

# Ruptured Sinus of Valsalva: Curious Case of Transient Loss of Consciousness

S.S. Myagerimath<sup>1</sup>, Antony Ben Decruz<sup>2</sup>

<sup>1</sup> S. S. Myagerimath, Glasgow Royal Infirmary, 84 Castle Street, Glasgow G4 0SF.

<sup>2</sup> Antony Ben Decruz, Glasgow Royal Infirmary, 84 Castle Street, Glasgow G4 0SF.

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## 1. S.S. Myagerimath

Glasgow Royal Infirmary, 84 Castle Street, Glasgow G4 0SF.

Email: [sadanand.myagerimath@nhs.net](mailto:sadanand.myagerimath@nhs.net)

## 2. Antony Ben Decruz

Glasgow Royal Infirmary, 84 Castle Street, Glasgow G4 0SF.

Email: [antony.deacruz@nhs.scot](mailto:antony.deacruz@nhs.scot)

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Corresponding author: S.S. Myagerimath | Email: [sadanand.myagerimath@nhs.net](mailto:sadanand.myagerimath@nhs.net)

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## Abstract

### Background

A sinus of Valsalva aneurysm (SOVA) is a rare cardiac anomaly with an incidence of 0.09%. It can either be secondary to congenital defects or acquired causes. A ruptured sinus of Valsalva (RSOV) is a complication of SOVA which could range from being diagnosed incidentally to causing cardiac arrest.

### Case Summary

This was a 28-year-old male with a good functional status and nil past medical history who presented with a short onset of chest pain and transient loss of consciousness lasting 5 minutes. Chest X-ray showed nil acute, electrocardiogram showed sinus tachycardia, troponin was negative and other blood tests were unremarkable. Auscultation of the heart revealed a systolic-diastolic continuous murmur. An urgent transthoracic echocardiogram showed turbulence from the root of the aorta to the right ventricle and a hyperdynamic left ventricle but good valvular function and good biventricular function. A diagnosis of RSOV was made and the patient was sent onwards to the cardiothoracic unit. Subsequent CT coronary angiogram showed a clot at the aortic root. Patient went on to have open heart surgery at a tertiary centre and was discharged with no complications after undergoing rehab for 3 months.

### Conclusion

RSOV is an important diagnosis to consider in patients presenting with cardiac symptoms albeit rare. Urgent cardiothoracic evaluation for suitability for definitive surgery by surgical repair or percutaneous device closure is paramount in RSOV given rate of deterioration. Surgical repair remains the gold standard with an in-hospital mortality rate of <5%.

**Abbreviations:** None that are not explained in the article.

**Keywords:** Transient Loss of Consciousness; Tachycardia; Ruptured Sinus of Valsalva; Echocardiogram; Systolic-diastolic murmur; Percutaneous Device Closure.

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## Introduction

The sinus of Valsalva (SOV) represents the anatomical dilatations of the aortic root that occur above the aortic valve. SOV helps the coronary artery supply with the left posterior aortic sinus and anterior aortic sinus giving rise to the left and right coronary artery respectively. The right posterior sinus is known as the non-coronary as it usually does not give rise to any coronary supply. These aortic sinuses are bounded by the aortic valve leaflets internally and externally by the aortic wall. A sinus of Valsalva aneurysm (SOVA) is a rare cardiac anomaly with an incidence of 0.09% and has had higher reported incidence in Asian demographics (1). It is defined as an abnormal dilatation between the aortic valve annulus and the sinotubular junction. SOVA can be secondary to mainly congenital defects (Marfan syndrome, bicuspid aortic valves, Ehlers-Danlos syndrome, etc) or acquired (infective endocarditis, chest trauma, iatrogenic injury from aortic valve surgery, vasculitic disease) (2). A ruptured SOVA is a potentially detrimental complication of SOVA where a patient could range from being asymptomatic to presenting with cardiac symptoms (chest pain, dyspnoea, decreased exercise tolerance, congestive heart failure), loss of consciousness or even cardiac arrest. The most common site of origin of aneurysms is the right coronary sinus which drains to the right ventricle most commonly (3).

