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Large Submitral Left Ventricular Pseudoaneurysm Following Inferior Wall ST-Elevation Myocardial Infarction Successfully Managed with Isolated Dor Endoventricular Circular Patch Plasty: A Case Report

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Case Report

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Abstract

Background

Left ventricular (LV) pseudoaneurysm is an uncommon but potentially fatal mechanical complication of acute myocardial infarction (AMI). It develops from a contained rupture of the ventricular free wall, with extravasated blood confined by pericardium and fibrous tissue rather than myocardium. Although timely reperfusion has reduced its incidence, delayed presentations continue to occur and carry a high risk of rupture if untreated. Early diagnosis through multimodality imaging and prompt surgical intervention are critical for successful outcomes.

Case Presentation

: A 66-year-old man with type 2 diabetes mellitus, hypertension, ischemic heart disease, and mildly reduced left ventricular systolic function presented with progressively worsening exertional dyspnea (New York Heart Association class III) three months after successful primary percutaneous coronary intervention (PCI) with stenting of the right coronary artery for inferior wall ST-elevation myocardial infarction. Transthoracic echocardiography and cardiac magnetic resonance (CMR) imaging revealed a giant submitral LV pseudoaneurysm with a narrow neck. Preoperative coronary angiography demonstrated a patent stent with only mild non-obstructive coronary artery disease. The patient underwent successful isolated left ventricular reconstruction using the Dor endoventricular circular patch plasty technique. His postoperative course was uneventful, with marked symptomatic improvement and stable left ventricular geometry on follow-up.

Conclusion

This case highlights the importance of suspecting LV pseudoaneurysm in patients with new or worsening heart failure symptoms months after myocardial infarction. Multimodality imaging, particularly CMR, plays a pivotal role in diagnosis and surgical planning. When significant obstructive coronary disease is absent, isolated Dor reconstruction provides an effective surgical option with favorable outcomes.

Background

Mechanical complications after acute myocardial infarction have become less frequent with modern reperfusion strategies but continue to be associated with significant morbidity and mortality (Torchio et al., 2022). Among these, left ventricular pseudoaneurysm remains one of the rarest and most serious. It results from a contained free-wall rupture, where blood is held within a sac formed by adherent pericardium and organized thrombus rather than myocardial tissue (Zhong et al., 2022). Surgical and conservative management options for this condition have been reviewed extensively (Lin et al., 2025).

In contrast to true left ventricular aneurysms, pseudoaneurysms have a narrow neck and a fragile wall lacking myocardial elements, conferring a high risk of rupture (Pirzada et al., 2023). They are frequently associated with inferior and posterolateral infarctions (Gupta et al., 2024). Clinical presentation is often nonspecific, including progressive dyspnea, heart failure, chest pain, or embolic phenomena. Although transthoracic echocardiography is typically the initial diagnostic modality, cardiac magnetic resonance imaging provides excellent tissue characterization, assessment of myocardial viability, thrombus detection, and detailed anatomic delineation essential for surgical planning (Shuai et al., 2022).

We report a case of a giant submitral left ventricular pseudoaneurysm presenting three months after successful primary percutaneous coronary intervention for inferior wall ST-elevation myocardial infarction, which was successfully managed with isolated Dor endoventricular circular patch plasty.

Case Presentation

A 66-year-old man with a history of type 2 diabetes mellitus, hypertension, ischemic heart disease, and mildly reduced left ventricular systolic function presented with progressively worsening exertional dyspnea (NYHA class III) over two months. Three months earlier, he had undergone successful primary PCI with right coronary artery stenting for inferior wall ST-elevation myocardial infarction.

On examination, he was hemodynamically stable. Electrocardiography showed persistent inferior Q waves without new ischemic changes, and cardiac troponin-I was normal. Transthoracic echocardiography demonstrated a giant submitral LV pseudoaneurysm with a narrow 14-mm neck and sac dimensions of approximately 67 × 49 × 68 mm, along with inferolateral wall akinesia and LVEF of ~ 40% [Figure 1].

Cardiac magnetic resonance imaging confirmed a large inferolateral pseudoaneurysm (86 × 50 × 75 mm) arising from contained rupture of the basal inferior wall, extensive transmural infarction involving ~31% of the LV myocardium in the right coronary artery territory, right ventricular inferior wall involvement, mural thrombus in both the LV and pseudoaneurysm cavity, and diffuse pericardial enhancement [Figure 2].

