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Transesophageal Echocardiography-Guided Management of Acute Left Main Coronary Thromboembolism During Redo Aortic Valve Surgery

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Abstract

Background: Redo aortic valve surgery is associated with high perioperative risk, and intraoperative hemodynamic instability can be life-threatening. Acute left main coronary thromboembolism is an exceptionally rare complication that requires immediate diagnosis and intervention. Transesophageal echocardiography provides real-time diagnostic capability in the operating room.

Methods: We present the case of a 31-year-old patient who underwent redo aortic valve replacement for prosthetic valve thrombosis. During weaning from cardiopulmonary bypass, the patient developed severe left ventricular dysfunction associated with regional wall motion abnormalities. Real-time transesophageal echocardiography identified a newly developed flow obstruction in the left main coronary artery, prompting urgent surgical reintervention.

Results: A fresh thrombus was extracted from the left main coronary artery using a Fogarty catheter under transesophageal echocardiography guidance. Intraoperative echocardiography confirmed restoration of coronary flow and rapid improvement in ventricular function, with the ejection fraction increasing from 25% to 45%. The patient was successfully weaned from extracorporeal support and had an uneventful postoperative recovery.

Conclusion: This case highlights the critical importance of structured intraoperative diagnostics and the pivotal role of TEE in the rapid identification and management of rare, life-threatening complications during complex cardiac surgery. Transesophageal echocardiography was instrumental in guiding both diagnosis and immediate surgical intervention, resulting in a favorable outcome.

Keywords: Redo aortic valve surgery; Left main coronary thromboembolism; Transesophageal echocardiography; Intraoperative diagnosis; Real-time imaging; Cardiac surgery complications; Fogarty catheter; Perioperative imaging

Introduction

Redo aortic valve surgery is one of the most demanding procedures in cardiac surgery, with a significantly increased perioperative risk compared to primary interventions [1]. Technical challenges such as resternotomy, extensive adhesions, and prolonged extracorporeal circulation contribute to a heightened risk of intraoperative hemodynamic instability [2]. Acute left main coronary thromboembolism, though rare, can precipitate rapid hemodynamic collapse and requires immediate, targeted intervention [3].

In this high-risk environment, transesophageal echocardiography (TEE) has become a cornerstone of surgical decision-making. TEE provides real-time, structured imaging that enables prompt identification of regional wall motion abnormalities, direct visualization of coronary flow, and rapid differentiation of potential etiologies. This diagnostic clarity is essential for guiding life-saving surgical interventions and adapting intraoperative strategy in response to evolving clinical scenarios [4].

The impact of TEE on clinical outcomes is well documented. Large registry studies have demonstrated that intraoperative TEE use is associated with improved outcomes, including lower 30-day mortality and stroke rates [5]. Furthermore, single-center analyses indicate that TEE findings lead to changes in surgical management in approximately 9% of cases, underscoring its decisive role in intraoperative strategy [6]. International guidelines universally recommend TEE as a standard diagnostic and monitoring modality in cardiac surgery, emphasizing its value in rapid evaluation, detection of complications, and guidance of interventions [7].

This case report demonstrates how TEE-guided intraoperative assessment enabled the timely recognition and successful management of acute left main coronary thromboembolism during redo aortic valve surgery. The outcome highlights that, in complex cardiac procedures, patient survival depends not only on technical expertise but on the speed and accuracy of diagnostic decision-making facilitated by TEE.

Case Presentation

Patient Selection and Preoperative Assessment

A 31-year-old patient with a history of mechanical aortic valve replacement for congenital aortic stenosis (2018) and DDD pacemaker implantation for bradycardia and asystole (2019) was admitted with progressive exercise intolerance and New York Heart Association (NYHA) class III dyspnea. Due to prior bleeding complications, anticoagulation therapy was changed from a vitamin K antagonist to low molecular weight heparin, resulting in increased thromboembolic risk. Coronary angiography identified an extensive distal left anterior descending (LAD) thrombus with failed recanalization, leading to persistent apical wall motion abnormalities.