## Case Presentation

We report a 28-year-old male, normally fit and well with a good functional status (exercises 2-3 times a week) and nil concerning past medical history. This patient had a body mass index of 25 and worked an office job. He presented to hospital in February 2021 after presenting with a short onset of chest pain, being

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sweaty, clammy and experiencing a transient loss of consciousness for 5 minutes whilst on the way to work by train. Paramedics were alerted to this patient. He had a tachycardia of 135 and a systolic blood pressure of 110. This patient was rushed to the hospital where the patient's electrocardiogram showed sinus tachycardia and troponin was negative. Other bloods were unremarkable, and his Chest X-ray showed nil consolidation, collapse with clear lungs and visualised lung bases. Upon auscultation of lungs, patient's chest was clear with vesicular breathing and no wheeze or crackles. Patient's abdomen was also soft and non-tender. However, upon auscultation of his heart, a systolic-diastolic continuous murmur was heard. The top 3 differentials at that moment were patent ductus arteriosus, pulmonary stenosis, and ventricular septal defect.

This patient was then transferred to the Cardiology department to have an urgent transthoracic echocardiogram. The echocardiogram showed good biventricular function, and good valvular function, a hyper-dynamic left ventricle and turbulence from the root of aorta to the right ventricle as explained in Figure 1a and 1b. The diagnosis of ruptured Sinus of Valsalva (RSOV) was made, and this patient was sent to the cardiothoracic unit where an urgent CT coronary angiogram showed a small clot at the aortic root, motion artefact and was difficult to visualize as patient was tachycardic. In May 2021, this patient was moved to a tertiary centre where he underwent open heart surgery. Post-op, the patient underwent rehab for 3 months, made good symptomatic recovery and was hence discharged.

## Discussion

In the investigation for RSOV, preliminary investigations such as an electrolyte screen, troponin, inflammatory markers, and ECG are always useful to exclude other causes of symptoms. An echocardiogram (transthoracic and transoesophageal) is 1st line for investigation of RSOV (4). Classically, a 'windsock' appearance can be seen in RSOV to the right ventricle, and it is usually seen better on a transoesophageal echocardiogram (5). Diagnostically, cardiac MRI is considered the gold standard imaging modality which this patient did not go through. However, this patient did have a CT coronary angiogram to as a diagnostic tool to assess anatomy and evaluate risk of coronary artery disease for possible intervention during cardiac surgery.

Urgent cardiothoracic evaluation is paramount in RSOV due to the rate of deterioration that could occur in these groups of patients (6). Definitive therapy is required be it surgical repair or percutaneous device closure. Although surgical repair is traditionally the mainstay of RSOV management, it is still the gold standard with in-hospital mortality of less than 5% (7). In this particular case, urgent escalation and surgery led to patient being asymptomatic and this was maintained throughout the 3-month rehab period.

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## Conflict of Interest

None declared.

