

Potential Role of Cardiac Computed Tomography in Establishing Diagnosis of Ruptured sinus of Valsalva Aneurysm: Case Report

Nusrat Ghafoor¹, Nawshin Siraj², Md. Sharif Hasan³, Kowshik Chakma⁴

ABSTRACT

Ruptured Valsalva aneurysm is a rare cardiac anomaly that may be congenital or acquired, a coexisting cardiac lesion might be present. The presentation may range from an asymptomatic murmur to cardiogenic shock. Most of these cases were earlier diagnosed using echocardiography and conventional angiography. But with the availability of advanced imaging modalities like cardiac CT this condition can be accurately assessed noninvasively. The high spatial resolution of cardiac CT provides anatomical details of the aneurysm by depicting a jet of contrast materials extending from the aneurysm and adjacent cardiac chamber. We report a case of ruptured aneurysm arising from the non-coronary sinus with a fistulous track connecting the sinus with the right atrium. This case was evaluated by 32 slice cardiac MDCT (Multi detector computed tomography) imaging. This was later confirmed peroperatively.

Key Words: Sinus of Valsalva, Aneurysm, Rupture, Fistula, Cardiac CT imaging.

INTRODUCTION

Ruptured sinus of Valsalva aneurysm (SVA) is a rare cardiac condition with variable manifestation that results in aorto-cardiac shunt. The presentation may range from an asymptomatic murmur to cardiogenic shock. The initial diagnosis is suspected by two dimensional echocardiography. The gold standard diagnostic method for ruptured sinus of Valsalva aneurysm is cardiac catheterization and aortography. Recent reports suggested a role of contrast-enhanced electrocardiogram-gated cardiac computed tomography (CCT) in establishing diagnosis in such cases. The high spatial resolution of CCT provides a detailed anatomical depiction of an SVA and surrounding structures and clearly identifies the ruptured sinus to the respective cardiac chamber. We report a case of ruptured aneurysm arising from the non-coronary sinus with a fistulous track connecting the sinus with

the right atrium providing aorto-cardiac shunting (left to right shunting). This case was evaluated by 32 slice cardiac MDCT imaging which was later confirmed by per-operative findings.

CASE REPORT

A 20 years old male presented with shortness of breath and chest discomfort for 6 months. He had no risk factors for coronary artery disease and no family history of congenital heart disease. On physical examination, a continuous murmur was heard in the left parasternal region. Chest radiograms showed cardiomegaly with right atrial & ventricular configuration. Echocardiography performed in the parasternal short axis view showed aneurysmal dilatation of right coronary sinus and rupture into right atrium below the tricuspid valve with left to right shunt, Enlargement of left ventricular cavity.

Authors' Information:

1. **Dr. Nusrat Ghafoor**, Associate Consultant, Department of Radiology & Imaging, ICHRI, Dhaka
2. **Dr. Nawshin Siraj**, Senior Consultant & Head of the Department of Radiology & Imaging, ICHRI, Dhaka
3. **Dr. Md. Sharif Hasan**, Associate Professor & Consultant, Department of Cardiac Surgery, ICHRI, Dhaka
4. **Dr. Kowshik Chakma**, Associate Consultant, Department of Radiology & Imaging, ICHRI, Dhaka

Address of Correspondance: Dr. Nusrat Ghafoor, Associate Consultant, Department of Radiology & Imaging, ICHRI, Dhaka.
Cell: +880 1711 316595, **E-mail:** ghafournusrat@yahoo.com

The patient was then evaluated by 32 slice cardiac CT, which demonstrated aneurysmal dilatation of the non-coronary sinus of valsalva (Fig:1). A long large windsock was identified type of tubular fistulous tract was seen extending between ascending aorta & right atrium. It opens into the post wall of right atrium (Fig: 2). Volume

rendered images clearly depicted the aneurysm and fistulous tract in relation to the adjacent structures (Fig: 3 & 4).

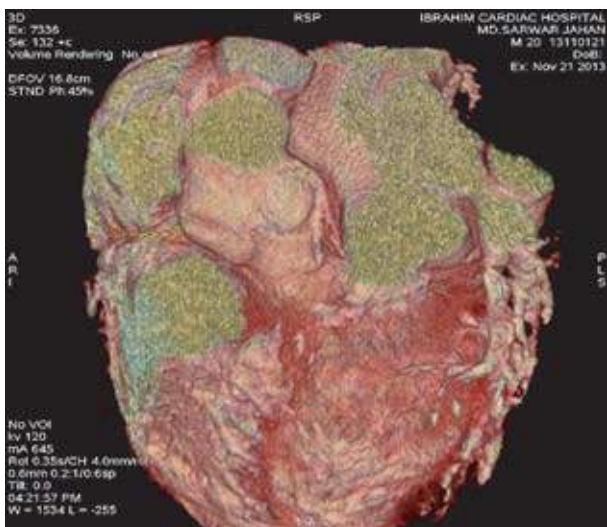


FIGURE 1: Three dimensional volume rendering image of cardiac computer tomography (CCT) depicting the ruptured sinus of Valsalva (arrow)



FIGURE 2: Multiplanar reformatting oblique images of contrast enhanced prospective electro-cardiogram gated cardiac computed tomography (CCT) showing contrast flow from the non-coronary sinus to the right atrium, AV Aortic valve; RA right atrium; AO Aorta.

