ESC European Society of Cardiology

European Heart Journal - Case Reports (2021) **5**(8), 1–5
doi:10.1093/ehjcr/ytab259

COMPETITION WINNER
Cardiac imaging

Thrombosed sinus of Valsalva aneurysm masquer ading as a cardiac tumour: a case report

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Received 12 November 2020; first decision 30 November 2020; accepted 16 June 2021

Background An aortic sinus of Valsalva aneurysm (SVA) often remains undiagnosed until it ruptures. An SVA filled with thrombus can be challenging to diagnose accurately.

Case summary A 70-year-old man was admitted with a clinical diagnosis of well-tolerated complete atrioventricular block (AVB). Transthoracic echocardiography revealed a spherical mass (43 × 49 mm) at the interatrial septum. Enhanced computed tomography (CT) showed a well-defined, hollow, and non-enhanced mass suggesting a cardiac tumour. However, 18F-fluorodeoxyglucose positron emission tomography/CT (18F-FDG PET/CT) showed no uptake in the mass. After implantation of a permanent pacemaker, anticoagulant therapy was started for paroxysmal atrial fibrillation. Two months later, follow-up evaluation by echocardiography and enhanced CT revealed an increase in size of the hollow interior cavity, suggesting thrombolysis by the anticoagulant. We diagnosed a non-coronary SVA filled with thrombus, which masqueraded as a cardiac tumour and may have caused complete AVB.

Conclusions We describe a rare case of a giant thrombosed SVA masquerading as a cardiac tumour. Initial 18F-FDG PET/CT and serial imaging studies were helpful in distinguishing it from a cardiac tumour.

Keywords Sinus of Valsalva aneurysm • Cardiac tumour • Complete AV block • Thrombus • Case report

Learning points

- An sinus of Valsalva aneurysm (SVA) filled with thrombus can occasionally masquerade as a cardiac tumour. In addition to 18F-fluorodeoxyglucose positron emission tomography/computed tomography (CT), changes of internal structure on echocardiography and enhanced CT can be helpful in distinguishing it from a cardiac tumour.
- Although rupture and aortic regurgitation are common complications of an SVA, it may cause atrioventricular block.

Introduction

An aortic sinus of Valsalva aneurysm (SVA) often remains undiagnosed until it ruptures, usually into the right ventricle or atrium.[1] The rupture may be clinically silent, or may present with symptoms of dyspnoea and chest pain, or with a new continuous to-and-fro murmur. An SVA filled with thrombus can be challenging to diagnose accurately. We describe a 70-year-old man who presented with new-

This case is published as a winning case from the ESC Annual Congress 2020 and underwent peer review with that organization.
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Handling Editor: Amardeep Ghosh Dastidar
Compliance Editor: Stefan Simovic
Supplementary Material Editor: Nida Ahmed
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onset complete atrioventricular block (AVB) as the first manifestation of a thrombosed SVA masquerading as a cardiac tumour.

Timeline

Day of admission (Day 0):

- Symptom: faintness
- ECG: complete AVB
- Echocardiography: a spherical mass (43 × 49 mm) in the center of the heart
- Enhanced CT: a well-defined, hollow, non-enhanced mass close to the interatrial septum

Day 1:

- Cardiac magnetic resonance imaging: the mass appeared isointense and hyperintense on T1- and T2-weighted images, respectively
- ECG monitor: paroxysmal atrial fibrillation

Day 11:

- Implantation of permanent pacemaker

Day 13:

- Anticoagulant therapy started

Two months later:

- Subsequent echocardiography and enhanced CT revealed an increase in the size of the hollow interior cavity, suggesting thrombolysis

Two weeks later:

- A non-coronary sinus plasty and thrombectomy were performed

Case presentation

A 70-year-old man with complete AVB was referred to our hospital for further evaluation and treatment (*Figure 1*). His initial chief complaint was faintness. Observation with careful haemodynamic monitoring revealed well-tolerated complete AVB. No heart murmur was heard. His vital signs were as follows: heart rate 42 beats/min, blood pressure 126/69 mmHg, SpO_2 99%, and temperature 36.5°C. He had a medical history of hypertension and a single kidney and had been taking an angiotensin II receptor blocker, calcium channel blocker, and β blocker. Even after discontinuation of the calcium channel blocker and β blocker, electrocardiogram monitoring showed complete AVB and frequent paroxysmal atrial fibrillation with junctional escape rhythm. A chest X-ray showed cardiomegaly with a cardiothoracic ratio of 55%. Surprisingly,

