

The Importance of Advanced Imaging by Cardiac Magnetic Resonance Imaging in Diagnosing Congenital Left Ventricular Diverticulum

Review began 06/08/2023

Review ended 06/09/2023

Published 06/12/2023

© Copyright 2023

Aljuhani et al. This is an open access article distributed under the terms of the Creative Commons Attribution License CC-BY 4.0., which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

Moayad Z. Aljuhani ¹, Hussein A. Ahmed ², Ali A. Almasood ², Abdullah A. Alsehly ²

1. Internal Medicine, Specialized Medical Center, Riyadh, SAU 2. Cardiology, Specialized Medical Center, Riyadh, SAU

Corresponding author: Moayad Z. Aljuhani, moayadzeyad@gmail.com

Abstract

The left ventricle diverticulum is a very rare congenital cardiac malformation that is usually present during childhood. However, we are reporting the case of an adult patient with a left ventricular diverticulum who presented with chest pain. This paper also highlights the importance of using advanced imaging modalities such as cardiac magnetic resonance, which was essential for diagnosing our case. Our management was conservative, as the patient's chest pain was very mild and resolved within a few days.

Categories: Cardiology, Radiology

Keywords: adult congenital cardiac malformation, cardiac magnetic resonance imaging, echocardiography, congenital cardiac malformation, left ventricular diverticulum

Introduction

The left ventricular diverticulum is a rare congenital cardiac malformation characterized by an outpouching of the left ventricular wall [1-4]. Although it has been reported before, each case has its own unique clinical presentation, anatomy, and imaging characteristics. Here, we present the case of a 55-year-old man who presented with chest pain and was incidentally discovered to have a left ventricular diverticulum during a diagnostic workup. The diagnosis was confirmed by cardiac magnetic resonance imaging, which played a crucial role in establishing the diagnosis and guiding the management strategy. This case highlights the importance of considering the left ventricular diverticulum as a potential cause of chest pain and the value of advanced imaging modalities in the diagnosis and management of this rare cardiac anomaly.

Case Presentation

A 55-year-old man presented to our cardiology clinic with a sudden onset of sharp left-sided chest pain. The pain has been transient and lasts for a few minutes without any radiation. It is not worsened by exertion, movement, food, activity, or respiration. He also denied shortness of breath, chills, cough, nausea, or diaphoresis. His medical history included diabetes mellitus type 2 and dyslipidemia. He denied any history of myocardial infarction, arrhythmias, hypertension, or stroke. He had never experienced exertional dyspnea or chest pain. His physical examination was unremarkable. An EKG showed a normal sinus rhythm without significant abnormalities (Figure 1). A 2D echocardiogram was done and showed a dissected left ventricular lateral wall with a differential diagnosis of left ventricular diverticulum or pseudoaneurysm. There was normal left ventricular wall thickness. There were no regional wall motion abnormalities (Figure 2).

How to cite this article

Aljuhani M Z, Ahmed H A, Almasood A A, et al. (June 12, 2023) The Importance of Advanced Imaging by Cardiac Magnetic Resonance Imaging in Diagnosing Congenital Left Ventricular Diverticulum. Cureus 15(6): e40302. DOI 10.7759/cureus.40302

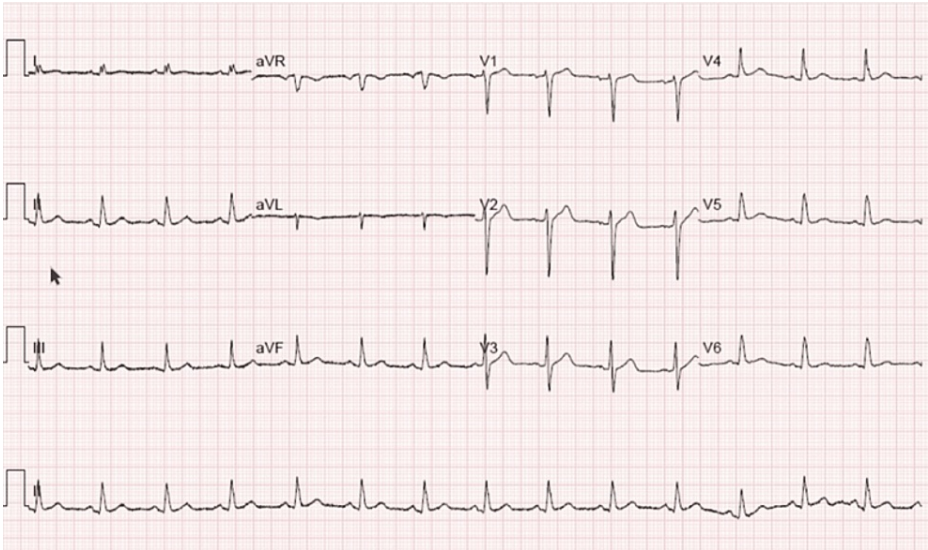


FIGURE 1: Electrocardiogram

Twelve-lead electrocardiogram showing sinus rhythm, without any significant abnormalities.

