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CASE REPORT
Arrhythmias/electrophysiology

Tachy- and bradyarrhythmia as an initial presentation of human immunodeficiency virus-related primary cardiac lymphoma: a case report

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Background Primary cardiac lymphoma is defined as extranodal lymphoma involving the heart or pericardium. Common presentations of human immunodeficiency virus (HIV)-associated cardiac lymphoma include heart failure, cardiac tamponade, and rhythm abnormalities. Arrhythmia is an uncommon presentation and treatment in young HIV patients is particularly challenging. We present a unique case of primary cardiac lymphoma in an HIV patient presenting with both symptomatic tachy- and bradyarrhythmias.

Case summary A 27-year-old man presented with intermittent palpitations and chest pain for 2 weeks. He has a significant past history of advanced HIV. He was noted to have complete heart block on cardiac monitoring. Imaging showed a large mass in the right atrioventricular (AV) groove extending into the myocardium, associated with a moderate pericardial effusion. During his stay, he developed symptomatic tachy–brady arrhythmias, with intermittent junctional tachycardia, supraventricular tachycardia, and complete AV block. After a multidisciplinary team discussion, endomyocardial biopsy was performed under fluoroscopy and transthoracic echocardiography guidance. Histology from the interventricular septum was consistent with Epstein–Barr virus positive B-cell lymphoma. The patient was subsequently transferred to a tertiary hospital with cardiothoracic surgical support to initiate chemotherapy.

Discussion To our knowledge, our patient is the first reported case of HIV-related primary cardiac lymphoma presenting with palpitations secondary to paroxysmal supraventricular tachycardia with concomitant AV block. This case illustrates the utility of multi-modality imaging in the investigation of a cardiac mass and the importance of having a high index of suspicion for pathology, such as cardiac lymphoma in HIV patients complaining of apparently minor cardiac complaints.

Keywords Case report • Tachy–brady arrhythmias • Primary cardiac lymphoma • Epstein–Barr virus positive B-cell lymphoma • Retroviral disease • HIV

Learning points

- Arrhythmia is an uncommon presentation for patients with primary cardiac tumours.
- Histological diagnosis is crucial for the management of patients with primary cardiac tumours.
- It is important to have a high index of suspicion for pathology such as cardiac lymphoma in human immunodeficiency virus patients complaining of apparently minor cardiac complaints.
- The utility of multi-modality imaging in the investigation of a cardiac mass.

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Introduction

Primary cardiac lymphoma is an uncommon malignancy that is associated with human immunodeficiency virus (HIV) infection. The presentation is non-specific depending on the location and extent of tumour involvement. Bradyarrhythmias such as heart block and tachyarrhythmias such as atrial fibrillation and flutter can occur. We report and discuss the management of a unique case of HIV-related primary cardiac lymphoma presenting initially with both supraventricular tachycardia and heart block.

Timeline

Day of admission	Event
1	Electrocardiogram is done showing sinus tachycardia with first-degree heart block with frequent atrial ectopics.
2	Developed intermittent complete atrioventricular (AV) block with broad escape rhythm with junctional tachycardia and supraventricular tachycardia.
3	Transthoracic echocardiogram showed a large mass in the right AV groove and abnormal thickening of the basal septum.
4	Computed tomography showed intracardiac masses along the right atrial wall and interventricular septum, and suspicion of encasement of the right coronary artery (RCA).
7	Computed tomography coronary angiogram showed encasement of the RCA by the mass with no luminal narrowing of the RCA.
9	Multidisciplinary discussion regarding the best modality of biopsy.
10	Cardiac magnetic resonance was performed for further characterization of the mass before biopsy.
11	Endomyocardial biopsy is done under combined fluoroscopy and transthoracic echocardiography guidance, with histology confirming Epstein–Barr virus positive B-cell lymphoma.
17	Transfer to tertiary institution.

Case presentation

A 27-year-old Chinese male presented with intermittent palpitations, chest pain, and reduced effort tolerance for 2 weeks. He had one episode of near syncope during exertion. He also complained of fever with maximum temperature 38.9°C for 2 days with dry cough and loose stools. He was diagnosed with advanced HIV infection 9 months ago when he presented with pneumocystis pneumonia complicated by pneumomediastinum (*Table 1*). He was compliant with highly active antiretroviral therapy since his diagnosis. His initial regimen included Tenofovir disoproxil fumarate, Emtricitabine, and Atazanavir boosted with Ritonavir, and he was then switched to Tenofovir disoproxil fumarate, Emtricitabine, and Rilpivirine when the HIV viral load became suppressed at 5 months.

