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On-Pump Coronary Artery Bypass Grafting With Concomitant Transaortic Left Ventricular Thrombectomy in a Patient With Severe Ischemic Cardiomyopathy and Viable Myocardium: A Case Report

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Abstract

Left ventricular (LV) thrombus is a recognized complication of severe ischemic cardiomyopathy and carries a substantial risk of systemic thromboembolism. Standard management is anticoagulation over four to eight weeks to allow clot resolution; however, this delays treatment of concurrent coronary arterial disease. In this patient, the severity of the triple-vessel coronary arterial disease prompted early intervention. We describe a combined on-pump surgical strategy in which cardioplegic arrest was used specifically for embolic protection, enabling simultaneous revascularization and thrombus removal.

A 66-year-old man with diabetes mellitus, hypertension, ischemic heart disease, and severe left ventricular (LV) dysfunction (LV ejection fraction (LVEF) = 23%) presented with four months of exertional dyspnea and chest discomfort. Coronary angiography demonstrated calcific triple vessel disease with total occlusion of the left anterior descending (LAD) and left circumflex (LCx) arteries and a 95-99% right coronary artery (RCA) lesion. Fluorodeoxyglucose-positron emission tomography (FDG PET) showed extensive hibernating myocardium, supporting revascularization. An echocardiogram obtained 13 days after a clot-free study revealed an 18×14 mm mobile LV apical thrombus. The patient underwent on-pump coronary artery bypass grafting (CABG; three grafts) with transaortic LV thrombectomy. To avoid the embolic risk of off-pump cardiac manipulation, cardiopulmonary bypass and cardioplegic arrest were established before the heart was handled, and the thrombus was removed transaortically under direct visualization of the arrested heart. Recovery was uneventful, and a postoperative day 3 echocardiogram confirmed clot resolution. At the three-week follow-up (postoperative day 21), the patient was clinically well with no recurrent thrombus and improvement in LVEF to 35-40%. This case suggests that an on-pump, arrested-heart approach can provide effective embolic protection when CABG and LV thrombectomy are performed in a single setting, and that FDG PET viability assessment can support high-risk revascularization in severely depressed LV function. In patients with severe coexisting coronary disease, early surgical clot removal may be preferable to awaiting clot dissolution on anticoagulation.

Categories: Nuclear Medicine, Cardiology, Cardiac/Thoracic/Vascular Surgery
Keywords: embolic protection, ischemic cardiomyopathy, left ventricle (lv) thrombus, lv thrombectomy, on-pump coronary artery bypass grafting

Introduction

Left ventricular (LV) thrombus often occurs after myocardial infarction and severe ischemic cardiomyopathy, especially in areas of regional akinesia and low flow. Its main risk is thromboembolism, causing stroke, mesenteric ischemia, and peripheral arterial occlusion. In patients needing surgical coronary revascularization, a coexisting thrombus presents a dilemma. Anticoagulation alone does not treat multivessel disease, and off-pump surgery is preferred in compromised ventricles to avoid cardiopulmonary bypass, which could dislodge a fragile apical clot due to serial cardiac displacement. This case is one in which on-pump coronary artery bypass grafting (CABG) with cardioplegic arrest was selected specifically as the embolic-protection strategy, allowing safe transaortic extraction of the LV thrombus under direct vision in the arrested heart, in the same operative sitting as triple vessel grafting and left anterior descending (LAD) endarterectomy.

Case Presentation

Patient information and presentation

The patient was a 66-year-old man with 4 months of exertional dyspnea and intermittent chest burning, with type 2 diabetes mellitus, hypertension, and ischemic heart disease. With no documented ST-elevation myocardial infarction (MI), he was stable on presentation (Table *1*).

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Parameter	Value	Ref. Range
Age/Sex	66/Male	N/A
Weight/Height	88.7 kg/167 cm	N/A
Hemoglobin	15.4 g/dL	13.5-17.5 g/dL
Platelets	403 ×103/µL	150-400 x10³/µL
INR	0.8	0.8-1.1
G6PD	Mildly deficient	N/A
FBS	120 mg/dL	70-99 mg/dL
Blood group	B Rh positive	N/A
BSA	2.03 m²	N/A
HbA1c	7.5%	<5.7% (non-diabetic)
Serum creatinine	1.0 mg/dL	0.7-1.3 mg/dL (adult male)
TSH	1.374 µIU/mL	0.4-4.0 µIU/mL
HIV/HBsAg	Non-reactive	N/A

TABLE 1: Baseline laboratory and clinical parameters

Ref., Reference; G6PD, glucose-6-phosphate dehydrogenase; FBS, fasting blood sugar; INR, international normalized ratio; BSA, body surface area; HbA1c, glycated hemoglobin; TSH, thyroid-stimulating hormone; HIV, human immunodeficiency virus; HBsAg, hepatitis B surface antigen; N/A, not applicable

Electrocardiography

A resting 12-lead electrocardiogram demonstrated sinus rhythm with a prolonged PR interval, poor R-wave progression, and an anterolateral infarct pattern of indeterminate age consistent with prior anterior wall injury (Figure *1*).