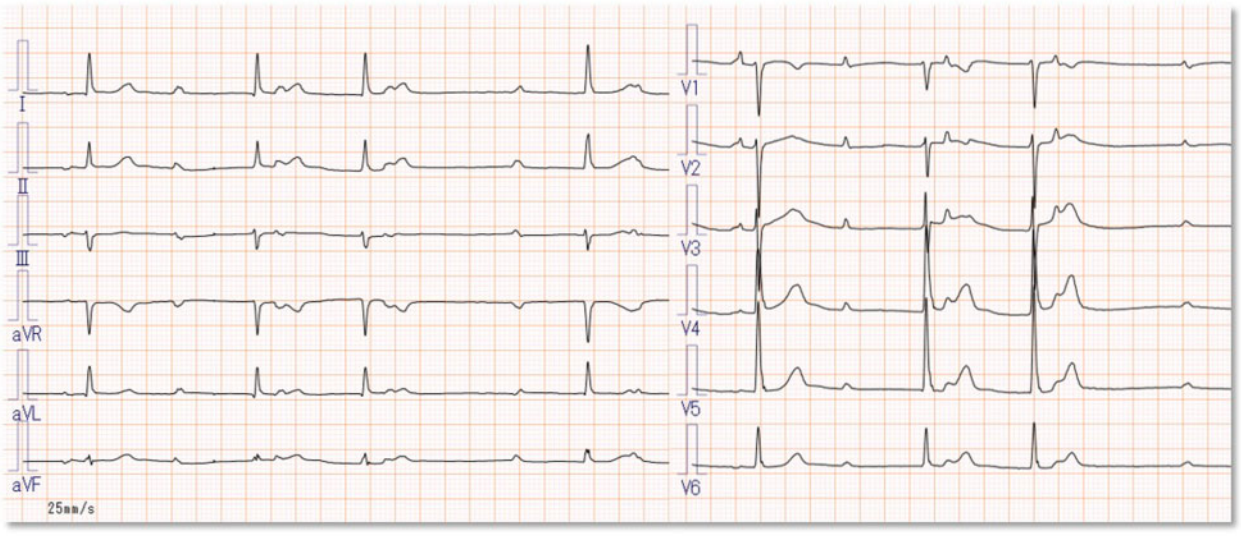


Figure 1 Electrocardiogram showed complete atrioventricular block with junctional escape rhythm.

