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Penetrating aortic ulcer in unusual topography presenting as acute coronary syndrome

Úlcera aórtica penetrante em topografia não habitual manifestando-se como síndrome coronária aguda

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ABSTRACT – Penetrating aortic ulcer is a rare entity with a poor prognosis within the spectrum of acute aortic syndrome. Even rarer are the cases located in the ascending aorta. This case demonstrates the importance of ancillary imaging methods for correct diagnosis and choice of the most appropriate management of this atypical presentation of the disease.

Keywords: Aortic diseases; Aortic aneurysm, thoracic; Cardiac catheterization; Coronary diseases

RESUMO – Úlcera aórtica penetrante é uma entidade rara e de prognóstico desfavorável dentro do espectro da síndrome aórtica aguda. Mais raros ainda são os casos localizados na aorta ascendente. O presente caso demonstra a importância dos métodos de imagem auxiliares para o correto diagnóstico e a escolha do tipo de abordagem terapêutica mais adequada nesta apresentação atípica da doença.

Descritores: Doenças da aorta; Aneurisma da aorta torácica; Cateterismo cardíaco; Doença das coronárias

INTRODUCTION

Penetrating ulcer of the aorta is defined as an atherosclerotic lesion that ulcerates and invades the internal elastic lamina of the aortic wall and progresses to the middle layer.¹ It is most frequently located in the descending aorta, and is less common in the aortic arch, and rare in the ascending aorta. Along with aortic dissection and intramural hematoma, it comprises the spectrum known as acute aortic syndrome.²⁻⁶

The objective of this case report is to discuss the therapeutic options and challenges that may be found in an acute aortic syndrome due to a penetrating ulcer located in the ascending aorta, presenting as acute coronary syndrome.

CASE REPORT

A 77 year-old female patient, widow, resident in the city of Pirassununga (SP, Brazil), was referred to the Department of Invasive Cardiology and Cath Lab of *Hospital Santa Casa de Ribeirão Preto*, in the city of Ribeirão Preto (SP, Brazil), with a non-ST-segment elevation acute myocardial infarction (NSTEMI), 72 hours after onset of symptoms, being hemodynamically stable. Her medical history included hypertension, paroxysmal atrial fibrillation (with no anticoagulation), non-dialytic chronic renal disease, and clipping of a cerebral aneurysm performed 20 years earlier.

Her blood pressure was 140×90mmHg, heart rate was 96 bpm, and the peripheral arterial oxygen saturation was 95%. Cardiac and pulmonary auscultation was normal.

Upon arrival, she presented recurrent angina and dynamic electrocardiogram changes, with ST-segment depression on the anterior wall. She was referred to the cath lab for invasive stratification.

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A coronary angiography was performed by right radial access, with a 6F GLIDESHEATH (Terumo Medical®, Tokyo, Japan) introducer. A Tiger catheter (Terumo Medical®, Tokyo, Japan) was used. Left ventriculography revealed moderate anterior and apical hypokinesia, with ejection fraction estimated at 45%. The right coronary artery was free of significant lesions, providing Rentrop grade III intercoronary collateral circulation to the left anterior descending artery (Figure 1). It was difficult to perform selective catheterization of the left coronary artery, due to dilation of the left coronary sinus. We decided to change the catheters, using, sequentially, a Multipurpose catheter (Merit Medical Systems®, Utah, USA); Judkins left 5.0 and 6.0 catheters (Merit Medical Systems®, Utah, USA); and a Voda left 4.0 catheter (Boston Scientific, Natick, USA), with no success in the selective catheterization (Figure 2).

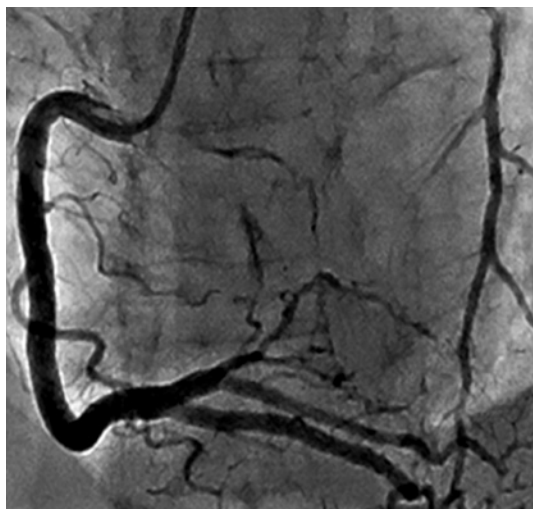


Figure 1. Selective catheterization of the right coronary artery with a Tiger catheter did not reveal a severe obstructive lesion, providing grade III collateral circulation for the left anterior descending artery.