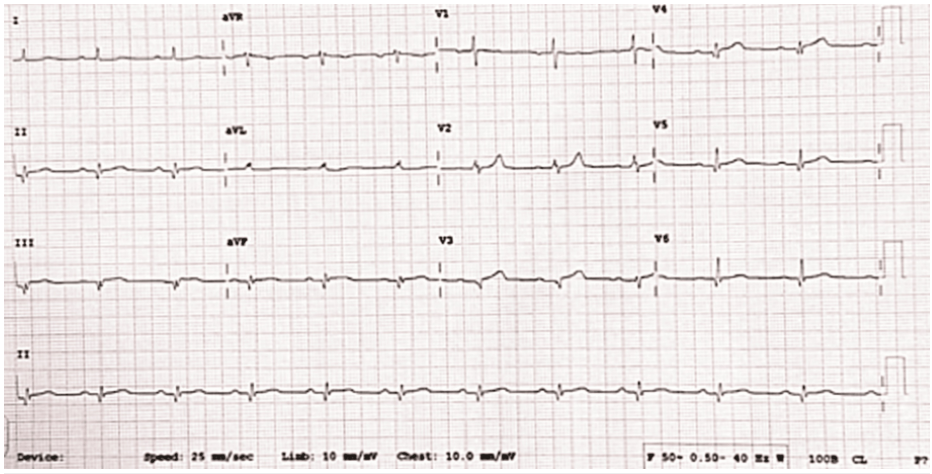


FIGURE 1: Preoperative 12-lead ECG

ECG, electrocardiogram

Chest radiography

A preoperative chest radiograph performed on 19 June 2026 showed a normal cardiac silhouette, clear lung fields, no pleural effusion, and no focal pulmonary abnormality, providing a clean baseline prior to surgery (Figure *2*).

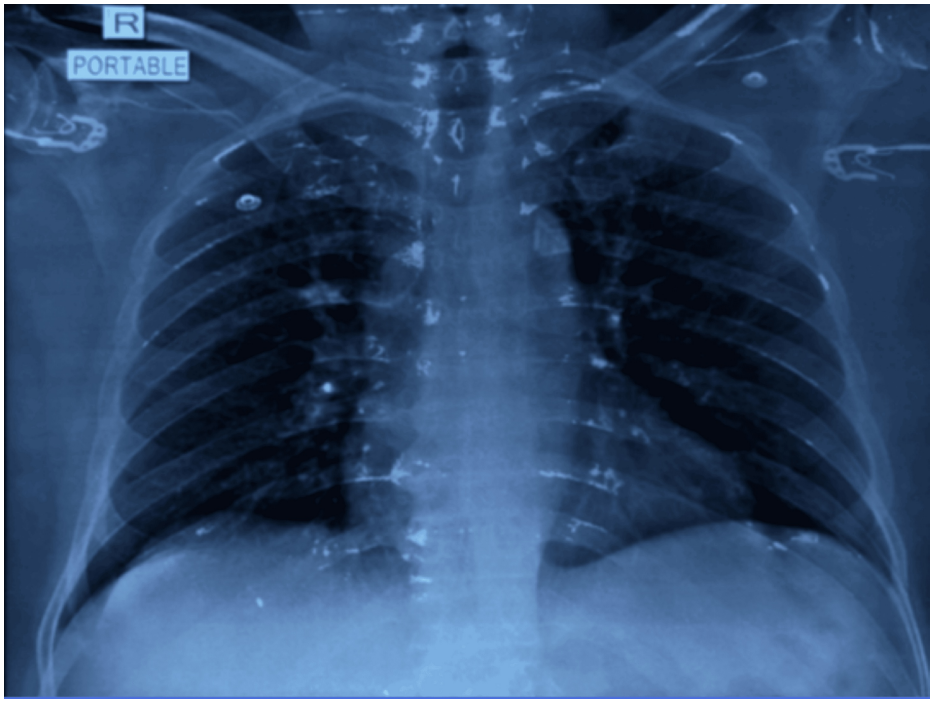


FIGURE 2: Preoperative PA chest radiograph

PA, posteroanterior

Echocardiography

Transthoracic echocardiography performed on 09 June 2026 (outside institution) demonstrated severely impaired LV systolic function with an ejection fraction of 23%, multi-territory regional wall motion abnormalities involving the distal interventricular septum, apex, anterolateral, and inferoposterior walls, grade 2 diastolic dysfunction, and a dilated left atrium. No intracardiac thrombus was identified at this stage.

An echocardiogram repeated at Masina Heart Institute on 22 June 2026, 13 days after the initially clot-free study, revealed a new discrete mobile left ventricular apical thrombus measuring 18×14 mm with an akinetic scarred apex and LVEF of 25-30% (Figure *3*). This interval development of a mobile apical clot directly shaped the operative strategy.

