



Case Report

Atheroma in the Left Main Coronary Artery Mimicking a Thrombus.

M. Adnan Raufi ^{1*}, Sana Arslan ², Mehreen Khalid³, Rashid Khan ⁴

1, M. Adnan Raufi, MD FACP FACC FSCAI, Westchester Medical Center, NY, USA.

2. Sana Arslan, MBBS, MCPS Sina Health, Karachi, Pakistan.

3. Mehreen Khalid, MBBS, Naas General Hospital, County Kildare, Ireland.

3. Rashid Khan, MBBS, Sheikh Shakhbout Medical City Abu, Dhabi, UAE.

***Correspondence to:** M. Adnan Raufi. MD FACP FACC FSCAI, Westchester Medical Center, NY, USA.

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Abstract

Thrombosis of the left main coronary artery (LMCAT) associated with acute myocardial infarction is a rare condition but carries an alarmingly high mortality rate. This critical clinical scenario is challenging to diagnose and manage, primarily due to its infrequency and the absence of robust evidence-based treatment protocols. The pathophysiology involves acute occlusion or near-occlusion of the left main artery, which supplies blood to a significant portion of the myocardium, making it a life-threatening emergency. Despite advancements in interventional cardiology and surgical techniques, the management of LMCAT often necessitates a highly individualized approach. This case report highlights a rare presentation of left main coronary artery disease mimicking thrombosis, outlining the diagnostic challenges and the stepwise clinical decisions leading to successful patient outcomes.

Abbreviations

LMCAT: Left main coronary artery thrombus

LMCAD: Left main coronary artery disease

IVUS: Intravascular Ultrasound

ULMCA: Unprotected left main coronary artery

Introduction

Left main coronary artery disease (LMCAD) is one of the most severe forms of coronary artery disease, with significant implications for morbidity and mortality. The left main coronary artery (LMCA) is responsible for supplying blood to the left anterior descending artery and the left circumflex artery, thereby perfusing a substantial portion of the myocardium. Critical stenosis or occlusion in this vessel, especially in acute presentations, can result in extensive myocardial ischemia, life-threatening arrhythmias, cardiogenic shock, or sudden cardiac death. Mortality rates range from 40% to 80% if left untreated.

Current clinical practice guidelines from the American College of Cardiology/American Heart Association (ACC/AHA) and the European Society of Cardiology (ESC) strongly recommend revascularization for all patients with $\geq 50\%$ stenosis of the LMCA, irrespective of their symptomatic status or ischemic burden. Historically, coronary artery bypass grafting (CABG) has been the gold standard for managing significant LMCAD due to its superior long-term outcomes, particularly in patients with complex coronary anatomy. However, the advent of drug-eluting stents and improvements in percutaneous coronary intervention (PCI) techniques have made PCI an acceptable alternative for selected cases. Recent trials suggest that PCI may achieve comparable outcomes in patients with low-to-intermediate anatomical complexity.

Despite these advancements, the management of LMCAD remains a source of clinical uncertainty, especially in emergent cases involving left main coronary artery thrombosis (LMCAT). Acute thrombosis in the LMCA is a rare but catastrophic event that requires immediate intervention to restore blood flow. Diagnostic modalities such as coronary angiography and intravascular imaging, including intravascular ultrasound (IVUS) or optical coherence tomography (OCT), are invaluable for differentiating thrombus from atheromatous plaque rupture and guiding therapeutic decisions.

This report presents a unique case of LMCAT in a patient presenting with acute ST-elevation myocardial infarction (STEMI). The case highlights the diagnostic complexities, therapeutic challenges, and the role of advanced imaging and interventional strategies in achieving a favorable outcome. It underscores the critical need for rapid, individualized decision-making in such high-stakes scenarios, emphasizing the importance of multidisciplinary collaboration in achieving the best possible outcomes.

Case Presentation

A 44-year-old male with no significant prior medical history presented to the hospital after experiencing approximately three hours of typical chest pain. His only notable cardiovascular risk factor was smoking (one pack daily for 10 years). The initial assessment revealed ST-elevations in leads II, III, and aVF, along with ST-depressions in leads V3-V4, indicative of an evolving STEMI. His hs-Troponin I levels were markedly elevated at 21,303.9 pg/ml. Laboratory tests otherwise showed no significant abnormalities.

