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Case Report

Double-Chambered Left Ventricle Mimicking Aneurysm and Pseudoaneurysm: Cardiac Magnetic Resonance-Based Diagnostic Characterization

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Abstract

Double-chambered left ventricle (DCLV) is a rare congenital anomaly mimicking aneurysm or pseudoaneurysm. We report two cases: a 50-year-old male with 20-year history of presumed apical aneurysm (normal coronaries) and a 64-year-old female with pseudoaneurysm in dilated cardiomyopathy (LVEF 25%, LBBB-induced). Cardiac magnetic resonance (CMR) confirmed DCLV in both, revealing a fibromuscular ridge dividing LV chambers. Case 1 (male) demonstrated novel subendocardial fibrosis (3% scar burden) confined to the distal chamber on late gadolinium enhancement (LGE). Case 2 (female) showed preserved accessory chamber contractility without fibrosis. CMR provided definitive differentiation through ridge visualization, chamber contractility assessment, and tissue characterization, guiding conservative management with rhythm surveillance.

Keywords: Double-chambered left ventricle; cardiac MRI; aneurysm mimic; congenital heart disease; myocardial fibrosis.

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Introduction

Double-chambered left ventricle (DCLV) divides the LV cavity via a fibromuscular ridge, occurring in 0.04–0.42% of imaging series. Echocardiography frequently misclassifies DCLV as aneurysm or pseudoaneurysm, particularly when the accessory chamber is hypocontractile. Cardiac MRI excels in morphological delineation and tissue characterization, definitively establishing diagnosis. We present two misdiagnosed cases highlighting CMR's diagnostic superiority and the rare finding of chamber-specific fibrosis.

Case Report

Case 1 (50-year-old male): Dyslipidemia patient with "apical aneurysm" diagnosed at age 30 following palpitations and TTE. Coronary angiography was normal. Over 20 years, serial echocardiograms showed stability. Recent cavity enlargement prompted tertiary referral. CMR demonstrated an apical fibromuscular ridge creating a 32×30 mm distal chamber with 6 mm wall thickness and reduced contractility. Notably, LGE imaging revealed subendocardial enhancement (3% scar burden) confined to the distal chamber, a finding rarely

documented in DCLV literature. Remaining myocardium was viable. Diagnosis: DCLV with distal chamber fibrosis. Management: Conservative follow-up with rhythm surveillance.