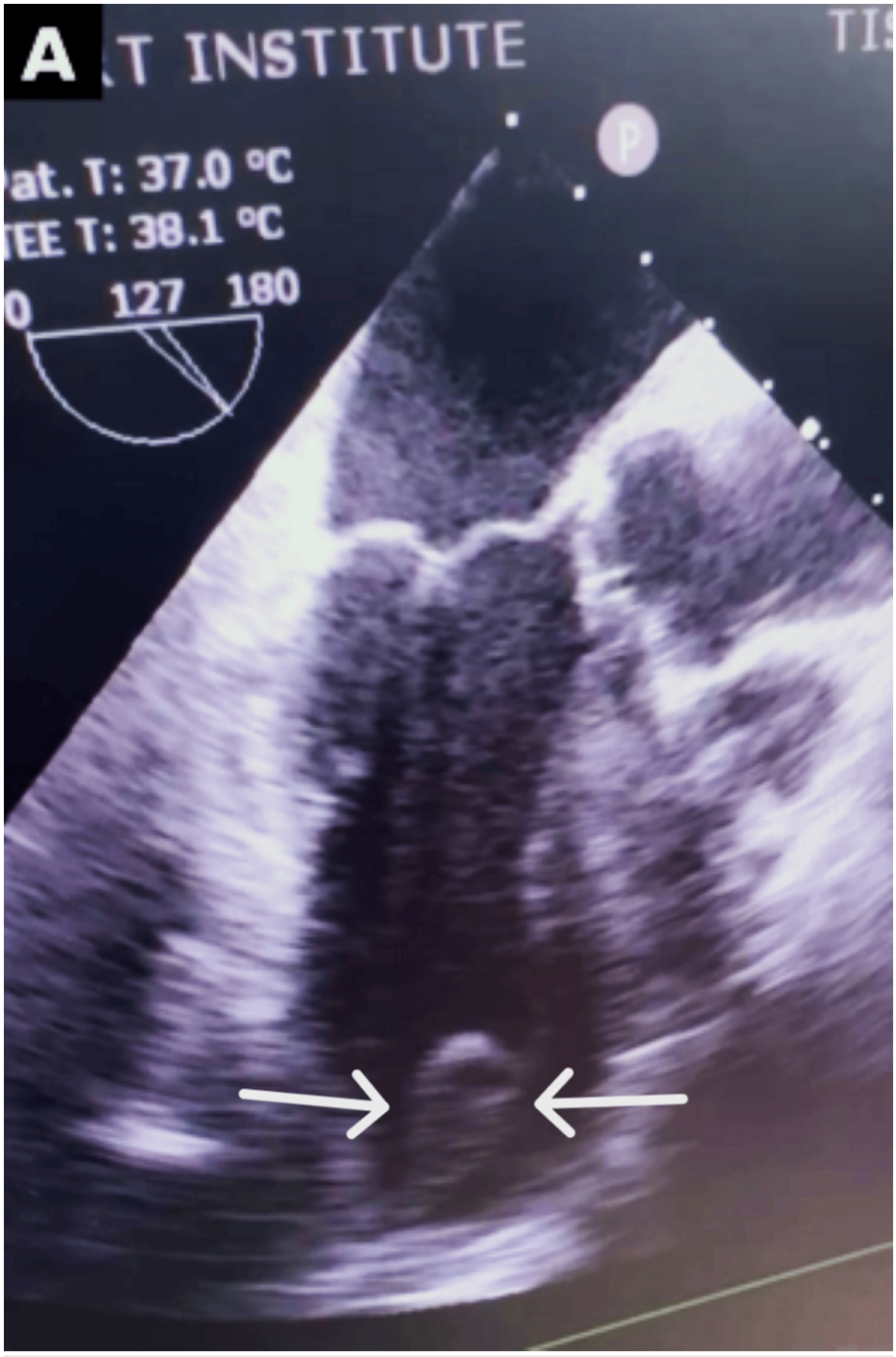


FIGURE 3: (A) Preoperative echocardiogram demonstrating the 18×14 mm LV apical thrombus

LV, left ventricular

Coronary angiography

Selective coronary angiography via a right radial approach on 10 June 2026 confirmed calcific triple vessel disease. Panel A shows the left anterior descending artery with mid-segment 100% occlusion, Panel B shows the right coronary artery with a 95-99% lesion and mid-segment dissection, and Panel C shows proximal occlusion of the first diagonal branch. The left main was normal. Early surgical vascularization was recommended by the reporting interventional cardiologist (Figure *4*, Table *2*).

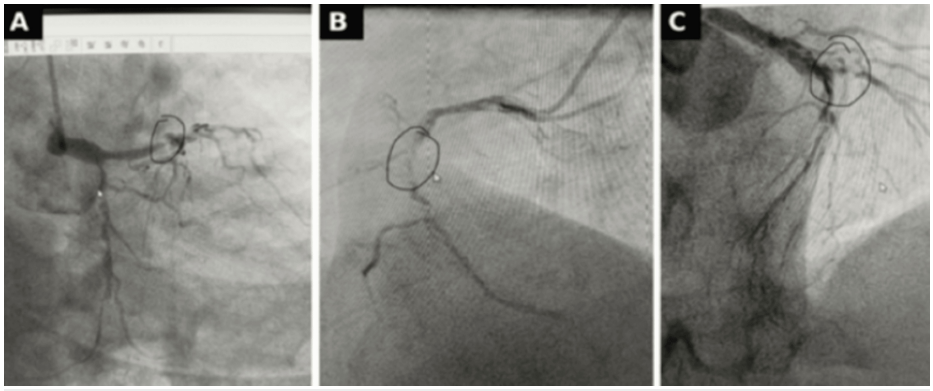


FIGURE 4: Selective coronary angiography

Vessel	Findings
Left main	Normal
LAD	Type III calcific vessel; ostio-proximal ulcerated plaque; proximal 90% → mid-segment 100% total occlusion. D1 and D2 diseased.
LCx	Non-dominant; ostial 90% → proximal 70–80% → distal 100% total occlusion. OM1 ostial 70%; OM2 proximal 80%.
RCA	Dominant calcific vessel; proximal plaque with mid-segment dissection and 95–99% lesion; TIMI I distal flow; retrograde filling from left system. PDA/PLV normal.

