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CASE REPORT
Coronary heart disease

Left main coronary artery thrombus after cannabis consumption: a case report

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Background Left main coronary thrombus is a rare angiographic finding associated with serious outcomes such as sudden death and cardiogenic shock. Rupture of an underlying atherosclerotic plaque is the main risk factor. The role of cannabis consumption in the pathophysiology of acute cardiovascular disease is controversial.

Case presentation We present a case of non-ST-elevation myocardial infarction characterized by a mobile left main coronary thrombus in a young male cannabis consumer successfully treated with manual aspiration, dual anti-platelet, and unfractionated heparin therapy.

Conclusion Cannabis consumption could be a risk factor for coronary artery thrombosis. The pathophysiology mechanism of action is not well understood. Reaching an optimal management is a potential challenge for physicians.

Keywords Cannabis • Left main • Coronary thrombosis • Case report • Anticoagulation therapy

Learning points

- Cannabis consumption could be a risk factor for coronary artery thrombosis.
- Young adults should have a greater awareness of the cardiovascular impact of cannabis use.
- Manual aspiration with anticoagulation therapy is a successful approach to manage left main coronary thrombus in the absence of significant atherosclerotic disease.

Introduction

Acute coronary syndromes provoked by left main coronary artery thrombus are scarce in the literature.[1] The lethal associated outcomes like death and cardiogenic shock may explain the rarity of previously published cases. While several therapeutic approaches are available, reaching an optimal medical treatment and avoiding a distal embolization remain a potential challenge. Otherwise, the cannabis consumption was linked to acute coronary syndromes by triggering myocardial infarction in the presence of coronary atherosclerosis or inducing coronary spasm. There are no clear standardized guidelines and decision management is based on the patient's condition and physician's experience. We report a case of non-ST-elevation myocardial infarction (NSTEMI) characterized by a mobile left main coronary thrombus in a young male cannabis consumer successfully treated with manual aspiration, dual anti-platelet, and unfractionated heparin (UFH) therapy.

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Timeline

Day 0 (at admission)	• A 40-year-old male smoker was brought to emergency department for acute sustained chest pain triggered by cannabis consumption • Electrocardiogram shows dynamic anterior ST elevation and negative T waves in inferior leads • Laboratory studies reveal a dynamic rise and fall in troponin • Non-ST-elevation myocardial infarction diagnosis was confirmed
Within 3 h	• Patient referred to emergent coronary angiography that shows a floating left main coronary thrombus • Distal embolization to the left anterior descending artery/septal branch bifurcation while performing manual aspiration
Day 5 (after anti-thrombotic regimen)	• Follow-up coronary angiography shows a complete resolution of the thrombus • Patient was discharged on apixaban 2.5 mg twice daily plus DAPT, then shifting to 5 mg twice daily on top of clopidogrel for 1 year
After 3 months	• A good clinical outcome in completely asymptomatic patient is noted with negative atrial fibrillation workup • A Reveal LinQ Insertable Cardiac Monitor was implanted

Case presentation

A 40-year-old previously healthy Afro-European male smoker was brought to emergency department (ED) for acute sustained chest pain preceded by an episode of palpitation and triggered by cannabis consumption. His physical exam was normal without relevant findings. Twelve-lead electrocardiogram (ECG) revealed transient anterior ST elevation and negative T waves in inferior leads (*Figure 1*). Laboratory studies showed normal biological parameters except for positive troponin level which rises from 23 to 400 ng/L (normal value <14 ng/L). Transthoracic echocardiography (TTE) showed a mild hypokinesia in the septo-apical wall, normal ejection fraction, and no valvular heart disease (*Video 1*).

The patient was diagnosed with NSTEMI and he was quickly referred for an emergent coronary angiography. The right coronary angiogram shows a patent right coronary artery (*Video 2* and *Figure 2A*) while the left coronary angiogram reveals the presence of highly mobile thrombus in the left main artery without evidence of coronary atherosclerosis and coronary blood flow compromise (*Video 3* and *Figure 2B*). After performing a manual aspiration, a residual thrombus fragment embolized to the proximal left anterior descending coronary artery and septal branch bifurcation (Supplementary material online, *Video S1* and *Figure 2C*).

