Available online at www.sciencedirect.com

ScienceDirect

journal homepage: www.elsevier.com/locate/ihj

Case Report

An unfortunate case of subaortic left ventricular diverticulum

P. Vinodh Kumar [a,*], Asha Moorthy [b]

[a] Assistant Professor, Department of Cardiology, Saveetha Medical College, Thandalam, Tamil Nadu, India
[b] Professor and Head of the Department, Department of Cardiology, Saveetha Medical College, Thandalam, Tamil Nadu, India

ARTICLE INFO

Article history:
Received 28 September 2015
Accepted 16 November 2015
Available online 20 December 2015

Keywords:
LV diverticulum
Subaortic
Coronary artery compression

ABSTRACT

A 38-year-old man presented with exertional angina of 1-year duration. Treadmill was strongly positive. Coronary angiogram revealed a significant phasic systolic compression of the left main and the proximal left circumflex artery. Echo and MRI revealed a subaortic left ventricle diverticulum causing compression of the coronary vessels. Before the planned surgery, the patient had sudden deterioration with cardiogenic shock and could not be saved.

1. Introduction

Cardiac diverticulum is a rare abnormality presenting either as a component along with other abnormalities or as an isolated abnormality. It usually is an incidental finding without any complications.

We present a very interesting and at the same time an unfortunate case of a left ventricular diverticulum, which presented with a life-threatening complication.

2. Case report

A 38-year-old male came to our op with complaints of exertional chest pain on and off, which varied from mild to moderate exertion for the past one year. The pain was typical anginal chest pain, which lasted for 2–5 min. He had history of admission to ER on previous two occasions in two different hospitals, within the past year and discharged with non-cardiac medications. His baseline examination and electrocardiogram were within normal limits. Echocardiogram done as outpatient was reported as normal. He was subject to treadmill test, which was strongly positive. Hence, he was admitted for coronary angiogram.

His coronary angiogram (Fig. 1) revealed a long left main with phasic systolic compression of about 40–50%. It also showed a significant 80–90% phasic systolic compression of the proximal left circumflex (LCX). The left anterior descending artery (LAD) had a fixed 90–95% lesion proximally. Right coronary was normal. Just at the end of the coronary angiogram, he developed acute pulmonary edema and the patient was treated with diuretics and noninvasive ventilation. Left ventricle (LV) angiogram could not be done.

* Corresponding author.
E-mail address: drvinodhmmc@gmail.com (P.V. Kumar).
http://dx.doi.org/10.1016/j.ihj.2015.11.021

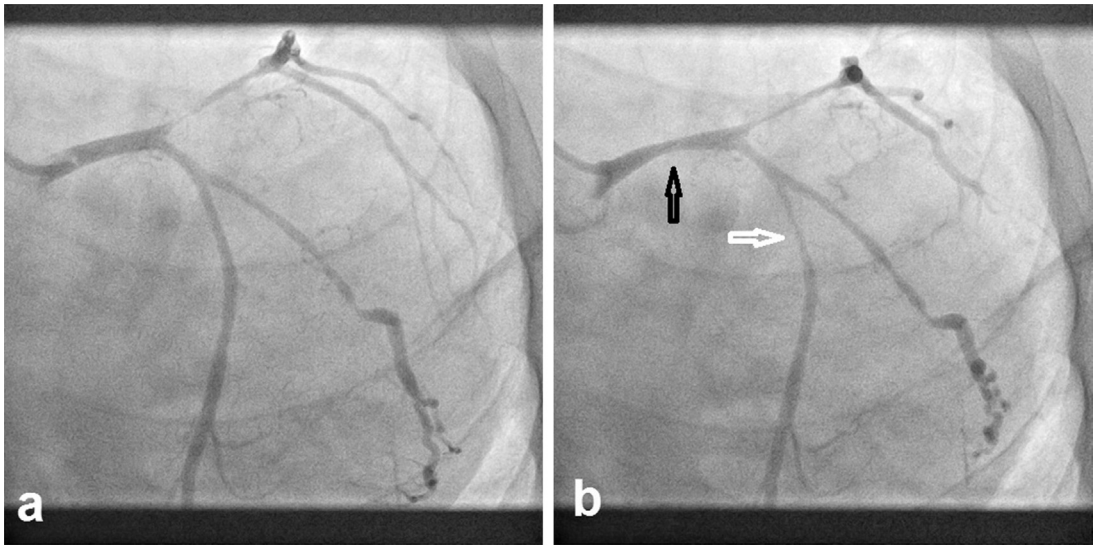

Fig. 1 – Coronary angiogram antero-posterior view. (a) Angiogram in diastolic frame showing fixed LAD stenosis. (b) Systolic frame shows a significant compression of the left main (black arrow) and the LCX (white arrow) arteries.