The patient was urgently taken to the cardiac catheterization laboratory. Angiography revealed a hazy appearance in the left main coronary artery, suggestive of a significant thrombus burden extending from the ostial to the mid segment. Further findings included thrombus dislodgement in the distal and apical segments of the left anterior descending artery, with luminal irregularities observed in the left circumflex and right coronary arteries.

To address the suspected thrombus in the left main artery, thrombectomy was performed, extracting some thrombus burden. The patient was treated with a 48-hour infusion of intravenous Tirofiban and heparin. A follow-up angiogram showed improved blood flow and reduced haziness. Intravascular ultrasound (IVUS) confirmed significant stenosis in the left main artery. Despite being offered CABG as the primary option, the patient declined and opted for PCI. The procedure involved pre-dilation with a 4.0 x 12 mm balloon, placement of a 4.0 x 8 mm drug-eluting stent, and post-dilation with a 5.0 x 8 mm balloon under high pressure. Post-procedure IVUS confirmed the stent was well-expanded and properly apposed, with a minimal luminal area (MLA) of 19.8 mm².

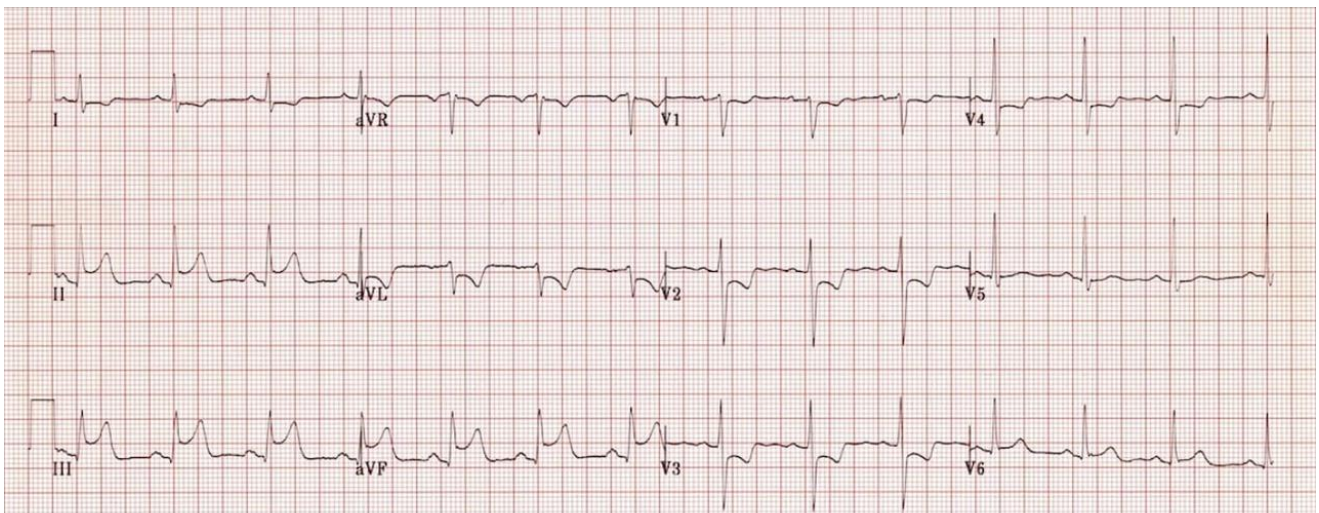


Fig. 1: ST-elevations in II, III and aVF and ST-depressions in V3-V4.



Fig. 2: Right coronary artery (luminal irregularities)

