

Ischemic Stroke in a Patient with Challenging Pseudoaneurysm in the Left Ventricular Outflow Tract

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Introduction

Literature shows cases of cardiac neocavities, often associated with pseudoaneurysms resulting from traumatic injuries or fistulized periprosthetic abscesses involving the left ventricle (LV).¹

Cardiac pseudoaneurysms are typically complications of acute myocardial infarction but can also occur in the late postoperative period of valve surgery. Certain areas are particularly prone to the development of ascending aortic pseudoaneurysms. Generally, these events occur in sites where aortic cannulation and clamping take place, as well as in the areas of graft sutures.²

This case report highlights the challenges and difficulties handled in some clinical cases associated with the development of pseudoaneurysms despite advancements in therapy.

Case report

This 39-year-old patient was admitted to the emergency room of a tertiary public hospital, with a clinical condition compatible with ischemic stroke (aphasia of expression and decreased strength in the right upper limb). A computed tomography scan of the skull revealed hypodense areas in the frontal region, frontal operculum, and left insular lobe. During the etiological investigation, ultrasound of the carotid and vertebral arteries revealed no abnormalities, and a transthoracic echocardiogram (TTE) was performed (Figure 1).

The patient had a previous pathological history of bicuspid aortic valve, and underwent cardiac surgery in 2021, in another hospital service, due to infectious endocarditis with valve abscess and significant aortic insufficiency. In May 2021, the patient underwent aortic valve replacement with a No. 23 mechanic prosthesis and correction of the aortic-cavitary fistula. However, in control TTE, maintenance of the aorto-cavitary fistula and sequelae of periaortic abscess were observed. A

month later, the patient underwent new heart surgery to close the fistula. However, postoperative imaging exams revealed the persistence of the fistula connecting the pseudoaneurysm and the left ventricular cavity. Thirty days after the second surgery, a new attempt at closure was made using a different technique, involving the placement of two Amplatzer® prostheses to promote thrombosis within the developed pseudoaneurysm. The procedure was performed via left thoracotomy with apical puncture. Despite these efforts, the closure was again unsuccessful, as confirmed by a follow-up echocardiogram showing the fistula still present.

Going back to the current hospitalization procedures, given the challenging characterization of the neocavity on TTE, a transesophageal echocardiogram (TEE) (Figure 2) was performed, revealing a pseudoaneurysm adjacent to the aortic prosthesis with the Amplatzer® prostheses inside. The mechanical aortic valve prosthesis exhibited good disc mobility and mild perivalvular regurgitation. The LV showed normal dimensions, preserved systolic function, and mild diastolic dysfunction. The left atrium was slightly enlarged. The patient had mild functional mitral regurgitation.

Considering the risk of new cardioembolic events and the patient's wish to address the pseudoaneurysm surgically, cardiac surgery was performed on August 25, 2023. During the procedure, a pseudoaneurysm was identified in the ascending aorta, involving the infra and supra-ventricular planes, containing two Amplatzer® prostheses. After entering cardiopulmonary bypass, the aortic prosthesis and large LV pseudoaneurysm with two-hole aorta were removed. Two Amplatzer® devices were extracted, and the communicating apertures were closed using 4-0 prolene. A pericardial patch was used to widen the aortic ring, and a mechanical valve No. 19 was implanted in the aortic position. However, due to the aorta's high fragility, upon removal of the clamp, the ascending aorta ruptured at the beginning of the aortic arch, resulting in significant bleeding. Despite efforts to control the hemorrhage, including refractory measures, the patient succumbed to hemorrhagic shock.

Keywords

False Aneurysm; Stroke; Heart Valve Prosthesis.

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Artigo recebido em 10/01/2024; revisado em 23/01/2024; aceito em 01/03/2024.

