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An aneurysmatic surprise: A myocardial infarction unexpected benefit

Diego Bastos Porto, Beatriz Amorim Beltrão, Joao Pedro Sobreira Borges, Antônio Daniel Leite Simão, Roberto Augusto Carneiro de Mesquita Lobo, Marcio Manozzo Boniatti

ABSTRACT

Introduction: Atypical presentations of cardiovascular pathologies might delay an accurate diagnosis, contributing to worse prognosis. Myocardial infarctions and aortic aneurysms are examples of such scenarios.

Case Report: A 65-year-old male patient was admitted with retrosternal chest pain and diaphoresis which began 2 hours prior to seeking medical assistance. On evaluation, he had a rise of ultrasensitive T-troponin curve. A cardiac catheterization showed important coronary obstructions which appeared to be related to an extrinsic compression. Transthoracic echocardiography showed an oval-shaped hypoechoic structure which seemed to compress the left atrial appendix. The patient was sent to the operating room in which a large aortic aneurysm was diagnosed. A valve sparing aortic root replacement procedure was made following Tirone David technique. Also, coronary revascularization was performed. Despite a few complications, such as sepsis and pericardial effusion, the patient recovered well, being discharged home.

Conclusion: Our patient developed an unusual presentation of a myocardial infarction, possibly due to a synergic mechanism: atherosclerosis and extrinsic compression of the coronary arteries by an aneurysm which wasn't initially diagnosed. His coronary disease wasn't severe, but the extrinsic aneurysm compression, together with arteries distension, may have caused the ischemia and, ultimately, his symptoms. This case emphasizes the importance of an extensive anamnesis (with complementary imaging studies when necessary) in order to elucidate the diagnosis and better care for our patients. Also, it highlights the importance of a due diagnostic and intervention which should be sought by all clinicians in order to avoid potentially harming misdiagnosis and optimize outcomes.

Keywords: Aortic aneurysm, Cardiac catheterization, Cardiac surgical procedures, Myocardial infarction

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INTRODUCTION

Cardiovascular pathologies encompass a broad spectrum of clinical presentations, ranging from cerebrovascular to peripheral artery diseases. If not

promptly treated, they may relate to worse outcomes [1, 2]. Atypical presentations might delay an accurate diagnosis, contributing to even worse prognosis. Myocardium infarction (MI) and aortic aneurysms represent good examples of such scenarios. These diseases may be diagnosed after a long period of subclinical development or may have an acute presentation. For instance, thoracic aneurysms, in general, are silent pathologies which are likely to increase in size over the course of the disease's natural history. Their rupture is usually sudden and fatal [3, 4]. Myocardium infarction patients often present as a clinically progressive coronary artery obstruction syndrome. Heart failure and death are frequent consequences of delayed ischemia intervention [5, 6]. We aim to describe and discuss a case of an unconventional non-ST elevation myocardial infarction (NSTEMI) diagnosis in which an accurate propaedeutics contributed to patient discharge and better outcomes.

CASE REPORT

A 65-year-old male patient was admitted with a history of retrosternal chest pain, irradiated to the jaw, together with a complaint of diaphoresis, all which began 2 hours prior to seeking medical assistance. These symptoms had a progressive deterioration in the past month and, initially, happened during exercise, such as climbing stairs or mild walks, and relieved on rest. He was previously diagnosed with hyperlipidemia and had a history of moderate-to-severe alcohol consumption. Both of his parents died of coronary disease.

On physical exam, he had a heart rate of 90 bpm and an arterial blood pressure of 130 × 85 mmHg. His electrocardiogram (EKG) didn't show alterations. His 3-hour cardiac injury markers evolution curve showed an ultrasensitive T-troponin rise from 168.5 to 396 ng/L. Under the diagnostic hypothesis of non-ST-elevation myocardial infarction the patient was admitted to a cardiologic Intensive Care Unit (ICU) with a perspective of percutaneous coronary intervention the next day.