Repeat coronary angiography revealed a patent right coronary artery stent with only mild non-obstructive disease elsewhere; therefore, concomitant coronary artery bypass grafting was not indicated [Figure 3].

Following Heart Team discussion, urgent surgical repair was recommended due to the size of the pseudoaneurysm and associated rupture risk.

The patient subsequently underwent surgery via median sternotomy. Intraoperatively, dense pericardial adhesions were noted surrounding the left ventricle, consistent with a chronic contained free-wall rupture. A large submitral left ventricular pseudoaneurysm was identified with a well-defined neck, making it suitable for endoventricular reconstruction. Based on the intraoperative findings and preoperative imaging, isolated left ventricular reconstruction using the Dor endoventricular circular patch

plasty technique was performed. The pseudoaneurysm was excluded, and ventricular geometry was restored using a bovine pericardial patch [Figure 4].

Concomitant coronary artery bypass grafting was not performed because preoperative coronary angiography demonstrated a patent RCA stent without significant obstructive coronary artery disease requiring surgical revascularization. The patient was successfully weaned from cardiopulmonary bypass.

Before discharge, transthoracic echocardiography demonstrated successful exclusion of the left ventricular pseudoaneurysm with no residual communication or recurrent pseudoaneurysm. The bovine pericardial patch repair was intact, and left ventricular geometry was satisfactorily restored. Left ventricular systolic function remained stable with an estimated LVEF of approximately 40%. No significant pericardial effusion or new valvular abnormalities were identified [Figure *5*].

The patient remained hemodynamically stable throughout the postoperative period and had an uneventful recovery. He was successfully discharged on guideline-directed medical therapy with marked symptomatic improvement and scheduled for regular outpatient follow-up. At follow-up visits conducted at 7 days, 1 month, 3 months, and 6 months after discharge, he remained clinically stable without recurrent chest pain, dyspnea, palpitations, syncope, or symptoms of heart failure. Serial transthoracic echocardiography demonstrated an intact bovine pericardial patch repair with complete exclusion of the left ventricular pseudoaneurysm, preserved left ventricular geometry, and no evidence of residual communication or recurrence. Left ventricular systolic function remained stable, and the patient continued guideline-directed medical therapy with sustained clinical improvement.

A chronological summary of the patient's clinical course, diagnostic evaluation, surgical intervention, and follow-up is presented in [Table 1].

Table 1. Chronological timeline of the patient's clinical course, including presentation with inferior wall ST-elevation myocardial infarction, diagnostic evaluation, surgical management with isolated Dor endoventricular circular patch plasty, and follow-up outcomes through 6 months.

Time	Clinical Event
Day 0	Inferior wall STEMI treated with successful primary PCI and RCA stenting.
3 months after MI	Presented Progressive exertional dyspnea with NYHA class III symptoms; echocardiography and CMR diagnosed a giant submitral LV pseudoaneurysm.
Preoperative	Coronary angiography confirmed a patent RCA stent without significant obstructive coronary artery disease.
Surgery	Underwent isolated Dor endoventricular circular patch plasty with bovine pericardial patch reconstruction.
Before discharge	Echocardiography confirmed complete exclusion of the pseudoaneurysm with satisfactory restoration of LV geometry.
7 days after discharge	Clinically stable; no postoperative complications.
1 month	Asymptomatic, NYHA class I; echocardiography showed intact patch repair without recurrence.
3 months	Continued clinical stability with preserved LV geometry and no recurrent pseudoaneurysm.
6 months	Remained asymptomatic and hemodynamically stable on guideline-directed medical therapy, with durable surgical repair and no recurrence on follow-up echocardiography.

Discussion

Left ventricular pseudoaneurysm is a rare but life-threatening complication of myocardial infarction that occurs when a free-wall rupture is locally contained (Torchio et al., 2022). It develops when the rupture is contained by adherent pericardium and organized thrombus rather than myocardium (Zhong et al., 2022). The wall of the pseudoaneurysm lacks myocardial tissue, rendering it fragile and prone to expansion or rupture, especially when the sac is large (Lin et al., 2025).

Delayed presentations, as seen in this case three months after successful reperfusion, remain a clinical challenge because symptoms such as progressive dyspnea may be attributed to other causes (Pirzada et al., 2023). Inferior and posterolateral infarctions are more commonly associated with pseudoaneurysm formation due to the likelihood of pericardial containment in these regions (Gupta et al., 2024). Multimodality imaging is crucial for accurate diagnosis and surgical planning. Echocardiography typically identifies the narrow neck and flow characteristics, while cardiac magnetic resonance (CMR) imaging provides detailed assessment of infarct size, viability, thrombus burden, and pericardial involvement (Shuai et al., 2022).

