, Ayesha S, et al. Haemorrhagic pericardial effusion leading to cardiac tamponade: A rare initial presentation of adenocarcinoma of the lung. *Cureus* 2020; 12: e11411.
8. Khan A, GJ A, Faisaluddin, et al. Cardiac tamponade in the setting of a thymoma. *Cureus* 2019; 11: 4952.
9. Fraser RS, Vilorio JB and Wang NS. Cardiac tamponade as a presentation of extracardiac malignancy. *Cancer* 1980; 45: 1697–1704.
10. Muir KW and Rodger JC. Cardiac tamponade as the initial presentation of malignancy: Is it as rare as previously supposed? *Postgrad Med J* 1994; 70: 703–707.
11. Jefferson LG, Riad NY and Daniel D. Surgical management of symptomatic pericardial effusion in patients with solid malignancies. *Ann Surg Oncol* 2006; 13: 1732–1738.
12. Helge S, Bernard C, Bogdan AP, et al. Covid-19 pandemic and cardiac imaging: EACVI recommendations on precautions, indications, prioritization and protection for patients and healthcare personnel. *Eur Heart J Cardiovasc Imaging* 2020; 21: 592–598.
13. Vindhu A, Jeremy J, Thaden MD, et al. Safe operation of an echocardiography practice during Covid-19 Pandemic: Single-centre experience. *Mayo Clin Proc* 2021; 96: 531–536.
14. Massimo I, Marzia C and Gaetano MDF. Pericardial disease in patients with cancer: Contemporary prevalence, management and outcomes. *Heart* 2020; 106: 569–574.
15. Sohaib A, David C and Claudia V. Systematic review of percutaneous interventions for malignant pericardial effusion. *Heart* 2015; 101: 1619–1626.