The absence of underlying atheromatous disease, the normal coronary blood flow, and the young age of the patient were the reason to avoid stent implantation and to continue with medical treatment. Also, the episode of palpitation described anteriorly to chest pain on top of the acute thrombotic event and the arrhythmogenic effect of cannabis guide towards a paroxysmal atrial fibrillation. Subsequently, we started a medical treatment including intravenous UFH and dual anti-platelets therapy (ticagrelor and aspirin initiated in ED). As the performed thrombo-aspiration led to a dramatic decrease in thrombotic charge with a Thrombolysis in Myocardial Infarction 3 blood flow, the administration of GpIIbIIIa inhibitors was avoided. Furthermore, Anti-Xa activity was controlled constantly according to a specific UFH protocol used in Acute coronary syndrome (ACS) with a target value between 0.3 and 0.6 UI/mL. No bleeding occurred.

All performed investigations like 24-h Holter EKG, lower limb venous Doppler, hypercoagulability workup, enhanced thoraco-abdomino-pelvis computed tomography scan, and transoesophageal echocardiography were normal (Supplementary material online, *Video S2*).

Repeat coronary angiogram performed after 5 days with the above cited medical treatment shows complete resolution of the residual fragment (Supplementary material online, *Video S3* and *Figure 2D*).

The patient was discharged on apixaban 2.5 mg twice daily, aspirin 75 mg, and clopidogrel 75 mg for 3 months, then shifting to apixaban 5 mg twice daily and clopidogrel 75 mg once daily up to 1 year. He was referred to a substance withdrawal programme. A good outcome in completely asymptomatic patient was noted at 3-month follow-up with normal TTE, coagulation testing, and 72-h Holter ECG findings. In order to detect a potential uncovered paroxysmal atrial fibrillation, a Reveal LINQ™ Insertable Cardiac Monitor that may help to guide long-term anti-thrombotic strategy was implanted.

Discussion

Acute left main coronary thrombus is a rare angiographic finding observed in 0.8–1.5% of patient presenting with acute coronary syndrome.[1] Rupture of pre-existing atherosclerotic plaque is the most common underlying aetiology.[2] In our case, the left main coronary thrombus that subsequently embolized to the left anterior descending artery/septal branch bifurcation was completely mobile, unattached to atheromatous plaque, non-occlusive, and without

