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Saccular Ascending Aorta Aneurysm: A Rare Clinical Occurrence

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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Case Report

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ABSTRACT

The saccular aneurysm at the level of the ascending aorta is an extremely rare clinical entity, considered as an effusion of part of the aortic circumference. This entity is often asymptomatic, and the pathophysiological mechanism is still poorly understood.
We describe two unusual clinical cases of saccular aneurysms of the ascending aorta, the first revealed fortuitously following hospitalization for a hemorrhagic accident with vitamin K antagonists and the second following a complication of a severe aortic insufficiency. Our experience confirms the fundamental role of modern cardiac imaging techniques in the differential diagnosis of these unusual cases and in planning the correct surgical intervention.

Keywords: Saccular aortic aneurysm; transthoracic echocardiography; CT angiography MRI; aortoplasty.

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1. INTRODUCTION

A true arterial aneurysm is defined as a permanent, localized dilation with an increase of at least 50% in diameter compared to the normal diameter of the artery in question [1,2]. The aorta and particularly the subrenal segment are the most common sites [1].

The typical fusiform form is the most frequent 1 whereas the saccular form at the level of the ascending aorta is an extremely rare clinical entity, considered as an effusion of part of the aortic circumference [3].

The etiology of saccular aneurysms is above all a focal infection of the aortic wall, or trauma, unlike the fusiform form where degeneration of the wall secondary to atherosclerosis is predominant [1].

Saccular aneurysms tend to develop in areas of healed microscopic dissection of the aortic wall that are more susceptible to rupture and therefore require urgent surgical management [4].

We present in this article, two cases of particularly rare saccular aneurysm, especially in their mode of revelation as well as in their anatomical form.

2. CASE PRESENTATION

Case 1: An 85-year-old patient, followed for atrial fibrillation (AF) complicated by ischemic cerebral vascular accident (ICD) put on vitamin K antagonist anticoagulant therapy based on (Sintrom), with a normal blood pressure, presents to the cardiology emergency department for a moderate haemorrhagic accident caused by vitamin K antagonist therapy, in a form of anal bleeding with a blood assessment: Normochromic normocytic anemia at 2.4 g/dl, and an INR above 12, haemodynamically well tolerated.

Clinical examination showed deep mucocutaneous pallor, NYHA stage 2 dyspnea, blood pressure (BP) at 129/73 mmHg, and heart rate (HR) at 93 bpm, and facial paralysis.

The rest of the examination was unremarkable.

On the ECG: there was an AF at 95 bpm, without electrical repolarization disorders.

On the echocardiography, we noted a slightly dilated left ventricle located at a septal wall measuring 12mm by 10mm. Its global and segmental contractility was good, LVEF: 60%, a biauricular dilatation with a left atrium at 40cm², and a right atrium at 32cm² without intracavity thrombus, with moderate mitral insufficiency and moderate Aortic Insufficiency (Fig. 1). The right ventricle was of good function, with a moderate tricuspid regurgitation (TR) estimating the systolic pulmonary pressure (SPAP) at 35+5: 40mmHg. We also note a dilated aorta with: ASCENDING aorta measuring 47 mm, Sinus 48 mm with a doubt of aortic dissection or aneurysm (Fig. 2).

With this finding, a thoracic CT angiography was carried out objectifying: an aspect of saccular aneurysm at the level of the initial part of the ascending aorta (Fig. 3).

The initial therapeutic management consist of hospitalization in the cardiac intensive care unit, with implementation of vitamin K perfusion and a blood transfusion to correct the present anaemia.

Subsequently, and given that the patient did not present any notable complication, as well as the risk of mortality for the surgery of her saccular aneurysm was high, after multidisciplinary staff discussion: a close monitoring was indicated.

Case 2: A 63-year-old male patient was admitted to our structure for heart valve disease control. Having a particular history, of arterial hypertension for one year under enzyme converting inhibitor (ECI). Note, he is a chronic smoker since the age of 20 at the rate of 10 packets per year.

On clinical examination, the patient presents a NYHA stage II dyspnea, with angina on exertion.

Overall, he is hemodynamically stable with BP at 130/60mmHg and HR at 65 bpm. On auscultation, there was a diastolic murmur in the intense aortic focus, with no sign of heart failure.

The electrocardiogram finds a complete left bundle branch block (LBBB) with secondary repolarization disorders.

The transthoracic echocardiography shows, severe aortic regurgitation (ROS=40cm², RV=59ml, Radius Piza=8mm, DT=26ms) on a normal tricuspid aortic valve without stenosis (Fig. 4). The LV was dilated (the end-diastolic diameter at 65mm), not hypertrophied, of good

function (LVEF at 62%) with the observation of an aneurysmal dilation of the thoracic aorta. The rest was unremarkable.