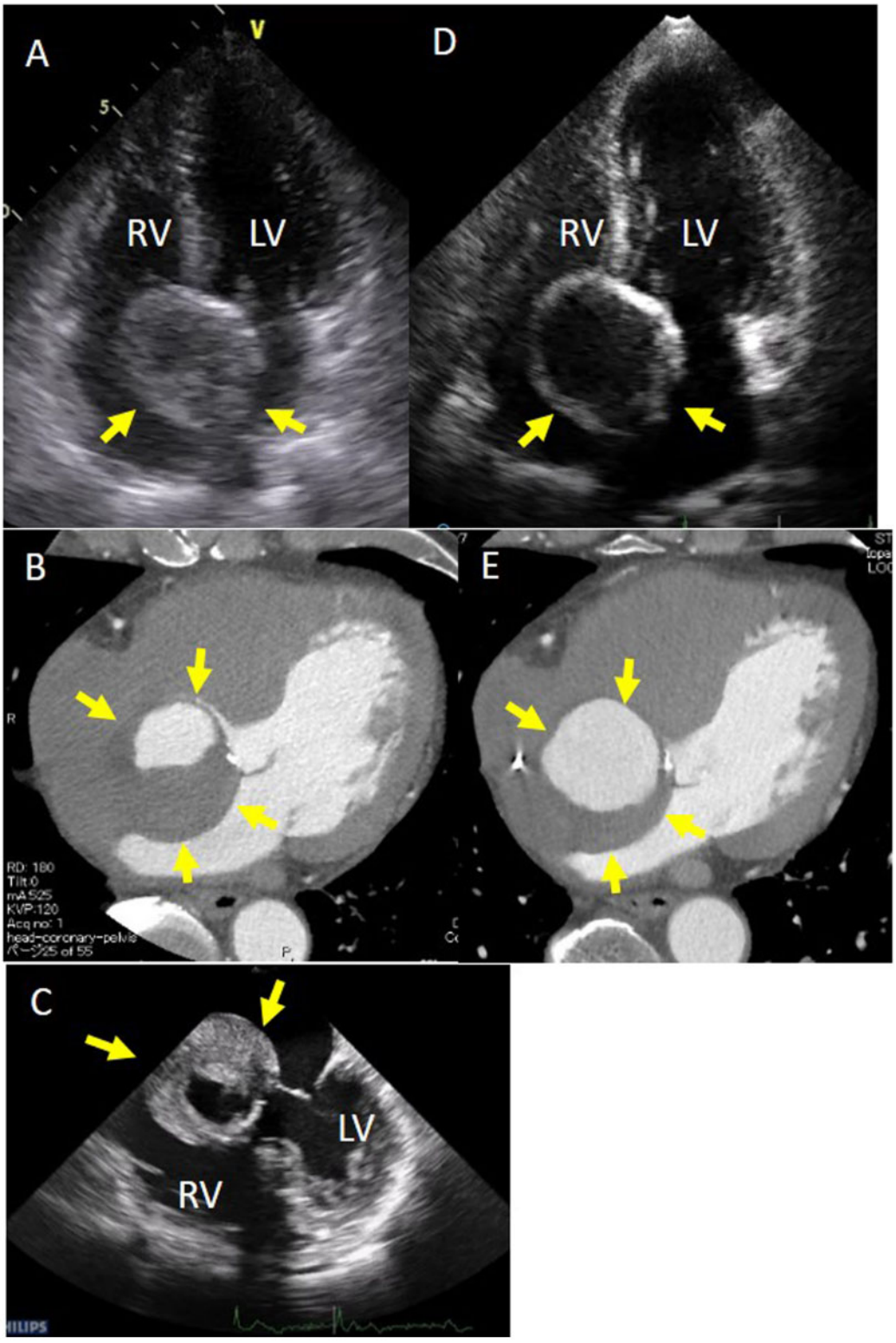


Figure 2 (*A*) Transthoracic echocardiography revealed a spherical mass (43 × 49 mm) at the centre of the heart (yellow arrows). (*B*) Enhanced computed tomography showed a well-defined, hollow, non-enhanced mass at the interatrial septum (yellow allows). (*C*) Transoesophageal echocardiography showed that the mass was close to the atrial septum without invasion. Two months after initiation of anticoagulant therapy, transthoracic echocardiography (*D*) and enhanced computed tomography (*E*) showed an increase in size of the hollow interior cavity.