Massive pseudoaneurysms can present with varied symptoms and require careful evaluation (Farooq et al., 2025). In the present case, preoperative coronary angiography showed no significant obstructive lesions requiring bypass grafting. This allowed isolated Dor endoventricular circular patch plasty, a

technique originally described for true aneurysms but effectively applied to selected pseudoaneurysms to exclude the non-viable segment and restore ventricular geometry (Frances et al., 1998). Various surgical strategies including linear repair and patch techniques have been described (Liu et al., 2024).

The Dor procedure has been successfully used in post-infarction left ventricular aneurysms and pseudoaneurysms (Ata et al., 2026; Rosen et al., 2024). Stable giant pseudoaneurysms have also been managed conservatively in selected cases (Yoon & Lee, 2022). Literature on isolated Dor repair for giant submitral pseudoaneurysms without concomitant revascularization remains limited, making this case a valuable addition (Dor et al., 2008; Kaya et al., 2018). Surgical intervention is generally recommended for large or symptomatic pseudoaneurysms because of the high risk associated with conservative management (Wieczorek et al., 2014). Our patient achieved an excellent early and mid-term outcome with sustained clinical improvement at 6-month follow-up, supporting individualized decision-making based on detailed imaging and coronary anatomy.

Conclusion

Large submitral LV pseudoaneurysm is a rare but serious delayed complication following Inferior wall myocardial infarction despite successful PCI. Progressive dyspnea post-infarction warrants evaluation for mechanical complications irrespective of normal biomarkers or absent recurrent ischemia. Multimodality imaging, especially CMR, is indispensable for diagnosis and planning. When obstructive coronary disease is absent, isolated Dor endoventricular reconstruction offers an effective and durable surgical option.

Learning Points

- LV pseudoaneurysm should be considered in patients with new or worsening heart failure after myocardial infarction.
- Normal cardiac biomarkers do not exclude late mechanical complications.
- Echocardiography is the first-line diagnostic tool.
- CMR (Cardiac Magnetic Resonance) provides detailed assessment of anatomy, viability, and thrombus.
- Preoperative coronary angiography is essential to determine whether concomitant coronary artery bypass grafting is required.
- Early surgical intervention is recommended for large pseudoaneurysms due to rupture risk.
- The Dor procedure is a valuable reconstructive technique in appropriately selected cases.

Abbreviations

ACT: Activated Clotting Time

AMI: Acute Myocardial Infarction

CABG: Coronary Artery Bypass Grafting

CMR: Cardiac Magnetic Resonance

CPB: Cardiopulmonary Bypass

IW-STEMI: Inferior Wall ST-Elevation Myocardial Infarction

LV: Left Ventricle / Left Ventricular

LVEF: Left Ventricular Ejection Fraction

NYHA: New York Heart Association

PCI: Percutaneous Coronary Intervention

RCA: Right Coronary Artery

Declarations

Ethics approval and consent to participate

Institutional Review Board approval was waived for this case report, as it describes a single patient managed as part of routine clinical care, in accordance with institutional and national ethical guidelines.

Consent for publication

Written informed consent for publication of this case report and accompanying images was obtained from the patient's legally authorized representative. All identifying information has been anonymized.

Availability of data and materials

The datasets generated and/or analyzed during the current study are available from the corresponding author on reasonable request.

Competing interests

The authors declare that they have no competing interests.

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Authors' Contributions

ZRA (Zakiur Rehman Ansari) conceived the study, collected and interpreted the clinical data, performed the literature review, and drafted the manuscript.

ZAH (Zainul Abedein Hamdulay) performed the surgical procedure, contributed to clinical management, and critically revised the manuscript for important intellectual content.

NJ (Nazir Juvale) contributed to the cardiology evaluation, interpretation of diagnostic imaging and clinical findings, and critically revised the manuscript.

AK (Azizullah Khan) contributed to perioperative critical care management, data acquisition, interpretation of clinical findings, and manuscript revision.

SJ (Sanjesh Jain) contributed to perioperative cardiac anesthesia management, intraoperative care, data acquisition, and manuscript preparation.

MH (Meher Hamdulay) supervised the study, contributed to perioperative management, and critically revised the manuscript for important intellectual content.

All authors read and approved the final manuscript and agree to be accountable for all aspects of the work.