Table 1 Investigations performed at initial diagnosis of human immunodeficiency virus

Baseline CD4 count (cells/μL)	143	280–1430
HIV viral load (copies/mL)	<20	—
CMV IgG (U/mL)	>500	<0.5 non-reactive 0.5 to <1 indeterminate ≥1 reactive
Toxoplasma IgG (IU/mL)	<0.1	<1 negative 1–3 equivocal >3 positive
Anti-HAV total	Non-reactive	—
HBsAg	Non-reactive	—
Anti-HBS (IU/L)	174	—
Anti-HBc core total	Reactive	—
Anti-HCV	Negative	—
Syphillis IgG (RU/mL)	5	<16 negative ≥16 to <22 borderline ≥22 positive
RPR	Non-reactive	NA

Anti-HBc, antibody to Hepatitis B core antigen; Anti-HBS, antibody to Hepatitis B surface antigen; CMV, cytomegalovirus; HAV, Hepatitis A virus; HBsAg, Hepatitis B surface antigen; HCV, Hepatitis C virus; HIV, human immunodeficiency virus; RPR, rapid plasma regain.

On admission, he was tachycardic with heart rate of 114 b.p.m. Blood pressure was 103/63 mmHg, and oxygen saturation on room air was 98%. Respiration rate was 20. Heart sounds were regular with no murmurs, and his lungs were clear with no evidence of fluid overload. There was no lower limb oedema noted. There were also no peripheral stigmata of infective endocarditis. Abdominal examination was normal with no palpable masses detected. There were no cervical or inguinal lymph nodes felt.

The initial electrocardiogram (ECG) showed sinus tachycardia, first-degree atrioventricular (AV) block, and frequent atrial ectopics. Chest radiography revealed an enlarged cardiac silhouette (cardiothoracic ratio of 60%). Blood cultures were negative for both aerobic and anaerobic bacteria. Other blood investigations are listed in *Table 2*. He was placed on continuous inpatient cardiac monitoring and intermittent episodes of asymptomatic complete AV block with a broad complex escape rhythm of 54 b.p.m. was noted (*Figure 1A*). There were also episodes of narrow complex tachycardia, including junctional tachycardia (*Figure 1B*) and supraventricular tachycardia (*Figure 1C*) correlating with palpitations. The patient was otherwise haemodynamically stable.

A transthoracic echocardiogram showed a large mass in the right AV groove and abnormal thickening of the basal septum (*Figure 2*). The left ventricular ejection fraction was 60%. There was a large pericardial effusion with no evidence of tamponade. A computed tomography (CT) scan of the neck, thorax, abdomen, and pelvis was

Table 2 Initial investigations on admission

Total white cell count (/L)	6.1×10^9	$4.0–9.6 \times 10^9$
Haemoglobin (g/dL)	9.7	13.6–16.6
Platelet (/L)	247×10^9	150–360
Creatinine (μmol/L)	64	60–105
High-sensitivity troponin I (ng/L)	98	0–40
Lactate dehydrogenase (U/L)	895	250–550
Alpha fetoprotein (μg/L)	1	0–9
Beta-human chorionic gonadotropin (IU/L)	<1	0–5
Uric acid (μmol/L)	305	250–550

performed for evaluation of persistent fever and for other potential targets for percutaneous biopsy. The CT showed intracardiac masses along the right atrial wall and interventricular septum encasing the right coronary artery (RCA), and involvement of the pericardium with pericardial effusion (*Figure 3A and B*). The involvement of the interventricular septum is likely the cause of his AV block. There were no other lesions suggestive of metastasis or other sites of disease. A further ECG gated CT coronary angiography (*Figure 3C*) demonstrated encasement of the RCA by the mass with no luminal narrowing of the RCA. There were also no stenoses in the other coronary arteries.