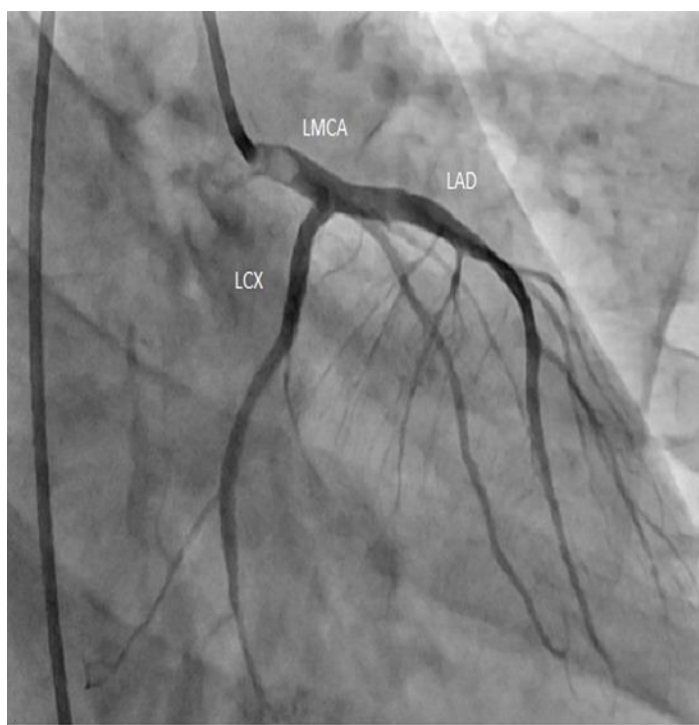


Fig. 3: LMCA (very hazy ostial to middle LMCA with suspicion of large amount of thrombus burden)

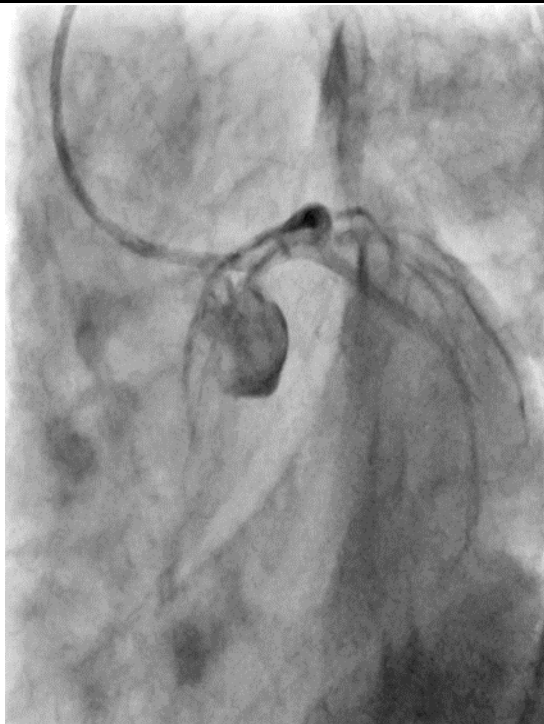


Fig. 4: LAD (thrombus dislodgement in its distal and apical segment) LCX (luminal irregularities)