Transthoracic echocardiography on admission (2025) revealed severe mechanical prosthesis dysfunction (peak gradient 80 mmHg, grade II aortic insufficiency, left ventricular ejection fraction [LVEF] 35%), with apical akinesis and mild aneurysmal bulging but preserved basal contractility. Redo aortic valve replacement was indicated (EuroSCORE II: 8.5%). Multidisciplinary evaluation, considering the patient's hemorrhagic history and anticoagulation intolerance, led to the selection of a biological prosthesis. Continuous intraoperative transesophageal echocardiography (TEE) was mandated for both monitoring and diagnostic guidance.

Intraoperative Imaging Protocol and Standardization

A structured intraoperative TEE protocol was implemented to guide diagnostic and therapeutic decisions (Figure 1). The protocol included the following algorithmic steps:

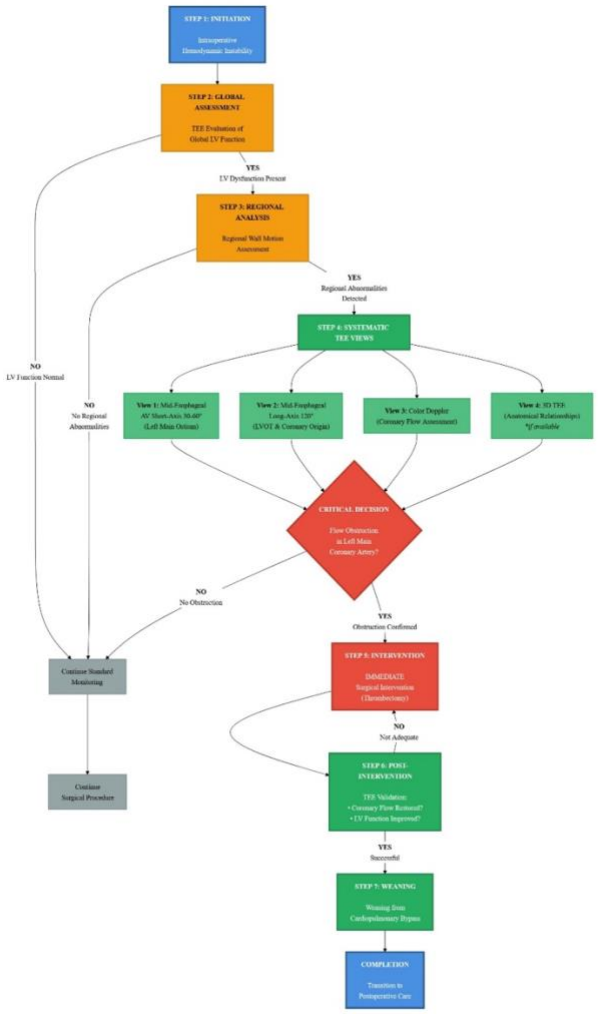

Figure 1: Structured transesophageal echocardiography based intraoperative diagnostic algorithm.

For systematic evaluation of acute hemodynamic instability during separation from cardiopulmonary bypass, confirmation of global left ventricular dysfunction is followed by regional wall motion analysis to identify potential coronary pathology. Targeted mid-esophageal views combined with color Doppler interrogation of the left main coronary ostium, enable rapid identification of flow obstruction, prompting immediate surgical intervention. Post-intervention TEE is used to confirm restoration of coronary flow and recovery of ventricular function before definitive weaning from extracorporeal circulation.

Anesthetic and Perfusion Management

General anesthesia was induced and maintained using target-controlled infusion (TCI) propofol (Schnider model, 3 µg/ml) and sufentanil (Gepts model, 0.3 ng/ml), with atracurium for neuromuscular blockade. Cefazolin was administered for perioperative antibiotic prophylaxis. Given pre-existing LV dysfunction, anesthetic induction was titrated to minimize reductions in cardiac output and arterial pressure. TEE was continuously used for real-time monitoring and diagnostic assessment.

