Congenital Left Ventricular Diverticulum in a Patient With Coronary Artery Disease

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Congenital ventricular diverticulum is rare. We present the case of a 76-year-old man who underwent cardiac multidetector computed tomography (MDCT) for recent intermittent chest pain. Obstructive single-vessel coronary artery disease was diagnosed. A left ventricular diverticulum of about 10 × 9 mm was found incidentally. Conventional angiography confirmed both diagnoses. Ventricular diverticulum may be more frequently found in the era of cardiac MDCT and should be differentiated from postinfarct (pseudo)-aneurysm. [*J Chin Med Assoc* 2010;73(8):441–443]

Key Words: cardiac computed tomography, coronary artery disease, multidetector computed tomography, ventricular diverticula

Introduction

Congenital ventricular diverticulum is a rare congenital anomaly. It was first described in 1838 by O'Bryan and defined as a pouch protruding from the ventricular myocardium.[1] It is usually detected in children with other cardiac abnormalities, as reported by Cantrell et al in 1958.[2] About 30% of cases are not associated with congenital malformations and are defined as isolated ventricular diverticula. An isolated ventricular diverticulum is often asymptomatic unless it grows quite large. Therefore, it is usually an incidental finding during transthoracic echocardiography or cardiac catheterization. Here, we present 1 case of left ventricular diverticulum discovered during multidetector computed tomography (MDCT) undertaken to evaluate coronary artery disease.

Case Report

A 76-year-old man suffered from intermittent chest pain that was exacerbated by exertion. The electrocardiographic results for myocardial ischemia were equivocal, and 2-dimensional echocardiography revealed no specific findings. Chest radiography showed that the patient also had situs inversus and bronchiectasis, and he was diagnosed with Kartagener syndrome. MDCT coronary angiography with a 16-MDCT scanner (Sensation 16; Siemens Medical Solutions, Erlangen, Germany) revealed severe stenosis (95%) of the middle left anterior descending coronary artery and moderate stenosis (50%) of the middle left circumflex coronary artery. One small contrast-medium-filled out-pouch was found incidentally, with a visible thin or minimal muscular wall, about 10 × 9 mm in size, with a narrow neck (2.5 mm) communicating with the left ventricular cavity from the base of the subvalvular area of the mitral valve (Figure 1). The volume of the diverticulum was 461 mm^3 in the systolic phase and 428 mm^3 in the diastolic phase, with no synchronous contraction during the cardiac cycle (Figures 2A and 2C). Obstructive single-vessel coronary artery disease with left ventricular diverticulum was diagnosed.

Coronary angiography was then performed, which confirmed the MDCT findings. Percutaneous coronary angioplasty was performed successfully with a Maverick 3.0 × 20-mm balloon catheter (Boston Scientific Corp.,

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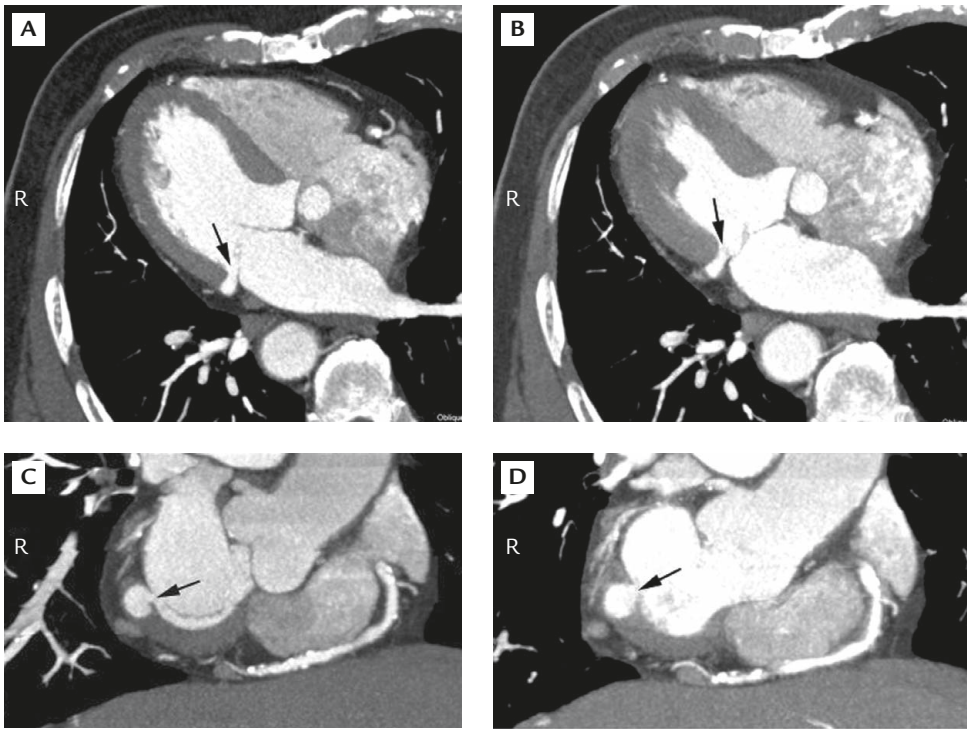

Figure 1. A 76-year-old man with dextrocardia and intermittent chest pain. Cardiac computed tomography reformatted in (A, B) 4-chamber and (C, D) short-axis views shows a diverticulum (arrow) over the submitral valvular area in diastole (A, C) and systole (B, D) (R = right side).