His cardiac catheterization showed important coronary obstructions of the left coronary trunk, descending anterior and circumflex arteries, as well as first diagonalis (Figure 1). The extensive vascular anatomy compromise made the hypothesis of intra-exam vasospasm, a possibility suggested after contrast injection (Figure 1), less possible. Therefore, no intracoronary vasodilator was used. The described obstructions appeared to be mainly related to an extrinsic compression mechanism and not only intraluminal atherosclerosis per se. A transthoracic echocardiography, performed the next day, showed preserved systolic and diastolic functions and an oval-shaped hypoechoic structure, measuring 49×31 mm, which seemed to compress the left atrial appendix. This was, later, confirmed by a transesophageal exam. A chest and abdominal angio-computed tomography (CT) were performed. The original radiology report didn't show any significant alterations or blood flow obstructions (Figure 2). At this point, the patient experienced another episode of excruciating chest pain and a new rise in cardiac injury markers. An urgent surgical approach decision was made.

Five days after hospital admission, our patient was sent to the operating room in which a large saccular aortic aneurysm was diagnosed. It was found to be on the aortic root, between the left coronary ostia and the aortic ring, lying posteriorly to the pulmonary artery, close to left atrial auricle (Figure 3). It measured about 4 cm of diameter with an orificium of 1 cm. A valve sparing aortic root replacement procedure was made with a 26 mm valvar ring tube graft. Following Tirone David technique, both coronary ostia were reimplanted together with reattachment of the coronary arteries. Also, revascularization of the left anterior descending anterior and marginal of the circumflex arteries was performed. The procedure lasted for a total cardiopulmonary bypass and aortic clamping times of 117 and 131 minutes, respectively, and corrected the vascular pathologies without any further issues (Figure 4).

Afterward, during his post-operatory ICU stay, he experienced a few complications, such as atrial fibrillation with rapid ventricular response and pulmonary sepsis, which were treated accordingly. Neither compromised his hemodynamic status or acutely worsened his clinical condition. On echocardiography follow-up, a progressive pericardial effusion, without hemodynamic compromise, was diagnosed. This was closely monitored and regressed with non-surgical interventions such as fluid balance optimization with diuretics and fluid restrictions when deemed necessary. He recovered well, being discharged home a few days later, fully functional. He was seen on follow-up consultation and didn't report any symptoms.

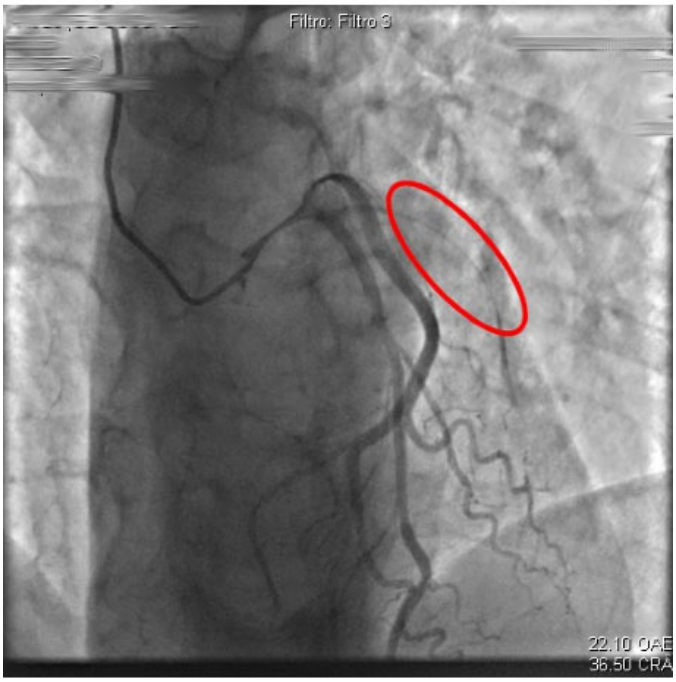

Figure 1: Coronary angiography showing coronary obstructions due to extrinsic compression.

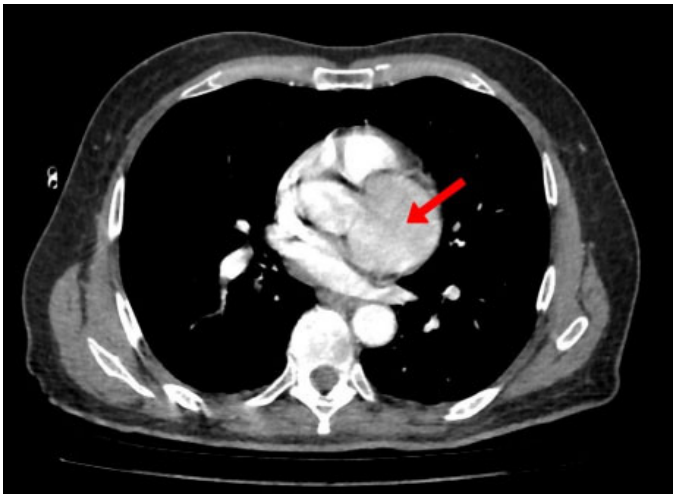

Figure 2: Computed tomography chest angiography. Initially, radiology reported the exam as without any abnormal vascular changes. However, after surgery and image review, a new report suggested a possible aortic aneurism, pointed by an arrow in the above image.