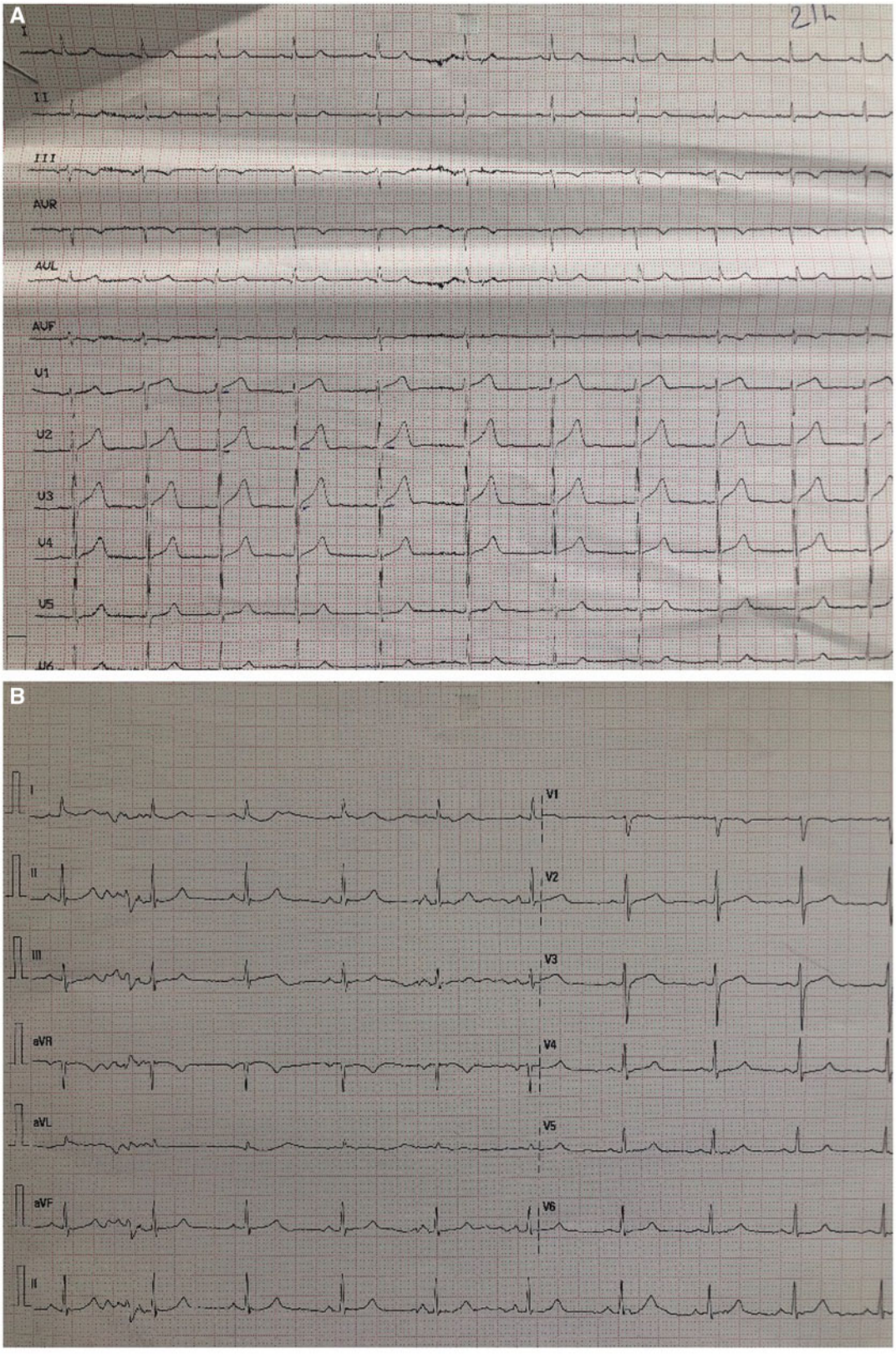
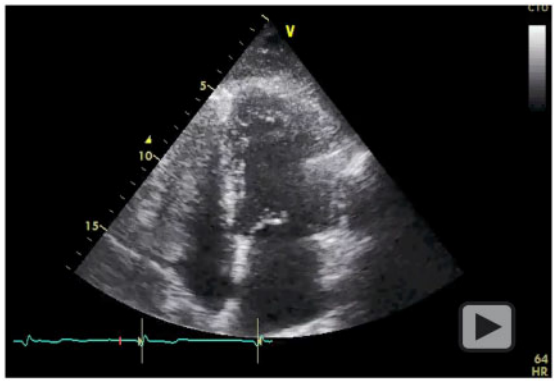
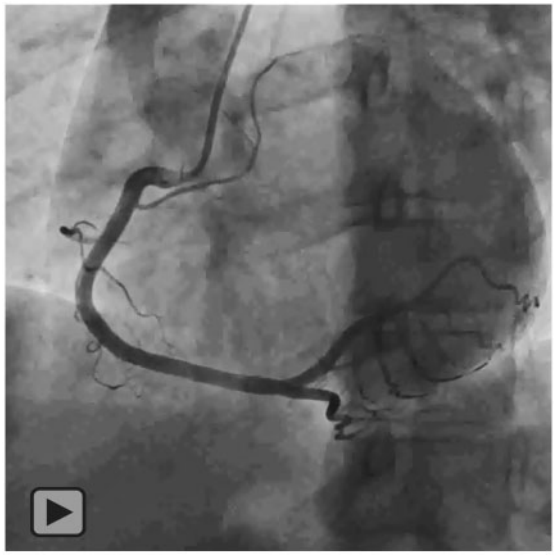