TABLE 2: Coronary angiographic findings

D1, first diagonal branch; D2, second diagonal branch; LAD, left anterior descending artery; LCx, left circumflex artery; OM1, first obtuse marginal branch; OM2, second obtuse marginal branch; PDA, posterior descending artery; PLV, posterolateral ventricular branch; RCA, right coronary artery; TIMI, thrombolysis in myocardial infarction (flow grade)

FDG-PET myocardial viability

Given the severely reduced ejection fraction, myocardial viability was formally assessed on 11 June 2026. This large perfusion-metabolism mismatch, indicating extensive hibernating but viable myocardium across all three coronary territories, provided the objective basis for proceeding with revascularization despite the severely depressed ejection fraction (Figure *5*, Table *3*).

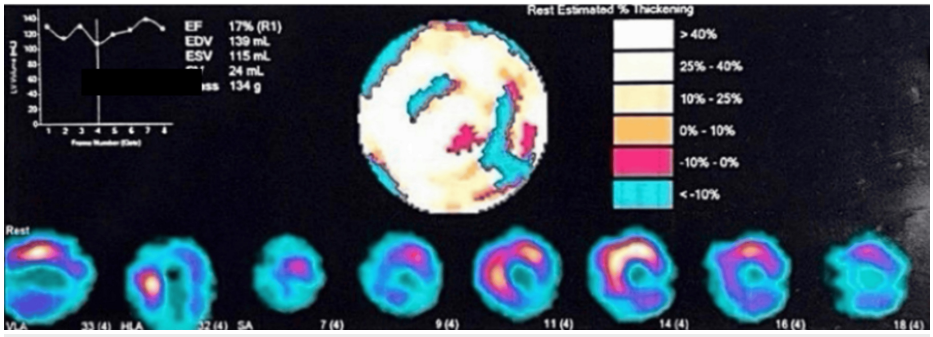


FIGURE 5: Gated FDG-PET

FDG-PET, fluorodeoxyglucose-positron emission tomography

Coronary territory	Viable/hibernating (PET mismatch), % of territory	Resting perfusion defect, % of territory
LAD territory	98	30
LCx territory	100	44
RCA territory	86	8
Total	99	33

TABLE 3: FDG-PET viability by coronary territory

FDG-PET, fluorodeoxyglucose-positron emission tomography; LAD, left anterior descending; LCX, left circumflex; RCA, right coronary artery

Operative strategy and intervention

A mobile LV apical thrombus with triple vessel disease posed a challenge. Instead of waiting four to eight weeks for anticoagulation, the team opted for early pump CABG with cardiopulmonary bypass for a duration of 130 minutes, aortic cross-clamping time of 75 minutes, and Del Nido 1000 mL, antegrade, 4 °C solution used for cardioplegic arrest for embolic protection. Arresting the heart prevented ejection, decompressed the ventricle, reduced clot dislodgement risk, and allowed safe thrombus removal through transaortic access (Figure *6*).



FIGURE 6: Intraoperative photo of the thrombus

Procedure details

The patient underwent triple-vessel on-pump CABG with concurrent transaortic left ventricular thrombectomy on 23 June 2026. Through a median sternotomy, a skeletonized left internal mammary artery (LIMA) was harvested with a harmonic scalpel, preserving its bifurcation, and the great saphenous vein was harvested concurrently. After systemic heparinization, the patient was cannulated, placed on cardiopulmonary bypass and cooled, and the aorta was cross-clamped with antegrade cardioplegia delivered to achieve complete cardiac arrest (Table *4*).

Parameter	Value
Procedure	On-pump CABG ×3 + transaortic LV thrombectomy
Grafts	LIMA→LAD (+ endarterectomy + long-patch); SVG→OM; SVG→PDA
CPB time	130 min
Cross-clamp time	75 min
ACT post-heparin	356 s
IABP	Perioperative support
Blood products	None required
Cardioplegia	Del Nido 1000 mL, antegrade, 4 °C
Oxygenator	Nipro (LL ADU 442 circuit)
Cannulation	Aortic 22 Fr; two-stage 36/46 Fr venous
Flow rate	4.87–6.09 L/min (BSA 2.03 m²)
Lowest temp on CPB	~34°C
Blood loss	700 mL
Inotropes on transfer	Dopamine (200 mg/50 mL @ 3.0 mL/h) + Norepinephrine (4 mg/50 mL @ 3–4 mL/h)

TABLE 4: Operative, perfusion, and cardioplegia parameters

CABG, coronary artery bypass grafting; LV, left ventricular; LIMA, left internal mammary artery; LAD, left anterior descending artery; SVG, saphenous vein graft; OM, obtuse marginal artery; PDA, posterior descending artery; CPB, cardiopulmonary bypass; ACT, activated clotting time; IABP, intra-aortic balloon pump; Fr, French; BSA, body surface area

With the heart arrested and the left ventricle decompressed, an aortotomy was performed to extract the apical thrombus transaortically through the aortic valve under direct vision, avoiding an incision into the scarred apex. After saline washout, the aortotomy was closed in layers. Extracting on the fully arrested non-ejecting heart was key to preventing intraoperative embolization. Three distal anastomoses followed (Table 5).