Extracorporeal circulation was established via femoral artery and vein cannulation using a LivaNova Sorin C5 heart-lung machine and Medtronic Affinity NT oxygenator. Myocardial protection was achieved with antegrade, cold crystalloid cardioplegia (Custodiol solution).

Surgical Technique and Intraoperative Diagnostics

Resternotomy and adhesiolysis were performed without complication. CPB was initiated via femoral cannulation; the initial aortic cross-clamp time was 103 minutes. After aortotomy, a 5 × 8 cm partially organized thrombus was encountered and visualized adjacent to the mechanical prosthesis, obstructing leaflet motion. The thrombus was extracted, the prosthesis was explanted and replaced with a biological valve (Epic Medtronic Supra, 21 mm).

During the initial attempt to wean from CPB, progressive hemodynamic instability and regional LV contractility deterioration were observed. TEE demonstrated acute anterior and anteroseptal left ventricular dysfunction with newly developed functional mitral regurgitation (Figure 2), consistent with ischemia in the left main coronary artery distribution.

Mid-esophageal 0° view obtained during failed separation from cardiopulmonary bypass showing acute anterior and anteroseptal left ventricular dysfunction associated with newly developed functional mitral regurgitation (color Doppler), consistent with ischemia in the left main coronary artery distribution. TEE excluded prosthetic valve dysfunction and global myocardial stunning.

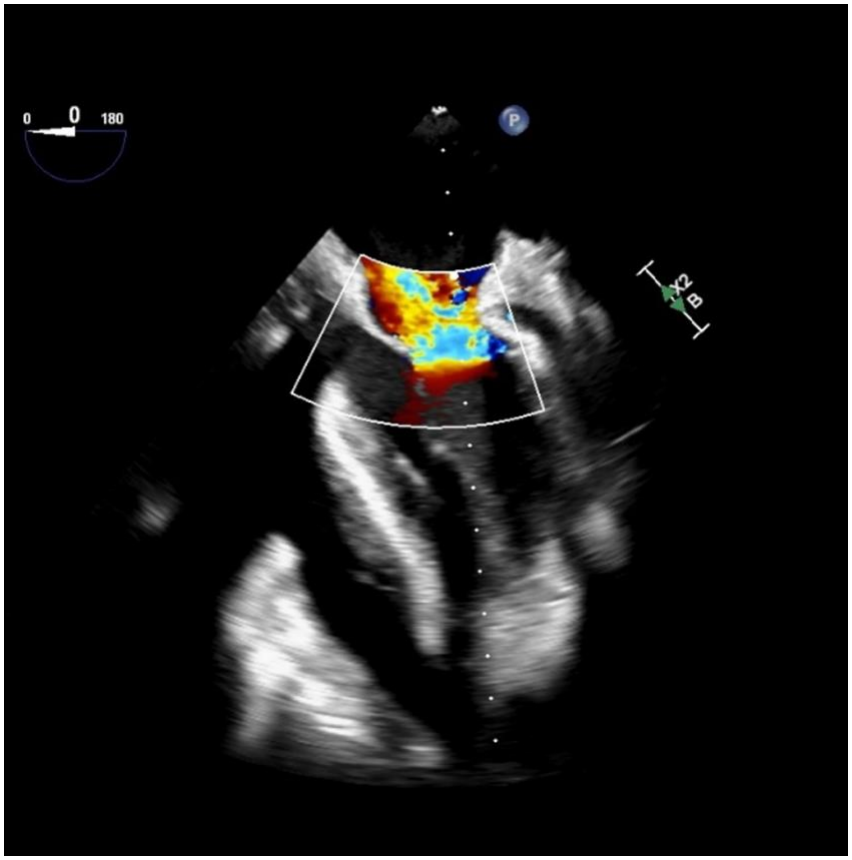

Figure 2: Mid-esophageal 0° transesophageal echocardiography demonstrating acute regional left ventricular dysfunction with secondary mitral regurgitation.