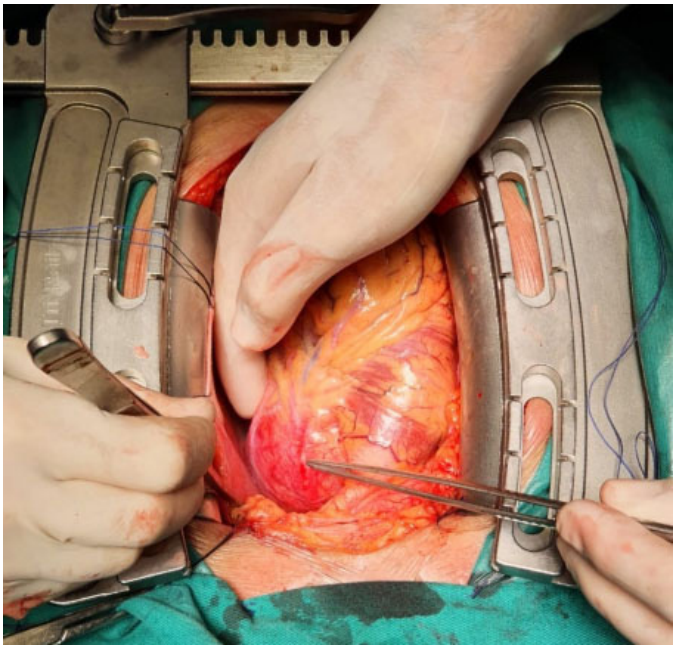

Figure 3: Aneurysm exposure.

DISCUSSION

Our patient developed an unusual presentation of two potentially fatal diseases. He had a myocardial infarction due to a synergic mechanism: atherosclerosis and extrinsic compression of the coronary arteries by an aneurysm which wasn't initially seen on the angio-CT scan investigation. He had, indeed, intravascular coronary atherosclerotic disease, as seen on the cardiac catheterization, but, possibly, this wasn't the main mechanism of ischemia at that time. Had the aneurysm not being that grown, he probably wouldn't have experienced symptoms until later on. This fact is corroborated by the relative lack of EKG abnormalities at presentation. Our rationale for this phenomenon rests on the possibility of a coronary flow reserve adaptation and a hibernating myocardium in the context of the silent aneurismatic growth and chronic coronary arteries obstruction.