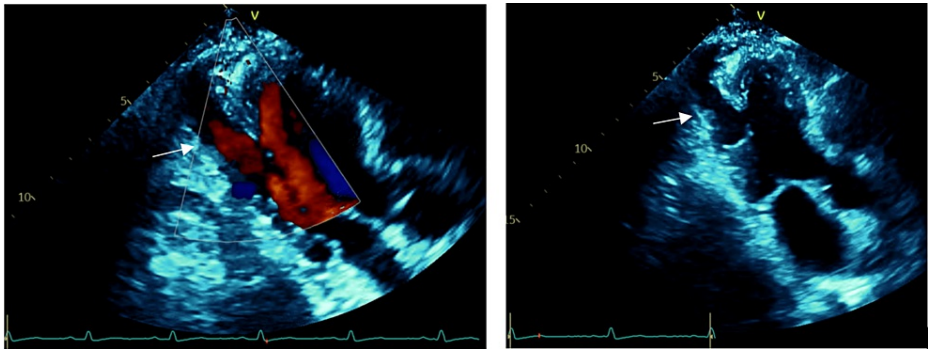


FIGURE 2: Echocardiogram

Echocardiogram of three-chamber view with color compare showing the left ventricular diverticulum - arrow.

Therefore, a cardiac MRI was needed for further assessment. An MRI was done and showed (Figure 3) a large diverticulum of the LV lateral wall. The opening (neck) measures 1.5 cm, and the maximum cavity length was 4.5 cm from a four-chamber view with preserved contractile function and muscular trabeculations/papillary attachment seen inside with mild to moderate hypokinesia seen at the anterior and lateral ventricular walls with noticeable wall thinning in the apical area. Left ventricular ejection fraction (LVEF) 46% cardiovascular magnetic resonance (CMR) tissue characterization sequences and late gadolinium enhancement (LGE) showed no evidence of scarring or fibrosis of the LV or RV myocardium or the diverticulum myocardial wall. No intracardiac thrombi or clots were seen. Left heart catheterization showed no significant lesions.

Our management approach was conservative because the patient's chest pain was mild and resolved within a few days. A six-month follow-up was performed, and the patient remained asymptomatic. The patient will be monitored during his regular clinic appointments to watch for any symptoms or changes that require additional interventions.

