Epstein-Barr Virus DNA in Pericardial Effusion Causing Subacute Cardiac Tamponade

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INTRODUCTION

We present the case of a 53-year-old morbidly obese woman who presented to the emergency department with a 3 weeks' history of increasing shortness of breath, cough, and peripheral edema. Bedside echocardiogram in the emergency department revealed signs suggestive of cardiac tamponade—cardiac swinging and right atrial and ventricular collapse. She proceeded urgently to a very difficult pericardiocentesis (due to her obesity, the only access site was the left parasternal border), where a volume of 1,000 mL was drained. The fluid was positive for Epstein-Barr virus (EBV) DNA on qualitative polymerase chain reaction (PCR).

Pericardial disease has many underlying causes, varying with population and geography. In developing countries, tuberculosis is the commonest cause of pericarditis and pericardial effusion.[1,2] In developed countries, pericardial disease is often idiopathic.[1,3,4] Infection (especially viral), malignancy, and iatrogenic causes should also be considered. Some causes of pericarditis, such as tuberculosis and malignancy, require specific treatment and should therefore be investigated and excluded if suspected.[1]

There are few reported cases of EBV-associated pericardial effusion either with or without tamponade, although it is a known, albeit uncommon, cause of pericarditis.

Regardless of cause, cardiac tamponade with hemodynamic compromise represents a medical emergency.

CASE PRESENTATION

A 53-year-old morbidly obese—body mass index, 48.9—woman presented to a tertiary hospital emergency department complaining of shortness of breath consistent with New York Heart Association class IV, cough, and peripheral edema that had worsened over the preceding 3 weeks. She had delayed her presentation to hospital due to concerns around the current coronavirus (COVID-19) pandemic.

The patient had noticed edema of her legs and abdomen. She had become dyspneic even sitting at rest, which represented a significant decline from her usual baseline of walking 3 km per day. She also described pleuritic-sounding chest pain occurring at the beginning of her illness, but this had since resolved. Her general practitioner had treated her with two courses of antibiotics for a suspected lower respiratory tract infection, with no improvement. She denied any antecedent illness, recent travel, or unwell contacts.

The patient did not have any preexisting medical complaints, other than a morbidly obese body mass index of 48.9. On examination, the patient was tachycardic to 130 beats per minute, tachypneic to 28 breaths per minute, and hypoxic with oxygen saturation (SpO2) of 91% on room air. Blood pressure was initially stable at approximately 145/65 mm Hg, but it had dropped to 90/60 mm Hg by the time pericardiocentesis was performed. The patient had an increasing oxygen requirement of up to 4 L/minute via nasal cannula to maintain saturations over 95%. She had pitting edema to the level of her arms. On auscultation, she had decreased breath sounds to the midzones, consistent with bilateral pleural effusions. Her weight was 163 kg, significantly higher than her self-reported dry weight of 133 kg. She also had obvious palpable pulsus paradoxus and elevated jugular venous pressure.

Full blood count was unremarkable. Liver function tests were consistent with a cholestatic pattern. Renal function tests showed acute injury. Electrolytes were normal. C-reactive protein was elevated to 67 mg/L. High-sensitivity troponin I was negative (<2 ng/L). Interestingly, B-type natriuretic peptide was not elevated.

Electrocardiogram (Figure 1) was low voltage but not obviously in electrical alternans. Chest x-ray (Figure 2) showed increased cardiothoracic ratio with bilateral pleural effusions and consolidation.

Urgent bedside echocardiogram was performed in the emergency department, and the patient was subsequently admitted to coronary care unit for urgent pericardiocentesis. The quality of the echocardiogram pictures obtained (Figure 3A–C) was significantly limited by patient positioning and large body habitus. However, there were signs consistent with tamponade, with a large (29.6 mm) effusion, cardiac swinging, and right atrial and ventricular collapse with preserved left ventricular function.

The only feasible approach to drainage was parasternal, due to body habitus and poor image quality. A volume of 1,000 mL was removed. The fluid drained was macroscopically bloody and appeared exudative, which was confirmed on assessment of protein/lactate dehydrogenase ratio. This raised concern for a malignant cause. However, fluid cytology and chest, abdomen, and pelvis computed tomography were performed and excluded malignancy. Similarly, autoimmune and inflammatory screens were negative.