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Figures

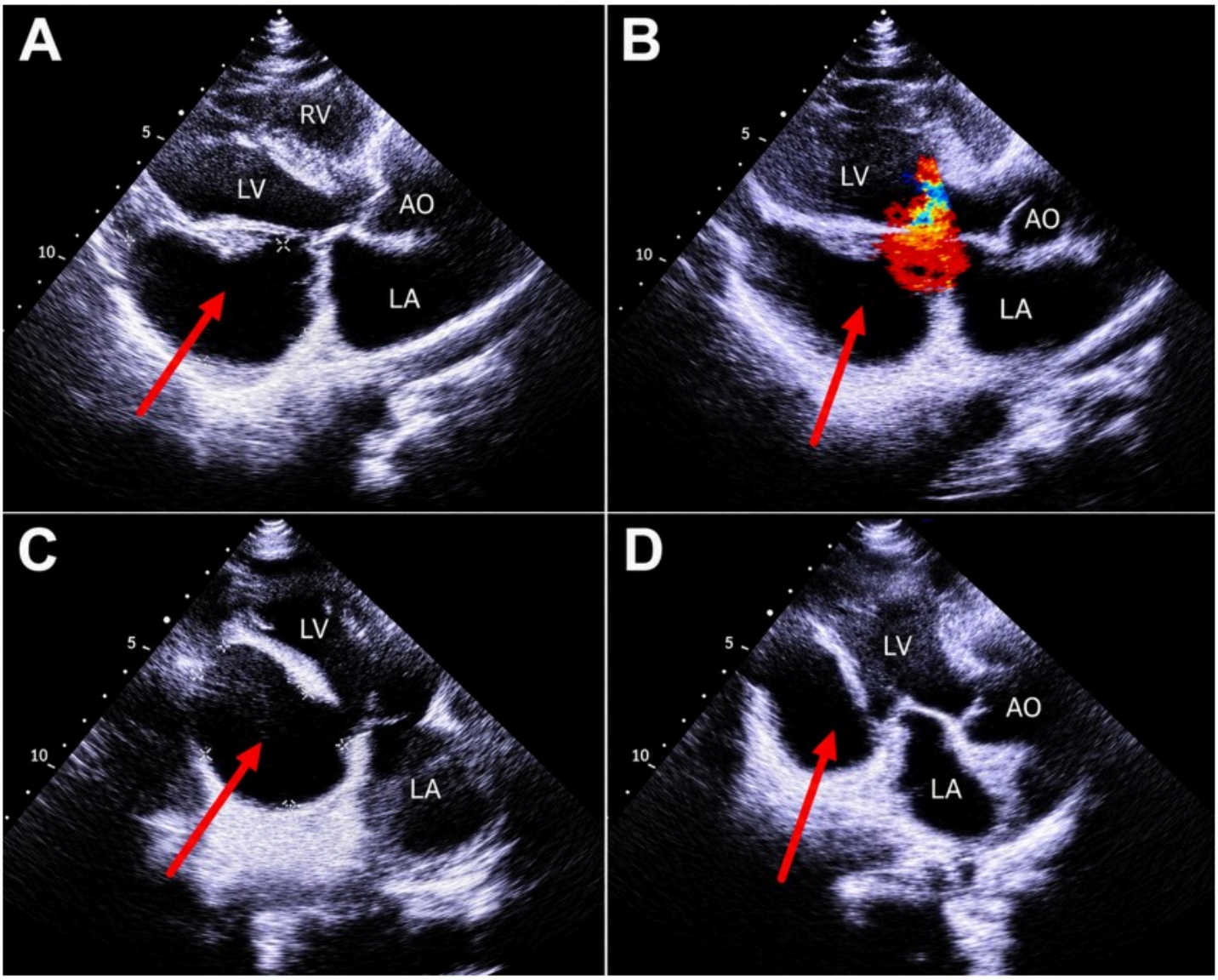


Figure 1

Transthoracic echocardiographic images demonstrating a large left ventricular (LV) pseudoaneurysm following inferior wall myocardial infarction.(A) Parasternal long-axis view showing a large submitral LV pseudoaneurysm (red arrow) communicating with the left ventricular cavity through a narrow neck.(B) Color Doppler imaging demonstrating turbulent bidirectional flow across the pseudoaneurysm neck, confirming communication with the LV cavity (red arrow).(C) Apical long-axis view showing the large submitral pseudoaneurysm arising from the inferoposterior LV wall (red arrow).(D) Modified apical view further delineating the pseudoaneurysm cavity and its narrow neck connecting to the left ventricle (red arrow), consistent with a contained left ventricular free-wall rupture.
Abbreviations: LV, left ventricle; RV, right ventricle; LA, left atrium; AO, aorta.