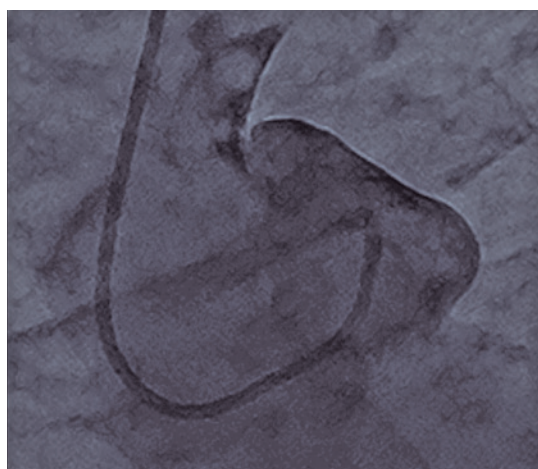


Figure 2. Significant dilation of the aortic root near the left coronary sinus.

An aortography was performed and the left coronary artery was opacified, which excluded acute occlusion. We decided to terminate the procedure and complement the investigation, performing a computed tomography angiography (CTA) of the coronary arteries and a transthoracic echocardiography.

CTA revealed an aneurysmatical dilatation of the aortic root extending up to the ascending aorta, affecting the sinotubular junction of the left coronary cusp, which had a compressive effect on the left main coronary artery (LMCA). There was no significant obstructive coronary artery disease, with presence of collaterals from the right coronary artery to the left anterior descending artery. The rest of the thoracic aorta was diffusely atheromatous, including the presence of eccentric mural thrombi, but with no evidence of dissections or other aneurysmal dilatation (Figures 3 and 4).

Echocardiography showed changes in segmental contractility of the left ventricle in the basal and mid antero-septal, and in the mid anterior and apical wall segments, with moderately depressed global contractile function. The mitral valve showed moderate regurgitation, and the aortic and tricuspid valves showed mild regurgitation. Moderate pulmonary hypertension was observed, with an estimated pulmonary systolic pressure of 49mmHg.

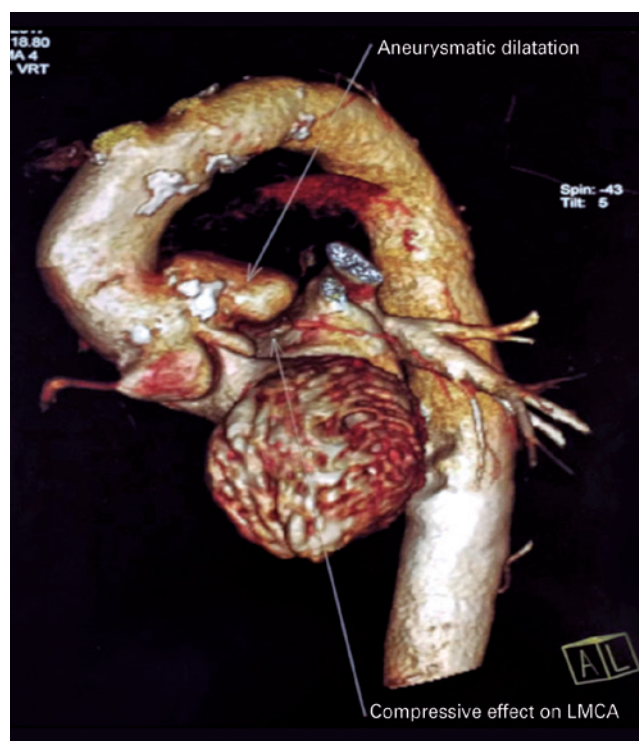


Figure 3. Computed tomography angiography showing aneurysmatical dilatation of the aortic root with compressive effect on the left main coronary artery.

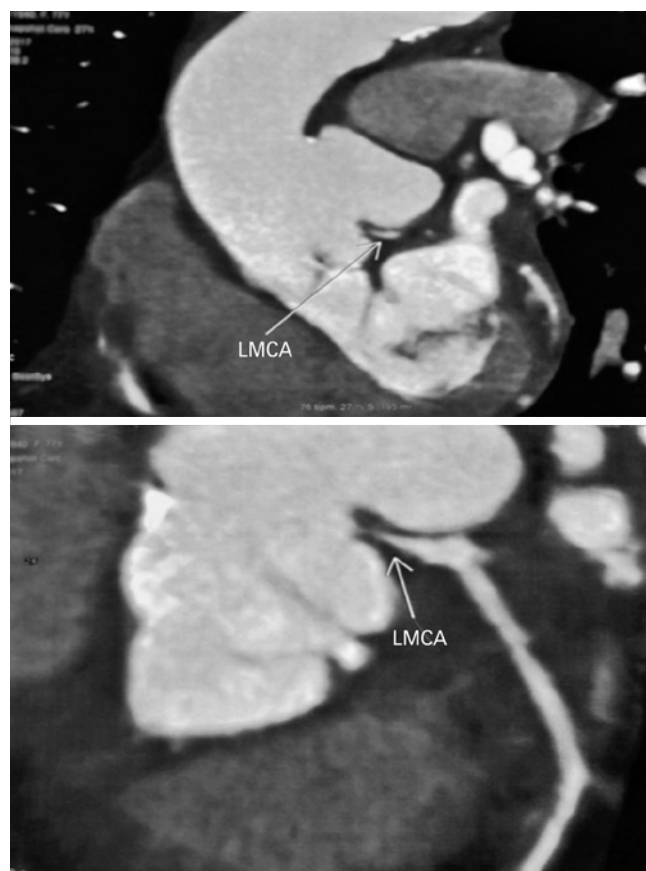


Figure 4. Computed tomography angiography showing extrinsic compression of the left main coronary artery. LMCA: left main coronary artery.