In front of this outcome, a thoracic CT angiography was carried out objectifying an aneurysmal thoracic aorta with the aspect of a saccular aneurysm (small size) at the initial part of the aorta (Aortic ring: 32mm, aortic sinus: 38mm, sino-tubal junction: 31mm, ascending aorta: 49mm, aortic arch: 36mm, descending aorta: 26mm) (Fig. 5).

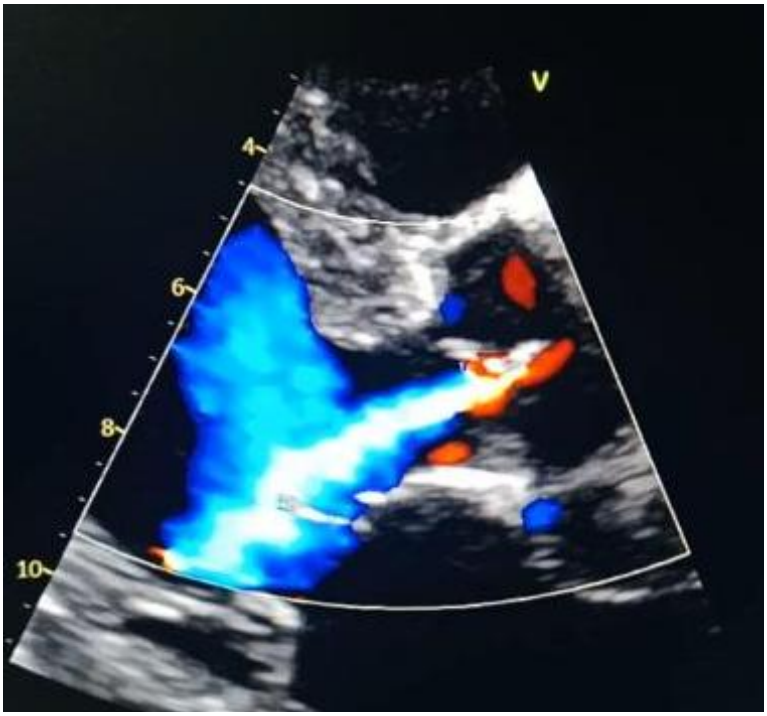

Fig. 1. Transthoracic echocardiography (TTE) shows a moderate aortic regurgitation, Vena contracta: 4mm

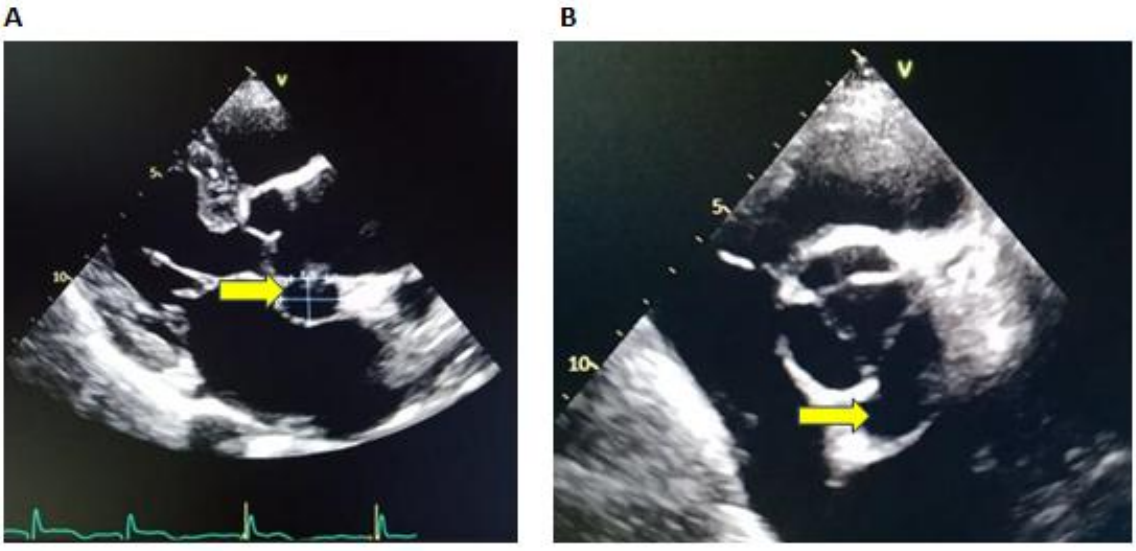

Fig. 2. A -Transthoracic echocardiography (TTE) long axis view: -shows a saccular aneurysm on the posterior wall of the aorta next to the posterior cusp aortic valve; B- TTE short axis view: saccular aneurysm (yellow arrow)