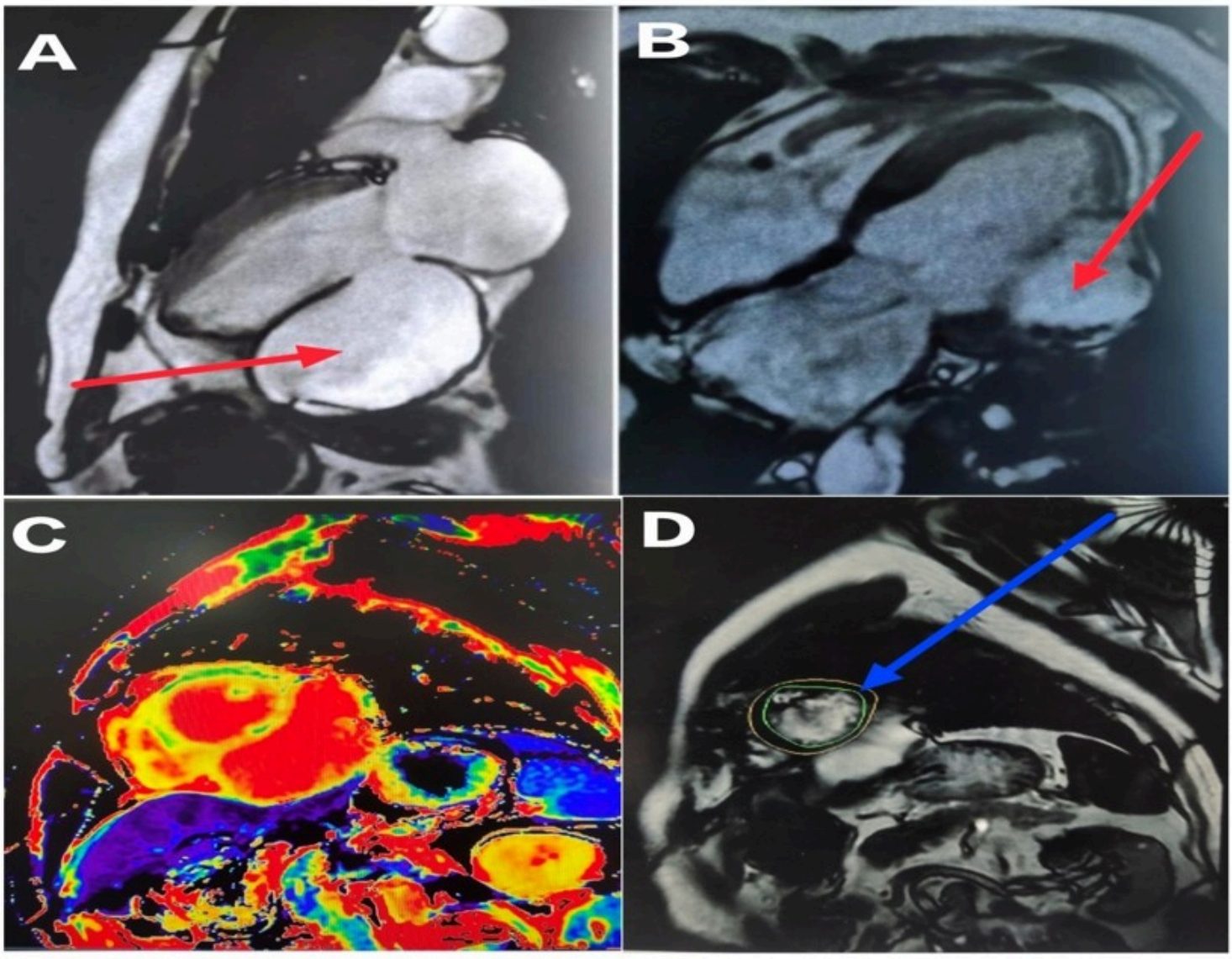


Figure 2

Cardiac magnetic resonance imaging (CMR) demonstrating a large posterior submitral left ventricular pseudoaneurysm .(A) Cine steady-state free precession (SSFP) long-axis view showing a large pseudoaneurysm (red arrow) arising from the basal inferior wall in the posterior submitral region.(B)

Short-axis or four-chamber view demonstrating the pseudoaneurysm (red arrow) originating just beyond the posterior mitral annulus with associated wall thinning.(C) Color-coded late gadolinium enhancement (LGE) viability map (polar plot) showing extensive transmural infarction (red-yellow areas) involving the inferior, lateral, and basal to mid-inferoseptal walls in the right coronary artery territory, along with inferior right ventricular wall infarction.(D) Late gadolinium enhancement (LGE) image highlighting the posterior submitral pseudoaneurysm (blue arrow) with diffuse wall enhancement and internal thrombus (green outline).