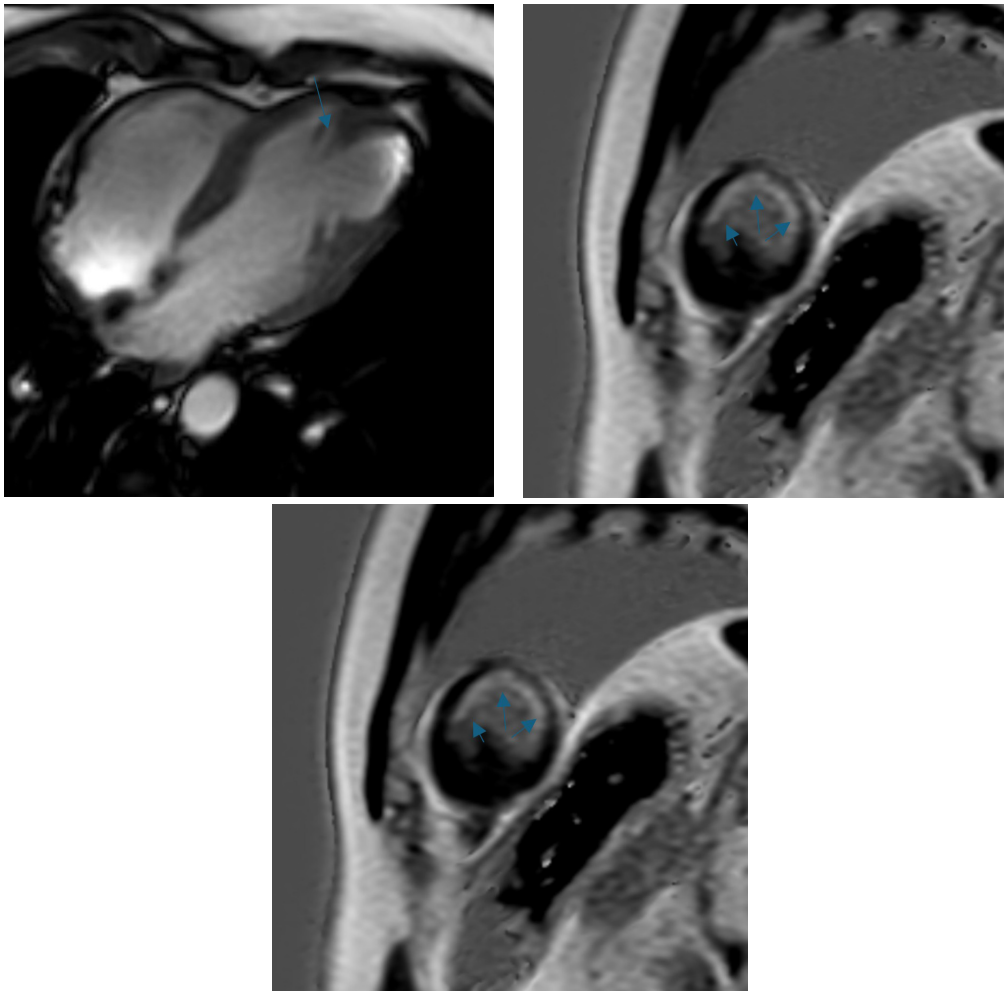
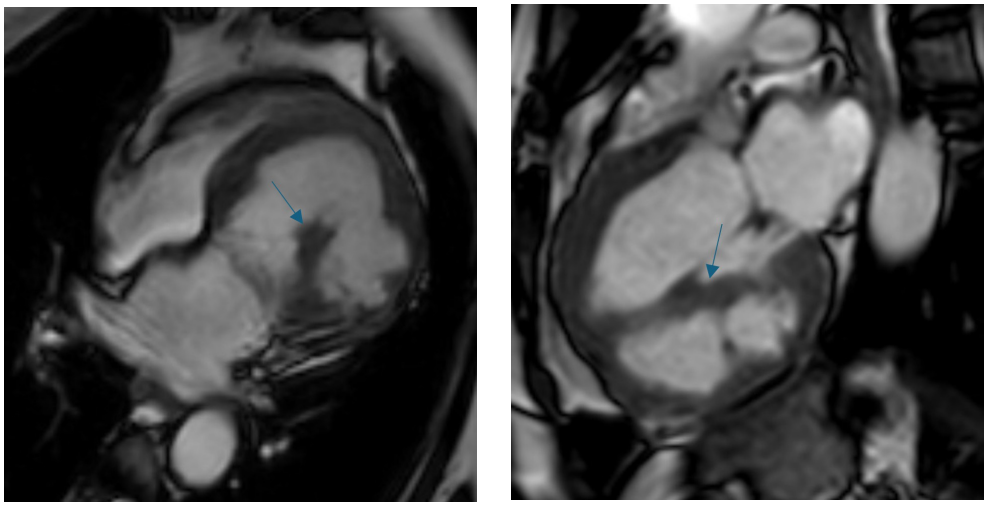


Figure 1. *Case 1 (50-year-old male with DCLV and distal fibrosis): Cardiac MRI demonstrating fibromuscular ridge in apical cavity with rare subendocardial fibrosis. (a) 4-chamber cine view showing muscular ridge (straight arrows) dividing LV into compartments; (b) Short-axis cine demonstrating ridge anatomy; (c) Late gadolinium enhancement short-axis view showing subendocardial enhancement (straight arrows) in distal chamber, consistent with localized fibrosis (3% scar burden).*

Case 2 (64-year-old female): Progressive exertional dyspnea with diastolic murmur. ECG showed LBBB and inferior ischemic changes. Echocardiography revealed moderate mitral stenosis/regurgitation, LVEF 25%, and an apparent inferior pseudoaneurysm. CMR demonstrated a lateral muscular band dividing the LV into two incompletely separated chambers. The accessory chamber exhibited preserved contractility and normal wall thickness with no LGE, excluding fibrosis. Global LV hypokinesia confirmed dilated cardiomyopathy with LBBB-related dyssynchrony. Diagnosis: Dilated cardiomyopathy with DCLV morphology. Management: Heart failure optimization with consideration for device therapy.



