CASE REPORT

Multimodality cardiac imaging of submitral left ventricular aneurysm with concurrent descending aorta mycotic aneurysm

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SUMMARY

We present a case of a 20-year-old Malay man with underlying tuberculous (TB) lymphadenitis who presented with shortness of breath and found to have submitral left ventricular aneurysm (SLVA). SLVA is well recognised but rare. Incidence of SLVA in Malay has never been documented. This is the first reported case of SLVA in Malays with concomitant thoracic aorta mycotic aneurysm. TB has been reported to be associated with SLVA. Treatment is either surgical or conservative. Imaging is required for diagnosis and preoperative assessment. Multimodality imaging include echocardiography (ECHO), cardiac CT angiography and the robust multiparametric cardiac MR (CMR). ECHO is the first line imaging and useful for initial detection of the aneurysm. CMR including the late gadolinium enhancement allows excellent visualisation of the LV aneurysm, tissue characterisation, cardiac function and detection of associated pathology as shown in this case.

BACKGROUND

Submitral left ventricular aneurysm (SLVA) is well recognised but relatively rare. The incidence in the literature from 1966 until 1999 (from MEDLINE date) was less than 100 cases. Beyond 2000 until recently, from PubMed literature review, about 30 additional cases have been reported. SLVA was first described in 1812 by Corvisant but only in 1962 that Abraham¹ reported series of 12 cases of SLVA from Nigerian and other African countries. Once, it was speculated that the entity is exclusive in black population. However, more recent case reports show the entity to occur in other races such as Indian, Caucasian² and Brazilian.³ Only one case of Xanthoderm (yellow skin)⁴ and a Brazilian brown patient has been reported. No such report has ever been made in Malays.

Incidence of SLVA in Malay is extremely rare. Even in our centre, being the country's Southern region cardiac referral centre, there have been no such cases diagnosed in the last 20 years. This is the first reported case of SLVA in Malays with demonstration of multimodality imaging. We propose that SLVA should be considered in young patients with unexplained reduced LV function. Tuberculosis (TB) is an aetiology that should be considered in SLVA and its association has been rarely documented in previous studies.⁵

CASE PRESENTATION

We report a case of a 20-year-old Malay man who presented with shortness of breath. Echocardiography (ECHO) shows basal left ventricular aneurysm with reduced left ventricular (LV) function.

He was initially diagnosed of TB axillary lymphadenitis with confirmatory histopathology and was started on anti-TB. The axillary nodal group, affected mainly of the central and anterior groups; which were ulcerating with visible sinus formation on the skin (stage 3). His blood pressure was 126/65, heart rate 100 bpm and oxygen saturation (SpO₂) 100% under room air. There is no pedal oedema.

INVESTIGATIONS

Blood investigations revealed haemoglobin Hb 9.5g/dL, white cell count 12.59x10⁹/L, platelet 627x10⁹/L. C-reactive protein 191.3 and erythrocyte sedimentation rate (ESR) 100. Mantoux test was positive despite negative sputum Acid Fast Bacilli (AFBs). Venereal disease research laboratory (VDRL) negative. Chest radiograph and ECG were unremarkable.

ECHO was done to rule out infective endocarditis. It showed reduced LV function ejection fraction of 35%–40%, dilated LA and LV, global hypokinesis, moderate MR and basal inferior pseudoaneurysm. [figure 1](#) (see online supplementary video 1) shows colour flow in and out of the submitral aneurysm. The patient was then referred for cardiac MR and subsequently had CT angiography (CTA) cardiac.

The cardiac MR shows SLVA with thrombus within and lower descending thoracic aneurysm with mural thrombus (mycotic) (see [figures 2 and 3](#)). Postcontrast study revealed transmural enhancement of the aneurysmal wall in the basal inferior and mid inferolateral wall. The pericardium and the wall of the descending thoracic aortic aneurysm also enhanced (see online supplementary videos 2 and supplementary video 3).

The CTA coronary shows normal coronary arteries and delineates the lower descending thoracic mycotic aneurysm (see [figure 4](#)).

DIFFERENTIAL DIAGNOSIS

It is important to differentiate true SLVA with post-infarct pseudo-LV aneurysm. This is primarily with the detection of the aneurysm beneath the posterior

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Figure 1 (A) 2-D ECHO parasternal long axis view showing the aneurysmal dilatation of the basal inferolateral wall of the left ventricle shown by the grey arrow. (B) Biplane ECHO images showing the submitral LV aneurysm indicated by black arrows. 2-D ECHO, two-dimensional echocardiography; LV, left ventricle.

mitral valve leaflet such as in this case prediction in the former. Presence of LGE in areas other than beneath the posterior mitral valve leaflet (PMVL) enhancement suggest infarct aetiology. Coronary artery disease was ruled out in this patient from the CTA coronary.