Infectious causes were also considered, with microbiological testing of both serum and pericardial fluid performed. Pericardial fluid was tested for a range of infectious pathologies, including toxoplasma gondii, mumps virus, parvovirus B19, varicella zoster, cytomegalovirus, adenovirus, enterovirus, and mycobacterium. These were all negative. The broth did grow staph epidermidis; however, this was determined to be a contaminant only. Qualitative PCR for EBV DNA was positive. Serum IgG was positive for EBV, and IgM was negative. This would be consistent with prior exposure to EBV with latency or localized reactivation/persistence.

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Keywords: Epstein-Barr virus, Pericardiocentesis, Pericardial effusion, Cardiac tamponade

Conflicts of Interest: None.

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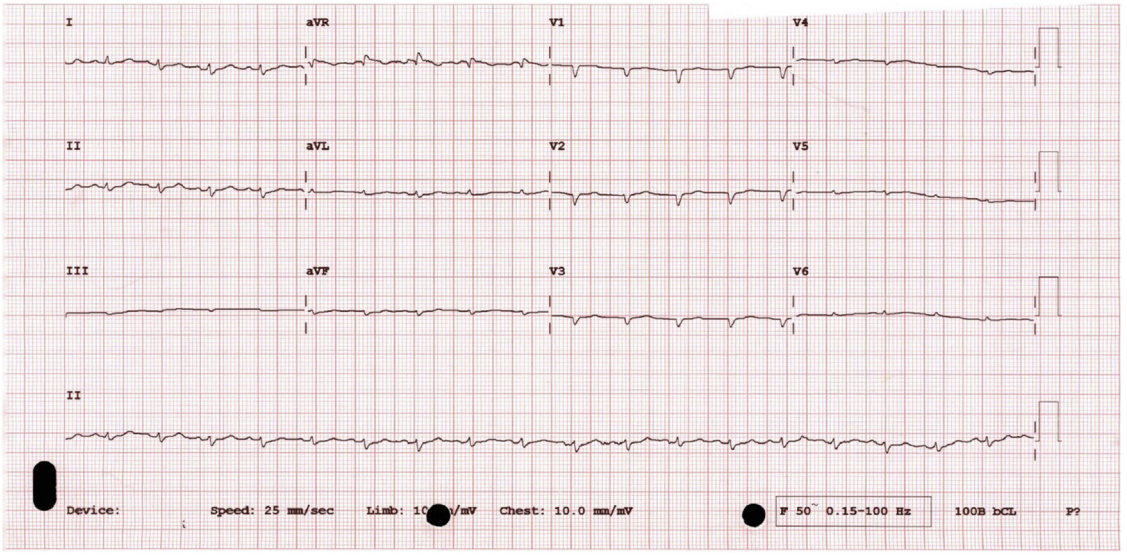

Figure 1 Electrocardiogram demonstrating sinus rhythm, with low voltage but no obvious electrical alternans.

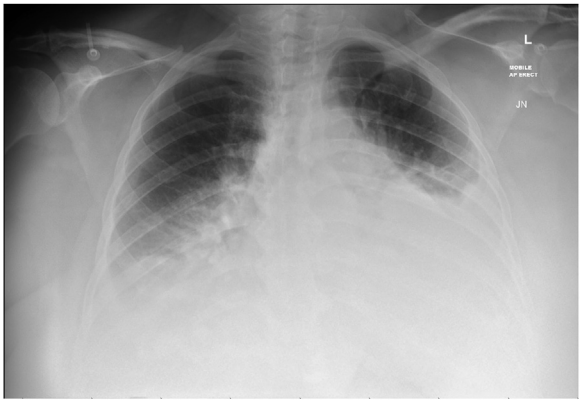

Figure 2 Chest x-ray demonstrating extensive bilateral consolidation and effusion, which is worse on the left.

Following pericardiocentesis, the patient's hemodynamics rapidly stabilized and her symptoms improved markedly, with resolution of tachycardia and tachypnea.

Repeat echocardiogram (Figure 4) again presented some technical challenges due to body habitus but showed no recurrence of effusion, with normal left ventricular size and systolic function. Chest x-ray (Figure 5) similarly showed almost complete resolution of bilateral pleural effusions.

During her admission, the patient also required treatment for an associated abdominal wall cellulitis, which became apparent postpericardiocentesis.

