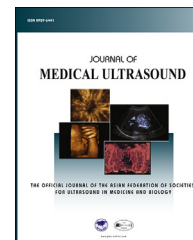


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CASE REPORT

Early Detection of Left Ventricular Diverticulum by Transthoracic Echocardiography



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Abstract Left ventricular diverticulum is a very rare entity to be found in adults. Noninvasive echocardiography can offer useful information prior to contrast-enhanced computer tomography or invasive angiography. We evaluated a patient with left ventricular apical diverticulum but complained no symptoms. Transthoracic echocardiography demonstrated a outpouching at left ventricle apex. A 640-slice computed tomography later confirmed the left ventricular diverticulum.

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Introduction

Congenital left ventricular diverticulum (LVD) was first described in 1816 and approximately 411 cases have been reported up to 2006. It was a rare finding especially when first diagnosed in adult, and patient often was asymptomatic but discovered incidentally [1]. In a retrospective

echocardiographic study, researchers found that the prevalence of congenital LVD was only 0.04% [2]. Congenital LVD can be classified into two types: muscular type and fibrous type. There were around 30% patients with LVD occurred in isolation and atypical LVD had a higher association with other anomalies [3]. Diagnosis of LVD usually required cardiac ventriculography, computed tomographic angiography, magnetic resonance imaging and, less commonly echocardiography [4].

The case

A 57-year-old female was referred for routine transthoracic echocardiography as part of cardiac evaluation before

Conflict of interest: There is no conflict of interest.

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gynecological surgery. She did not have history of hypertension, diabetes mellitus, coronary heart disease, cardiac dysrhythmia, cerebrovascular disease, nor asthma. In addition, she did not have complaints of exertional dyspnea or chest pain. The results of her physical examination were within normal limits. An electrocardiogram showed normal sinus rhythm. The cardiac ultrasound exam showed normal left ventricular (LV) size and function, however careful scanning at long-axis view revealed a small outward protrusion at apex (Fig. 1). A 640-slice computer tomography was ordered and confirmed a 1.6×0.6 cm narrow neck outpouching at the apex of left ventricle, shaped like a diverticulum (Fig. 2). There were no anomalous origin and termination of the coronary arteries except for a myocardial bridging of the distal part of first diagonal artery.

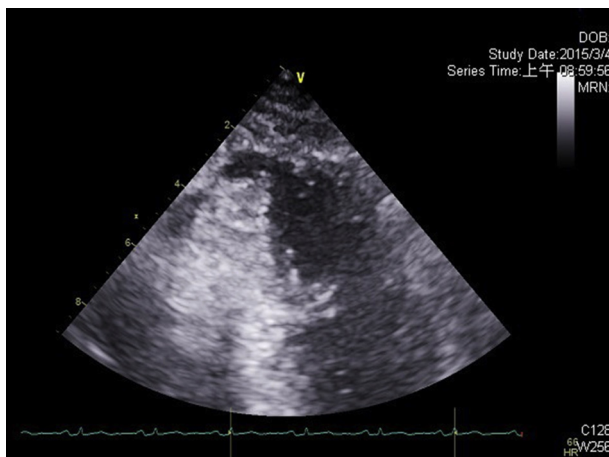


Figure 1 Transthoracic echocardiography with long-axis view. Note the normal ventricular size and function but an outward protrusion at apex.



Figure 2 A 640-slice computer tomography confirmed a 1.6×0.6 cm outward protrusion at the apex of left ventricle, suspected to be a diverticulum.

Discussion

A developmental disturbance in the primitive paramidline mesoderm can occur between the 14th and 18th day of the embryonic phase, shortly after the differentiation into a ventral and parietal part [5]. Then, diverticulum may develop in the 4th embryonic week that forms along the right and left ventrolateral borders of the endocardial tube. The development of a congenital LVD can be explained by a partial cessation in the development of the embryonic ventricle [6]. This explains that the location of the abnormality frequently occurs at left ventricular apex. In terms of LV myocardial diseases, these diverticulum may be congenital or acquired. Hence, the differential diagnosis of LV myocardial diseases includes aneurysm, pseudoaneurysm, diverticulum and LV noncompaction.

LVD is a very rare condition in adult and was first described in the 1800s [7–9]. Previous studies demonstrated that the incidence of LVD was around 0.04–0.4%, while using improved imaging technology, the incidence of LVD is increased to around 2.2% [10]. LVD may be congenital or acquired, with former being more common. Apical diverticulum is usually associated with midline thoracoabdominal defects and other heart malformations, whereas non-apical diverticulum occurs in isolation [11]. Our patient has the apical diverticulum but there were no other congenital abnormalities found by the computed tomography. Using transthoracic echocardiography, we can identify that an LV aneurysm has a wide communication with the ventricle, whereas the LVD communicates with the ventricle through a narrow sleeve [12]. In this patient, a narrow sleeve outpouching communicated with the ventricle was noted. Other differential diagnosis of LVD is LV noncompaction, which is categorized as myocardial disease, and is characterized by the prominent trabecular meshwork with a distinctly spongy appearance and deep intertrabecular recesses [13]. The clinical outcomes of LVD have not been systematically studied. Major complications of LVD include thrombosis, embolism, rupture, congestive heart failure, ventricular arrhythmias, and valvular abnormalities. The true incidences of these complications are not known because of the rarity of LV diverticulum. In one long-term follow-up case report, the LVD did not increase in size over 13 years, suggesting that the clinical outcome may be benign [14].

LVD was accidentally detected by pre-operation echocardiography in this patient. From the multimodality imaging studies, this outpouching communicated with LV via a narrow sleeve. In our evaluation of this patient, transthoracic echocardiography offered excellent visualization of the diverticulum by noninvasive means and blood flows in and out of the outpouching. In summary, high-quality ultrasound image studies could detect LVD. Although lower spatial resolution compared to computed tomography, echocardiography is still the most convenient and versatile imaging tool in the detection of these congenital anomalies.

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