

Sinus of Valsalva aneurysm: congenital or acquired? A multimodal imaging approach. Case report

*Aneurisma de los senos de Valsalva: ¿congénito o adquirido?
Abordaje por imagen multimodal. Reporte de caso*

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ABSTRACT. Sinus of Valsalva aneurysm is a rare finding that could be acquired or congenital. The acquired form may result from trauma, Marfan's syndrome and infective endocarditis. We report the case of a 36-year-old man with heart failure and aortic regurgitation, was suspected to have infectious endocarditis. The diagnosis workup revealed sinus of Valsalva aneurysm and bicuspid aortic valve. The patient underwent cardiac surgery to replace the aortic valve and exclude the sinus of Valsalva aneurysm and successfully discharged with no heart failure symptoms. This case highlights the importance of multimodal imaging in patients with IE to make a correct diagnosis of local complication like sinus of Valsalva aneurysm.

Keywords: Infective endocarditis, sinus of Valsalva aneurism, echocardiography, cardiac computed tomography.

RESUMEN. Los aneurismas de los senos de Valsalva son raros y pueden ser adquiridos o congénitos. La forma adquirida puede ser el resultado de trauma, síndrome de Marfan y endocarditis infecciosa. Reportamos el caso de un hombre de 36 años de edad con insuficiencia cardíaca e insuficiencia aórtica, sospechoso de ser portador de endocarditis infecciosa. El abordaje diagnóstico demostró dos aneurismas de los senos de Valsalva y válvula aórtica tipo bicúspide. El paciente se sometió a cirugía cardíaca con el objetivo de reemplazar la válvula aórtica y excluir los aneurismas de los senos de Valsalva. Fue egresado satisfactoriamente sin insuficiencia cardíaca. Este caso subraya la importancia de un abordaje de imagen multimodal para el correcto diagnóstico de complicaciones de la endocarditis infecciosa, como lo son los aneurismas de los senos de Valsalva.

Palabras clave: Endocarditis infecciosa, aneurisma de senos de Valsalva, ecocardiografía, tomografía cardíaca.

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INTRODUCTION

Sinus of Valsalva aneurysm (SOVA) is a rare disease that could be congenital or acquired. Its consequence of a defect between aortic valve annulus and aortic media. The high pressure in the aorta lumen promotes the development of the aneurysm and in certain cases rupture to cardiac chambers.¹

The delay in diagnosis and prompt treatment of patients suspecting to have Infective Endocarditis (IE) is associated with poor outcomes and complications like acquired SOVA.² In selected patients, a multimodal imaging approach including transthoracic

echocardiogram (TTE), transesophageal echocardiogram (TEE) and cardiac computed tomography (CCT) can be useful to achieve a correct diagnosis without invasive studies.

We present the case of a male with type one bicuspid aortic valve and SOVA developed after acquiring IE, which was successfully treated with surgical aortic valve replacement (SAVR) and exclusion of SOVA.

CASE REPORT

We report the case of a 36 years-old male with past medical record of Coarctation of the Aorta (CoA) and type 1 bicuspid aorta.



The CoA was treated with aortic stent 10 years ago. He referred dyspnea, loss of weight and fever 8 months ago. He was evaluated by a community doctor and prescribed different empirical antimicrobial regimens for a non-identified source of infection. The fever stopped but the dyspnea continued. He consulted a community hospital where a heart murmur was heard so a TTE was performed that revealed severe aortic regurgitation (AR). He was referred to our institution.

On physical examination he was tachycardic and dyspneic; bilateral crackles and a diastolic murmur at the aortic area. In the fingernails Quincke's sign was found. The ECG showed sinus tachycardia with first degree atrioventricular block (PR interval 215 ms). The blood chemistry reported NT-pro BNP 9041 pg/mL and normal C reactive protein (CRP). Blood cultures were negative.

TTE revealed type 1 bicuspid aortic valve with severe AR. The Transesophageal (TEE) showed two SOVA (Figure 1). Additionally, 3D TTE and CCT was performed demonstrating SOVA with no coronary obstruction (Figure 2).

The patient underwent surgical treatment. SOVA was excluded with bovine pericardial patch and the aortic valve was replaced with a mechanical St Jude Masters valve (Abbott Cardiovascular, Santa Clara, CA). The valve biopsy showed polymorphonuclear cell aggregates. The patient was discharged 8 days after surgery.

DISCUSSION

Delay in diagnosis and initiation of the antimicrobial therapy in patients with suspected

infective endocarditis (IE) is associated with poor outcomes. One of many complications is the development of sinus of Valsalva aneurysm (SOVA).