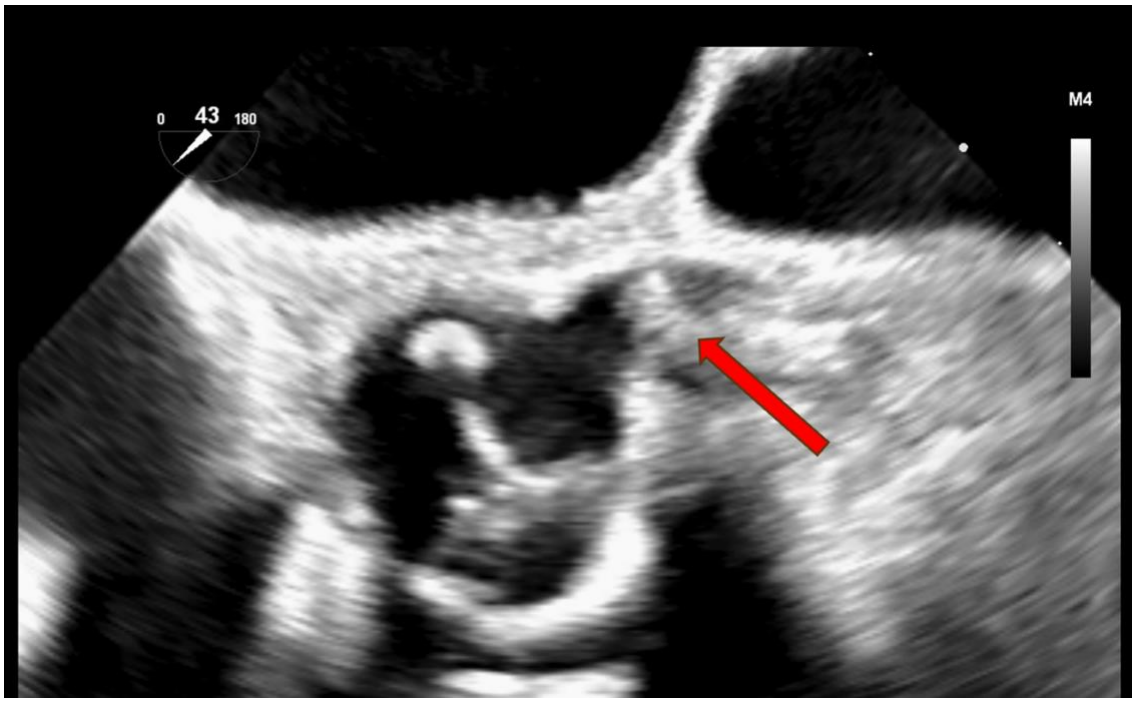

Figure 3: Direct visualization of left main coronary artery thrombus on transesophageal echocardiography.

Mid-esophageal aortic valve short-axis view demonstrating echogenic material within the left main coronary artery (arrow), consistent with acute thrombotic obstruction. Subsequent targeted transesophageal imaging in the mid-esophageal aortic valve short-axis view revealed echogenic material within the proximal left main coronary artery, consistent with acute thrombotic obstruction (Figure 3), thereby confirming coronary etiology of the observed ventricular dysfunction.

Immediate reintervention was undertaken. After reestablishing CPB and aortic cross-clamp (total cross-clamp time: 128 minutes), an 8F Fogarty catheter was advanced through the left coronary ostium into the left main artery, and a fresh 2 × 4 cm thrombus was extracted. Post-intervention TEE confirmed restoration of left main coronary flow, marked improvement in regional wall motion, and an increase in LVEF from 25% to 45%. These findings validated the intervention and informed subsequent surgical and anesthetic management.