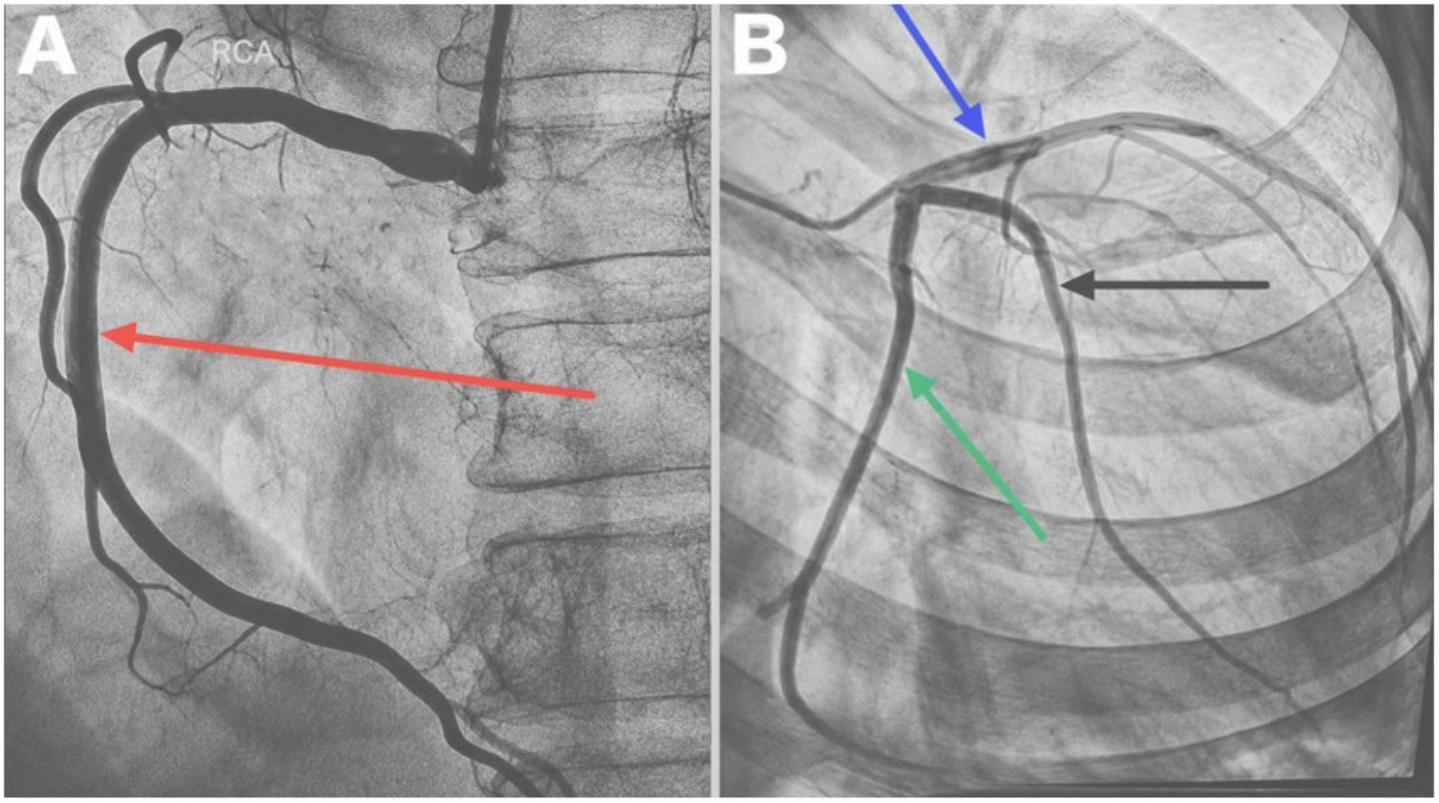


Figure 3

Coronary angiography.(A) Right coronary angiogram showing a patent right coronary artery (RCA) stent (red arrow). (B) Left coronary angiogram showing the left anterior descending (LAD) (blue arrow), left circumflex (LCx) (green arrow), and ramus intermedius (black arrow) arteries without significant stenosis.