The patient's significant edema was managed with aggressive diuresis. The patient's admission weight was 163 kg, and it had fallen to 130 kg on discharge. The pitting edema and shortness of breath resolved with ongoing diuresis.

DISCUSSION

Worldwide, the commonest cause of pericarditis and pericardial effusion is tuberculosis.[1,2] In countries with a low prevalence of tuberculosis (such as in Western Europe and North America), idiopathic cases represent 80%-90% of the total.[1] The remainder of occurrences with a known etiology are typically infectious, inflammatory, autoimmune, iatrogenic, malignant, or secondary to pericardial injury.[1,3,4]

While EBV is a documented cause of pericarditis, there are only a very small number of published case reports that describe EBV in association with pericardial effusion with or without cardiac tamponade.

A literature review found just three reported cases of EBV-associated pericardial effusion. The first case of EBV-associated cardiac tamponade was in an 80-year-old woman, where, similar to this case, EBV PCR was positive in pericardial fluid.[5] In another case of pericardial effusion, EBV DNA was found in drained pericardial fluid.[6] A further case of tamponade associated with EBV was reported in an 18-year-old woman, although in this case EBV PCR was tested in serum.[7]

A cohort of 259 German patients with moderate to large pericardial effusions had microbial PCR testing of pericardial fluid, epicardial/pericardial tissue, and blood performed. In none of the patients were bacterial genomes discovered. Of the 259 patients, 51 (19.7%) were found to have viral genomes on PCR testing. The virus detected most often was parvovirus B19, followed by EBV. In total, 19 patients (7.3%) had EBV identified. Nine of these had an underlying malignancy, and of this group, two had coinfection with parvovirus.[8]

Therefore, as is demonstrated in this case, an "idiopathic" pericardial effusion may belie an underlying viral etiology if this possibility is appropriately explored.

The immediate treatment of cardiac tamponade with hemodynamic compromise remains urgent therapeutic periocardiocentesis, regardless of what the underlying cause may be.

CONCLUSION

Cardiac tamponade with hemodynamic compromise is an emergency, regardless of cause. The causes of pericardial disease vary widely with population and geography, although infectious etiologies are common. Some causes of pericarditis require specific treatment and should therefore be investigated for and excluded if suspected. Epstein-Barr virus is a rarely described infectious cause of pericardial effusion.