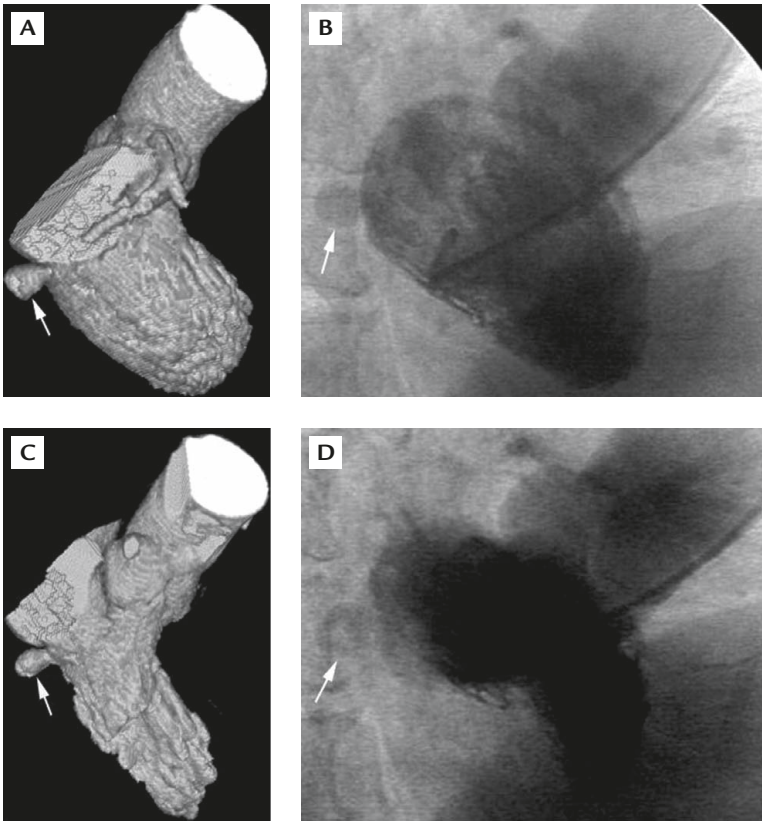

Figure 2. Volume-rendered cardiac computed tomography ventriculography shows a diverticulum (arrow in A and C) with a narrow neck over the submitral valve area. The volume of the diverticulum was 461 mm^3 in diastole and 428 mm^3 in systole. Ventriculography in (B) diastole and (D) systole shows similar findings (arrow).

Natick, MA, USA). Ventriculography showed a diverticulum from the base of the left ventricle without synchronous contraction (Figures 2B and 2D), supporting the MDCT findings. The patient had an uneventful recovery with periodic follow-up.

Discussion

Cardiac diverticula are rare congenital heart anomalies, which usually arise from the left ventricle.[3] There are 2 phenotypes of left ventricular diverticula. The most common type is Cantrell's syndrome, which accounts for 70% of cases. It is usually detected in children with a pentalogy of midline thoracoabdominal defects and which presents as pericardial effusion, shock, or cardiac arrest caused by acute rupture.[4] The remaining cases constitute the isolated form, with no other associated congenital malformations. The isolated form presents in adults as a finding incidental to arrhythmia, congestive cardiac failure, acute chest pain, tamponade attributable to acute rupture, and even sudden death.[5,6] Pathologically, diverticula can be classified into: (1) the muscular type, which contains all the layers of the myocardium and contracts synchronously with the ventricle; and (2) the fibrous type, which contains few or no muscle fibers and shows akinetic or dyskinetic contractility.[3] The muscular type usually arises from the left ventricular apex with a narrow neck, whereas the fibrous type is usually located in the apical or subvalvular area.

It is important to differentiate congenital ventricular diverticula from other causes of acquired ventricular aneurysm, such as those that occur after myocardial infarction, myocardial inflammatory disease (myocarditis), infectious endocarditis, or trauma. Aneurysms consist of predominantly fibrous tissue, which occurs at the replaced myocardium, with a wide-based connection to the ventricle, an abnormal myocardial contour in diastole, and myocardial bulging during systole.

We considered that this patient had the congenital fibrous type of left ventricular diverticulum for the following reasons. First, the diverticulum was not located in the region of the left anterior descending coronary artery (the "culprit" artery). Second, the diverticulum had a narrow neck communicating with the ventricle. Therefore, a ventricular aneurysm was not very likely. We also considered the diverticulum to be the fibrous type because no synchronous contraction was evident in the cardiac cycle.

We have found no association between Kartagener syndrome and congenital left ventricular diverticulum reported in the literature, so we think that this was a coincidental occurrence.

Most cases of isolated ventricular diverticulum have a benign course. However, rare complications such as thrombus formation with emboli, endocarditis, ventricular arrhythmia, and rupture have been reported. Surgical resection is the treatment of choice in symptomatic patients. Our patient was asymptomatic for many years. He sought treatment for intermittent chest pain that had persisted for 1 month, and he was suspected of having coronary artery disease. Because his chest pain was relieved after percutaneous coronary intervention, we considered that none of his associated symptoms or complications were related to the diverticulum.

In conclusion, congenital ventricular diverticula are often silent, with a benign clinical course. With the increasing use of MDCT to evaluate chest discomfort, the incidental detection of congenital left ventricular diverticulum may become more common than previously. This condition should be considered in the differential diagnosis of acquired ventricular aneurysms such as myocardial infarction.

References

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