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CASE REPORT
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Quadrichambered ventricles

Ramazan Akdemir[1], Mustafa M. Balci[1], Cigdem Ozer[2], Musturay Karcaaltincaba[2], Sadik Acikel[1]

[1]Diskapi Research and Education Hospital, Cardiology Department, Ankara, Turkey
[2]Hacettepe University, Radiology Department, Ankara, Turkey

Abstract

Double chambered is a term that has been used to describe the subdivision of a ventricle as a result of anomalous septum or muscle bundle. Subdivision of the left ventricular cavity is a rare cardiac anomaly compared to subdivision of the right ventricle. This case features a double chambered right ventricle and a rare double chambered left ventricle at the same time. (Cardiol J 2010; 17, 3: 303–305)

Key words: double chambered ventricles, echocardiography, magnetic resonance imaging

Case report

A 37 year-old man with a history of ventricular septal defect (VSD) and Eisenmenger's syndrome was referred to our institution owing to dyspnea. On physical examination, he was not febrile. He had blood pressure of 120/80 mm Hg, a pulse of 76 beats per minute and a respiratory rate of 14 breaths per minute. Pulse oximetry revealed oxygen saturation of 90% while breathing ambient air. Cardiac examination revealed a grade 2/6 systolic murmur at the base with a faint diastolic component and a prominent pulmonic valve component (P2). Auscultation of the chest was normal and digital clubbing was seen. Chest radiography confirmed the finding of a normal-sized heart, with markedly prominent pulmonary truncus. Electrocardiography showed sinus rhythm with right ventricular hypertrophy. Echocardiography demonstrated large perimembranous VSD, severe tricuspid regurgitation, mitral valve prolapse, mild mitral regurgitation and two different accessory interventricular septums in the left ventricle (LV) and the right ventricle (Fig. 1). We expected at least a minimal obstruction due to accessory septums, but surprisingly Doppler echocardiography demonstrated that none of these accessory septums were causing ventricular outflow tract obstruction in either ventricle. This may be explained by the course of accessory septums being not perpendicular but parallel to the out-flow of ventricles.

We decided to perform cardiac magnetic resonance imaging which demonstrated an apical muscular VSD in the true septum which was not disclosed by echocardiography (Fig. 2). The case we report here is of a double chambered left ventricle (DCLV) and a double chambered right ventricle (DCRV) at the same time. This image is similar to the quadrichambered ventricles.

Discussion

Subdivision of the LV cavity is a rare cardiac anomaly compared to subdivision of the right ventricle. When we searched for DCLV in the literature, cases reported were mainly of congenital divertriculum, aneurysms and a common association with cardiomyopathy. The true division of the LV

Address for correspondence: Mustafa M. Balci, MD, Diskapi Research and Education Hospital, Cardiology Department, Ankara, Turkey, tel: +90 312 435 56 00, fax: +90 312 433 11 16, e-mail: mmbalci@mynet.com

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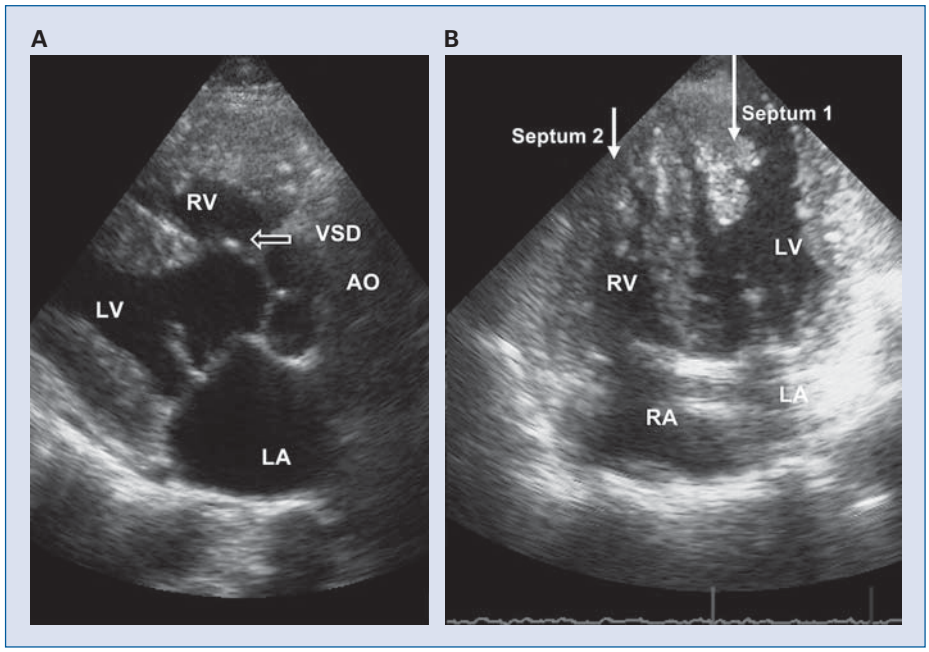