Abbreviations: RCA, right coronary artery; LAD, left anterior descending artery; LCx, left circumflex artery.

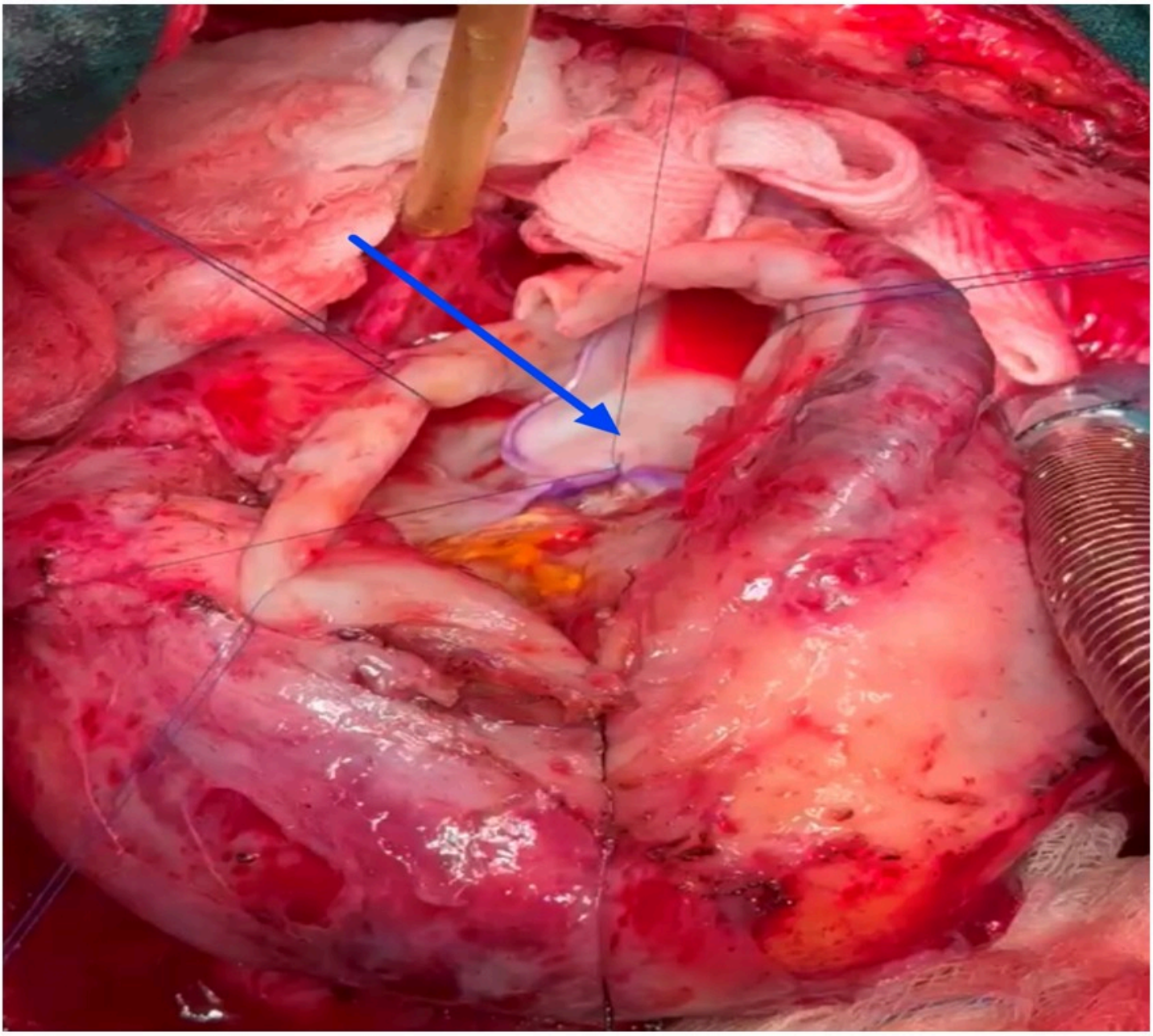


Figure 4

Intraoperative view of surgical repair of a large left ventricular pseudoaneurysm.

The pseudoaneurysm neck (blue arrow) is closed using a bovine pericardial patch during isolated Dor endoventricular circular patch plasty, restoring left ventricular geometry after excision of the pseudoaneurysm sac.