After discussing the case, the clinical, interventional and surgical teams decided for a surgical intervention (the Society of Thoracic Surgeons – STS – predicted risk of mortality was 9.5%).

The patient remained hemodynamically and clinically stable at the intensive care unit. After 4 days, she was referred to surgery, with a proposed aneurysm repair and possible coronary artery bypass graft.

During surgery, we observed an aortic ulcer with localized rupture and pseudoaneurysm in the ascending aorta. The pseudoaneurysm in the ascending aorta was resected, with preservation of the aortic valve. A synthetic tubular interposition graft was placed, with ostial plasty of the left main coronary artery and inclusion in the graft itself, with no need for reimplantation.

In the first postoperative day, the patient remained hemodynamically stable, requiring low doses of vasoactive drugs, and extubation was scheduled. On the second day, extubation was successfully performed, with a favorable clinical course until the night period. Thereafter, the patient presented significant hypotension associated with respiratory failure and hyporesponsiveness. Orotracheal intubation was conducted, and the patient required high

doses of vasoactive drugs. On the morning of the third day, still in a critical condition, she had a cardiorespiratory arrest, cardiorespiratory resuscitation maneuvers were not successful, and the patient died. The team decided not to refer the patient to the Death Verification System.

DISCUSSION

Penetrating aortic ulcer is defined as ulceration of an atherosclerotic plaque of the aorta, which penetrates the internal elastic lamina and progresses towards the middle layer.⁶ Such lesions account for 2 to 7% of all cases of acute aortic syndromes.³ The spread of the ulcerative process can lead to intramural hematoma, pseudoaneurysm, aortic rupture or acute aortic dissection.⁴

In this reported case, a penetrating ulcer evolved to rupture, with formation of pseudoaneurysm in a rare topography in the ascending aorta, causing extrinsic compression of the left main coronary artery, which triggered the symptoms mimicking an acute coronary syndrome.

Penetrating aortic ulcer is less frequently located in the aortic arch than in the descending aorta, due to its close association with atherosclerosis, which is more prevalent in the descending aorta, and because of the fast blood flow that becomes a protective factor in the ascending aorta and the aortic arch.⁵

Common characteristics of patients with penetrating aortic ulcer include advanced age, male sex, smoking habit, hypertension, coronary artery disease, chronic obstructive pulmonary disease, and concomitant abdominal aneurysm.^{3,6}

Penetrating aortic ulcer is often asymptomatic and primarily an incidental finding. When located in the descending aorta, the preferred management includes watchful waiting and drug therapy, as well as imaging tests to monitor progression of the ulcer. However, for patients with involvement of the ascending aorta - even those asymptomatic - surgical or endovascular intervention is recommended as soon as possible, since the patients are at high risk of progressing to classic type A aortic dissection, type A intramural hematoma, or acute rupture of ascending aorta. The symptoms may be similar to those of acute aortic dissection, although they occur more frequently in elderly patients, and rarely present as signs of poor organ perfusion.

Computed tomography is the best method for diagnosing penetrating ulcer. It provides a two- or three-dimensional, high-quality, fast image reconstruction, in which a contrast medium-filled focal lesion, with irregular borders extending beyond the expected limits of the aortic wall, usually associated with severe underlying atheromatous disease, is visualized.^{1,6} Since aortography failed to fully elucidate the patient's case, computed tomography was essential to make diagnosis and plan therapy.

In the presence of acute aortic syndrome associated with penetrating ulcer, the goal of treatment is to prevent

aortic rupture and progression to acute aortic dissection. The usual indications for intervention include recurrent and refractory pain, as well as signs of contained rupture, such as rapidly growing aortic ulcer, associated periaortic hematoma, or pleural effusion.⁵

The choice of treatment is usually based on anatomical characteristics, clinical presentation and comorbidities. Since these patients are often unsuitable candidates for conventional surgery due to advanced age and comorbidities, endovascular treatment has become the first-line approach, for its high technical success rate and low mortality and morbidity.^{7,8}

Endovascular treatment of penetrating ulcers in descending aorta is the standard treatment when an intervention is deemed necessary. However, when the ulcer is located in the ascending aorta, which is a rare topography, the standard treatment is surgical in most cases, and the endovascular treatment is reserved for exceptional cases.^{9,10}

This case report shows rupture of aortic ulcer in unusual topography in the ascending aorta, just above the valve plane and near the origin of the coronary ostia. Due to the anatomical characteristics of this case, the treatment of choice was conventional surgery, even in a patient with high surgical risk, because the area affected was not technically suitable for endovascular treatment. In addition, advanced age and comorbidities were decisive factors for the unfavorable outcome.

SOURCE OF FINANCING

None.

CONFLICT OF INTEREST

The authors declare there are no conflict of interest.

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