Conduit	Target	Site	Target vessel diameter (mm)	Disease	Comment
LIMA	LAD	Mid	2.0	Severe	Endarterectomy end-to-side
SVG (Aorta)	PDA	Mid	1.5	Severe	End-to-side
SVG (Aorta)	OM	Mid	1.5	Severe	End-to-side

TABLE 5: Operative details: on-pump CABG × 3 grafts

CABG, coronary artery bypass grafting; LAD, left anterior descending artery; LIMA, left internal mammary artery; OM, obtuse marginal branch; PDA, posterior descending artery; SVG, saphenous vein graft; OM: obtuse marginal

The heart was de-aired, the cross-clamp released, and the patient rewarmed and weaned from bypass on a beating heart with inotropic support (Dopamine - 200 mg/50 mL @ 3.0 mL/h and Norepinephrine - 4 mg/50 mL @ 3-4 mL/h). Transoesophageal echocardiography confirmed satisfactory ventricular structure with no residual apical thrombus (Figure 7). Hemostasis was secured; thereafter, the chest was closed with sternal wires and mediastinal drains, and the patient was transferred to the ICU.

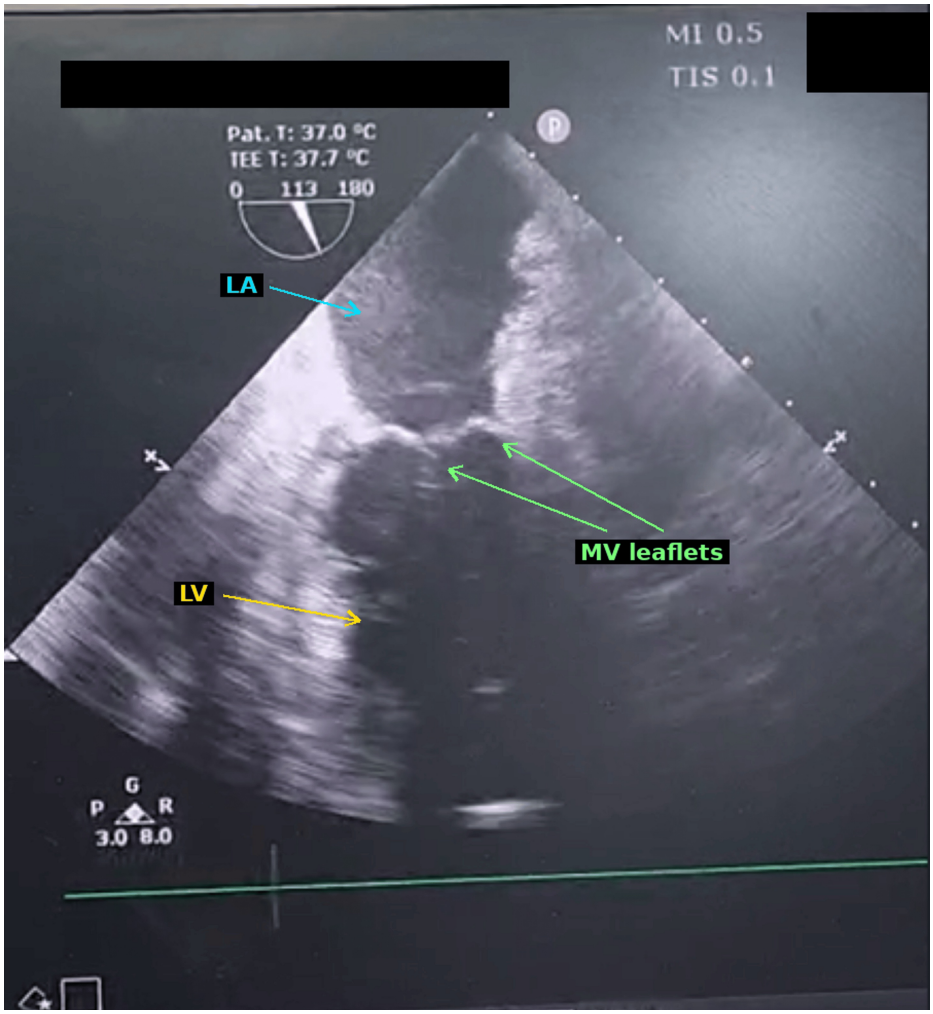


FIGURE 7: Intra-operative transoesophageal echocardiogram performed immediately after clamp release, confirming complete removal of the LV apical thrombus. The apex is clear with no residual echogenic mass.

LA, left atrium; LV, left ventricle; MV, mitral valve

Postoperative outcomes and follow-up

The postoperative course was uneventful. A 12-lead electrocardiogram performed on the day of surgery showed sinus tachycardia with an intraventricular conduction delay and prolonged QTc, without evidence of a new territorial infarction.