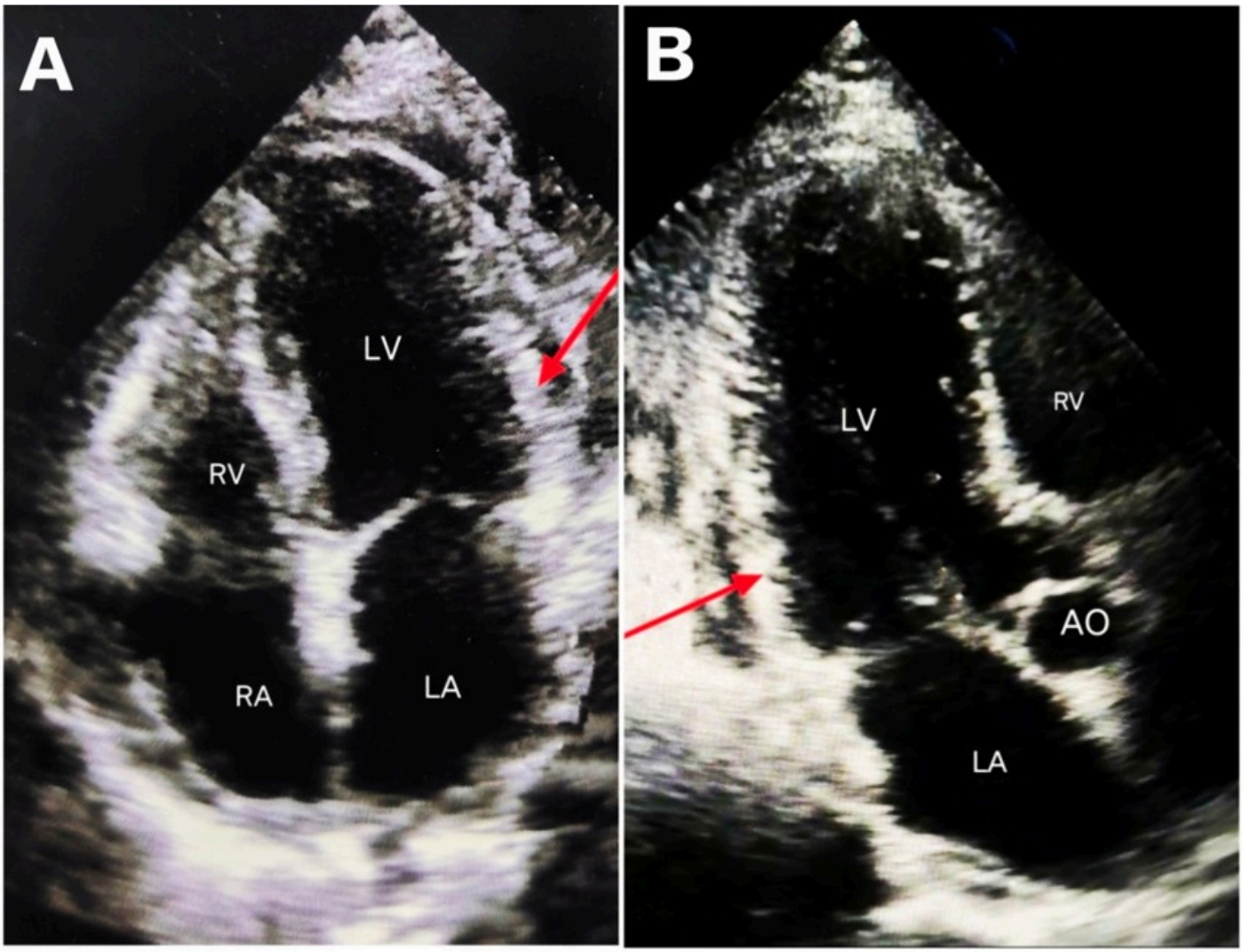


Figure 5

Postoperative transthoracic two-dimensional echocardiography following bovine pericardial patch repair of the left ventricular pseudoaneurysm.(A) Apical four-chamber view demonstrating an intact bovine pericardial patch (red arrow) along the inferolateral/posterior left ventricular wall with restoration of normal left ventricular geometry and no residual pseudoaneurysm cavity. (B) Modified apical view confirming a well-seated bovine pericardial patch (red arrow) with complete exclusion of the pseudoaneurysm and preserved left ventricular cavity without evidence of residual communication. Abbreviations: LV, left ventricle; RV, right ventricle; LA, left atrium; RA, right atrium; AO, aorta.

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