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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INTRODUCTION

Sinus of Valsalva aneurysm (SOVA) is a rare disease that could be congenital or acquired. Is 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 empiric antimicrobial regimens for a non-identified source of infection. The fever stopped but the dyspnea continued. He consulted a community hospital were a heart murmur was heard so a TTE was performed that reveal 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 exclude 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 finger-like 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.
TEE in cases of complications of IE (both are class I recommendation). The sensitivity of the TTE for the diagnosis of abscesses is about 50%, and near 90% in the case of TEE. 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).

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. 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, socioeconomical 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.

REFERENCES