In the ICU, repeat echocardiogram was done (Fig. 2), which showed a hypokinesia of the basal inferolateral segment of LV with moderate mitral regurgitation. Unconventional lateral sweep of the parasternal long axis (PLAX) view revealed an abnormal outpouching from the left ventricular outflow (LVOT) area. Findings were suggestive of an aneurysm or a diverticulum. Magnetic resonance imaging (MRI) (Fig. 3) confirmed the findings, which clearly showed a outpouching in the subaortic region. Cine MRI revealed that the pouch was minimally expanding with each systole and reducing in size with diastole. It also revealed that the diverticulum was in close contact with left main and the LCX artery and it was getting compressed with each systole (Fig. 3e and f).

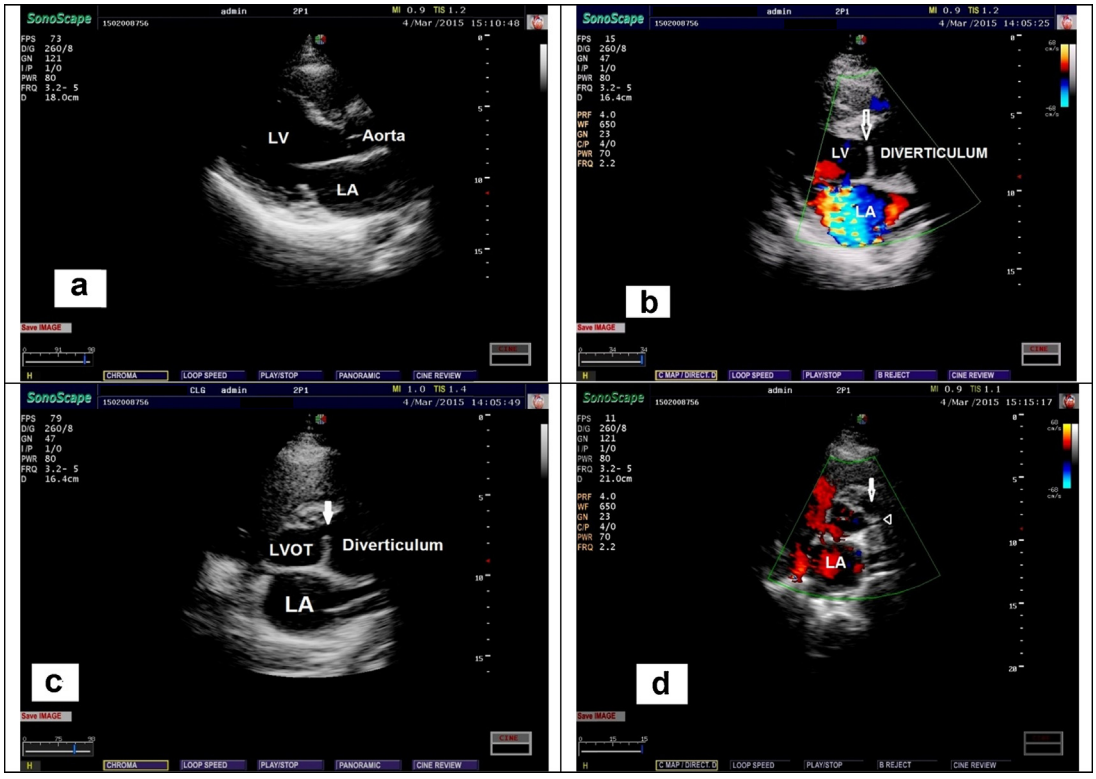

Fig. 2 – Echocardiogram images. (a) Normal PLAX view does not reveal any abnormality. (b) PLAX with lateral tilt shows a pouch (arrow) with connection to the LVOT region. (c) Short axis view (SAX) below the aortic valve reveals a chamber (arrow) with a connection to LVOT. (d) SAX view shows the diverticulum (arrow) in relation to the left main coronary vessel (arrow head).