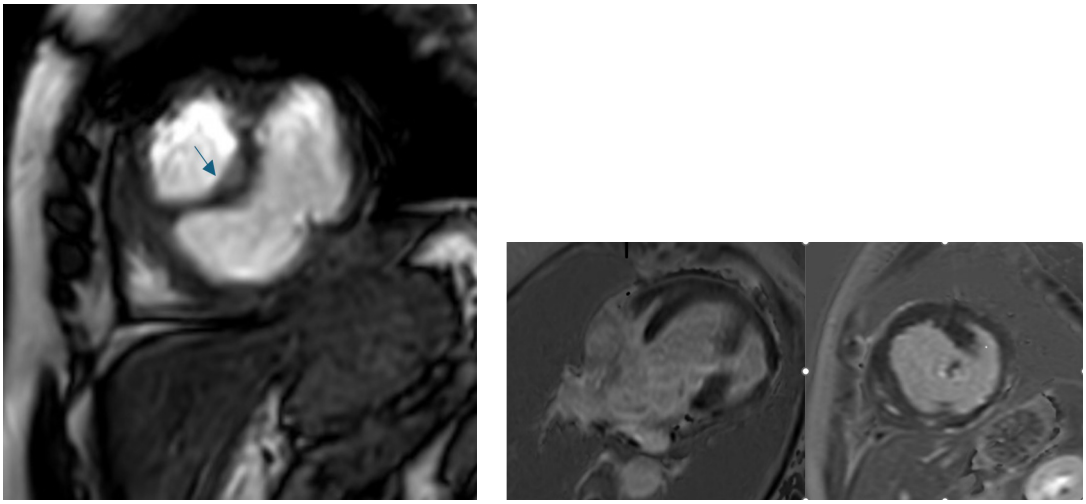


Figure 2. *Case 2 (64-year-old female with DCM and DCLV): Cardiac MRI showing muscular ridge dividing the left ventricle into two chambers with preserved accessory chamber contractility and no fibrosis. (a) 4-chamber view showing muscular ridge (straight arrow); (b) 2-chamber view delineating the ridge; (c) Short-axis view demonstrating the muscular band; (d) Late gadolinium enhancement 4-chamber and short-axis views showing absent fibrosis.*

Discussion

DCLV presents diagnostic ambiguity because an hypocontractile accessory chamber morphologically mimics aneurysm or pseudoaneurysm. However, DCLV is distinguished by: (1) a true muscular ridge connecting chambers, (2) both chambers lined by myocardium and endocardium, (3) normal or only focally abnormal coronary arteries, and (4) a communicating orifice. In contrast, true aneurysms are transmural post-infarct outpouchings with abnormal LGE distribution; pseudoaneurysms show myocardial discontinuity and narrow necks.

Table 1. *Imaging Differentiation of DCLV vs Aneurysm/Pseudoaneurysm*

Feature	DCLV	Aneurysm	Pseudoaneurysm
Morphology	Muscular ridge; myocardial chambers	Thin dyskinetic wall	Narrow-neck pericardial sac
CMR Findings	Normal coronaries; focal LGE	Transmural LGE; CAD	Myocardial discontinuity
Course	Benign; arrhythmia risk	HF/thromboembolism	Rupture risk
Management	Surveillance	Medical/surgical	Urgent repair

Case 1's subendocardial fibrosis is remarkable, as prior large series (Meier et al., Saadia et al.) documented no LGE in DCLV cohorts. This finding likely reflects chronic remodeling secondary to altered flow dynamics and localized myocardial hypoperfusion within the distal chamber. Embryologically, DCLV results from abnormal trabecular resorption or misalignment of muscular ridges during ventricular development.

CMR's superior tissue characterization enables definitive diagnosis and risk stratification. Fibrosis presence warrants closer arrhythmia surveillance. Management remains conservative (observation, anticoagulation if indicated) unless complications emerge.

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