Figure 1. Parasternal long axis view shows the perimembranous ventricular septal defect (VSD) (**A**), apical four chamber view shows the two accessory septums parallel to the real septum (**B**); RV — right ventricle; LV — left ventricle; RA — right atrium; LA — left atrium; AO — aorta

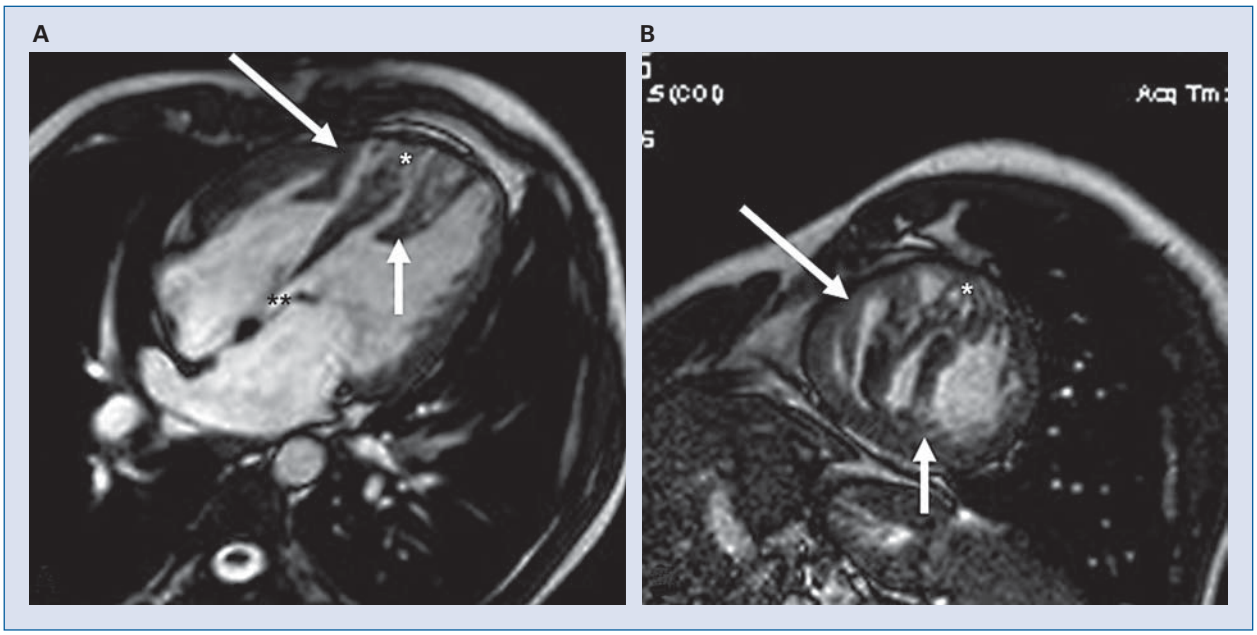

Figure 2. Four-chamber (**A**) and two-chamber (**B**) bright blood TRUE-FISP images show accessory muscle bundle in the left ventricle (short arrow) and right ventricle (long arrow). Note the apical muscular ventricular septal defect (*) between the accessory septums and the perimembranous ventricular septal defect (**).

cavity as a result of accessory septum or muscle bundles has been generally termed DCLV. This distinction was first made by Gerlis et al. [1]. Since Gerlis, very few researchers have reported DCLV. Kay et al. [2] reported a patient with a large accessory chamber lying anterolateral to the main LV,

with non-constrictive communication between the two chambers. The patient presented with congestive heart failure and was surgically treated by excluding the accessory chamber. Caron et al. [3] and Tecklenberg et al. [4] have described DCLV cases that suggest formation of the left ventricular subdivision could represent the end stage of a hypertrophic cardiomyopathy localized to the mid portion of the left ventricle. Harikrishnan et al. [5] reported a case of DCLV with muscular VSDs seen in the true interventricular septum separating the right ventricle from the left ventricle and a mitral valve over-riding both the chambers.

DCRV is typically diagnosed and repaired in childhood, but it may be diagnosed in adulthood from symptoms or electrocardiographic abnormalities due to right ventricular outflow obstruction, or due to associated congenital heart disease such as pulmonary valve stenosis, atrial septal defect, discrete subaortic stenosis and VSD [6–8]. VSD is seen in up to 77% of cases at the time of diagnosis [9]. Several subtypes of divided right ventricle have been described in literature, such as anomalous hypertrophy of septoparietal band and anomalous hypertrophy of apical trabeculations [10].

In conclusion, echocardiography usually provides important morphological and functional information. Magnetic resonance imaging can be an alternative or a complementary technique to echocardiography in the evaluation of congenital heart disease. In our case, magnetic resonance imaging and echocardiography showed us a different kind of DCLV, accompanied both by apical muscular and perimembranous VSD in the true septum and a double chambered right ventricle. This image is similar to the quadrichambered ventricles.

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