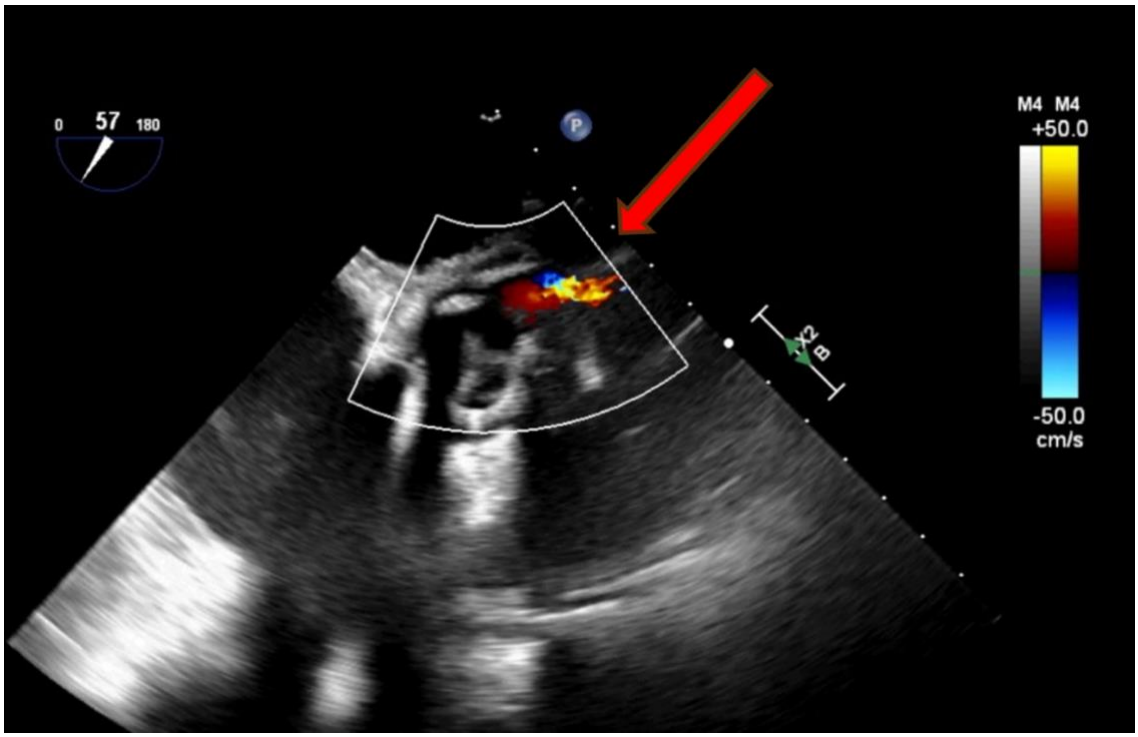

Figure 5A: Echocardiographic confirmation of reperfusion and ventricular recovery following left main coronary thrombectomy.