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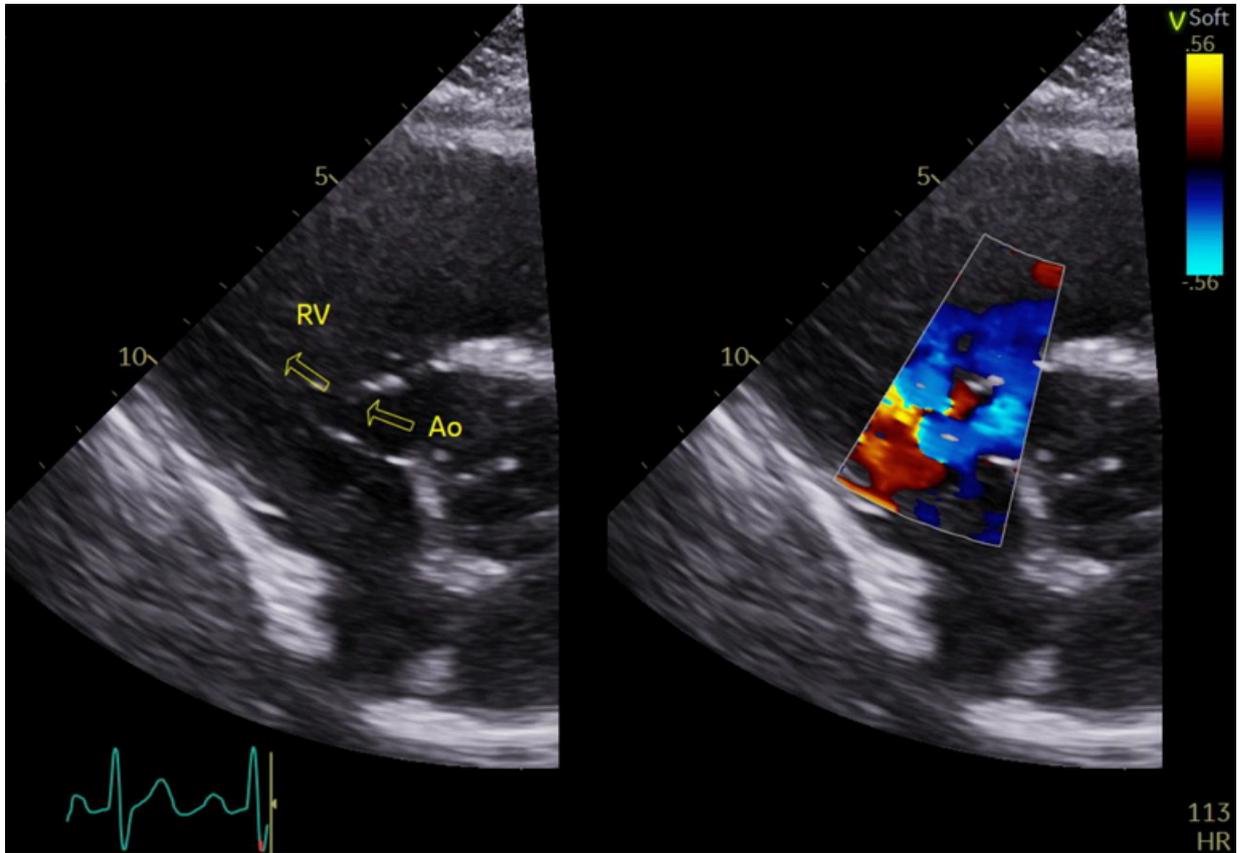
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## Figures

1- Figure 1a (Left). Ultrasound image of the patient's heart in a parasternal short axis view. Echocardiogram demonstrates a rupture of the sinus of Valsalva which has led to turbulent blood flow from the root of the aorta (Ao) to the right ventricle (Rv) with the arrows denoting direction of flow. This gives rise to a continuous systolic-diastolic murmur.

2- Figure 1b (Right). The ultrasound image of the patient's heart in a parasternal short axis view. With colour Doppler technique, the echocardiogram demonstrates the ruptured sinus of Valsalva (ruptured aneurysm of the right coronary sinus) with left-to-right shunt into the right ventricle.



1- Figure 1a (Left). Ultrasound image of the patient's heart in a parasternal short axis view. Echocardiogram demonstrates a rupture of the sinus of Valsalva which has led to turbulent blood flow from the root of the aorta (Ao) to the right ventricle (Rv) with the arrows denoting direction of flow. This gives rise to a continuous systolic-diastolic murmur.

2- Figure 1b (Right). The ultrasound image of the patient's heart in a parasternal short axis view. With colour Doppler technique, the echocardiogram demonstrates the ruptured sinus of Valsalva (ruptured aneurysm of the right coronary sinus) with left-to-right shunt into the right ventricle.