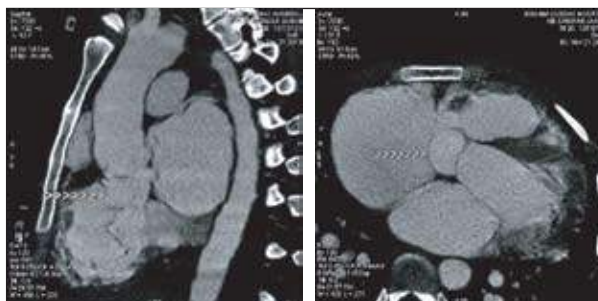


FIGURE 3 & 4: Multiplanar reformatting image of CCT showing sinus of Valsalva aneurysm (arrow).

The patient underwent open heart surgery through median sternotomy. The large tubular wind sock was identified in right atrium. Excision of wind sock and direct closure of sock was done in two horizontal mattresses through in through suture by 4-0 proline. The Aortotomy and RAomy were closed. There were no significant postoperative complications.

DISCUSSION

The aorta commences with the three leaflet aortic valve. This semi-lunar valve has leaflets related to the three slightly bulging sinuses of Valsalva.¹ Each sinus associated with corresponding right, left and non coronary valve cusps. These sinuses allow enough space for the movement of aortic valve leaflets during systole without causing occlusion of ostia of coronary arteries.

The anterior sinus is also known as the right coronary sinus that gives rise to the right coronary artery and the leftward posterior sinus is also known as the left sinus of Valsalva that gives rise to the left coronary artery. The right ward posterior sinus is also known as the non-coronary sinus.² Sinus of Valsalva aneurysms are more common in males compared to females (ratio being) 3:1 and prevalent in Eastern and Asian countries.³

They may be congenital or acquired. Congenital causes are due to weakness or deficiency of the elastic lamina of the aortic media and annulus fibrosus, they may be associated with an underlying defect of normal elastic tissue such as that found in Marfan and Ehler-Danlos syndromes patients.⁴ They are commonly associated with cardiac anomalies like ventricular septal defect, bicuspid aortic valve, aortic regurgitation and coronary artery anomalies. Acquired causes include infective endocarditis, syphilis, tuberculosis, atherosclerosis and deceleration trauma.

According to Meier et al,⁵ 65-85% of sinus of Valsalva aneurysm originate from the right sinus. 10-30% from non coronary sinus and <5% from the left sinus. These aneurysms usually arise from the right coronary and non coronary sinuses and commonly rupture into the adjacent right atrium, right ventricle, left ventricle into Interventricular septum. Asymptomatic aneurysms may be symptomatic when the aneurysms are large, producing pressure effects on the adjacent structures on due to rupture. In case of rupture, they may present with chest pain, dyspnoea cardiac failure depending upon the rapidity with which they rupture and the chamber with which they communicate.³

Earlier, sinus of Valsalva aneurysms was diagnosed using Color Doppler echocardiography followed by conventional angiogram. But with the advent of newer imaging modalities like cardiac CT and MRI, the condition can be non-invasively diagnosed. According to Aliye OB et al,⁴ ECG - gated (Electrocardiogram) contrast enhanced multi-slice CT provides much better spatial resolution of cardiac structures compared to other imaging methods and provides detailed anatomic depiction of Valsalva sinus aneurysms and the surrounding cardiac structures. The surgeon can also be provided with high resolution pre-operative 3D representation which are invaluable in planning the surgical approach and provide important anatomical information, as in our case

where the pre-operative information from the 3D images helped the surgeon to preserve the coronary ostium. However, the disadvantage of CT is the use of ionizing radiation.³

The advantages of performing MR imaging in the setting of a known or suspected Valsalva sinus aneurysm include the ability to evaluate the left ventricular hemo-dynamic pattern, identify aortic regurgitation and quantify aortic cardiac shunt or fistulous blood-flow. But CT is less time consuming and the preferred investigation compared to MRI in case of acute setting of aneurysmal rupture. Conventional angiography is the gold standard and can be used for both diagnostic and therapeutic purposes.

The differential diagnoses for rupture sinus of Valsalva aneurysm include aortic root aneurysm, coronary arterio-venous fistulas and prolapsed aortic cusps. Sinus of Valsalva aneurysm occur between the aortic annulus and sino-tubular ridge where as aortic root aneurysm occur above the sino-tubular ridge. This differentiation can be made out either by using echocardiography or cross sectional imaging (CT or MRI). Coronary arterio-venous fistula can be diagnosed using cardiac CT, since it depicts coronary artery anatomy better.

The mainstay of treatment of such case is cardiopulmonary bypass surgery, where aneurysm is closed with pericardial or polyester patch or with sutures, which was done in our case.

CONCLUSION

Cardiac CT plays an important role in the diagnosis of the sinus of Valsalva aneurysm and its complication like rupture. It provides a comprehensive cardiac evaluation including coronary artery anatomy and other associated cardiac or vascular anomalies which will help in planning the surgical approach.

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