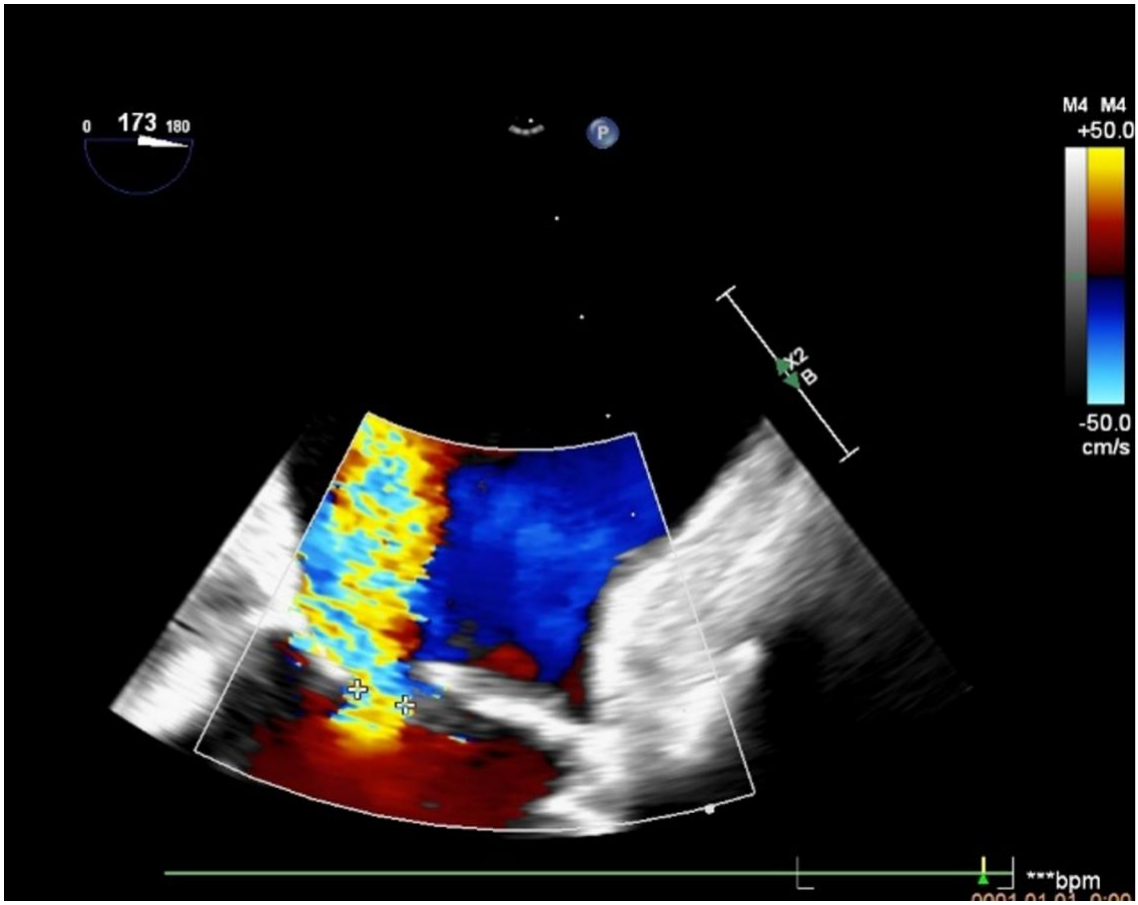

Figure 5B: Echocardiographic confirmation of reperfusion and ventricular recovery following left main coronary thrombectomy.

(A): Post-intervention color Doppler transesophageal echocardiography demonstrating restored forward flow at the left main coronary ostium (arrow).

(B): Mid-esophageal four-chamber view obtained after embolectomy demonstrating marked improvement in left ventricular systolic function accompanied by reduction of functional mitral regurgitation, consistent with recovery from acute ischemia.

Postoperative Course

Following successful extraction of the left main coronary thrombus and restoration of coronary flow, the patient was weaned from extracorporeal circulation under combined inotropic support, including levosimendan, noradrenaline, and dopamine. The total duration of cardiopulmonary bypass (CPB) was 261 minutes. Hemodynamic stability was achieved in the intensive care unit, with continuous monitoring confirming normalization of arterial pressure and cardiac output. Inotropic agents were tapered and discontinued within the first 24 hours postoperatively.

Serial transthoracic echocardiography performed during the early postoperative period demonstrated preserved left ventricular systolic function and optimal prosthetic valve performance. No evidence of recurrent thromboembolism, paravalvular leak, or significant arrhythmia was observed. The patient's recovery was uneventful, with no major adverse cardiac or cerebrovascular events recorded.

By postoperative day six, the patient had achieved New York Heart Association (NYHA) class I functional status and was discharged home in stable condition. At discharge, laboratory parameters and imaging studies confirmed the absence of residual cardiac dysfunction or prosthetic valve complications.

Discussion

This case underscores the inherent diagnostic complexity of intraoperative left ventricular (LV) failure during redo aortic valve surgery [8]. The clinical presentation of intraoperative hemodynamic instability is frequently non-specific, with a broad differential diagnosis that includes myocardial stunning [9,10], inadequate myocardial protection, mechanical obstruction, coronary spasm, air embolism [11], and thromboembolism. These etiologies often manifest with overlapping hemodynamic profiles, complicating prompt identification of the underlying cause [12]. Optimal management in this context is contingent upon rapid, algorithmic diagnostic decision-making rather than empirical expansion of therapeutic interventions.