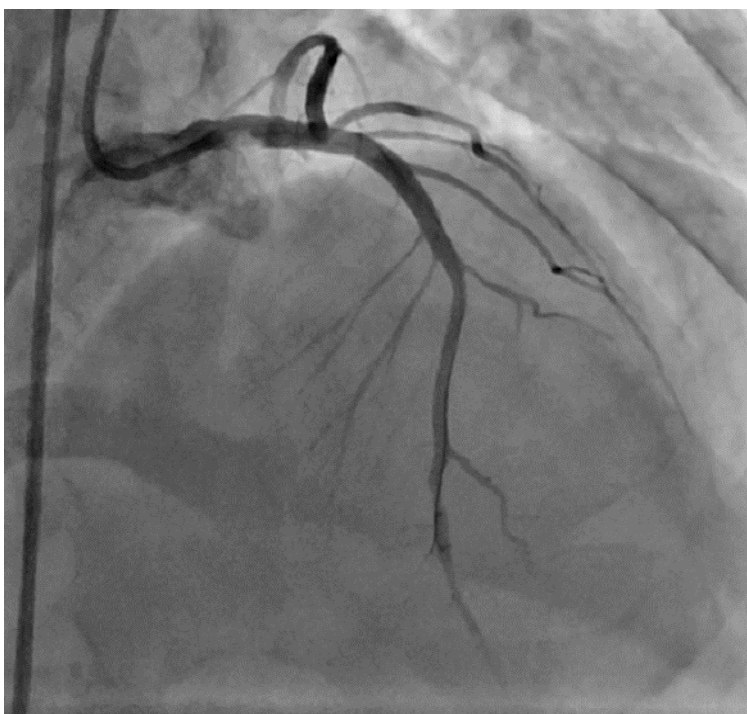


Fig. 5: After thrombectomy



Fig. 6: After thrombectomy

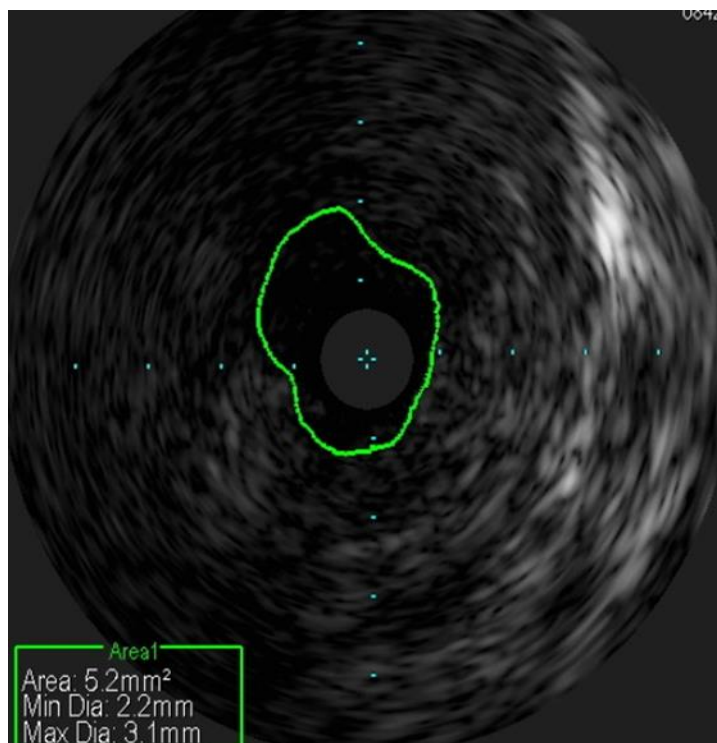


Fig. 7: IVUS showing large amount of soft atheromatous plaque with minimal luminal area of 5.2mm².

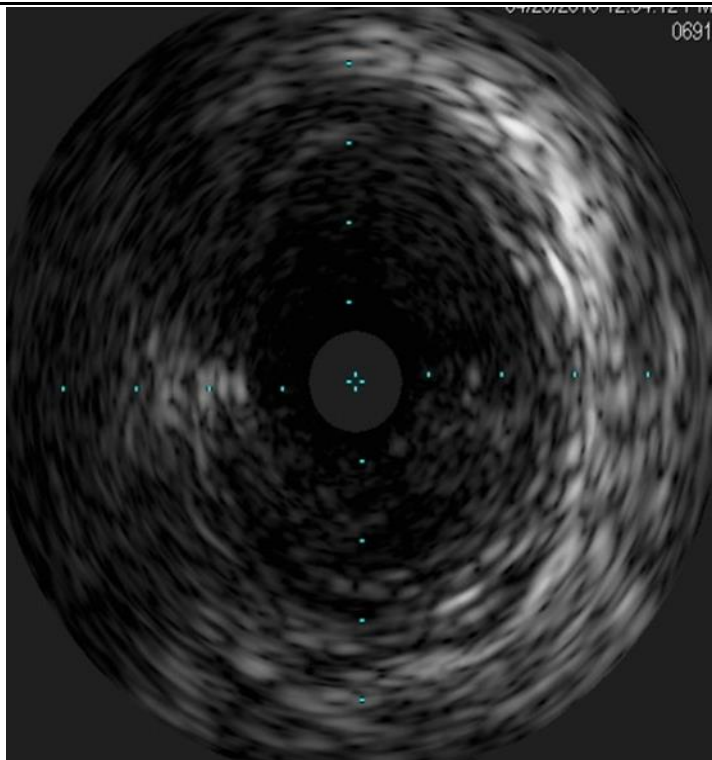


Fig. 8: IVUS of Left Main coronary artery showing large soft atheromatous plaque.