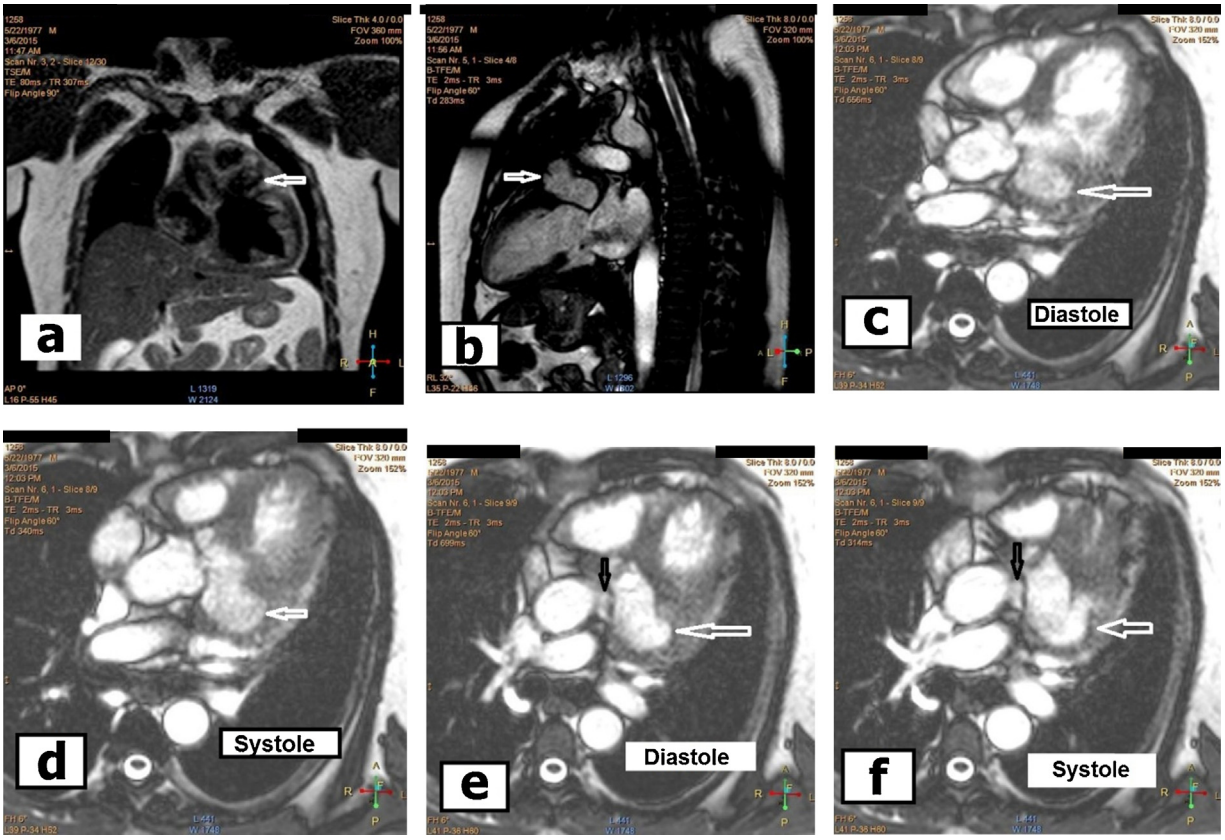

Fig. 3 – (a) T2 weighted coronal section showing the pouch above the LV. (b) bTFE sequence sagittal section showing the diverticulum (arrow). (c and d) Transverse section just below the aortic valve shows the pouch/diverticulum (arrow) in systole and diastole. (e and f) Transverse section at the level of coronaries shows the diverticulum in close relation to the left main and LCX (black arrow), with compression of the coronaries by the diverticulum in systole (white arrow).

We planned coronary artery bypass grafting with resection of the diverticulum on the subsequent day. However, unfortunately the patient developed sudden chest pain on the day of surgery and went in for sudden hypotension and cardiogenic shock in ICU. Attempted resuscitation was not successful. He went into bradycardia and cardiac asystole even before intra-aortic balloon pump could be started or could be shifted for emergency surgery. Echo done during this resuscitation revealed a moderate LV systolic dysfunction with severe mitral regurgitation and the diverticulum was still intact. Unfortunately, the patient could not be saved. Since the patient's relatives were not willing for a post-mortem, it was not done.

