



Case Report

Pyopericardium progressing to cardiac tamponade in a patient with dengue fever

Bikash Khadka^{a,*}, Kishor Khanal^a, Ashim Regmi^a, Anup Ghimire^a, Shirish KC^b, Rohini Nepal^b,
on behalf of Doctors on Wheels¹

^a Nepal Medicit, Department of Anesthesia and Critical Care, Nepal

^b Department of Clinical Research, Doctors on Wheels, Kathmandu, Nepal

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ABSTRACT

Pyopericardium is a rare cause of cardiac tamponade. We present a case of a dengue fever patient who presented with cellulitis of the upper limbs, later manifesting cardiac tamponade, which was fatal. Although echocardiography on admission revealed a small pericardial effusion only, it later manifested as tamponade, causing cardiogenic shock. Staphylococcus pyopericardium was found later. Early identification could be possible with bedside point-of-care ultrasonography and echocardiography. Emergent pericardiocentesis or pig tail drain placement is life saving.

Introduction

Dengue is a mosquito-borne viral infection transmitted by the bite of the *Aedes aegypti* mosquito, and it has spread worldwide. It is an important public health problem that may present with mild symptoms such as fever, headache, retro-orbital pain, rash, myalgia, and arthralgia or with a more severe form of dengue hemorrhagic fever/dengue shock syndrome (DHF/DSS). It may present with a spectrum of cardiac complications, with Electrocardiogram (ECG) abnormalities observed in 30.6 % of cases of non-specific ST-T changes (8.6 %), ST depression (7.9 %), and T-wave inversion (2.3 %), left ventricular (LV) systolic dysfunction (5.7 %) and myocarditis (2.9 %), pericarditis (0.1 %), pericardial effusion (1.3 %), and pericardial tamponade (0.1 %) being recorded as rare but notable manifestations [1]. Treatment is supportive and that of secondary complications if any.

Case details

A 27 year male presented to us with a fever for nine days with a maximum temperature of 105 Fahrenheit associated with cellulitis of the left hand on the site of previous peripheral line insertion. He was admitted for dengue (NS1 antigen positive) with myocarditis, the patient being hypotensive (80/50 mm Hg). His initial WBC count was 10,020 cc/mm, platelets 56,000, CRP 212 mg/l, PT INR 16.1/ 1.4,

deranged LFT, and FDP positive. Evaluations for malaria, leptospirosis, scrub typhus, and enteric fever were negative. Sepsis marker evaluation was done with investigations such as ESR, CRP, Procalcitonin level, LDH, and pan culture, including blood, sputum, and urine samples to rule out septic shock, while echocardiography was done to rule out cardiogenic shock. He had mildly raised CK-MB 32 U/L and troponin I with 1.37 ng/ml and lactate 3.7, indicating myocarditis. ECG showed low voltage sinus rhythm, and echocardiography (ECHO) revealed an ejection fraction of 60 % with small pericardial effusion. Left arm ultrasonography(USG) showed thrombophlebitis of the left cephalic vein with cellulitis. The patient was initially managed with intravenous (I.v) antibiotics meropenem and clindamycin, ointment thrombophobe and calamine lotion for thrombophlebitis, tab bisoprolol and tab colchicine for perimyocarditis, and tab clonazepam and tab nitrest for agitation along with I.v maintenance fluid.

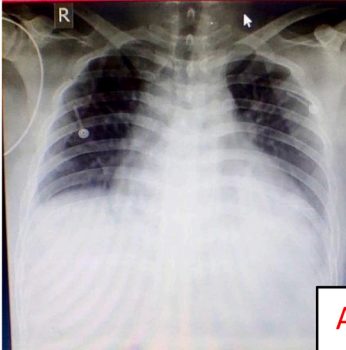
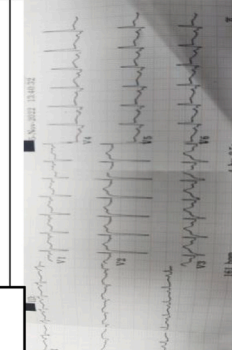
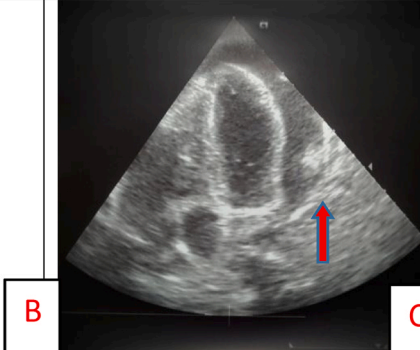
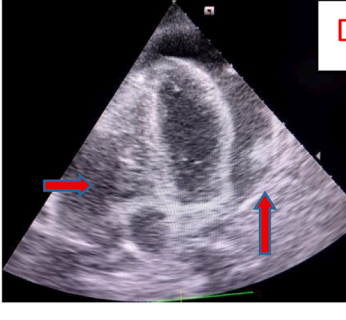