A cardiac magnetic resonance (CMR) scan was subsequently performed for characterization of the mass (*Figure 4*). The mass was

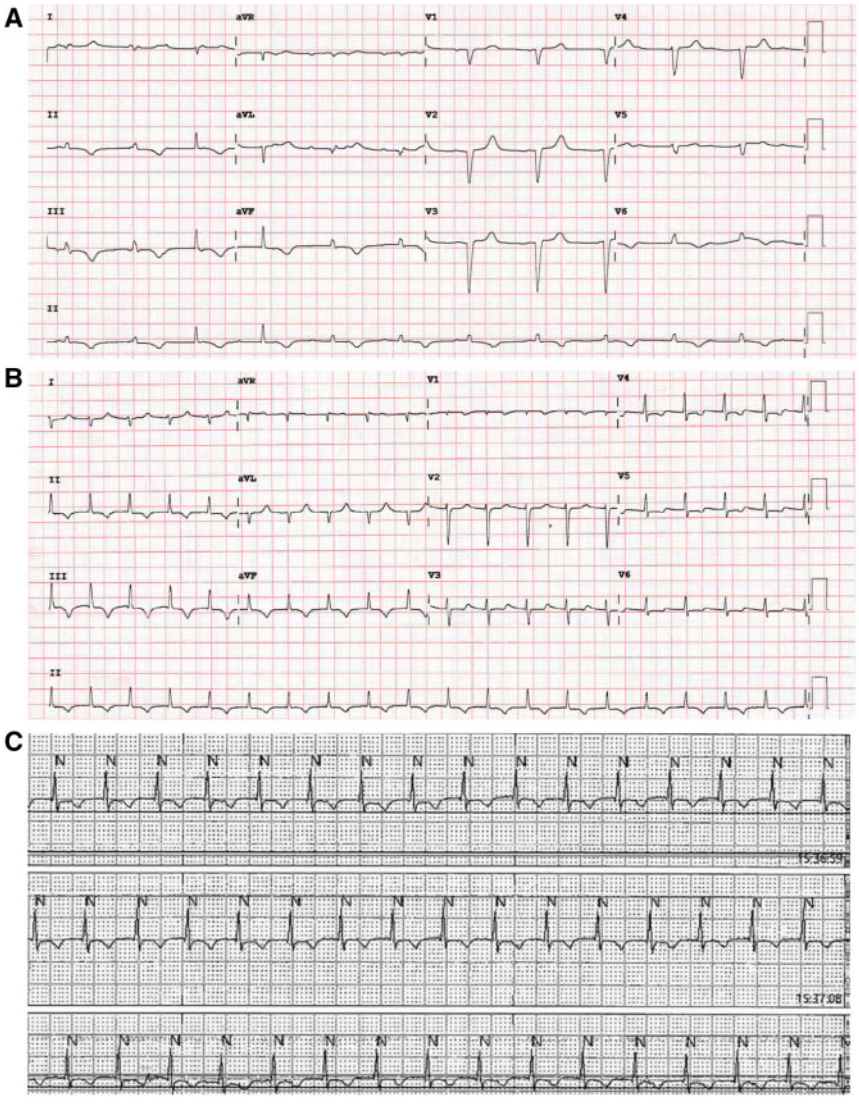

Figure 1 Electrocardiogram showing (*A*) complete heart block with broad escape rhythm, (*B*) junctional tachycardia, and (*C*) supraventricular tachycardia captured on telemetry.