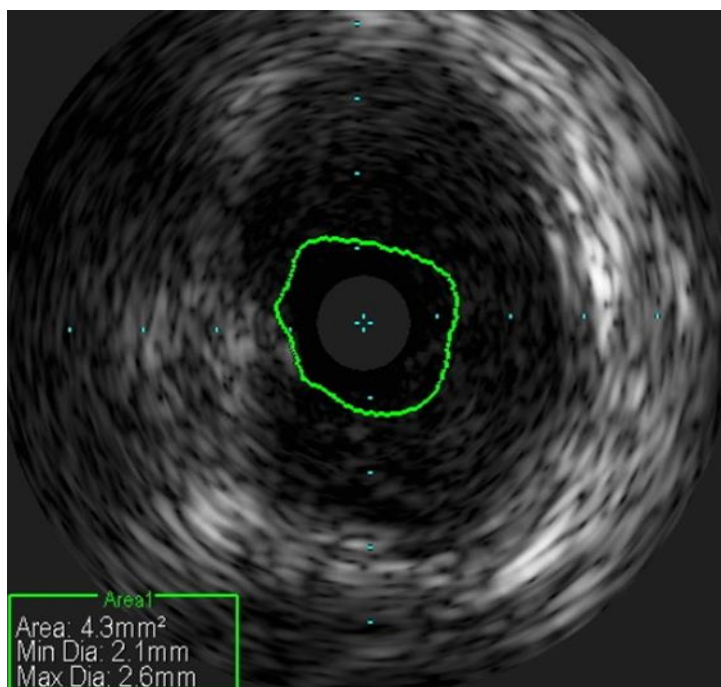


Fig. 9: IVUS of Left Main coronary artery showing large soft atheromatous plaque with minimal luminal area of 4.3mm².



Fig. 10: Left main coronary artery intervention



Fig. 11: Left main coronary artery intervention

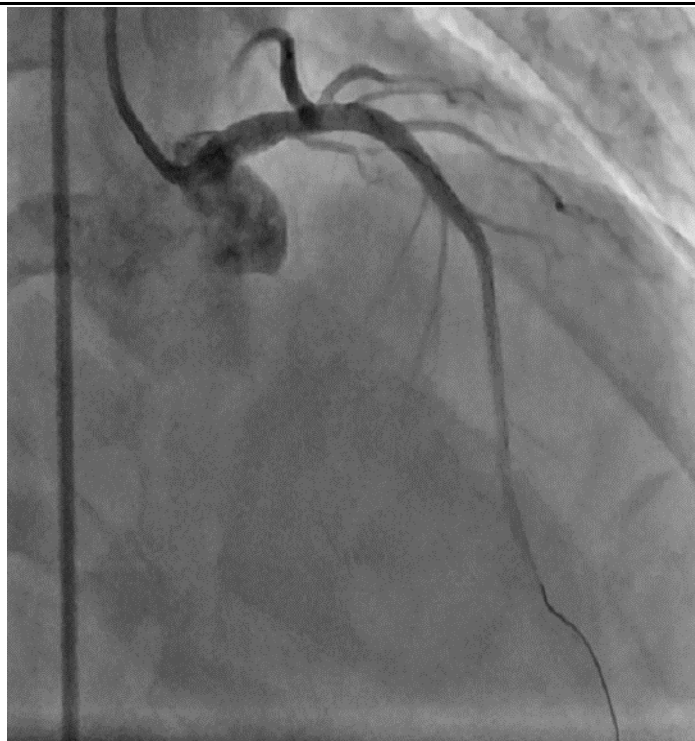


Fig. 12: Left main coronary artery intervention

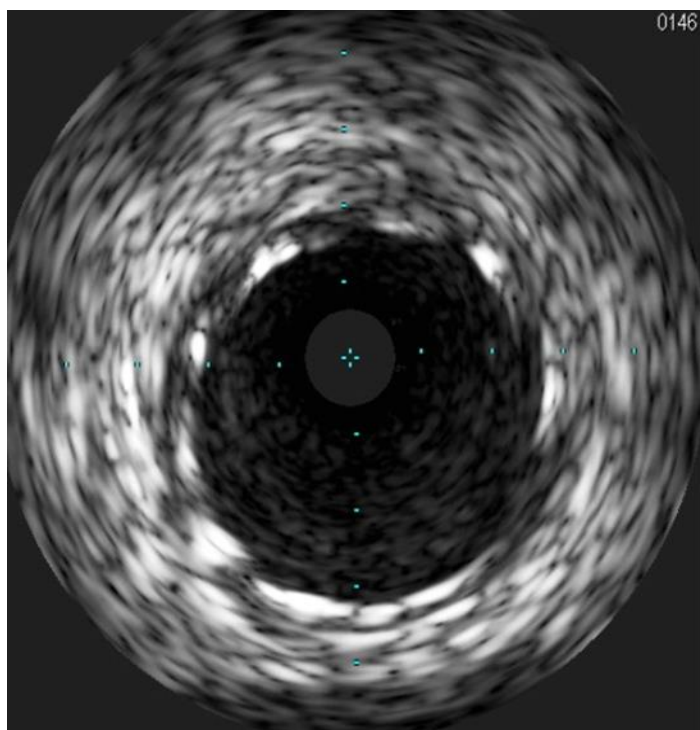


Fig. 13: Post stenting intravascular ultrasound showing a well expanded and well apposed stent.