Delayed or non-targeted diagnosis in the setting of acute intraoperative deterioration can be catastrophic, whereas early etiological clarification enables immediate recognition and correction of surgically remediable pathology. In the present case, continuous intraoperative transesophageal echocardiography (TEE) was pivotal for elucidating the etiology of hemodynamic instability. TEE facilitated the detection of a newly developed flow obstruction in the left main coronary artery—a finding not apparent with other monitoring modalities. The structured application of TEE enabled rapid differentiation among potential causes of LV dysfunction and directly informed the selection of a targeted, life-saving surgical intervention.

Although this single-case report does not provide quantitative data on the frequency of TEE-driven intraoperative diagnosis, it exemplifies the critical importance of TEE in high-risk surgical scenarios. International guidelines universally endorse TEE as a standard diagnostic and monitoring modality in cardiac surgery, highlighting its essential role in the rapid evaluation of cardiac structures, detection of intraoperative complications, and guidance of surgical interventions. Large registry studies, such as the JAMA Network Open 2022 analysis, have demonstrated that intraoperative TEE use is associated with improved clinical outcomes, including reductions in 30-day mortality and stroke rates, although these studies do not specify the direct diagnostic yield of TEE. Furthermore, a single-center retrospective analysis [13] reported that intraoperative TEE findings led to changes in surgical management in approximately 9% of cases, underscoring its significant impact on intraoperative decision-making.

Limitations

The principal limitation of this report is its single-case design, which limits the generalizability of the findings to broader patient populations. The precise etiology of the thromboembolic event-whether intraoperative mobilization of pre-existing thrombus or de novo formation-could not be definitively established in the absence of histopathological analysis. Additionally, the short interval between surgery and publication restricts the availability of long-term follow-up data regarding prosthetic valve function and recurrence risk. The absence of a control group and the inherent subjectivity of intraoperative decision-making further constrain the extrapolation of these results to other clinical settings.

Future Directions

Future research should focus on multicenter, prospective studies to quantify the diagnostic yield and therapeutic impact of intraoperative TEE in complex cardiac surgeries, particularly in redo procedures. Standardization of TEE imaging protocols and integration of advanced modalities-such as three-dimensional echocardiography and artificial-intelligence-assisted image analysis-may further enhance diagnostic accuracy and support real-time decision-making. Longitudinal studies are needed to evaluate the long-term outcomes in patients managed with TEE-guided interventions and to identify predictors of recurrent thromboembolic events and prosthetic valve dysfunction. Finally, the development of evidence-based intraoperative diagnostic algorithms may improve reproducibility and optimize patient outcomes in high-risk surgical populations.

Conclusion

In the context of complex redo aortic valve surgery, this case underscores that rapid, structured intraoperative diagnostic decision-making- supported by continuous transesophageal echocardiography (TEE) monitoring-is essential for the timely recognition and management of rare, life-threatening complications such as left main coronary thromboembolism. Real-time TEE functioned not only as a diagnostic tool but also as a strategic framework for intraoperative confirmation of surgical interventions, ultimately contributing to improved patient outcomes.

List of Abbreviations

AVR: Aortic Valve Replacement; **CPB:** Cardiopulmonary Bypass; **DDD:** Dual-chamber pacing, Dual-chamber sensing, Dual response (pacemaker type); **EF:** Ejection Fraction; **LAD:** Left Anterior Descending coronary artery; **LM:** Left Main coronary artery; **LV:** Left Ventricular; **LVEF:** Left Ventricular Ejection Fraction; **LMWH:** Low Molecular Weight Heparin; **NYHA:** New York Heart Association; **TCI:** Target-Controlled Infusion; **TEE:** Transesophageal Echocardiography; **VKA:** Vitamin K Antagonist

Declarations

Ethics approval and consent to participate

This case report was conducted in accordance with the Declaration of Helsinki and adhered to institutional ethical standards. According to institutional policy, formal ethics committee approval is not required for single-patient case reports that do not involve experimental interventions. The patient provided written informed consent to participate and to allow the collection and analysis of clinical data.