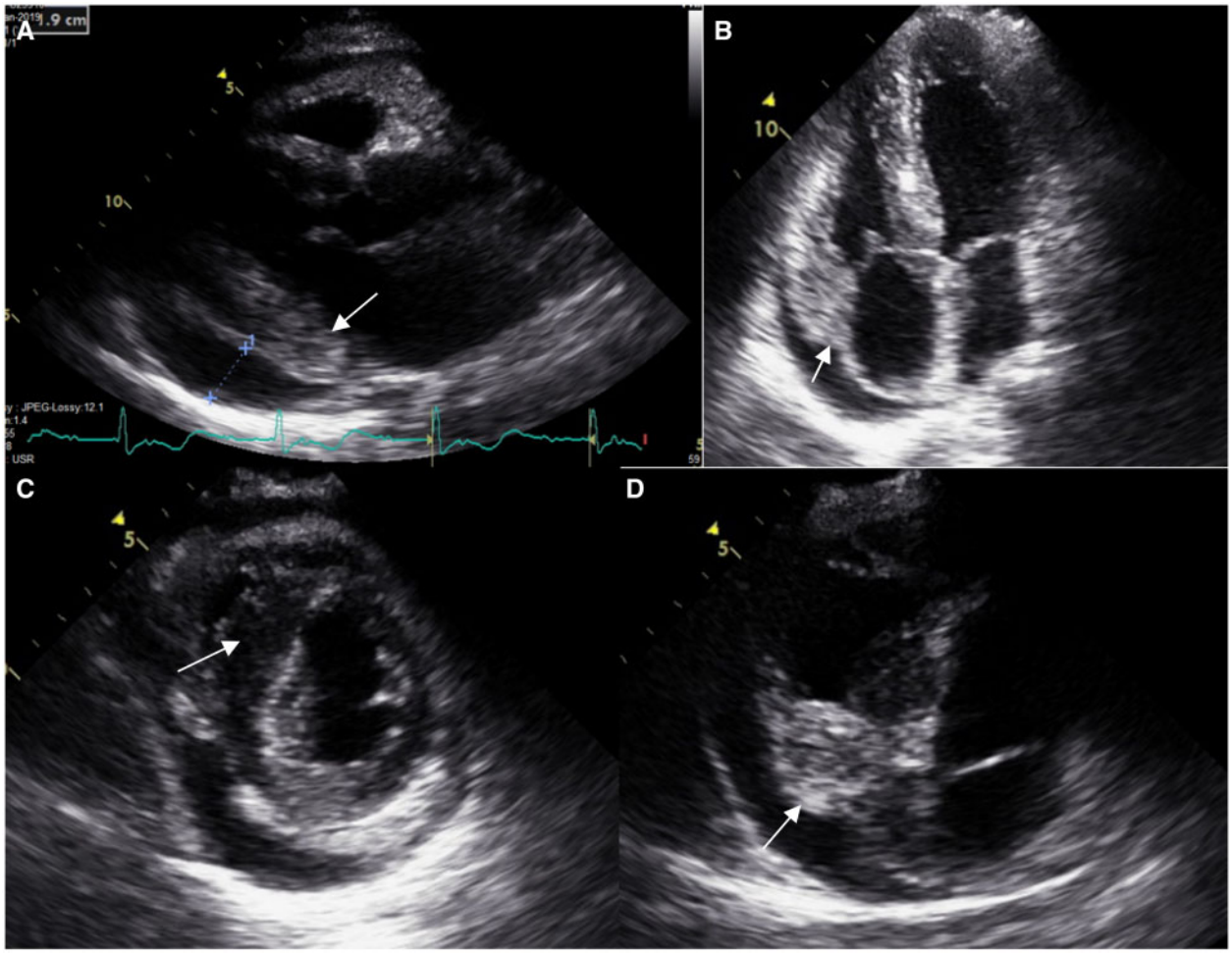

Figure 2 Transthoracic echocardiogram demonstrating a large mass (2.8 cm by 2.7 cm, white arrow) in the right atrioventricular groove extending into the right ventricular myocardium, with a large pericardial effusion, largest pocket seen anterior to the right ventricular free wall measuring 2.9 cm.

isointense relative to myocardium on both T1- and T2-weighted sequences. There was minimal contrast uptake during first-pass perfusion imaging. Delayed enhancement images showed patchy heterogenous enhancement within the mass.

Given the clinical presentation, background history of retroviral disease and imaging findings, differential diagnoses of either cardiac lymphoma or angiosarcoma were considered. After a multidisciplinary discussion involving cardiologists, cardiothoracic surgeons, and infectious disease physicians, an endomyocardial biopsy (EMB) was performed under combined fluoroscopy and transthoracic echocardiography guidance using an EMB forcep (Jawz, Argon Medical). Histologic examination with immunochemical stains of the samples taken from the interventricular septum showed atypical B cells, consistent with Epstein–Barr virus positive B-cell lymphoma. Cultures taken from the endocardial biopsy were negative for bacteria (including mycobacteria) and fungi.

The patient was subsequently transferred to a tertiary hospital with cardiothoracic surgical support to initiate chemotherapy with sequential R-COP (Rituximab, Cyclophosphamide, Vincristine, and Prednisolone). Since initiation of treatment, serial ECGs showed normal sinus rhythm with first-degree AV block (*Figure 5*). No further tachyarrhythmias or AV dissociation were observed.