Most critically, a transthoracic echocardiogram on postoperative day 3 (26 June 2026) showed complete resolution of the LV apical thrombus with a clear apex (Figure *8A*), and the patient remained free of any thromboembolic event throughout the admission. Therapeutic anticoagulation was instituted in view of the prior thrombus and severely reduced ejection fraction.

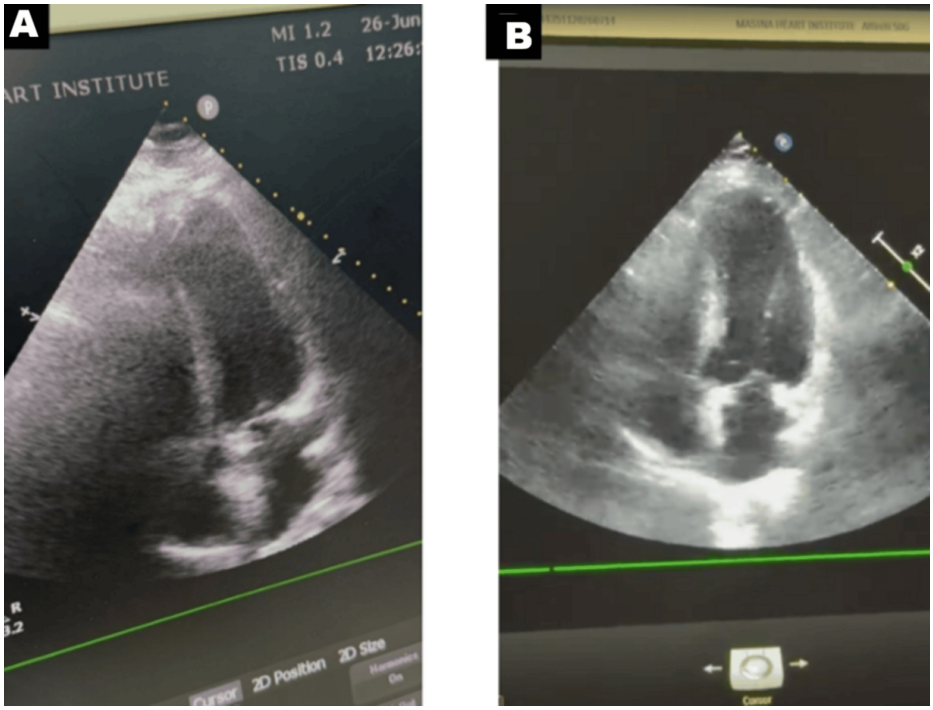


FIGURE 8: (A, B) Postoperative transthoracic echocardiograms

At the three-week follow-up on 14 July 2026 (postoperative day 21), the patient was clinically well and hemodynamically stable. Repeat echocardiography at Masina Heart Institute showed improved systolic function, with LVEF increased to 35-40% from 23-25%, and no intracardiac thrombus or vegetation (Figure *8B*). Regional wall motion abnormality remained in the basal, mid-inferior wall and basal septum, consistent with prior ischemia, while left atrial size normalized, diastolic dysfunction improved to grade I, and there was no pericardial effusion (Table *6*). A follow-up echocardiogram and review are planned at three months (October 2026) to assess ongoing recovery.

Stage	LVEF	Apical thrombus	Key findings
Baseline	23%	Absent	Severe LV dysfunction; multi-territory RWMA; no clot
Viability study	17%	—	Hibernating viable myocardium; EDV 139 mL
Preoperative	25–30%	Present, 18×14 mm	Akinetic scarred apex; new mobile apical thrombus
Intraoperative	—	Extracted	Clot removed transaortically; apex clear post-extraction
Postop Day 3	—	Resolved	Complete clot clearance confirmed
Postop Day 21	35–40%	Absent	Moderately impaired LV systolic function; no clot/thrombus/vegetation; Grade I diastolic dysfunction; mild MR; no pericardial effusion

TABLE 6: Echocardiographic evolution of LV function and apical thrombus

LV, left ventricular; RWMA: regional wall motion abnormality; EDV: end-diastolic volume

A postoperative portable chest radiograph confirmed satisfactory sternal closure and line positions with no pneumothorax (Figure *9*).