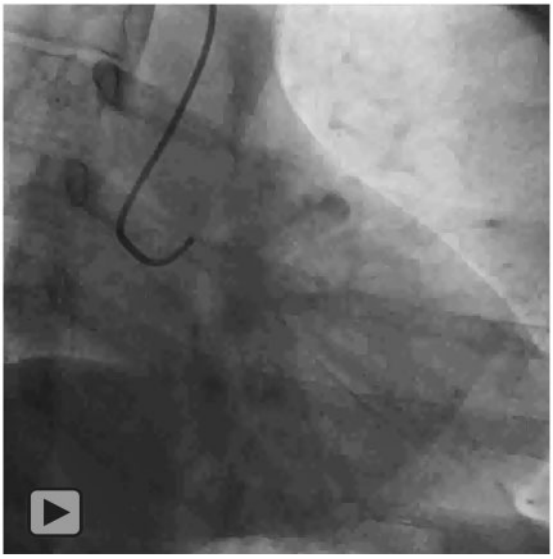
Figure 1 (*A*) Electrocardiogram showing mild anterior ST elevation and negative T waves in inferior leads DIII and AVF. (*B*) Electrocardiogram at discharge with no significant abnormalities.



Video 1 Transthoracic echocardiography showing normal Left ventricular ejection fraction (LVEF), mild septo-apical wall hypokinesia, and no evidence of thrombus.



Video 2 Right coronary angiogram. Right coronary angiogram showing a patent right coronary artery.



Video 3 Left coronary angiogram. Left coronary angiogram showing a floating thrombus in the left main coronary artery.

underlying atherosclerotic disorder or other predisposing factor except for cannabis consumption.

Cannabis is the most widely consumed illicit drug, especially among adult population.[3] The correlation between cannabis usage and cardiovascular events such as myocardial infarction or coronary thrombosis is controversial. Indeed, a paradoxical platelet reaction to the cannabis active molecule is reported. Some described a non-reversible prolonged platelet aggregation whereas others described an inhibition in platelet aggregation in the presence of D9-tetrahydrocannabinol.[4] Furthermore, by stimulating the sympathetic system, cannabis contributes to an inflammatory reaction at the arterial wall level leading to an endothelial erosion and thrombus formation even in the presence of normal coronary arteries as in our reported case.[3] Moreover, the potential arrhythmogenic effect of cannabis is well documented.[3] As a result, the role of cannabis in coronary thrombosis is multifactorial, not well known and several hypotheses may be proposed.

The optimal management of acute left main coronary thrombosis depends on patient condition and physician's experience. There is a need for clear recommendations and the data available are limited in the literature to a few cases.[5] The presence of an underlying plaque or atherosclerotic disease, haemodynamic situation, and coronary blood flow compromise are the major determinants for the therapeutic approach and associated outcome. Coronary artery bypass graft, percutaneous coronary intervention (PCI) with stent implantation, aspiration thrombectomy, and thrombolysis are the different strategies reported in the literature. PCI and Coronary artery bypass graft (CABG) are preferred in the presence of significant coronary atherosclerosis.[1,5] However, in our case, the absence of atherosclerotic disorder and coronary blood flow compromise in a young patient was the rationale behind a conservative treatment. It is worthy to note that stent implantation exposes the patients to a longer antiplatelet therapy duration.