Discussion

Primary cardiac lymphoma is defined as extranodal lymphoma involving only the heart or the pericardium.[1] One of the criteria for diagnosis requires the clinical presentation to be reflective of the tumour's impact on the heart.[2] Common presentations in HIV-associated cardiac lymphoma include heart failure, cardiac tamponade, and rhythm abnormalities.[3] Our patient presented with the

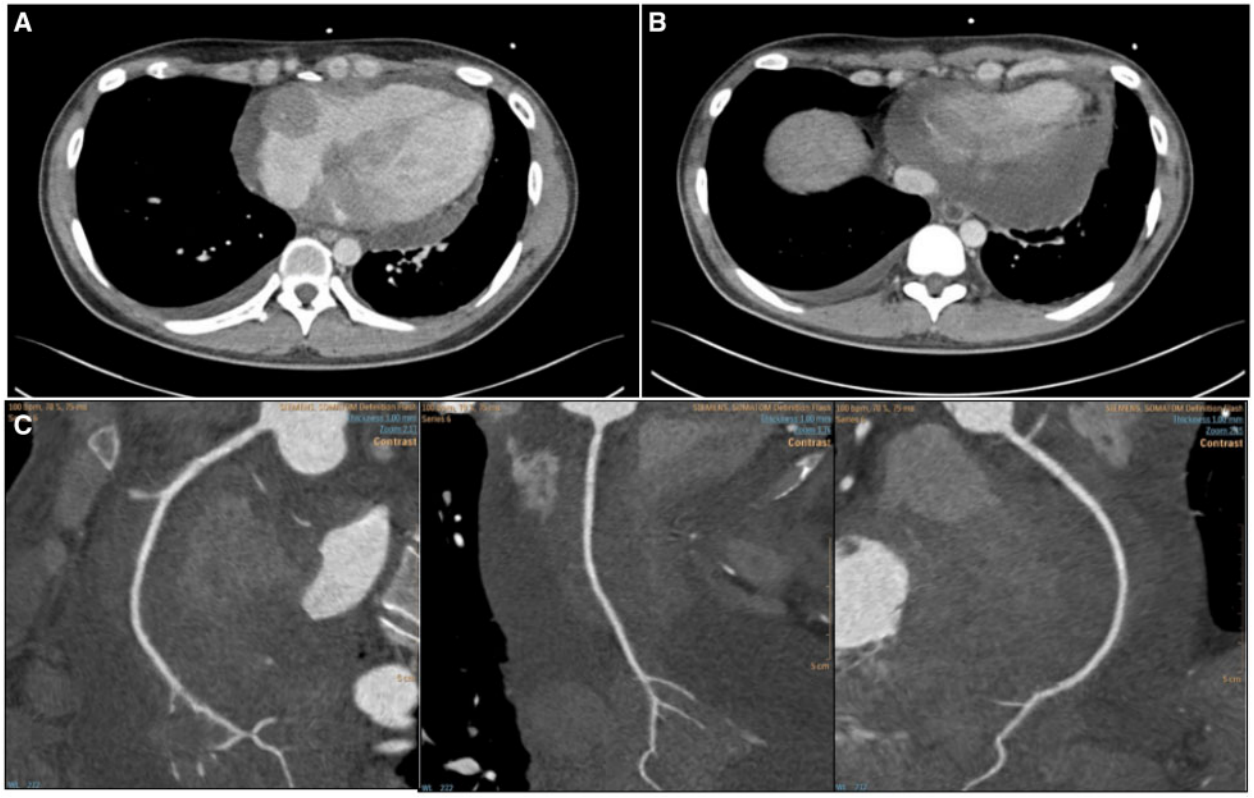

Figure 3 Computed tomography features. (*A* and *B*) Computed tomography thorax axial views demonstrate a homogenous mass along the right atrial wall measuring 3 cm by 3.23 cm encasing the proximal right coronary artery, as well as a large pericardial effusion. (*C*) Curved multiplanar reformats from contrasted computed tomography angiography showing no significant luminal compromise of the right coronary artery.