TREATMENT

Curative treatment involves surgical aneurysmectomy and requires thorough preoperative assessment and planning.

For our patient, he was treated with TB maintenance therapy of rifampicin (600 mg once daily), isoniazid (300 mg once daily) and pyridoxine (10 mg once daily). He underwent conservative management under the cardiology team with perindopril (2 mg once daily) and bisoprolol (2.5 mg once daily). He refused surgical option. Patient was started on warfarin for anticoagulation and dose adjusted according to the coagulation profile (international normalised ratio (INR)).

OUTCOME AND FOLLOW-UP

He is well and with normal daily function. He remains well and free of failure symptoms 6 months post follow-up.

Figure 2 (A, B, D, E) Saccular aneurysm at the basal inferior wall, submitral in location behind the posterior leaflet of mitral valve, with wide neck measures 2.7 (AP) x 5.7 (w) cm. The left ventricle is dilated. (C) Short axis LGE image shows transmural enhancement of the pericardium and the wall of the descending thoracic aortic aneurysm are also enhanced. (F) LGE revealed thrombus in the dependant part of aneurysmal sac measuring about 5.2 (w) x 3.6 (AP) x 1.6 (cc) cm. AP, anterior posterior; LGE, late gadolinium enhancement.

Figure 3 (A, B, D) The aortic root, ascending and arch aorta are of normal calibre. There are saccular lobulated and multiseptated descending thoracic aneurysm extending to the diaphragmatic hiatal level. No periaortic haematoma or evidence of leaking. (C) White blood coronal image showing normal visualised abdominal aorta.

DISCUSSION

SLVA is rare, only one has been reported in the central Asia. To the best of the authors' knowledge from the literature reviews, this case report will be the first one reported in Malay population with concurrent descending thoracic aorta mycotic aneurysm likely of TB aetiology.

The SLVA aetiology is not completely understood and there are ongoing debate around the topic. It is postulated to be congenital.⁶ The pathophysiology is thought to be the disjunction between LV musculature and LA mitral valve region due to disturbance of the complex embryogenesis. This theory is supported by the observation that SLVAs occur in a typical location underneath the PMVL and have not been shown to arise from alternate sites in the mitral apparatus.⁷

There are, however, isolated case reports of SLVAs in patients with underlying infectious and/or inflammatory conditions,

Figure 4 (A) Multiplanar reconstructed LVOT view shows the submitral left ventricular aneurysm. (B) Multiplanar reconstructed VLA view shows the submitral left ventricular aneurysm. (C) Multiplanar reconstructed short axis view shows the submitral left ventricular and descending thoracic aorta mycotic aneurysm. LVOT, left ventricular outflow tract; VLA, vertical long axis.

suggesting that a second insult will lead to manifestation of disease in predisposed individuals.⁷ Five reported cases of TB associated with SLVA have been previously reported.^{5–10} There was another SLVA case report of a 9-year-old child with coinfection of HIV and TB.¹¹ Nonetheless, no previous report of descending thoracic aorta mycotic aneurysm in SLVA with TB was ever described in literature as demonstrated in this case. This adds the myriad presentation of TB with SLVA.

Patient with SLVA presents with myriad of symptoms ranging from asymptomatic, shortness of breath, reduced exercise tolerance to chest pain. The symptoms are due to mitral insufficiency with or without LV dysfunction. Patients may also present with arrhythmia or thromboembolic event. Myocardial ischaemia may occur secondary to compression of the left coronary artery. On the other hand, patients may also be asymptomatic.⁶

In the era of advanced imaging, there are several modalities available for the evaluation of patients presenting with cardiovascular disease and in the setting of SLVA.^{12–14} These include:

1. Echocardiography is the first-line modality in detection of submitral aneurysm. It also allows assessment of cardiac morphology and function but it is operator dependent and may be limited by patient-related factors such as body habitus.
2. CT angiography provides detailed information of the coronary arteries, assessment of cardiac lesions as well as the rest of the aorta. However, this modality requires cardiac gating or heart rate control.
3. A multiparametric cardiac MR assessment allows accurate assessment of morphology of the SLVA, tissue characteristics including inflammation, oedema and enhancement, presence of thrombus, flow and systolic function.

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Learning points

- Submitral left ventricular aneurysm (SLVA) is rare and postulated to be due to congenital aetiology. Occasionally, involvement of the whole posterior mitral annulus is associated with infective aetiology.
- Tuberculosis (TB) has been rarely associated with SLVA and should be considered in young patients with reduced LV function.
- This is the first case report on TB aortic mycotic aneurysm associated with SLVA.
- Multimodality imaging in the assessment of SLVA include echocardiography (ECHO), CT angiography and the robust cardiac MR (CMR). CMR has superior resolution and multiparametric assessment of the cardiac abnormality and function.

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