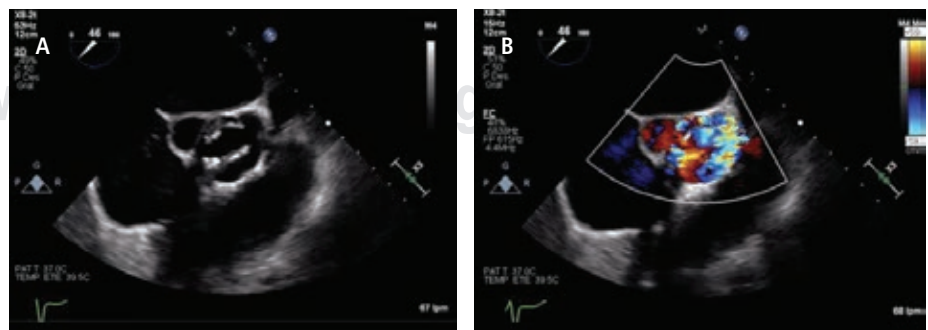
SOVA can be congenital or acquired. The former is due to a lack of continuity between the aortic annulus and aortic media, and the high aortic pressure promotes the development of fingerlike sacs, which walls are composed by fibrous tissue and can rupture to a cardiac chamber.¹ The prevalence of congenital SOVA is estimated to occur in the 3.5% of all congenital heart defects (CHD). The right sinus of Valsalva is the most frequent sinus affected (80%), followed by non-coronary sinus (16%) and left coronary sinus (4%).³ The most accepted theory of this is consequence of incomplete fusion of the aortopulmonary and interventricular septum, that weakens the supporting tissue of the right and non-coronary sinus.¹ Additionally, 1 of 10 cases is associated with aortic bicuspid valve.⁴

Acquired SOVA can present as consequence of multiple diseases like trauma, tuberculosis, Marfan's syndrome, syphilis, and endocarditis, is not associated with other CHD and tends to extend superiorly.¹ In case of IE, SOVA is due to rupture of a paravalvular abscess to cardiac lumen, like sinuses of Valsalva.² The estimated prevalence of SOVA in IE about 28%.³

In the past, the cardiac catheterization was the method considered the gold standard.¹ Technological advances in the TTE, TEE and CCT improves the anatomical detail of cardiac chambers, valves and surrounding tissues. The American and European guidelines on IE suggest obtaining TTE imaging as soon as possible in patients with suspected IE and

Figure 1:

TEE short axis image at level of the aortic valve. **A)** 2D shows type 1 aortic valve, engrossment of the edge and two SOVA in the anterior valve. **B)** Color doppler image of **A)** that shows the communication of the SOVA to the aortic lumen.



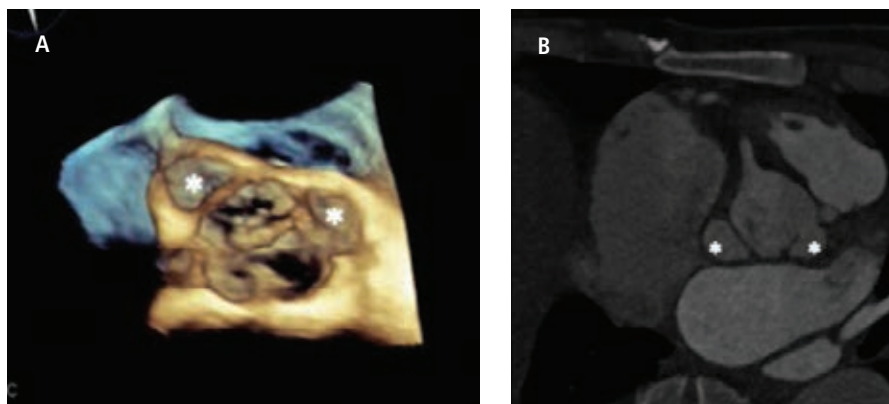


Figure 2:

Multimodal imaging approach to SOVA.

A) TTE 3D zoom in a short axis view at level of aortic valve that shows the SOVA seen in *Figure 1* (*). Note the extracardiac localization and wide neck of SOVA.

B) CCT Axial Oblique imaging of sinus of Valsalva that shows the two SOVA (*).

TEE in cases of complications of IE (both are class I recommendation).^{2,5} The sensitivity of the TTE for the diagnosis of abscesses is about 50%, and near 90% in the case of TEE.² Another imaging modalities can be used in IE, for example CCT to assess anatomical features of perivalvular complication and preoperative planification as well (e.g. diagnosis of coronary artery obstruction).⁶

The evolution of this patient is probably due to the absence of correct diagnosis and prompt treatment of IE, that lead to paravalvular abscess and rupture to the aortic lumen with the resulting SOVA. The images obtained by TEE and CCT (*Figures 1 and 2*) shows two SOVA that have wide neck, extracardiac extension and no rupture to cardiac chambers. Additionally, in the previous intervention there is no report of SOVA. The presence of perivalvular complications like SOVA is associated with poor outcomes in patients with IE.² With the previous information, we decided that most probably explanation to SOVA is that was acquire due to IE.

The patient arrived in heart failure due to severe AR with no evidence of cardiogenic shock, so we proposed urgent surgery. The two SOVA was closed with a pericardial patch and the *heart team* of our institution based on age, socioeconomic status and health services access, decided to replace the aortic valve with a mechanical prosthesis. The evolution was favorable and was discharged to home.

CONCLUSIONS

The lack of a correct diagnosis and timely treatment in patients with infective endocarditis, is linked to adverse outcomes. This case highlights the importance of multimodal imaging in patients with IE to make a correct diagnosis of local complication like sinus of Valsalva aneurysm. This not only for diagnostic proposes, but for planning the surgical approach.

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