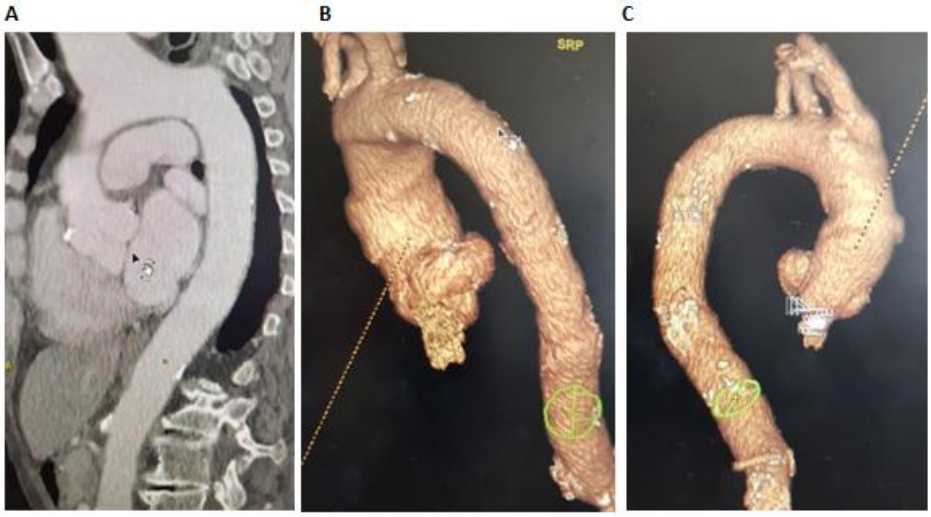

Fig. 3. Shows a saccular aneurysm at the level of the initial part of the ascending aorta (A: CT angiography image, B and C: 3D aortic construction showing the localization of the aneurysm)

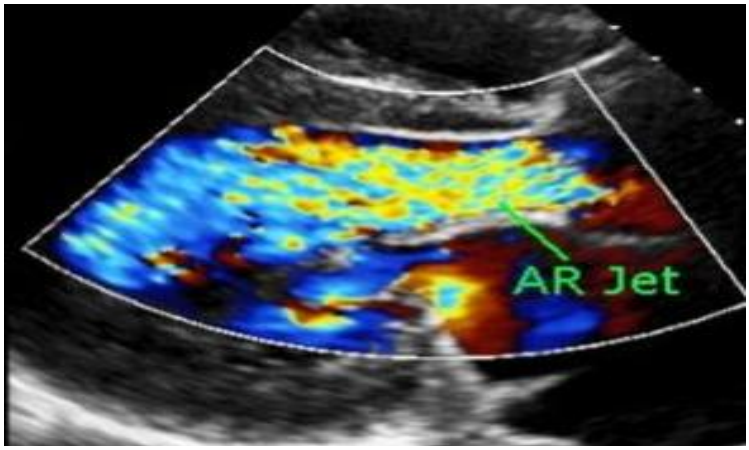

Fig. 4. TTE: Long axis view: Severe aortic regurgitation (Vena contracta:7mm)

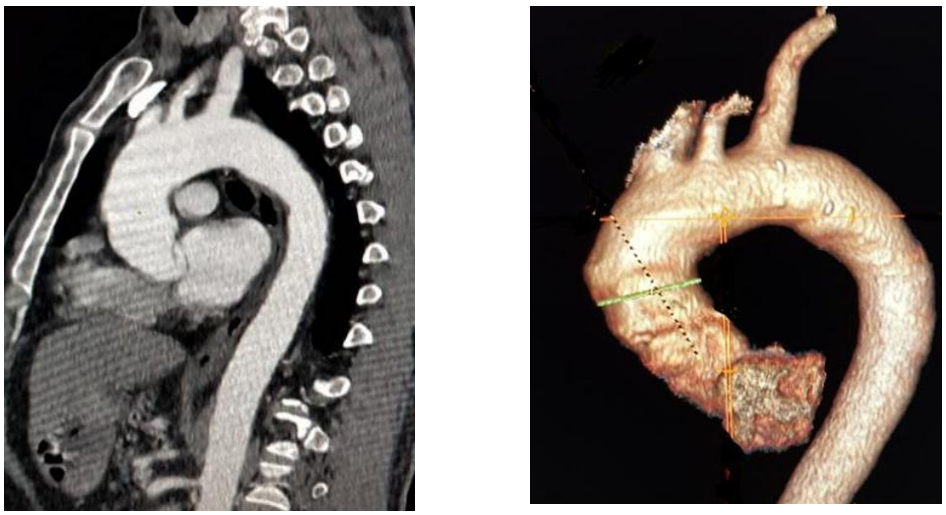

Fig. 5. CT angiography: shows a dilated thoracic aorta with the presence of a saccular aneurysm (small size) at the initial part of the ascending aorta

The biological assessment, both inflammatory and infectious, does not report any particularity. The cause of the aneurysm was not yet elucidated.

