An unusual case of rupture of left sinus of valsalva aneurysm into main pulmonary artery

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ABSTRACT

We report a case of left sinus of Valsalva aneurysm rupture into main pulmonary artery who underwent successful surgical correction. The preoperative diagnosis was facilitated by echocardiography, cardiac catheterization, and computed tomography. The benefits of surgery are sustained at 8 months on clinical and angiographic follow-up.

Keywords: Left sinus of valsalva aneurysm, rupture into main pulmonary artery, surgical correction

INTRODUCTION

Sinus of Valsalva aneurysm is a rare cardiac anomaly which can be congenital or acquired. Majority of them arise from right and non-coronary sinuses and aneurysms from left sinus are rare (<5%).[1-3] There are isolated reports of rupture of left coronary sinus aneurysm into pulmonary artery.[4-6]

The early and precise diagnosis of left sinus of Valsalva aneurysm rupture is difficult due to its rarity. We report a unique case of left sinus of Valsalva aneurysm rupture that was accurately diagnosed preoperatively and underwent successful surgical correction.

CASE REPORT

A 55-year-old male was referred to our unit with a clinical diagnosis of severe aortic regurgitation (AR) for further management. Patient had New York Heart Association (NYHA) class II to III dyspnea for the last 2 years. He denied any history of hypertension, diabetes, Marfan's syndrome, connective tissue disorder, trauma, or infective endocarditis. Physical examination revealed sinus rhythm, peripheral signs of aortic run off, bilaterally equal peripheral pulses, blood pressure of 120/60 mmHg in right upper limb and 160/60mmHg in left upper limb, normal S1, normally split S2, loud P2, loud S3, and grade 3/6 continuous murmur along the left sternal border. Relevant blood investigations were normal. Electrocardiogram revealed sinus rhythm, left atrial enlargement and left ventricular hypertrophy. Radiograph of the chest in postero-anterior projection revealed cardiomegaly with cardiothoracic ratio of 0:6, prominent ascending aorta and marginal increase in pulmonary vascularity. Cross-sectional echocardiography in short axis view [Figure 1a] revealed left coronary sinus to be markedly dilated. Left ventricular ejection fraction (LVEF) was normal. Doppler interrogation revealed moderate to severe AR. Hemodynamic and oximetry data is summarized

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DOI: 10.4103/0974-2069.140852

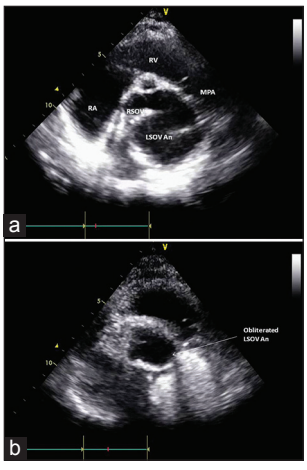

Figure 1: (a) Echocardiography in parasternal short axis view depicts a large aneurysm arising from left sinus of Valsalva (b) Post-surgery echocardiography, in parasternal short axis view documents obliteration of the aneurysm. RA: Right atrium, RV: Right ventricle, MPA: Main pulmonary artery, RSOV: Right sinus of Valsalva, LSOV: An left sinus of Valsalva aneurysm

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in Table 1. Left ventriculography showed LVEF of 60%. Aortography in various projections demonstrated a tricuspid aortic valve and grade 3/4 AR. There was marked dilatation of left coronary sinus and on selective injection into the aneurysm, there was opacification of main pulmonary artery (MPA) and its branches [Figure 2a]. The arterial pigtail catheter from aorta could be negotiated into MPA. These findings suggested an unusual rupture (communication) between left coronary sinus and pulmonary artery. Coronaries were normal on angiography. Computed tomographic (CT) aortography [Figure 3a] revealed a large (approximately 4.0 × 5.2 × 5.0 cms), wide neck, saccular, partially thrombosed aneurysm communicating with MPA. Atherosclerotic plaques and patchy calcification were observed in ascending aorta, arch, and arch vessels.

At surgery, an aneurysm of left sinus of Valsalva (approximately 4 × 3 × 3 cm) was visualized containing thrombus and communicating with mid portion of MPA. The aortic valve was incompetent. The operative procedure included: Closure of aorto-pulmonary communication with dacron graft, repair of ascending aorta and left sinus aneurysm, and replacement of aortic valve using a 21mm St. Jude metallic prosthesis. Histopathology of the excised aneurysm showed calcified atherosclerotic plaques. The patient had an uneventful postoperative course. Pre-discharge, cross-sectional echocardiography revealed a normally functioning aortic valve prosthesis, grade 1/4 aortic regurgitation, and LVEF of 60%. No communication was visualized between aorta and MPA.

At 8-months follow-up, the patient was asymptomatic with a normal hemodynamic and oxymetry data [Table 1]. Echocardiography [Figure 1b] showed obliteration of the aneurysm. Aortography [Figure 2b] revealed a well-functioning aortic prosthesis and dacron graft, grade 1/4 aortic regurgitation, and no communication between aorta and MPA. CT aortography [Figure 3b] confirmed absence of any aneurysm or any aorto-pulmonary communication.