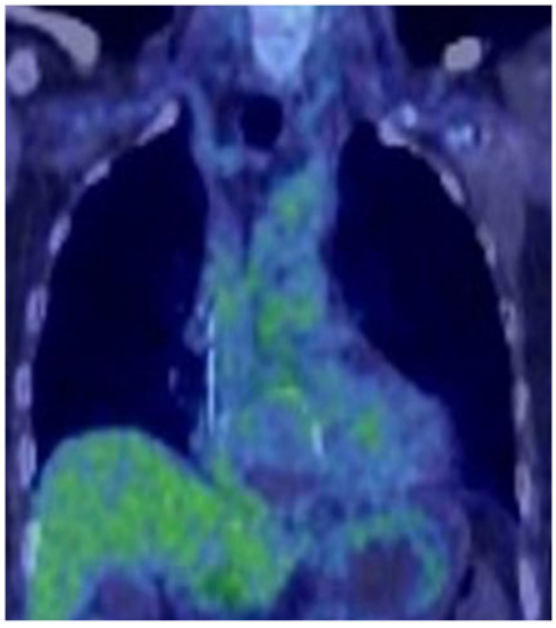
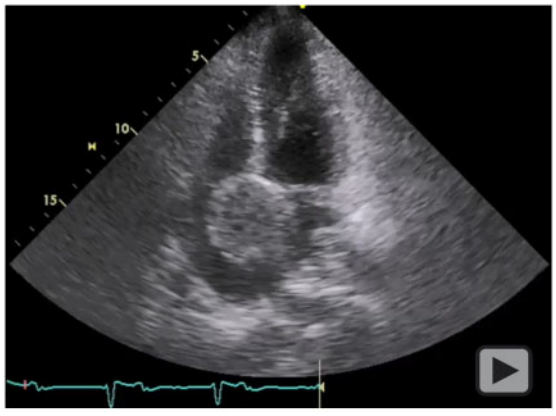
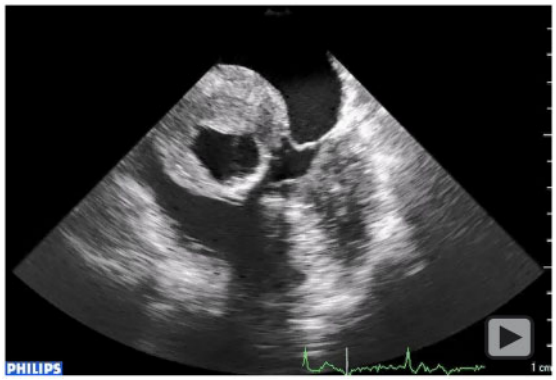


Figure 3 No uptake in the mass was found on 18F-fluorodeoxyglucose positron emission tomography/computed tomography.

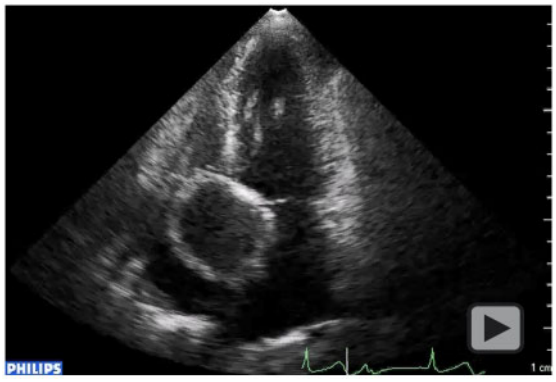


Video 1 Transthoracic echocardiography showed a spherical mass at the center of the heart.

transthoracic echocardiography (TTE) revealed a spherical mass (43 × 49 mm) in the centre of the heart with normal left ventricular systolic function (*Figure 2A*, *Video 1*). Blood tests showed an elevated brain natriuretic peptide level of 84.3 pg/mL (normal value: 0–18.4 pg/mL), serum creatinine of 1.12 mg/dL (normal value: 0.46–0.79 mg/dL), and D-dimer of 1.87 μg/mL (normal value: 0–0.99 μg/mL) but were otherwise normal. The tumour marker levels, such as soluble interleukin-2 receptor, squamous cell carcinoma, pro-gastrin-releasing peptide, neuron-specific enolase, and cytokeratin 19 fragment, were within the normal range. Contrast-



Video 2 Transesophageal echocardiography confirmed that the mass was close to the atrial septum.



Video 3 Follow-up evaluation by transthoracic echocardiography revealed an increase in size of the hollow interior cavity.

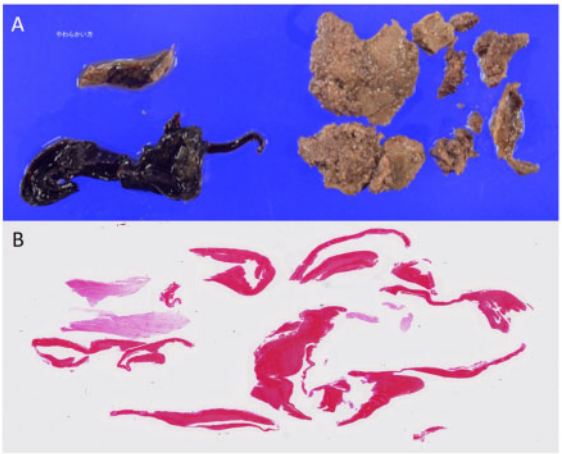


Figure 4 (*A*) Gross features of the specimen from the non-coronary sinus of Valsalva aneurysm. (*B*) Histological examination shows that the internal contents of the non-coronary sinus of Valsalva aneurysm consisted of thrombus.