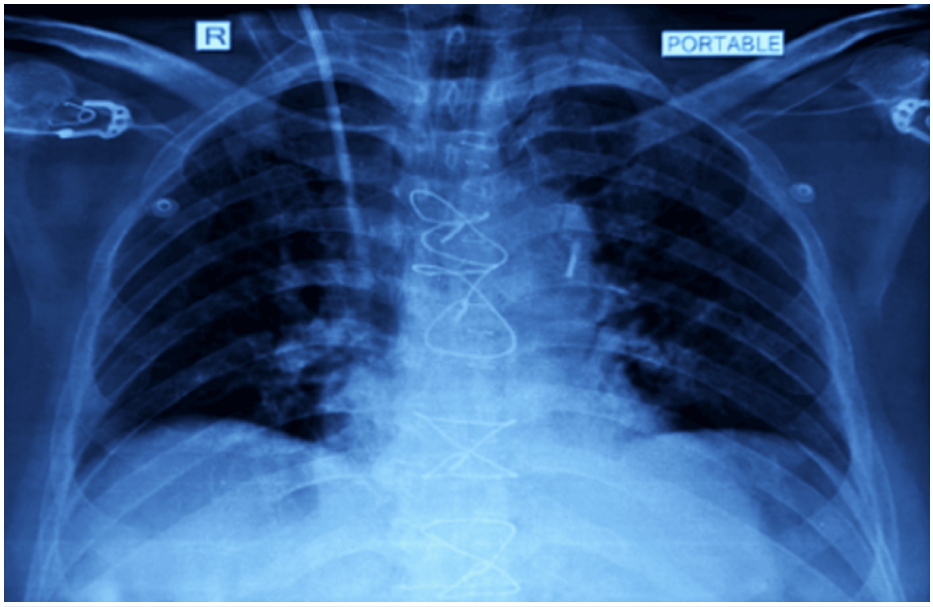


FIGURE 9: Postoperative portable chest radiograph

Hospital course and discharge

Postoperatively, the patient remained in the intensive care on ventilatory and inotropic support with invasive monitoring and mediastinal drains in situ. Conventional heparin was started within six hours of surgery to prevent further clot formation. He was extubated the next morning and transitioned to non-invasive bilevel positive airway pressure (BiPAP). He received intravenous piperacillin-tazobactam followed by oral cefuroxime with antiplatelet and anticoagulant therapy per protocol. Invasive lines were removed per unit protocol, and the intra-aortic balloon pump was weaned gradually.

He developed multiple episodes of paroxysmal atrial fibrillation with a fast ventricular rate, managed with intravenous amiodarone overlapped with the oral formulation. He was mobilized, and the surgical drains were removed on postoperative day 5. The remainder of his stay was uneventful, and he remained clinically stable prior to discharge on postoperative day 7 (30 June 2026) on aspirin 75 mg, atorvastatin 20 mg, nebivolol 2.5 mg, and apixaban 5 mg.

Clinical timeline

Figure *10* presents the clinical timeline of the patient.

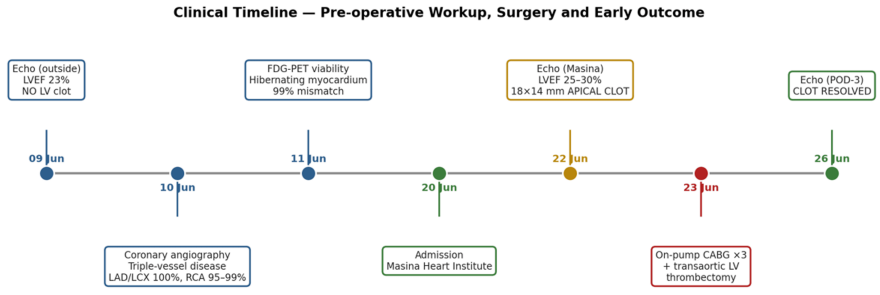


FIGURE 10: Clinical timeline from initial outpatient evaluation through surgery and early postoperative outcome

Note the interval development of the LV apical thrombus between the clot-free study on 09 June 2026 and the surveillance study on 22 June 2026.

CABG, coronary artery bypass grafting; Echo, echocardiography; FDG-PET, fluorodeoxyglucose positron emission tomography; LAD, left anterior descending artery; LCX, left circumflex artery; LV, left ventricle/left ventricular; LVEF, left ventricular ejection fraction; POD, postoperative day; RCA, right coronary artery

Discussion

Left ventricular thrombus (LVT) occurs more often after anterior ST-elevation myocardial infarction (STEMI) involving the apex, particularly when LVEF is reduced. Its presence carries an increased risk of adverse cardiovascular events and mortality, and current evidence indicates that anticoagulation for a minimum of three months lowers this risk. Even once the thrombus has resolved, LVT should be viewed as an indicator of a persistently elevated thrombotic risk over the long term. The optimal management of these patients remains uncertain, and results from ongoing trials are awaited to guide treatment [1].

The first decision, to operate on a heart with an LVEF of 23%, rested on objective viability data. FDG-PET showed a near-complete perfusion metabolic mismatch across all three coronary arterial territories, confirming that the dysfunction was predominantly due to hibernating, recoverable myocardium. A landmark meta-analysis found that viable myocardium predicts an approximately 80% reduction in annual mortality with revascularization compared with medical therapy alone [2] and extended follow-up of a large randomized trial established that this survival benefit persists at 10 years [3]. Without FDG-PET confirming extensive viability, operating on an impaired ventricle would have been difficult to justify.

The second decision concerned the urgency of the combined procedure. Current practice typically involves anticoagulation before surgical revascularization to resolve the thrombus prior to operating, but here, the severity of the coronary arterial disease precluded such deferral, as critical triple vessel disease (TVD) with TIMI I distal RCA flow demanded early surgical intervention regardless of the thrombus. Thrombus mobility and location are among the highest-risk configurations for systemic embolization [4,5], and proceeding with an 18 x 14 mm mobile apical clot in situ required a strategy that addressed both problems simultaneously. Anticoagulation alone was therefore insufficient, and single-stage thrombectomy and revascularization in the same setting was the only safe option, consistent with precedents in the literature [6,7].

