

SUDDEN GROWTH OF SUBMITRAL ANEURYSM POST CORONARY ARTERY BYPASS GRAFTING

Cardiothoracis

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KEYWORDS

INTRODUCTION

Submitral left ventricular aneurysms are an uncommon condition, often believed to be congenital due to a structural weakness at the posterior mitral leaflet's attachment. They exhibit a racial predisposition, primarily affecting the African population, and usually become symptomatic in the third decade of life. Potential etiologies include infection, ischemia, and inflammation. This case is particularly unique as the aneurysm demonstrated a sudden increase in size over a period of three to four months following CABG without any infarct in the area.

Case Summary

A 69-year-old frail female, 156 cm in height and weighing 50 kg, presented with discomfort. A coronary angiogram (9/4/24) confirmed Triple Vessel Coronary Artery Disease, while a 2D echocardiogram revealed an ejection fraction of 50% along with mild mitral regurgitation.

Intraoperative TEE confirmed mild mitral regurgitation with a vena contracta measuring 3mm. The left atrium was not enlarged (3.6 cm), and the mitral annulus was small (2.8 cm). Additionally, a small aneurysm measuring 1 x 1.5 cm was noted at the basal posterior region (Fig. 1a).



Fig. 1a (Tee Image Dated 13/4/2024)

Since the submitral aneurysm was small and an incidental finding, it was decided to leave it untouched. The patient subsequently underwent an off-pump CABG. Her hospital stay was uneventful, and she was discharged on postoperative day (POD) 7.

At the one-month follow-up, she remained stable. However, she progressively developed worsening dyspnea (NYHA III), requiring two hospital readmissions over two months. During the second admission, a TEE revealed severe mitral regurgitation with a submitral aneurysm that had expanded to 4 x 3.6 cm. The reason for this rapid aneurysmal enlargement remained unclear.

A repeat coronary angiogram showed all grafts patent, except for the sequential segment of the LIMA to the Left Anterior Descending artery beyond the Diagonal artery, likely due to competitive flow. A routine non-contrast CT of the chest was performed to assess the sternal distance from the heart, which confirmed a 4.8 x 4.8 cm left ventricular aneurysm located at the inferolateral wall of the left ventricle (Fig. 1b).

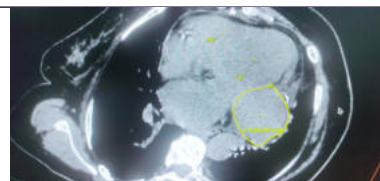


Fig. 1b

A repeat intraoperative TEE was performed (Fig. 1c).

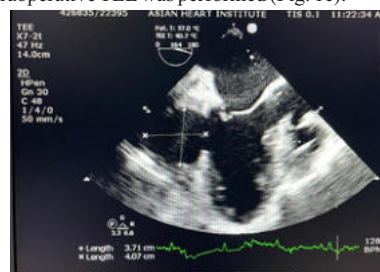


Fig. 1c

Following a redo median sternotomy, vascular adhesions surrounding the heart were meticulously cleared. The aneurysm was completely mobilized, including its lateral aspect (Fig. 2a). After standard cannulation, it was decided to approach the aneurysm via an intracardiac route since mitral regurgitation also required correction. The left atrium was opened to inspect the mitral valve, which appeared structurally normal with intact chordae. Upon retracting the posterior mitral leaflet, the aneurysm's mouth was identified. Since its location was just below the mitral valve annulus, an extracardiac approach was deemed more suitable for better visualization and technical ease.

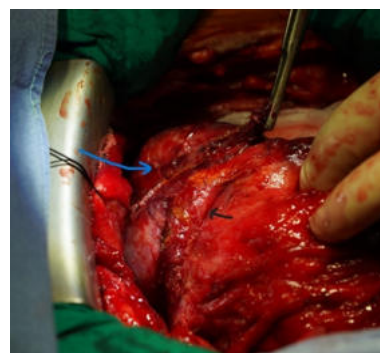


Fig. 2a— Blue arrow: Aneurysm, Black arrow: Radial artery from CABG

The aneurysm was subsequently incised, revealing layered thrombus within, which was carefully dissected and removed. Redundant tissue was excised, and the aneurysmal neck was closed using 4-0 Prolene sutures.

The heart was then repositioned to reassess mitral valve function through the left atrium. Mild central mitral regurgitation was noted, prompting the placement of a 26 mm CG Future ring for annuloplasty. Additionally, a vein graft was placed on the LAD. Post-repair TEE showed only trivial mitral regurgitation (Fig. 2b). The patient recovered well postoperatively and was discharged on day 8.

The excised ventricular tissue was sent for histopathological evaluation to rule out infectious or inflammatory etiologies, but findings were consistent with aneurysmal tissue.



Fig. 2b – After repair – Trivial MR

DISCUSSION

Based on the extent of aneurysmal involvement, Du Toit et al. classified submitral aneurysms into three types:

- **Type I**—Single localized neck
- **Type II**—Multiple necks with distinct openings
- **Type III**—Complete involvement of the mitral annulus

Surgical intervention is the definitive treatment for submitral aneurysms. The first reported case was managed in 1963 by Shrire and Barnard using an extracardiac approach. Challenges associated with this technique include inadequate exposure of the mitral annulus, persistent mitral regurgitation, and technical difficulties due to adhesions.

Manuel de Jesus Antunes described an innovative transatrial approach in 1987, which provided direct exposure of the aneurysmal neck via an incision in the left atrial floor (roof of the aneurysm). Both techniques have since been employed with comparable success rates.

The success of surgical management depends on accurate identification of the aneurysmal neck. Surgical failure may occur if multiple small inlets into the aneurysm remain undetected. Closure techniques include direct suturing or the use of a Dacron patch.

This case is among the few documented instances of sudden aneurysmal enlargement post-CABG. A combined intracardiac approach (for mitral valve annuloplasty) and extracardiac approach (for aneurysm closure) yielded successful outcomes.

The exact etiology in this case remains uncertain. The patient, of Asian descent, was diagnosed incidentally in her seventh decade, with rapid aneurysmal growth occurring within 3 to 4 months. This does not align with the usual presentation of submitral aneurysms. Further investigation into the role of ischemia as a predisposing factor is warranted.

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Declarations

- **Ethics Committee Approval:** Obtained.
- **Statement Of Human And Animal Rights:** Not applicable.
- **Consent:** Written informed consent obtained from the patient.
- **Conflict Of Interest:** All authors declare no financial or non-financial conflicts of interest relevant to this study.

Data Availability Statement

Data available upon request.

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