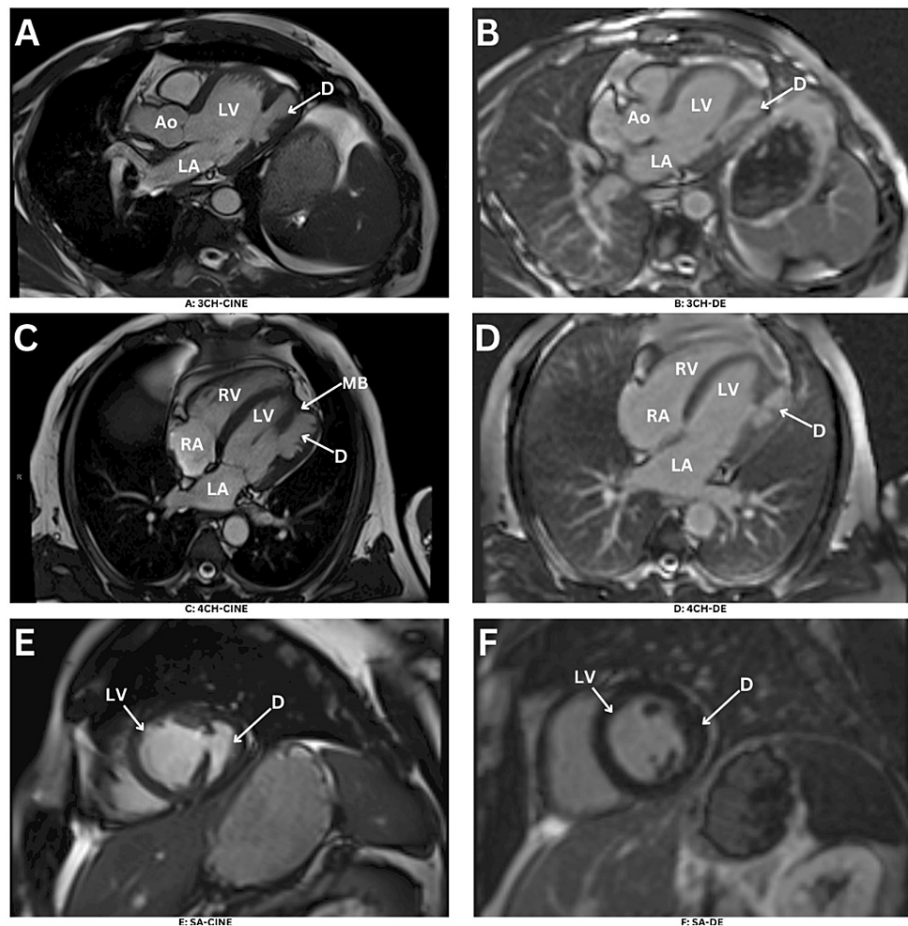


FIGURE 3: Cardiac magnetic resonance imaging

Cardiac MRI demonstrated the left ventricle diverticulum myocardial wall with noticeable wall thinning measuring 2-3 mm in the lateral area in the four chambers long axis SSFP view (C), and D (DE). Three chambers view SSFP sine (A) and (B) of DE. Short axis SSFP (E) and F (DE). D, diverticulum; LA, left atrium; LV, left ventricle; MB, muscle band; RA, right atrium; RV, right ventricle. DE (delayed contrast enhancement). SSFP: steady-state free precession sequence.

Discussion

The LV diverticulum is a very rare cardiac congenital anomaly in adults. Only 0.4% of cases have been detected at autopsies [1]. The LV diverticulum is a left ventricle outpouching structure that contains all three heart wall layers (endocardium, myocardium, and pericardium) and exhibits synergistic contraction with the left ventricle [2].

Nowadays, the diagnosis of the left ventricular diverticulum relies heavily on advanced imaging. Using cardiac MRI to evaluate cardiac function and visualize the cardiac anatomy has a crucial role in helping to differentiate between similar conditions. Cardiac MRI demonstrates late gadolinium enhancement of the myocardium and pericardium in regions of fibrosis or infarct, which is often seen in cases of left ventricular aneurysm and pseudoaneurysm [3]. On MRI, the LV diverticulum will demonstrate normal myocardial signal intensity in its wall without any discontinuity or enhancement on late-gadolinium sequences. On cine MRI, it will show synchronous contractility [3]. Cardiac magnetic resonance imaging is also well known for its unique and sensitive role in detecting left ventricular thrombi [3]. Earlier studies estimated an incidence of 0.4%, while one study utilizing multi-detector computed tomography angiography found an increased prevalence of 2.2% [3].

There is still debate about whether an isolated, asymptomatic LV diverticulum should be treated with surgery. Typically, surgical therapy is advised when the condition is symptomatic or when it coexists with other cardiac problems [4]. In a few cases, spontaneous regression occurs, and their size may not alter over time, reflecting a benign course. Close clinical monitoring is usually sufficient, and additional management should be dependent on related abnormalities and potential complications [3].

Conclusions

Congenital left ventricle diverticulum is a rare incidental finding with an unclear appearance on 2D transthoracic echocardiography. This case report stresses the important role of multi-modality imaging in cardiology to establish, categorize, and help in the management strategy of various common and rare congenital and acquired cardiac diseases. Our patient is managed conservatively since no major supporting clinical evidence warrants surgical intervention.

Additional Information

Disclosures

Human subjects: Consent was obtained or waived by all participants in this study. Specialized Medical Center Ethics Committee issued approval #012-2022. We received the ethics committee's approval on September 14, 2022. IRB registration number with KASCT, KSA: H-01-R-056. **Conflicts of interest:** In compliance with the ICMJE uniform disclosure form, all authors declare the following: **Payment/services info:** All authors have declared that no financial support was received from any organization for the submitted work. **Financial relationships:** All authors have declared that they have no financial relationships at present or within the previous three years with any organizations that might have an interest in the submitted work. **Other relationships:** All authors have declared that there are no other relationships or activities that could appear to have influenced the submitted work.

References

1. Mardini MK: Congenital diverticulum of the left ventricle. Report of two unusual cases . Br Heart J. 1984, 51:321-6. [10.1136/hrt.51.3.321](https://doi.org/10.1136/hrt.51.3.321)
2. Luc TQ, Hien PD, Ninh TP, et al.: Left ventricular diverticulum: a case report and review of the literature . Radiol Case Rep. 2022, 17:2717-22. [10.1016/j.radcr.2022.04.036](https://doi.org/10.1016/j.radcr.2022.04.036)
3. Sharma A, Kumar S: Overview of left ventricular outpouchings on cardiac magnetic resonance imaging . Cardiovasc Diagn Ther. 2015, 5:464-70. [10.3978/j.issn.2223-3652.2015.11.02](https://doi.org/10.3978/j.issn.2223-3652.2015.11.02)
4. Marijon E, Ou P, Fermont L, Concorde S, Le Bidois J, Sidi D, Bonnet D: Diagnosis and outcome in congenital ventricular diverticulum and aneurysm. J Thorac Cardiovasc Surg. 2006, 131:433-7. [10.1016/j.jtcvs.2005.09.046](https://doi.org/10.1016/j.jtcvs.2005.09.046)