chief complaint of palpitations which led to investigations uncovering the underlying primary cardiac lymphoma. Of note, palpitations were not reported as one of the common presenting complaints in a series of 85 primary cardiac lymphoma patients.[4] A published series demonstrated that an arrhythmia other than sinus tachycardia or bradycardia is seen in more than half the time.[5] In terms of bradyarrhythmias, both sinus node dysfunction and AV block, especially complete heart block, have been frequently observed.[3,5] The mechanism is most likely related to malignant cardiac infiltration with disruption of the sinoatrial/AV nodes or the conduction system, although initial presentation with sick sinus syndrome without apparent echocardiographic abnormality has also been reported.[6] While there are several case reports describing bradycardias in primary cardiac lymphoma, the literature for bradyarrhythmia specifically in HIV-related cardiac lymphoma is scarce. We were only able to identify one case report of HIV-related cardiac lymphoma presenting initially with heart failure and then developing paroxysmal complete heart block during admission.[7] The treatment of bradyarrhythmias in HIV patients is also particularly challenging. As HIV-associated primary cardiac lymphoma occur in a much younger population as opposed to general cardiac lymphoma patients (mean age 42 vs. 62 years),[3] the decision to implant a permanent pacing device in a young patient requires careful consideration. The effect of chemotherapy on bradycardias secondary to malignant infiltration is unclear. Although there are reported cases of improvement,[8,9] AV block and pacing dependence may also persist despite treatment.

Apart from sinus tachycardia, atrial arrhythmias can be seen in 23% of primary cardiac lymphoma,[5] of which atrial fibrillation and atrial flutter are most common.[3,4,9,10] To our knowledge, our patient is the first reported case of HIV-related primary cardiac lymphoma presenting with palpitations secondary to paroxysmal supraventricular tachycardia with concomitant AV block. Closer inspection of the morphology of the supraventricular tachycardia suggests a long RP interval. Given the long RP interval and P-wave morphology, it is possible that the narrow complex tachycardia represents atrial tachycardia originating from the right atrium due to local effects of the mass. Ventricular arrhythmias can also occur in primary cardiac lymphoma,[5,11] but we did not detect this in our patient. Although confirmation of the exact tachyarrhythmia with diagnostic electrophysiologic testing would be ideal, it was not integral to the management of this patient with aggressive malignancy.

Our case also demonstrates the utility of multi-modality imaging in the investigation of a cardiac mass. Our patient's overall imaging findings were supportive of the diagnosis of cardiac lymphoma. In particular, the typical imaging features of right AV groove involvement with complete encasement of the RCA favours a diagnosis of