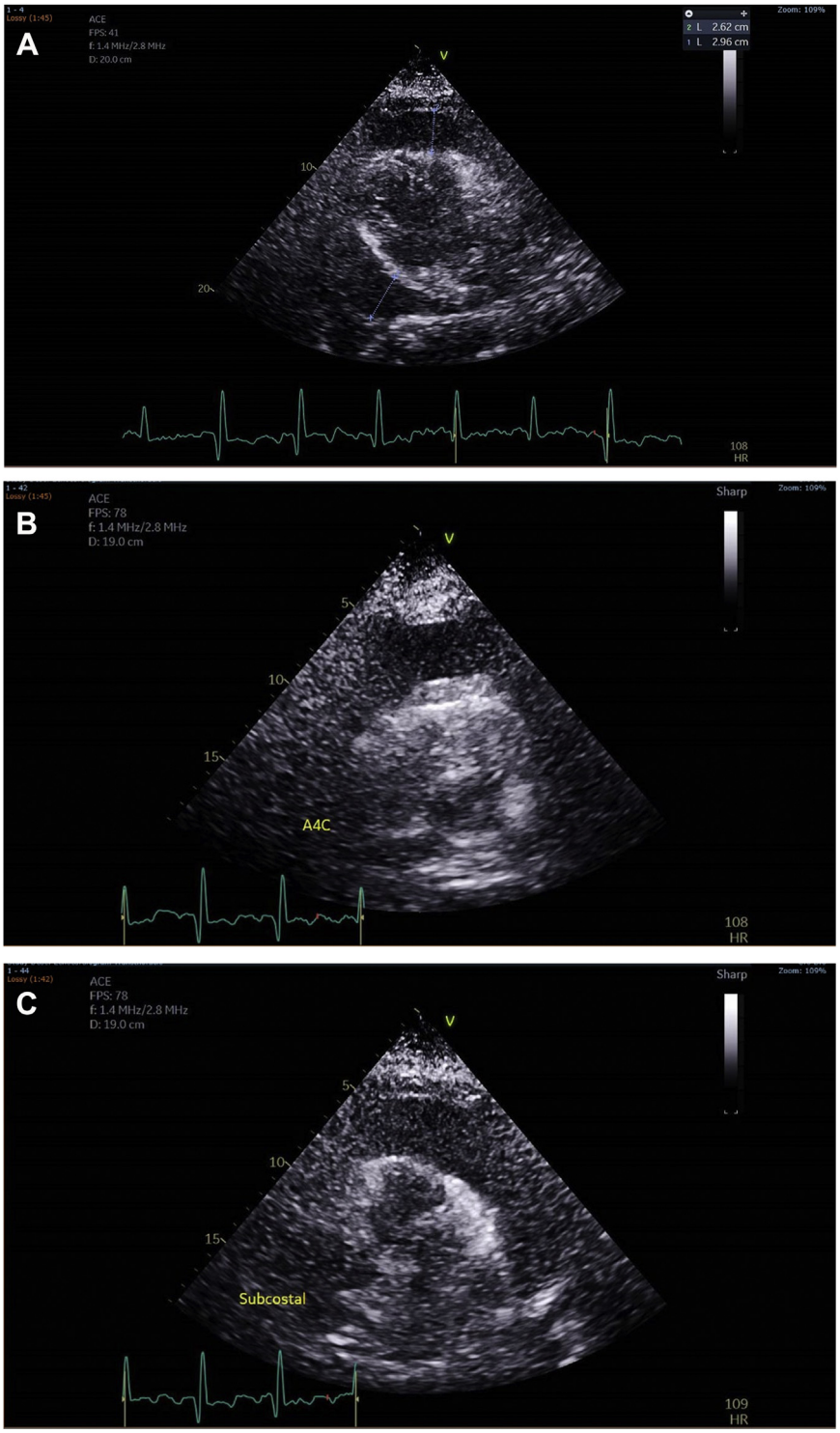

Figure 3 Bedside echocardiogram images were obtained, which were suboptimal due to body habitus and positioning. **(A)** Parasternal view demonstrating maximal effusion measurement of 29.6 mm. **(B)** Apical four-chamber view. **(C)** Subcostal view.

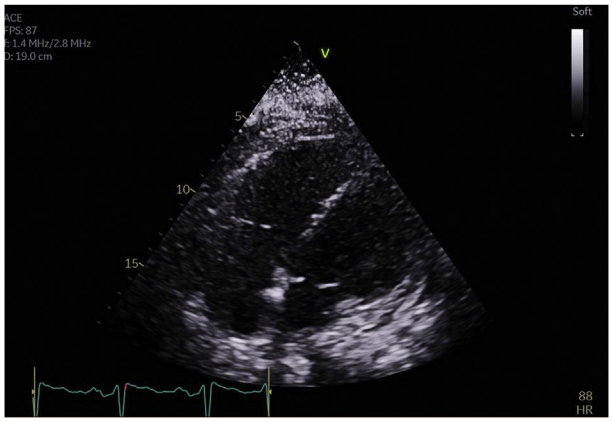

Figure 4 Repeat echocardiogram again demonstrating difficulty in obtaining images, with no recollection of effusion.

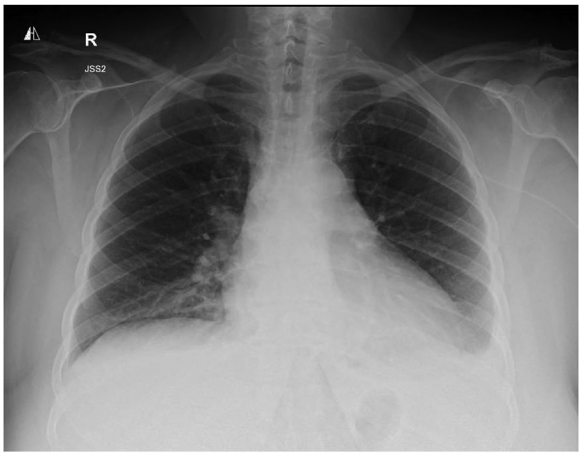

Figure 5 Chest x-ray showing near complete resolution of the previously noted bilateral effusion.

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