As concerning the management of his valve disease, the heart team decided an aortic surgical replacement by BENTHALL was performed. The post-operative follow-up was simple and uncomplicated.

The patient is still under cardiological follow-up.

3. DISCUSSION

An arterial aneurysm is a permanent dilatation characterized by a diameter 50% greater than that of the normal vessel in question [5]. True aneurysm can be divided into two types: fusiform (most common) and saccular [3,6].

Regarding the etiology, fusiform aortic aneurysms often occur as part of the degeneration of the walls secondary to atherosclerotic disease, whereas saccular aneurysms may occur following aortic infections, degeneration of a penetrating ulcer, trauma or complicating aortic surgery [5,7].

The saccular aneurysm has a greater risk of rupture than the fusiform form, and therefore they are often treated at smaller diameter [8].

Several studies have been performed with the aim of providing an accurate radiological characterization of the size, presentation and progression of saccular aortic aneurysms.

Pathophysiologically, saccular aneurysms are secondary to localized aortic dissection. This begins with zonal degeneration and fibrosis extending through the intima and first tier of media, the area of "healed microscopic dissection" of the aortic wall. This process involves ulceration of the intima followed by the formation of an aneurysm [4,9,10].

Pathologically, the edges of dissected saccular aneurysms protrude, which histologically consist of the medial part of the dissected media, and are associated with a medial thinning in the center of the aneurysmal wall. These lesions differ from organized thrombi in the false lumens [4].

Classically, patients with ascending aortic aneurysms report chest pain associated with ischemic abnormalities on the electrocardiogram, particularly in cases of sinus of Valsalva aneurysms [11]. However, the saccular aneurysm is rarely symptomatic. Its discovery is often fortuitous following an assessment of other manifestations, as is the case of our patients described above, or following complications.

Imaging plays an essential role in the diagnosis and follow-up of patients with aortic aneurysms. It can also point to risk or causal factors. Echocardiography is usually the initial cost-effective imaging modality that is used in the diagnosis of aneurysms, as seen in our patients it is safe and widely available [12,13,14].

Cross-sectional imaging such as CT and MRI are integral to the diagnosis, follow-up and management of aneurysms [12].

The growth rate of the aneurysm is considered an indicator of the risk of rupture [15] as confirmed by Dapunt et al who examined the natural history of thoracic aortic aneurysms and determined a combined mean growth rate of 4.3 mm/year.

While many biomechanical studies implicate aortic asymmetry as an indicator of risk of rupture and aneurysm growth, [16,17] no increased saccular aneurysm growth rates have been noted compared to fusiform aneurysms. In fact, neither the aortic diameter nor other saccular aneurysm diameters measured predicted aneurysm growth, although the former was based on a small sample size. More importantly, the heterogeneity of growth rates detected suggests that individual aneurysm characteristics may be important in determining aneurysm stability [5,18].

In the report of the subcommittee of the Joint Council of the Society for Vascular Surgery and the International Society for Cardiovascular Surgery, it was recommended that saccular aneurysms could represent an indication for surgery, regardless of their size. This recommendation is widely shared by most vascular surgeons. Despite the few studies focusing on the natural history of saccular aortic aneurysms. But the focal and asymmetrical bulge characterizing the saccular aneurysm represents an area of extreme thinning of the aortic wall with a greater risk of rupture [1].

Surgical management and technique vary by location. If an obvious acute infection is

encountered at the time of repair, debridement, aortic closure and bypass surgery will only be feasible if the involvement is infrarenal. It is more practical to consider the use of a substitute such as a bovine patch or a cadaveric aorta [19].

For thoracic aortic aneurysms, it is advantageous to perform patch aortoplasty when <50% of the wall circumference is involved and there is normal tissue at the edge. This ensures sparing of the thoracic intercostal arteries and minimizes the risk of spinal cord ischemia [20].

In summary, our case reports show that saccular aortic aneurysms are an unusual variant with a poorly understood natural history. Transthoracic echocardiography, CT angiography and cardiac MRI are the most efficient diagnostic tools. Treatment decision should involve the heart team. Patients with aortic regurgitation should be screen correctly for aortic aneurysms.

4. CONCLUSION

Saccular aneurysms are often asymptomatic. Multimodality imaging and echocardiography are ideal for accurate diagnosis. Early management, particularly surgery, is the standard approach with satisfactory results.

These were rare and original cases which broaden knowledge in general cardiology, vascular pathology, and surgical modalities.

ETHICAL APPROVAL

As per international standard or university standard written ethical approval has been collected and preserved by the author(s).

CONSENT

As per international standard or university standard, patient(s) written consent has been collected and preserved by the author(s).

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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