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Case Report

Giant congenital left ventricular diverticulum associated with infective endocarditis: A diagnosis made by tissue Doppler echocardiography

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ABSTRACT

Left ventricular (LV) diverticulum is a relatively rare condition, and it is important to differentiate it from pseudoaneurysm. The increasing use of noninvasive imaging modalities can help to demonstrate different types of ventricular outpouching structures. We report a case of congenital LV diverticulum that is much larger than the usual size and is diagnosed with tissue Doppler echocardiography and cardiac magnetic resonance imaging. Although a ventricular diverticulum is mostly asymptomatic, in the case of this particular patient, it has become complicated with infective endocarditis.

<**Learning objective:** Congenital ventricular diverticulum is a rare finding and can be diagnosed with noninvasive imaging modalities such as tissue Doppler echocardiography and cardiac magnetic resonance imaging rather than surgery. Although congenital ventricular diverticulum is asymptomatic in most cases, infective endocarditis is a known complication.>

Introduction

A diverticulum is an outpouching structure that contains endocardium, myocardium, and pericardium and has normal contraction [1]. Unlike pseudoaneurysm, diverticulum is mostly asymptomatic but complications such as thrombosis, embolism, rupture, and infective endocarditis can occasionally occur [1]. Herein, we report a case of an isolated congenital left ventricular (LV) diverticulum complicated with infective endocarditis. In this article, we suggest that advanced echocardiography might be a useful tool for the diagnosis of LV outpouching structures.

Case report

The patient was a 19-year-old girl who had been in good health until she was 9 years old. At this time, she experienced fever and chest pain for the first time. She was evaluated in another center, and an LV outpouching, indicative of pseudoaneurysm or diverticulum, was found fusing by echocardiography. We know that she had previously undergone an operation, but unfortunately we were not able to have full access to her medical records, and we only know that removal of the lesion was unsuccessful and she was transferred for medical follow-up. The follow-up period was uneventful until one month previously, when she was referred to our center because of a fever. She had no history of trauma or systemic disease, and her family history was unremarkable.

Preliminary laboratory tests revealed anemia and elevated erythrocyte sedimentation rate (115 mm/h). Multiple blood cultures were obtained but only one was positive for methicillin-resistant *Staphylococcus aureus*. Another blood culture that tested positive for *Enterobacter* spp. was considered not related to infectious endocarditis. Further evaluation revealed an opacity in the left paracardiac space in a chest X-ray (Fig. 1), and subsequent transthoracic echocardiography showed a mildly enlarged LV with a moderately reduced systolic function (ejection fraction = 40%) and a large outpouching (80 mm × 55 mm) in the lateral side of the LV (Video 1). Tissue Doppler imaging (Fig. 2) and strain imaging

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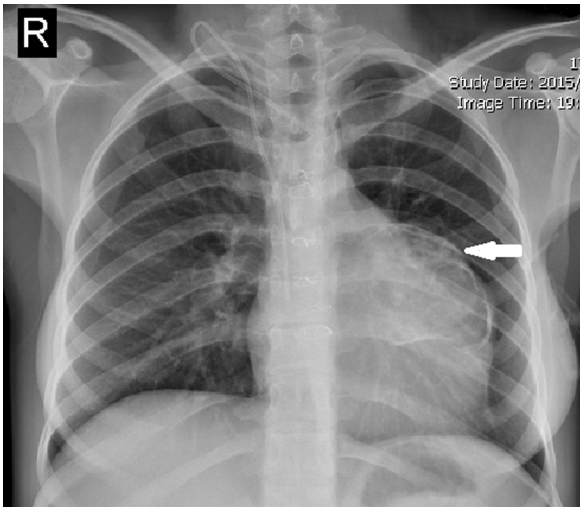

Fig. 1. A postero-anterior chest X-ray revealed opacity with irregular border and calcification in the left paracardiac space (white arrow).

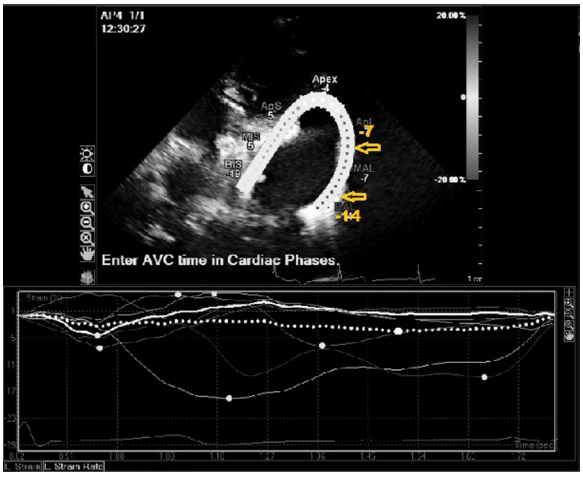

Fig. 2. Segmental longitudinal strain by 2D speckle tracking echocardiography; the yellow arrow shows the outer layer of left ventricular outpouching (longitudinal strain: −7%, −14%).