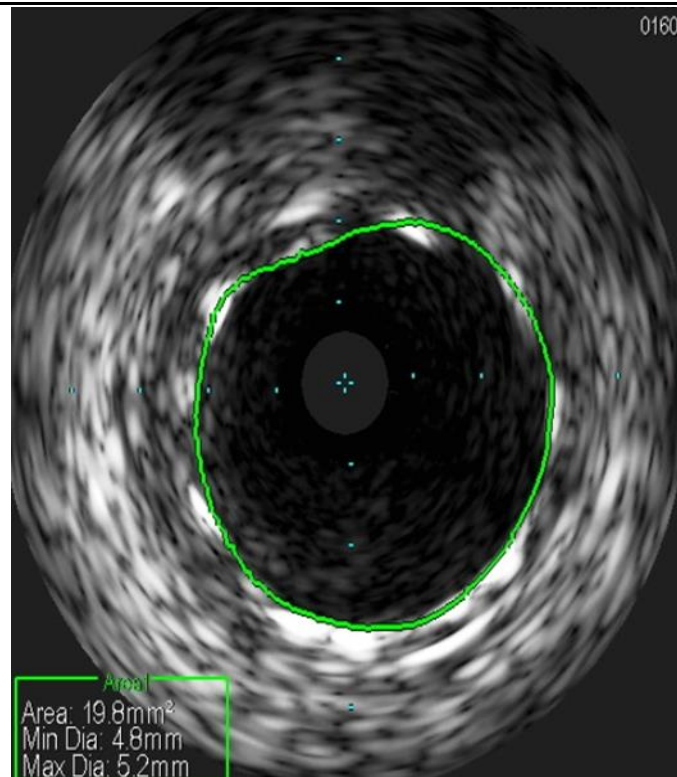


Fig. 14: Post stenting intravascular ultrasound (minimal luminal area of 19.8mm²)

Discussion

Thrombus in the left main coronary artery (LMCA) is an uncommon but catastrophic condition associated with acute myocardial infarction, resulting in a high risk of mortality due to the large volume of myocardium at risk. The rarity of this condition makes it difficult to establish clear evidence-based protocols for its management. Most clinical guidelines emphasize the importance of revascularization in cases of left main coronary artery disease (LMCAD) with significant stenosis ($\geq 50\%$), regardless of symptoms. However, the choice between coronary artery bypass grafting (CABG) and percutaneous coronary intervention (PCI) often depends on the patient's clinical condition, the anatomical complexity of the disease, and their personal preferences.

In this case, the patient's presentation of ST-elevation myocardial infarction (STEMI) with significant thrombus burden in the left main artery posed a challenging scenario. While CABG is the gold standard for managing significant LMCAD, especially in high-risk anatomical presentations, the urgency of the situation and the patient's decision against surgery necessitated PCI as the treatment of choice.

Thrombectomy, combined with the use of antithrombotic agents such as 2B3A Inhibitors and heparin, successfully reduced the thrombus burden and improved coronary blood flow. The follow-up angiography and intravascular ultrasound (IVUS) confirmed significant stenosis in the left main artery, justifying the need for PCI. Stent placement was performed effectively, as evidenced by post-procedure IVUS showing a well-expanded stent with no residual stenosis.

This case emphasizes the importance of individualized treatment strategies in LMCAD, particularly in patients who are not candidates for CABG. It also highlights the role of advanced imaging techniques such as IVUS in guiding PCI and ensuring optimal stent deployment. Despite the favorable outcome in this case, PCI in left main coronary artery disease should be approached with caution, especially in patients with complex or high-risk anatomical features, as the long-term outcomes may not be as favorable as those seen with CABG.

Conclusion

Thrombosis in the left main coronary artery is a rare but life-threatening condition requiring prompt diagnosis and management. This case underscores the critical importance of a tailored approach to treatment, balancing guideline recommendations with patient-specific factors. While CABG remains the gold standard for significant LMCAD, PCI can serve as a viable alternative in selected patients, particularly when surgery is contraindicated or declined. The use of adjunctive techniques such as IVUS plays a pivotal role in optimizing PCI outcomes. Further studies are needed to better understand the long-term outcomes of PCI in patients with left main coronary artery thrombosis and to establish standardized management protocols for this high-risk population.

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