Editor responsável pela revisão: Marco Lofrano-Alves

DOI: <https://doi.org/10.36660/abcimg.20240001i>

Discussion

Aorto-cavitary fistulas are rare abnormal connections between the aorta and the heart cavities. These can be congenital or acquired, with the most common etiology being iatrogenic (38%), followed by infectious (25%), traumatic (14%) and rupture of the sinus of Valsalva (8%). The most common locations are aorta to right atrium

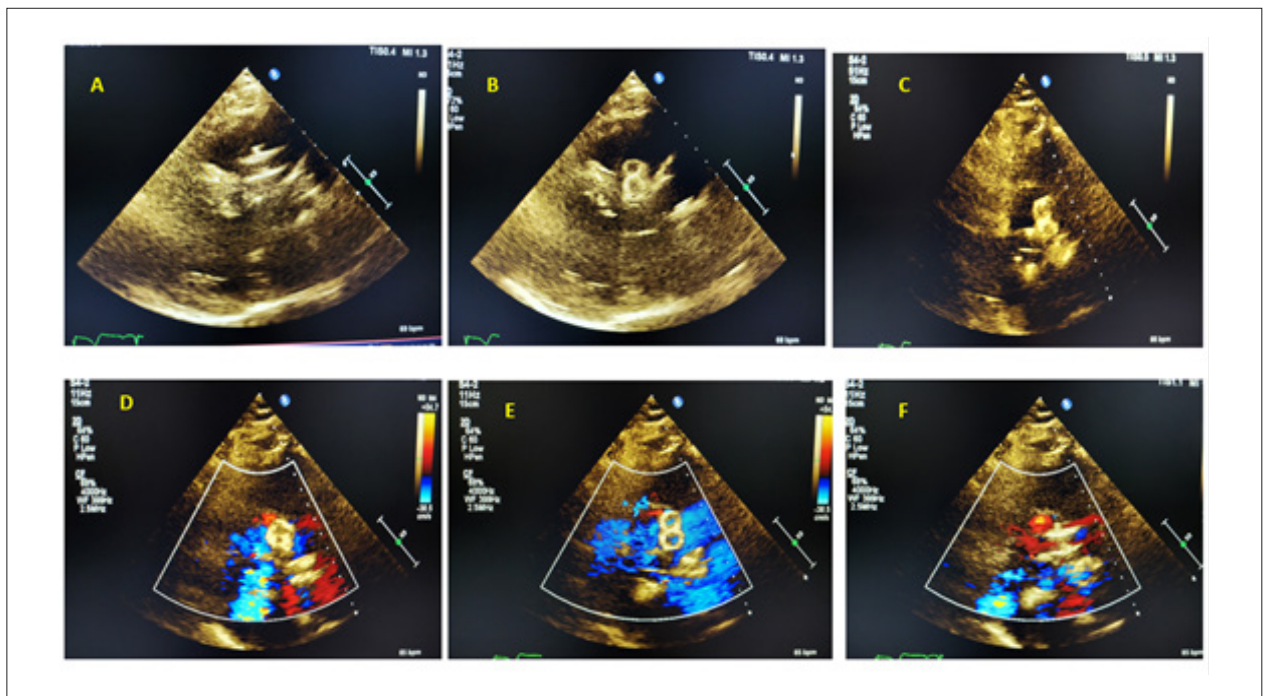


Figure 1 – TTE in parasternal window. Tables A, B and C show two moving and independent images in a position anterior to the LV and the aortic valve. Tables D, E and F show images suggestive of Amplatzer® prostheses highlighted when applying the color Doppler effect.