The third decision, transaortic rather than transventricular thrombectomy, avoided an incision into the thin, akinetic, scarred apex, sparing contractile myocardium and eliminating the risk of hemorrhage or late aneurysm formation [6,7]. It permitted complete extraction and washout under direct vision on the arrested heart, confirmed by intraoperative transesophageal echocardiogram (TEE) and, by postoperative day 3, an echocardiogram showing complete clot resolution.

The interval formation of the thrombus is itself instructive: clot-free on 9 June and 18 x 14 mm just 13 days later. This rapid development within an akinetic myocardium reinforces recommendations for repeat preoperative imaging close to surgery in high-risk ventricles [5], since a thrombus fundamentally alters the operative strategy. The LAD also required endarterectomy with long patch reconstruction owing to diffuse calcific disease, an adjunct that achieves complete revascularization with acceptable outcomes in experienced hands [8].

Robust comparative evidence is still lacking for this patient group. Randomized and observational studies comparing surgical revascularization with percutaneous coronary intervention are needed to clarify their relative impact on survival, complications, and healthcare costs [9].

Limitations

This report has several limitations. As a single case, it cannot establish the safety or superiority of an on-pump, arrested-heart strategy over anticoagulation followed by delayed or off-pump surgery. Follow-up was limited to 21 days, so long-term graft patency, thrombus recurrence, and durability of LV functional recovery remained unknown. Finally, original imaging and records were unavailable in digital format and were photographed on a mobile device, which reduced figure quality; however, detailed figure descriptions have been provided to compensate.

Conclusions

In a patient with severe but viable ischemic cardiomyopathy and a coexisting mobile LV apical thrombus, an on-pump arrested heart strategy combining triple vessel CABG, LAD endarterectomy, and transaortic thrombectomy achieved complete clot clearance without embolic complication(s). Further comparative studies are warranted to determine the optimal revascularization strategy in patients with severe ischemic cardiomyopathy and left ventricular thrombus. Its embolic protection value and transaortic extraction through the aortic valve offer a safe alternative to ventriculotomy given its direct visibility.

Additional Information

Author Contributions

All authors have reviewed the final version to be published and agreed to be accountable for all aspects of the work.

Concept and design: Mawhid U. Haque

Acquisition, analysis, or interpretation of data: Mawhid U. Haque, Zainulabedin Hamdulay

Drafting of the manuscript: Mawhid U. Haque

Critical review of the manuscript for important intellectual content: Mawhid U. Haque, Zainulabedin Hamdulay

Supervision: Zainulabedin Hamdulay

Disclosures

Human subjects: Informed consent for treatment and open access publication was obtained or waived by all participants in this study. **Conflicts of interest:** In compliance with the ICMJE uniform disclosure form, all authors declare the following: **Payment/services info:** All authors have declared that no financial support was received from any organization for the submitted work. **Financial relationships:** All authors have declared that they have no financial relationships at present or within the previous three years with any organizations that might have an interest in the submitted work. **Other relationships:** All authors have declared that there are no other relationships or activities that could appear to have influenced the submitted work.

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References

1. Cruz Rodriguez JB, Okajima K, Greenberg BH: Management of left ventricular thrombus: a narrative review . Ann Transl Med. 2021, 9:520. 10.21037/atm-20-7839
2. Allman KC, Shaw LJ, Hachamovitch R, Udelson JE: Myocardial viability testing and impact of revascularization on prognosis in patients with coronary artery disease and left ventricular dysfunction: a meta-analysis. J Am Coll Cardiol. 2002, 39:1151-8. 10.1016/S0735-1097(02)01726-6
3. Velazquez EJ, Lee KL, Jones RH, et al.: Coronary-artery bypass surgery in patients with ischemic cardiomyopathy. N Engl J Med. 2016, 374:1511-20. 10.1056/NEJMoa1602001
4. Camaj A, Fuster V, Giustino G, et al.: Left ventricular thrombus following acute myocardial infarction: JACC state-of-the-art review. J Am Coll Cardiol. 2022, 79:1010-22. 10.1016/j.jacc.2022.01.011
5. Levine GN, McEvoy JW, Fang JC, et al.: Management of patients at risk for and with left ventricular thrombus: a scientific statement from the American Heart Association. Circulation. 2022, 146:e205-23. 10.1161/CIR.0000000000001092
6. Eyekpegha J, Williams PD, Krishnan SV, Ruiz Segria C, Owens WA: Transaortic extraction of left ventricular thrombus. JACC Case Rep. 2025, 30:104567. 10.1016/j.jaccas.2025.104567
7. Eranki A, Villanueva C, Collins N, Seah P: Video assisted, transaortic removal of left ventricular thrombus during concurrent cardiac surgery: a case report. J Cardiothorac Surg. 2021, 16:242. 10.1186/s13019-021-01626-4
8. Ali N, Gatta F, Elkhatib M, Mediratta N: Outcomes and determinants of coronary endarterectomy with coronary artery bypass graft (CABG): a tertiary centre's five-year experience. Cureus. 2025, 17:e100061. 10.7759/cureus.100061
9. Kasarla R, Beyer M, Cuello S, Tadepalli P, Beyer E: Alternative approach to left ventricular thrombectomy using percutaneous cardiopulmonary bypass: a case report. Cureus. 2025, 17:e77229. 10.7759/cureus.77229