Consent for publication

Written informed consent was obtained from the patient for the publication of this case report and any accompanying images, including echocardiographic images and clinical photographs. A copy of the signed consent form is available for review by the Editor-in-Chief of this journal upon request.

Availability of data and materials

All clinical data generated and analyzed during this case report are included in this published article. Additional de-identified patient data, including detailed echocardiographic measurements and perioperative parameters, are available from the corresponding author upon reasonable request, in accordance with institutional data protection policies and patient privacy regulations.

Competing interests

The authors declare that they have no competing interests. The have received no financial or non-financial benefits from any party related directly or indirectly related to the subject of this article.

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Authors' contributions

RW conceived the case report, performed the surgical procedures, participated in data collection, and drafted the manuscript. KG provided intraoperative and postoperative echocardiographic assessments, interpreted the TEE findings, and contributed to manuscript revision. GYW managed anesthetic care, monitored hemodynamic parameters, and assisted with data acquisition. JW and AR contributed to data interpretation and provided critical feedback during manuscript preparation. All authors critically reviewed the manuscript, offered intellectual input, and approved the final version for submission.

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REFERENCES

1. Narayan P, Dimagl A. Outcomes of reoperative aortic valve surgery: Data from a national registry over 23 years. Indian Journal of Thoracic and Cardiovascular Surgery. 2025; 41: 1125-1135.
2. Roselli EE, Pettersson GB, Blackstone EH, et al. Adverse events during reoperative cardiac surgery: Frequency, characterization, and rescue. The Journal of Thoracic and Cardiovascular Surgery. 2008; 135: 192-199.
3. Torres-Ruiz G, Mallofré-Vila N, Rojas-Flores P, et al. Evidence-based management of left main coronary artery disease. European Cardiology Review. 2023; 18: Article e63.
4. Nicoara A, Skubas N, Ad N, et al. Guidelines for the use of transesophageal echocardiography to assist with surgical decision-making in the operating room: A surgery-based approach. Journal of the American Society of Echocardiography. 2020; 33: 692-734.
5. MacKay EJ, Zhang B, Augoustides JG, et al. Association of intraoperative transesophageal echocardiography and clinical outcomes after open cardiac valve or proximal aortic surgery. JAMA Network Open. 2022; 5: Article e2147820.
6. Eltzschig HK, Rosenberger P, Löffler M, et al. Impact of intraoperative transesophageal echocardiography on surgical decisions in 12,566 patients undergoing cardiac surgery. The Annals of Thoracic Surgery. 2008; 85: 845-852.

7. Nicoara A, Skubas N, Finley A, et al. Guidelines for the use of transesophageal echocardiography to assist with surgical decision-making in the operating room: A surgery-based approach. Journal of the American Society of Echocardiography. 2020; 33: 692-734.
8. Gudejko MD, Gebhardt BR, Zahedi F, et al. Intraoperative hemodynamic and echocardiographic measurements associated with severe right ventricular failure after left ventricular assist device implantation. Anesthesia and Analgesia. 2019; 128: 25-32.
9. Breisblatt WM, Stein KL, Wolfe CJ, et al. Acute myocardial dysfunction and recovery: A common occurrence after coronary bypass surgery. J Am Coll Cardiol. 1990; 15: 1261-1269.
10. Bolli R, Marbán E. Molecular and cellular mechanisms of myocardial stunning. Physiol Rev. 1999; 79: 609-634.
11. Oka Y, Inoue T, Hong Y, et al. Retained intracardiac air: Transesophageal echocardiography for definition of incidence and monitoring removal by enhanced techniques. J Thorac Cardiovasc Surg. 1986; 91: 329-338.
12. Roselli EE, Pettersson GB, Blackstone EH, et al. Adverse events during reoperative cardiac surgery: Frequency, characterization, and rescue. J Thorac Cardiovasc Surg. 2008; 135: 192-199.
13. Subramaniam B. Perioperative Transesophageal Echocardiography: Advances and Challenges. J Perioper Echocardiogr. 2013; 1: 1-3.