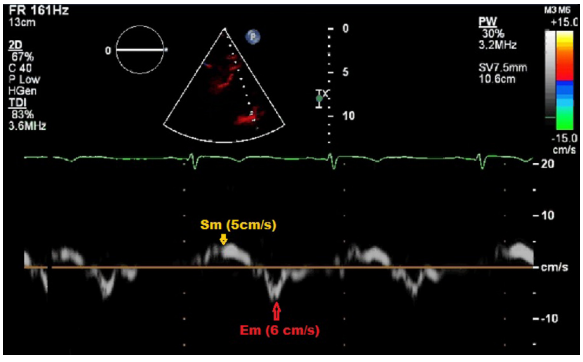

Fig. 3. Tissue Doppler imaging; the yellow arrow shows recordable Sm (systolic tissue velocities) and the red arrow shows Em (early diastolic tissue velocities) in the outer layer of left ventricular outpouching, both of these were compatible with the presence of myocardial tissue.

(Fig. 3) revealed synchronous contraction in the outpouching that was suggestive of diverticulum. Transesophageal echocardiography (TEE) was performed, which confirmed the previous observations. Notably, it showed smoky patterns and a linear mass with a myocardial density (36 mm × 10 mm) at the opposite site of the diastolic jet of the lesion, which is suggestive of vegetation or a clot (Video 2).

Supplementary video related to this article can be found, in the online version, at http://dx.doi.org/10.1016/j.jccase.2016.06.004.

To confirm whether the wall of the lesion consisted of muscle, cardiac magnetic resonance imaging (MRI) was performed. In addition to previous data, it revealed the flow inside the sac with obvious muscle in its wall and no evidence of a clot (Fig. 4A and B).

According to modified Duke's criteria, our patient had one major criterion (intracardiac mass in the path of regurgitant jet in TEE) and three minor criteria (predisposing heart condition, fever, and one positive blood culture for a typical organism). Therefore, a diagnosis of infective endocarditis was made and empirical treatment with vancomycin and cefepime was started. After the results of the blood cultures were obtained, treatment with vancomycin was continued for 6 weeks. The fever was resolved, and in follow-up echocardiography, there was no evidence of vegetation.

Discussion

Once left ventricle outpouching lesions are detected, the next crucial step is to differentiate aneurysm, pseudoaneurysm, and diverticula from each other as the prognosis and management of each condition is substantially different [1]. While definite diagnoses need to be made by histopathologic evaluation, a review of the literature showed that there are different clinical and radiologic criteria for distinguishing these lesions. A recent study illustrated differential diagnosis of LV outpouching based on coronary angiography, cardiac computed tomography, and cardiac MRI [2]. Among these, cardiac MRI is emerging as a useful tool that allows simultaneous anatomical and functional evaluation of lesions [3]. Based on MRI, a pseudoaneurysm is an akinetic lesion with a narrow neck that is usually located in the posterior or inferior parts and shows enhancement of the overlying pericardium in viability imaging [3,4], while a diverticulum is an apical lesion with a variable neck size (usually narrow) and synchronous contractility with no enhancement in the wall of the sac or pericardium in viability imaging [3,5]. The size of diverticula may vary from as small as 0.5 cm in diameter to as large as 8–9 cm [6]. Tissue Doppler, strain, and strain rate echocardiography provide additional information in comparison to conventional echocardiography; these techniques also provide a means of assessing wall motion [7].

Our patient was subjected to tissue Doppler imaging, strain imaging, and 3-dimensional TTE, and as shown in Figs. 2 and 3, we found contractile function in the outpouching that was suggestive of a diverticulum. In addition to TTE, there were other clues in the history and imaging that confirmed our diagnosis; a narrow neck lesion with a thin fibrous layer and the absence of a clot, an uneventful period of about 10 years since the first presentation, and a lack of previous history of any insulting factor to the heart were all suggestive of a diverticulum.

In conclusion, we aimed to show that a diverticulum can be a large lesion, and although they are mostly asymptomatic, they can be complicated with infective endocarditis.

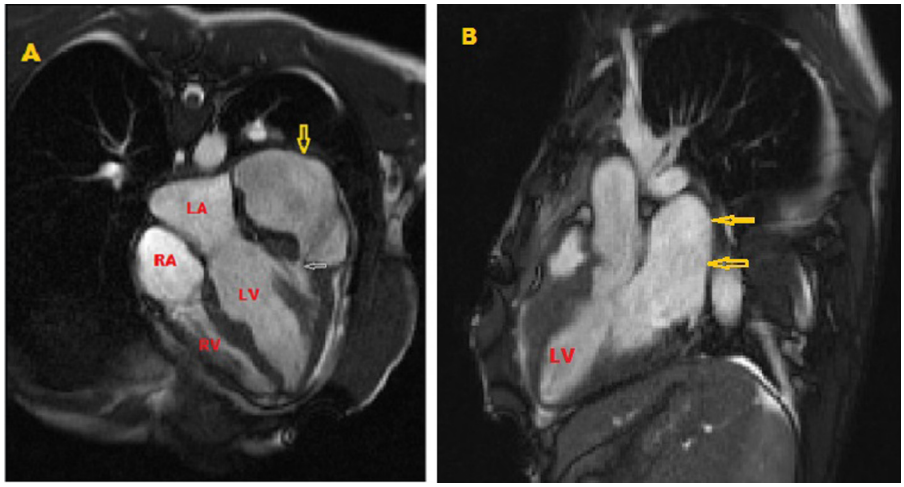

Fig. 4. Multiplanar magnetic resonance imaging (panel A: coronal image, panel B: vertical long-axis image) shows large left ventricular (LV) outpouching measuring 76 mm × 50 mm (yellow arrow), which contains a thin myocardium and is connected to a mid LV lateral segment via a narrow neck (white arrow). LA, left atrium; RA, right atrium; RV, right ventricle.

Conflict of interest

The authors declare that they have no conflicts of interest.

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