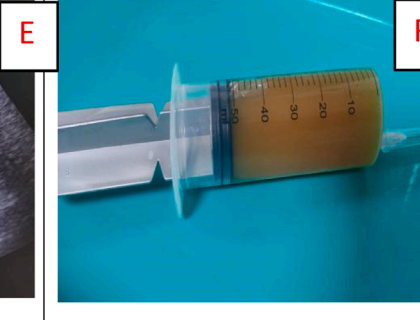
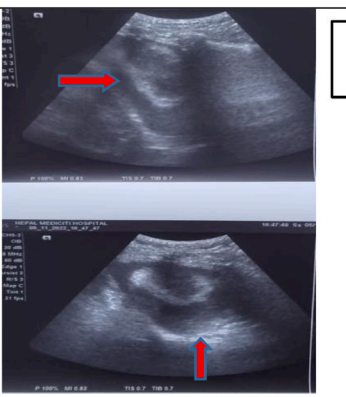
The patient had persistent high-grade fever with a temperature of up to 106 F and was hypotensive. His CK-MB 326 U/L, troponin I 52, and Procalcitonin > 100 ng/ml suggest sepsis along with cardiac failure.

Figure demonstrating multiple radiological images, chest x-ray, ECG, POCUS view, and ECHO view carried out that indicated pericardial effusion and tamponade.

* Correspondence to: Department of Anesthesia and Critical Care, Nepal Medicit, Nakhu, Nepal.

E-mail address: khadka.vkas@gmail.com (B. Khadka).

¹ Members of DOW are listed in the Acknowledgments section of the article.

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 <p>D</p>	 <p>E</p>	 <p>F</p>
 <p>G</p>	<p>A) Chest Xray with widened mediastinum and enlarged cardiac shadow</p> <p>B) ECG showing sinus tachycardia with ST elevation in V3-V6 leads</p> <p>C) POCUS view demonstrating pericardial effusion</p> <p>D) ECHO view with large pericardial collection</p> <p>E) ECHO view showing contracted Right ventricle with pericardial collection indicating cardiac tamponade</p> <p>F) Sample(pus) collected following pericardiocentesis</p> <p>G) Repeat POCUS view demonstrating recollection in the pericardium</p>	

Case management

He continued to deteriorate clinically over the next 2 h, with persistently increasing inotrope support and altered sensorium. Elective intubation was done. Point-of-care ultrasound (POCUS) revealed collapsed inferior vena cava and pericardial fluid collection. ECHO showed massive pericardial effusion with tamponade and collapsed right ventricle. Intravenous fluid resuscitation with bolus fluid up to 4 l was infused to increase preload. Emergent USG guided pericardiocentesis was done with aspiration of 180 ml of purulent fluid. Improvement in hemodynamics and right ventricle contractility was noticed. Over the next two hours, there was increased inotropic demand. Repeat POCUS and ECHO were carried out, which showed massive pericardial effusion, and the patient was on tamponade. He was planned for pigtail catheter placement. Sudden asystole was noticed, and cardiopulmonary resuscitation was initiated. There was no ROSC, and the patient expired on the same day of admission to the ICU. *Staphylococcus* growth was isolated later in pericardial fluid culture. Retrospectively, that could have been a case of sepsis, originating from thrombophlebitis /cellulitis of the left arm with dengue infection leading to cardiac complications.

Discussion

This is one of the few cases reported in the literature of cardiac tamponade in a patient with dengue fever and the first well documented case in Nepal. This case is clinically important as primary dengue infection was presumably of mild intensity that had the rapid course to develop sudden cardiac tamponade with pyocardium.

The mechanism of myocardial damage in dengue is not clear, however it could be due to the release of inflammatory mediators and/or the direct action of the virus on cardiomyocytes.

Rapidly accumulating pericardial effusion causing life-threatening cardiac tamponade is rarely encountered. Incidence of pyopericardium is uncommon, accounting for less than 1 % of cases of acute pericarditis [2]. In a study by Malik J et al. that included 2313 citations from databases involving 6773 patients, Pericardial involvement was noted as pericarditis (0.1 %), pericardial effusion (1.3 %), and pericardial tamponade (0.1 %) [1]. Mechanical sequelae were present in 10.4 %, including left ventricular (LV) systolic dysfunction (5.7 %) and myocarditis (2.9 %) [1].