The angiographic characteristics of left main coronary thrombus: proximal localization, highly mobile, non-attached, and well demarcated in the presence of patent coronary arteries without any angiographic evidence for atherosclerosis was the rationale behind our therapeutic approach. Indeed, we preferred to exclude the thrombus by mechanical aspiration over performing intracoronary imaging like IVUS or Optical coherence tomography (OCT) which may worsen thrombosis in order to prevent deleterious outcomes such as aortic migration resulting in cerebral/systemic embolization and proximal coronary embolization resulting in coronary blood flow compromise. The 5-day follow-up coronary angiography documented a complete resolution of the thrombus

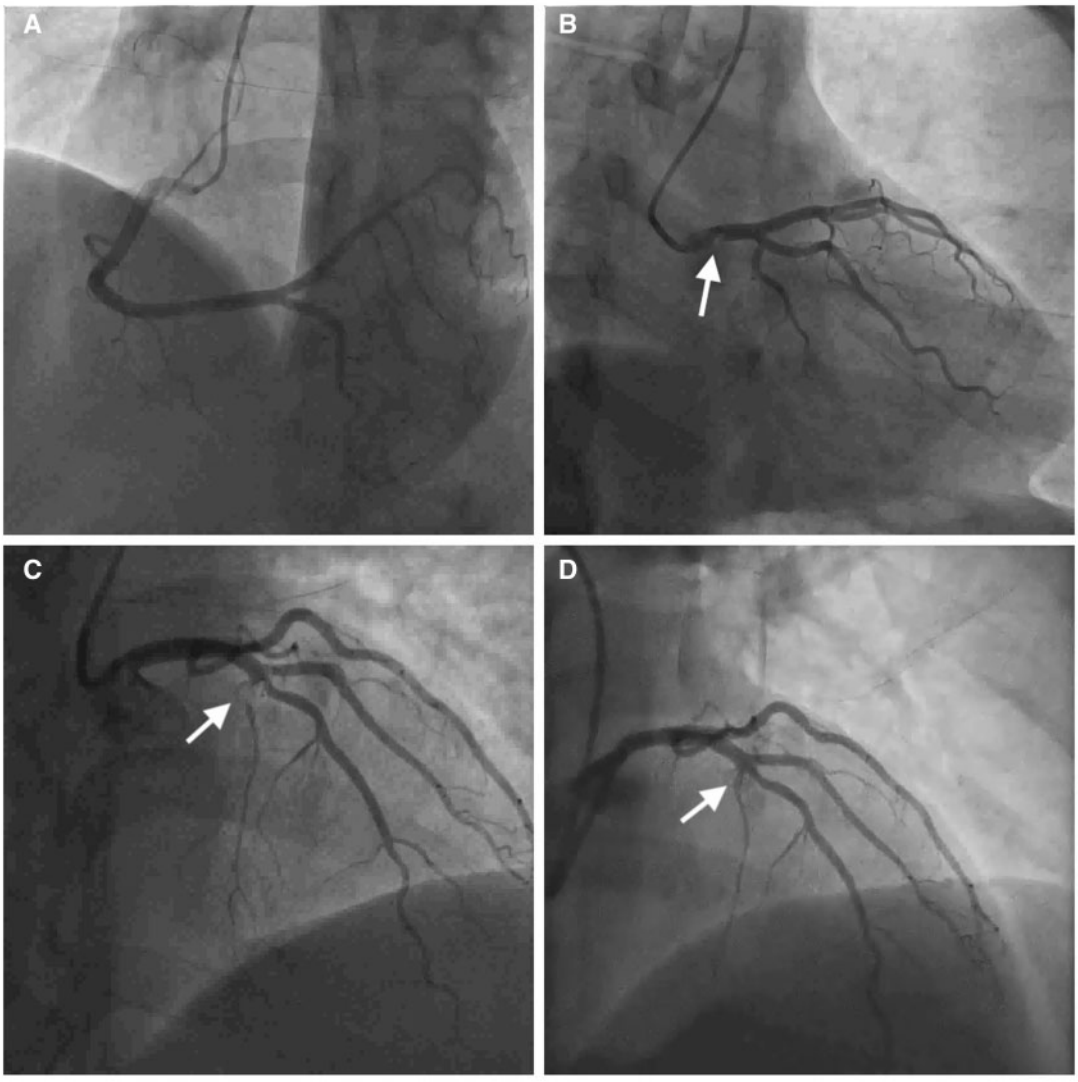


Figure 2 (*A*) Right coronary angiogram showing a patent right coronary artery. (*B*) Left coronary angiogram showing the thrombus in the left main coronary artery. (*C*) Left coronary angiogram showing the thrombus embolizing the left anterior descending artery/septal branch after performing manual aspiration. (*D*) Left coronary angiogram showing a complete resolution of the thrombus after 5 days of anticoagulation ascending aorta.