3. Discussion

Left ventricular diverticulum can be defined as an out-pouching that contains all three layers of the heart and displays normal contraction.[1] The prevalence is reported as 0.4% in necropsy studies. There has been approximately 100 cases reported in the English literature with a prevalence estimated at 0.013%; however, the true prevalence is not clearly known.[2] Congenital left ventricular diverticulum starts in the 4th embryonic week. Possible etiologies are intrinsic abnormalities of embryogenesis or in utero acquired malformations (like viral infections, arrhythmia-related vascular accidents, or cardiomyopathies.[3] In 1958, Cantrell described an association of cardiac defects with anterior abdominal defects, sternal defects, anterior diaphragmatic defects, and pericardial defects.[4] Among the reported cases of Cantrell's syndrome in literature, about 32% had LV diverticulum and 4% had RV diverticulum.[5] In about 30% of cases, these diverticulum occurs without any associations.[6] Most cardiac diverticulums are located in the LV, but other locations like right ventricular, right atrial, left atrial, and biventricular have also been reported.

The LV diverticulum can be muscular or fibrous. Muscular forms occur in the apex. The fibrous type occurs in subaortic region, submitral region, or apex. The true incidence of subaortic LV diverticulum is not known. Only few case reports have been published.[7–9] Most of the previous reports of subaortic diverticulum had reported with aortic regurgitation as the complication. This is the first time that a case of LV diverticulum causing compression to the coronaries is being reported. The other major complications apart for valvular regurgitation are thrombosis, embolism, rupture, congestive heart failure, and ventricular arrhythmias.[1] Echocardiography and ventriculography can be used for detection and confirmation of the lesion. Other modalities like MRI and CT can also be used for confirmation and clear delineation of the diverticulum.

The natural history of the disease depends on the associated anomalies. Long-term follow-up of uncomplicated diverticulums have been shown to have a benign course.[10] The treatment for complicated or symptomatic cases is surgical resection. However, some suggest surgical resection for all patients.

Conflicts of interest

The authors have none to declare.

REFERENCES

1. Makkuni P, Kotler MN, Figueredo VM. Diverticular and aneurysmal structures of the LV. *Tex Heart Inst J*. 2010;37:.
2. Keith JD, Rowe RW, Vlad P. Incidence of various congenital heart defects. In: Keith JD, ed. In: *Heart Disease in Infancy and Childhood* 3rd ed. New York: Macmillan; 1978:4–6.
3. Shah D, Kumar CP, Shah MS, et al. Case series: Congenital left ventricular diverticulum. *Indian J Radiol Imaging*. 2010;20:211–214. http://dx.doi.org/10.4103/09713026.69356.
4. Cantrell JR, Haller JA, Ravitch MM. A syndrome of congenital defects involving the abdominal wall, sternum, diaphragm, pericardium and heart. *Surg Gynecol Obstet*. 1958;107:602–614.
5. Vazquez-Jimenez JF, Muehler EG, Daebritz Keutel J, et al. Cantrell's syndrome: a challenge to the surgeon. *Ann Thorac Surg*. 1998;65:1178–1185.
6. Gruberg L, Goldstein SA, Pfister AJ, et al. Cantrell's syndrome left ventricular diverticulum in an adult patient. *Circulation*. 2000;101:109–110.
7. Petiero J, de Almedia CA, Alzamora P, et al. LV diverticulum at subaortic level. *Rev Port Cardiol*. 1989;8:869–870.
8. Deng Y, Sun Z, Dong N, Du X. Congenital cardiac diverticulum in the subaortic valve area. *J Thorac Cardiovasc Surg*. 2006;132:1087.
9. Caralps JM, Martí V, Montie J. Congenital subaortic diverticulum. *Rev Esp Cardiol*. 2007;60:1314.
10. Marijon E, Ou P, Fermont L, et al. Diagnosis and outcome in congenital ventricular diverticulum and aneurysm. *J Thorac Cardiovasc Surg*. 2006;131:433–437.