In a study done in Colombia among 102 children with DHF, ten patients had acute myocarditis requiring the use of inotropic drugs, and one child died [3]. Echocardiograms were performed on 50 % of the children, revealing pericardial leakage grade I and II in two patients with diminished EF and AF [3]. Setiawan et al. demonstrated the presence of mild pericardial effusion in only 8 % of cases of severe dengue in a study done among 148 confirmed cases of DHF [4].

Gram-positive bacteria are isolated in 40–45 % of all cases of purulent pericarditis, with *S. aureus* being the most frequently cultured (in about one-third of cases) [2,5]. Currently, Gram-negative enteric bacteria and fungi (*Candida* and *Aspergillus* species) are increasing in frequency [6]. Massive pyopericardium leading to cardiac tamponade is uncommon in disseminated staphylococcal disease and requires prompt drainage and antibiotics [7].

Retropharyngeal abscess, hepatic/subdiaphragmatic abscess, pneumonia, penetrating trauma, surgical wounds, osteomyelitis, perivalvular abscess rupture in endocarditis, esophageal rupture with fistula formation, and seeding from circulating bacteraemia are some of the sources of pyopericardium [8]. Our patient had cellulitis of the upper limb due to thrombophlebitis.

Tamponade has been reported by Kumar et al. in a patient with Lupus and Bendwal et al. where dengue was a secondary infection, presenting with normal cardiac enzymes and minimal decrease in platelet counts, and 500 ml and 1500 ml of pericardial fluid tapping was done, respectively [9,10]. Fernandes et al. in a postpartum lady, and Biswas et al. reported cardiac tamponade where dengue was a primary

infection, where platelet counts were more than one lakhs, the cardiac marker was raised, and 280 ml of pericardiocentesis was done in later mentioned study [11,12]. In our case, dengue was a primary infection with a normal platelet count and initial normal cardiac biomarkers.

Beck's triad, which comprises hypotension with narrow or weak pulse pressure, muffled heart sounds, and raised jugular venous pressure (JVP), is indicative of cardiac tamponade. However, not all present with this salient feature. Patients with impending or early tamponade are usually anxious and may complain of dyspnea and chest pain [13]. Similar clinical features were present in our case except for raised JVP. Pneumonia may mask purulent pericardial effusion; however, pneumonic consolidation was not present in our case.

Ultrasonography is a useful tool to detect the amount of plasma leakage, one of the predictions of dengue severity similar to the identification of early signs of plasma leakage, such as pleural effusion, ascites, perirenal fluid, and pericardial effusion [14]. In a study done by Venkata Sai et al. among 88 serologically positive cases, approximately 28 % of the patients had pericardial effusion by ultrasound performed between the fifth and seventh day of illness [15]. In our case, POCUS was the indicator for pericardial effusion that helped us to guide further screening with ECHO. ECHO screening is diagnostic which can detect a very low amount of pericardial collection, up to 20 ml can be detected.

Conclusion

Dengue virus can produce atypical manifestations, such as acute myocarditis, leading to pericardial effusion, cardiogenic shock, and death. Pyocardium causing cardiac tamponade, though rare, can also occur in dengue infection. POCUS is very useful for detecting these medical emergencies. Emergent pericardiocentesis or pigtail drain placement is life-saving.

Ethical approval

IRB Approved from the institution.

Consent

Written consent.

Consent and ethical clearance

This case report did not require the approval of any Ethical Committee. Written informed consent was obtained from the patient party.

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CRedit authorship contribution statement

Shirish KC: Resources, Writing – review & editing. **Rohini Nepal:** Writing – review & editing. **bikash khadka:** Conceptualization, Formal analysis, Methodology, Project administration, Supervision, Writing – original draft, Writing – review & editing. **Kishor Khanal:** Conceptualization, Methodology, Supervision, Writing – original draft, Writing – review & editing. **Ashim Regmi:** Conceptualization, Methodology, Writing – original draft, Writing – review & editing. **Anup Ghimire:** Supervision, Writing – original draft, Writing – review & editing.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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a. Department of Anaesthesiology and Critical Care, Nepal Medicit, Nepal

b. Department of Clinical Research, Doctors on Wheels, Kathmandu, Nepal

c. Department of Internal Medicine, NYC Health and Hospitals/Woodhull, New York, USA

d. Department of Neurology, Columbia University Irving Medical Center, New York, USA

e. Department of Ophthalmology, Tribhuvan University Teaching Hospital, Nepal

f. Chapakot Hospital, Syangja, Nepal

g. Rhythm Neuropsychiatry Hospital and Research Center, Nepal

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Appendix A. Supporting information

Supplementary data associated with this article can be found in the

online version at [doi:10.1016/j.idcr.2024.e01996](https://doi.org/10.1016/j.idcr.2024.e01996).

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