in the presence of normal patent coronaries (Supplementary material online, *Video S1*). Then, the postponed intracoronary imaging seemed unbeneficial as it could not affect the management strategy. Finally, performing thrombo-aspiration and delaying intracoronary imaging in a critical acute thrombotic coronary event maybe a successful therapeutic approach.

Otherwise, the triple anti-thrombotic regimen including a low dose of apixaban (2.5 mg) and Dual antiplatelet therapy (DAPT) (aspirin + clopidogrel) at discharge for 3 months was decided following a multidisciplinary expert opinion. Indeed, the clinical presentation of a left main thrombus in young adult cannabis consumer precipitated by an episode of palpitation support the concept of possible atrial fibrillation regardless of the negative initial investigations. The potential arrhythmogenic effect of cannabis,[3] the low bleeding risk in our young patient with no significant comorbidities, the highest risk of a recurrent thrombotic event during the first 30 days as noted in literature[6] were the rationale to prescribe this therapeutic approach while waiting the result of the extended atrial fibrillation planned workup.

Conclusion

Left main coronary artery thrombus is a rare angiographic finding and it can lead to critical clinical situations. Prompt diagnosis and appropriate therapeutic approach are highly recommended. Cannabis smoking is a potential predisposing factor in young healthy adults.

However, its role is unclear and not well explained. Manual aspiration followed by heparin and dual anti-platelet therapy is a successful

less invasive approach in haemodynamically stable patient without underlying coronary atherosclerosis.

Lead author biography

Jerome Roncalli, MD, PhD, is a Professor of Cardiology at the Medical School in Toulouse, France. Prof. Roncalli serves as the Assistant Director of the Cardiac Catheterization Laboratory since 2008. He also serves as Director of the Heart Failure, Transplantations and Assist Devices Unit at the University Hospital of Toulouse. Prof. Roncalli is a member of the French and the European Society of Cardiology. Prof. Roncalli is currently coordinator of the CARDIOMET Institute and the IMPACT FHU. His major research is focused on interventional cardiology, heart failure, tissue repair/regeneration, angiogenesis/vasculogenesis, and progenitor/adult stem cells.

Supplementary material

Supplementary material is available at *European Heart Journal - Case Reports* online.

Slide sets: A fully edited slide set detailing this case and suitable for local presentation is available online as Supplementary data.

Consent: The authors confirm that written consent for submission and publication of this case report including images and associated text has been obtained from the patient in line with COPE guidance.

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References

1. Oman Z, Khalid N, Boppana S, Helmy T, Abo-Salem E. Management options of acute left main coronary thrombus. *Cardiovasc Revasc Med* 2018;**19**:25–27.
2. Neri R, Migliorini A, Moschi G, Valenti R, Dovellini EV, Antoniucci D. Percutaneous reperfusion of left main coronary disease complicated by acute myocardial infarction. *Catheter Cardiovasc Interv* 2002;**56**: 31–34.
3. Goyal H, Awad HH, Ghali J. Role of cannabis in cardiovascular disorders. *J Thorac Dis* 2017;**9**:2079–2092.
4. Dahdouh Z, Roule V, Lognone T, Sabatier R, Grollier G. Cannabis and coronary thrombosis: what is the role of platelets? *Platelets* 2012;**23**:243–245.
5. Gupta R, Rahman M, Uretsky B, Schwarz ER. Left main coronary artery thrombus: a case series with different outcomes. *J Thromb Thrombolysis* 2005; **19**:125–131.
6. Spinthakis N, Farag M, Rocca B, Gorog D. More, more, more: reducing thrombosis in acute coronary syndromes beyond dual antiplatelet therapy-Current data and future directions. *J Am Heart Assoc* 2018;**7**:e00754.