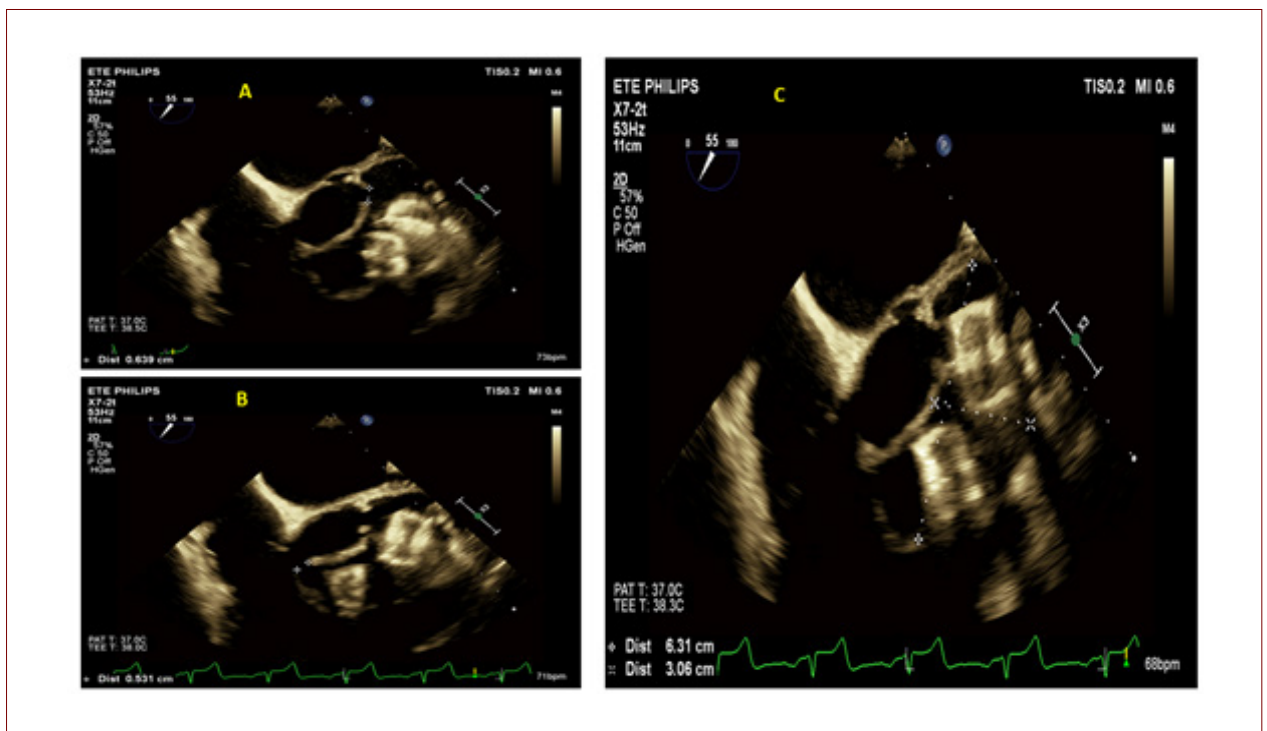


Figure 2 – TEE. A) Anterior aortic periprosthetic pseudoaneurysm with thin walls and two communications with the left ventricular outflow tract, one measuring 0.6 cm at 2 o'clock. B) Communication with the LV outflow tract measuring 1 cm at 8 o'clock. C) Anterior aortic pseudoaneurysm measuring 6.3 x 3 cm, with two Amplatzer® prostheses inside.

Case Report

(37%), to pulmonary artery (25%), to left atrium (18%), to right ventricle (18%) and to LV (2%). Management of this disease includes symptomatic treatment and surgical or percutaneous interventions, which is a common treatment option in the 21st century.³

Amplatzer® prostheses are currently used in several percutaneous procedures. However, with the increasing use of Amplatzer® devices, an increasing number of device-related complications have been observed, such as device migration, patency of the embolized vessel and late reperfusion of the vessel or orifice.⁴ In a single-center study following 803 patients for up to 25 years after Amplatzer® closure of interatrial septal defects, major complications occurred in 0.5% of cases, including device embolization, thrombus formation on the occluder's surface, post-procedure cardiac erosion, and infective endocarditis.⁵

For cases of device embolization, management depends on factors such as location, timing, clinical manifestations, and the type of device employed.⁶

Given the current situation of cardioembolic ischemic stroke with potential recurrence, pseudoaneurysm in the left ventricular outflow tract, and displaced Amplatzer® prostheses, the patient, in consultation with the medical team, decided to attempt resolution, despite the high surgical risk associated with the patient's medical history.

Conclusion

In this case, surgical attempts were made to resolve the aorto-cavitary fistula and the pseudoaneurysm in the LV outflow tract, but they were all unsuccessful. The clinical evolution was unfavorable, and the patient died intraoperatively.

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Even with substantial advancements in therapeutic medicine, there are still clinical cases that pose challenges and are difficult to resolve. Discussions within the Heart team regarding the therapeutic measures adopted are crucial, as is involving patients in the decision-making process.

Author Contributions

Conception and design of the research and acquisition of data: Cunha SR; analysis and interpretation of the data, writing of the manuscript and critical revision of the manuscript for intellectual content: Cunha SR; Pandolfo F, Barros FC, Pianca EG, Barcellos PT.

Potential Conflict of Interest

No potential conflict of interest relevant to this article was reported.

Sources of Funding

There were no external funding sources for this study.

Study Association

This article is part of the scientific production of the Medical Residency Program in Echocardiography at Hospital Nossa Senhora da Conceição.

Ethics Approval and Consent to Participate

This article does not contain any studies with human participants or animals performed by any of the authors.



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