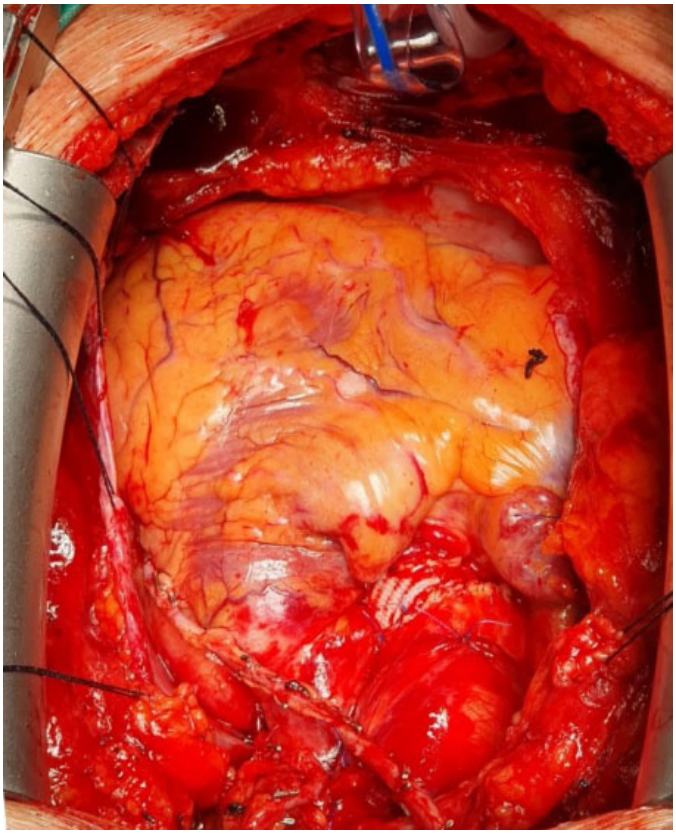

Figure 4: Finished aspect of aortic root intervention surgery with right internal thoracic artery graft to lateral coronary branches.

This uncommon etiology of his symptoms may have contributed to a late diagnosis, suboptimal treatment (regarding coronary artery disease) and potentially worse outcomes [3, 4]. Our patient underwent intervention about five days after presentation in a context of relapsed chest pain and urgent surgery indication. Fortunately, this delay didn't result in any further complications.

The prompt recognition and diagnosis of pathologies like aortic aneurisms requires previous clinical knowledge and awareness of uncommon presentations. We speculate that the mechanism of our patient's aneurism development was related to unforeseen genetic factors, atherosclerotic disease or even idiopathic, as the patient didn't have any stigma of other aortic diseases and didn't show, in surgery, further vascular pathology, besides the aneurism. Usually, this disease's natural history and recognition revolves around asymptomatic cases, incidental diagnosis or fatal presentations [4]. After surgery, with a direct anatomy observation and knowledge, we have discussed and reviewed the chest-CT images in a clinical session with Radiology and the

Cardiothoracic surgeons involved in the case. In fact, the image highlighted in Figure 2 may be the actual aneurism, although doubt remains whether the structure isn't related to a normal pulmonary trunk anatomy. This may be due to contrast washout, subtraction, and exam limitation interpretations. We, therefore, would like to stress that the correct diagnosis of such cases is challenging, making it a potentially deadly, although silent, pathology. Our patient's coronary disease wasn't severe, but we hypothesize that, with the aneurysm's growth and arteries compression and longitudinal distension (like a squeezed hose), a consequently reduced lumen caused the ischemia. During surgery, it was seen that the aneurism was, in fact, below the coronary ostia and it had grown to overstretch the coronary arteries, obstructing blood flow. The proposed intervention intended to preserve the competent aortic valve, repair the vascular defect and bypass the coronary obstructions and was successful. The choice of procedure was made based on the surgical staff experience and aortic valve normal function. Paradoxically, hadn't the patient experienced chest pain and a myocardial infarction, his aneurism might have taken a toll later on (being clinically silent disease), either by dissection or extensive and uncontrollable bleeding. Ultimately, this would end in a fatal outcome.

CONCLUSION

This case highlights the importance of a due intervention in order to optimize outcomes. Out of the multiple possible approaches, the chosen one may have contributed to our patient's better functional outcomes and quality of life, despite being a complex endeavor which required vast surgical expertise and preoperative planning. Fortunately, our patient had been extensively studied (with multiple complementary imaging studies) in order to clarify the diagnosis and his anatomy was well known. Thus, a keen and rational clinical investigation should be sought by all clinicians, especially in the ICU setting, in order to avoid potentially harming misdiagnosis and outcomes.

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Author Contributions

Diego Bastos Porto – Conception of the work, Design of the work, Acquisition of data, Analysis of data, Interpretation of data, Drafting the work, Revising the work critically for important intellectual content, Final approval of the version to be published, Agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved

Beatriz Amorim Beltrão – Conception of the work, Design of the work, Acquisition of data, Analysis of data, Interpretation of data, Drafting the work, Revising the work critically for important intellectual content, Final approval of the version to be published, Agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved

Joao Pedro Sobreira Borges – Conception of the work, Design of the work, Acquisition of data, Analysis of data, Interpretation of data, Drafting the work, Revising the work critically for important intellectual content, Final approval of the version to be published, Agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved

Antônio Daniel Leite Simão – Conception of the work, Design of the work, Acquisition of data, Analysis of data, Interpretation of data, Drafting the work, Revising the work critically for important intellectual content, Final approval of the version to be published, Agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved

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Authors declare no conflict of interest.

Data Availability
All relevant data are within the paper and its Supporting Information files.