enhanced computed tomography (CT) showed a well-defined, hollow, 4.5 cm, non-enhanced mass in the interatrial septum (*Figure 2B*). Transoesophageal echocardiography confirmed that the mass was close to the atrial septum without invasion (*Figure 2C*, *Video 2*). Cardiac magnetic resonance imaging showed excellent delineation of the tumour, the internal contents of which showed high signal intensity on a T2-weighted image and iso-signal intensity on a T1-weighted image. Based on these findings, we suspected that this was a cardiac tumour arising from the interatrial septum or the wall of the non-coronary sinus of Valsalva. However, 18F-fluorodeoxyglucose positron emission tomography/CT (18F-FDG PET/CT) revealed no uptake in the mass (*Figure 3*). To summarize his findings so far, he presented with bradycardia due to complete AVB, paroxysmal atrial fibrillation and an unidentified cardiac mass. After implantation of a permanent pacemaker for complete AVB, anticoagulant therapy with rivaroxaban was started for paroxysmal atrial fibrillation. The patient was treated conservatively. Two months later, unexpectedly, follow-up evaluation by TTE and enhanced CT revealed an increase in size of the hollow interior cavity (*Figure 2D* and *E*, *Video 3*). This suggested thrombolysis by rivaroxaban and offered useful additional information for the diagnosis. A non-coronary SVA filled with thrombus was the most likely preoperative diagnosis. Two weeks later, a non-coronary sinus plasty and thrombectomy were performed. Intraoperatively, a non-coronary SVA filled with chronic mural and fresh thrombus was found (*Figure 4*).

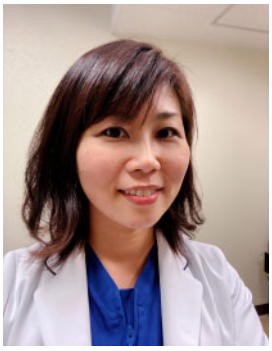
Discussion

We present a rare case of a giant thrombosed SVA. Two aspects of this case are of particular interest. First, an SVA filled with thrombus can be challenging to diagnose because it mimics a cardiac tumour.[2] The differential diagnosis of a spherical mass at the atrial septum would include primary or metastatic cardiac tumour. Echocardiography is the first-choice diagnostic procedure for assessing cardiac tumours. However, the utility of echocardiography for tissue characterization is limited. In our case, 18F-FDG PET/CT findings helped us make the diagnosis. In addition, serial echocardiography and enhanced CT examinations revealed a change in size of the hollow interior cavity, and in the thickness of the mass after anticoagulation therapy. These multimodality imaging features helped to differentiate it from the other possible interatrial masses mentioned above. Second, new-onset complete AVB as the first manifestation of an SVA is rare, although chest pain and dyspnoea due to rupture and aortic regurgitation are frequent initial symptoms. There are few reports of an SVA discovered by the onset of AVB.[3] Anatomically, the atrioventricular (AV) node is close to the non- and right-coronary cusps. In this case, we presume that the non-coronary SVA grew large enough to compress the AV node. An SVA should be considered as a possible cause of AVB.

Conclusions

We describe a rare case of a giant thrombosed SVA masquerading as a cardiac tumour. 18F-FDG PET/CT and serial imaging studies were helpful in the differential diagnosis of cardiac tumour by providing additional information on the tissue composition.

Lead author biography



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Supplementary material

Supplementary material is available at *European Heart Journal - Case Reports* online.

Slide sets: A fully edited slide set detailing this case and suitable for local presentation is available online as Supplementary data.

Consent: The authors confirm that written consent for submission and publication of this case report including images and associated text has been obtained from the patient in line with COPE guidance.

Conflict of interest: None declared.

Funding: None declared.

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