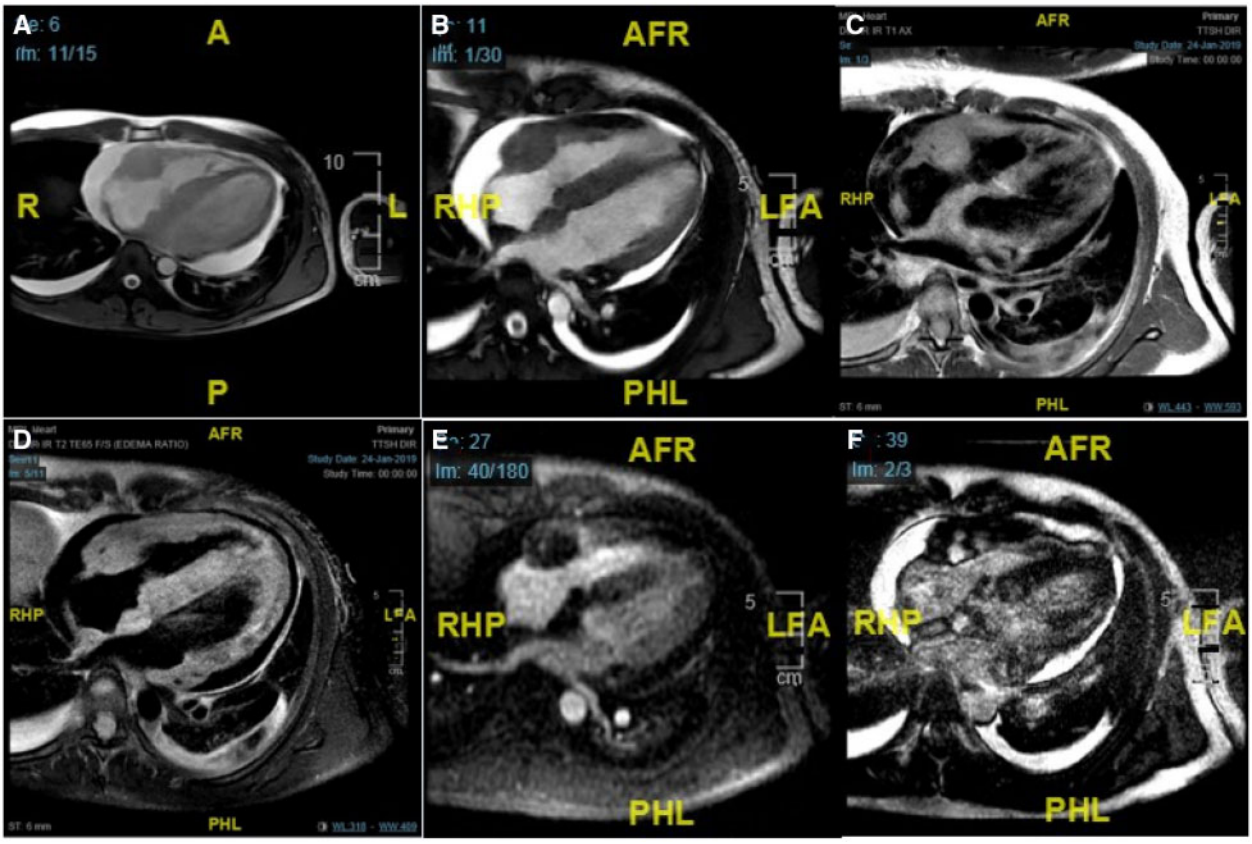

Figure 4 Cardiac magnetic resonance features. (*A*) Steady-state free precession axial anatomy and (*B*) still frame from white blood steady-state free precession cine at end-diastole demonstrating an isointense (relative to myocardium) right atrial mass, thickened interventricular septum, and associated pericardial effusion. The mass and the affected parts of the interventricular septum also appears isointense to myocardium on (*C*) T1-weighted and (*D*) T2-weighted images. (*E*) Minimal enhancement was seen within the mass on first-pass perfusion imaging. (*F*) Patchy delayed gadolinium enhancement within the mass and the basal interventricular septum.

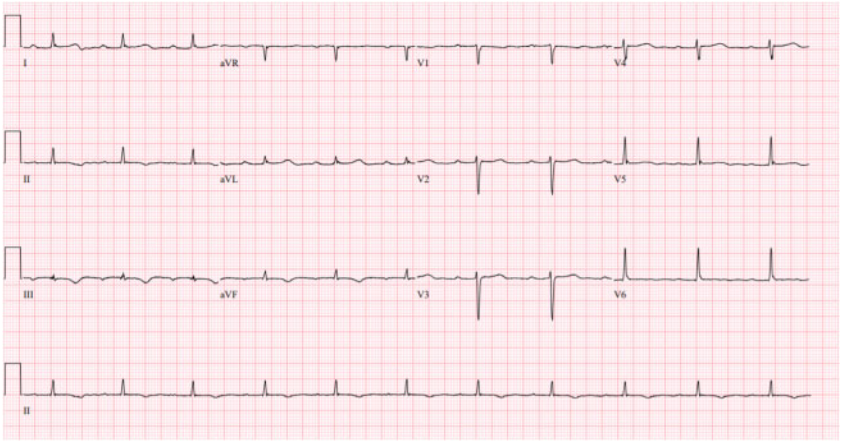

Figure 5 Electrocardiogram showing sinus rhythm and resolution of arrhythmias post-treatment.

lymphoma over cardiac sarcoma, consistent with a small CMR series published previously.[12]

Conclusion

In summary, we report a case of HIV-related primary cardiac lymphoma presenting with both supraventricular tachycardia and complete heart block. While arrhythmia is not the most common presentation for primary cardiac lymphoma, it has been observed that patients presenting with rhythm abnormalities have better survival due to earlier diagnosis and treatment.[3] This case illustrates the importance of having a high index of suspicion for pathology such as cardiac lymphoma in HIV patients complaining of apparently minor cardiac complaints.

Lead author biography

Dr Shonda Ng graduated from Yong Loo Lin School of Medicine National University of Singapore (NUS) in 2014. She obtained her Masters of Medicine and MRCP (UK) in 2016. She completed her internal medicine residency training in 2017 and is currently a 3rd year senior resident in Department of Cardiology, Tan Tock Seng Hospital.

Supplementary material

Supplementary material is available at *European Heart Journal - Case Reports* online.

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Slide sets: A fully edited slide set detailing this case and suitable for local presentation is available online as Supplementary data.

Consent: The author/s confirm that written consent for submission and publication of this case report including image(s) and associated text has been obtained from the patient in line with COPE guidance.

Conflict of interest: none declared.

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