Table 1: Hemodynamic and oxymetry data

	Oxymetry (%)		Pressure (mmHg)	
	Preoperative	Postoperative	Preoperative	Postoperative
SVC	49.3	64.7		
IVC	50.7	67.9		
RA	48.2, 46.7, 47.0	68.5	ḿ=5	ḿ=5
RV	46.9	66.7	30/5	30/4
MPA	68	67.2	30/20, ḿ=22	30/10, ḿ=15
Aorta	97.1	98.2	130/50	140/80
LV	97	98	150/30	140/8

SVC: Superior vena cava, IVC: Inferior vena cava, RA: Right atrium, RV: Right ventricle, MPA: Main pulmonary artery, LV: Left ventricle

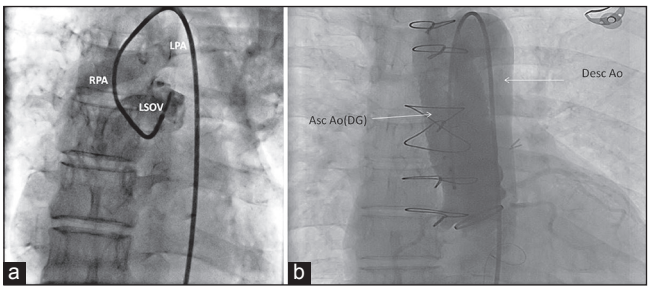

Figure 2: (a) Selective angiography in LSOV (AP view) shows opacification of pulmonary arteries across the rupture (black arrow) (b) Post-surgery angiography (AP view), reveals Dacron graft (DG) and absence of any aorto-pulmonary communication. LSOV: Left sinus of Valsalva, RPA: Right pulmonary artery, LPA: Left pulmonary artery, Asc: Ao ascending Aorta, Desc: Ao descending aorta

DISCUSSION

Sinus of Valsalva aneurysm is a rare cardiac anomaly that can be either congenital or acquired. The morphology of congenital sinus of Valsalva aneurysm has been well-documented[7] and is attributed to the absence of muscular and elastic tissue in the aortic wall of the sinus of Valsalva. Most studies have found that right coronary sinus is most frequently affected followed by non coronary sinus and left coronary sinus involvement in rarest of all.[1-3] Rupture of the aneurysm most often occurs into the right ventricle followed by right atrium and rarely into left ventricle, interventricular septum, or pulmonary artery.[4-6] Uncommonly, acquired sinus of Valsalva aneurysm can be associated with endocarditis, atherosclerosis, syphilis, or aortic dissection.[8]

Two large surgical series reported only isolated cases of rupture from left sinus of Valsalva aneurysm.[1,3] The case reported in this communication is unusual for several reasons: Etiology of sinus of Valsalva aneurysm, site of rupture, accurate preoperative diagnosis and the successful surgical management. The etiology of the aneurysm seems atherosclerotic as suggested by age of the patient, atherosclerotic changes visualized on computed

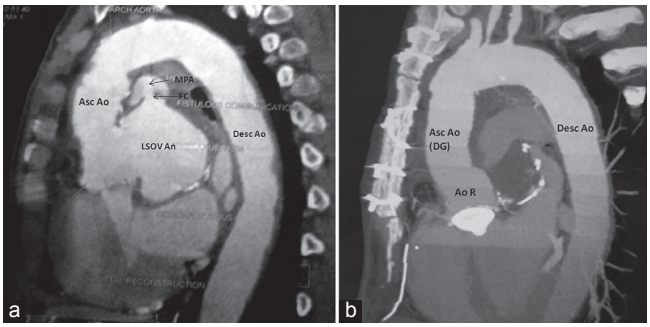

Figure 3: (a) Computed tomography (CT) chest in sagittal section demonstrates a large LSOV communicating with MPA (black arrow) (b) Post-surgery CT chest in sagittal section, shows ascending aorta Dacron graft and absence of any aorto-pulmonary communication. Asc: Ao ascending Aorta, Desc: Ao descending aorta, LSOV: An left sinus of Valsalva aneurysm, MPA: Main pulmonary artery, FC: Fistulous communication (white arrow), Ao R: aortic root

tomography imaging of the aorta and histopathology of the surgically excised aneurysm. Despite the close anatomic proximity of the left coronary sinus and main pulmonary artery, the fistulous communication between these two structures is rare.[4-6]

Diagnosis of this variant can be possible by echocardiography,[5] cardiac catheterization, and angiography[4] and by currently available modalities like CT aortography. An accurate preoperative diagnosis was possible by all available imaging modalities. Aortic regurgitation is common with congenital sinus of Valsalva aneurysm and occurs in 17–75%.[9] Successful surgical repair of this communication along with aortic valve replacement produced excellent immediate and follow up results.

This unusual case of left sinus of Valsalva aneurysm rupture into pulmonary artery is reported to emphasize that preoperative diagnosis is feasible and surgical treatment is safe and effective.

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How to cite this article: Munjewar CB, Agrawal RD, Sharma S. An unusual case of rupture of left sinus of valsalva aneurysm into main pulmonary artery. Ann Pediatr Card 2014;7:210-2.

Source of Support: Nil, **Conflict of Interest:** None declared