


CASE REPORT

Mechanical thrombectomy using neurovascular catheter from radial artery during acute myocardial infarction: A case report

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Key Clinical Message

Coronary occlusion due to large thrombus is frequently encountered during ST-elevation myocardial infarction (STEMI). Despite guidelines discourage this practice, often thrombus aspiration is necessary to reduce thrombotic burden and to prevent embolization. We report a case of mechanical thrombectomy with a Neurovascular Catheter from radial artery during inferior STEMI.

KEYWORDS

acute coronary syndrome, coronary artery ectasia, coronary thrombectomy, mechanical aspiration, myocardial infarction, thrombotic burden

1 | INTRODUCTION

Acute myocardial infarction (MI) represents the worldwide leading cause of morbidity and mortality.¹ It is generally the result of coronary atherosclerotic plaque rupture with thrombus formation and acute vessel occlusion. Re-open the occluded coronary artery through percutaneous coronary intervention is mandatory, but distal embolization is a terrific complication especially in patient with high thrombotic burden: impaired epicardial flow and microvascular dysfunction can lead to a poor myocardial perfusion that associates with worsening of the left ventricular function recovery and long-term mortality.²

Since large RCTs have failed to demonstrate a clinical benefit with routine manual thrombus aspiration in comparison to conventional primary percutaneous

coronary intervention,³ the current guidelines firmly discourage this practice.⁴

Nevertheless, in selected scenarios thrombus aspiration is necessary to reduce the thrombotic burden in order to minimize the distal embolization and preserving myocardial perfusion.

2 | CASE HISTORY/ EXAMINATION

A 40-year-old gentlemen with acute chest pain was admitted to Emergency Department in the early morning. His past medical history was significant for obesity without other traditional cardiovascular risk factors. At the admission the patient was heavily sweaty, symptomatic for angina, in class II of Killip's classification.

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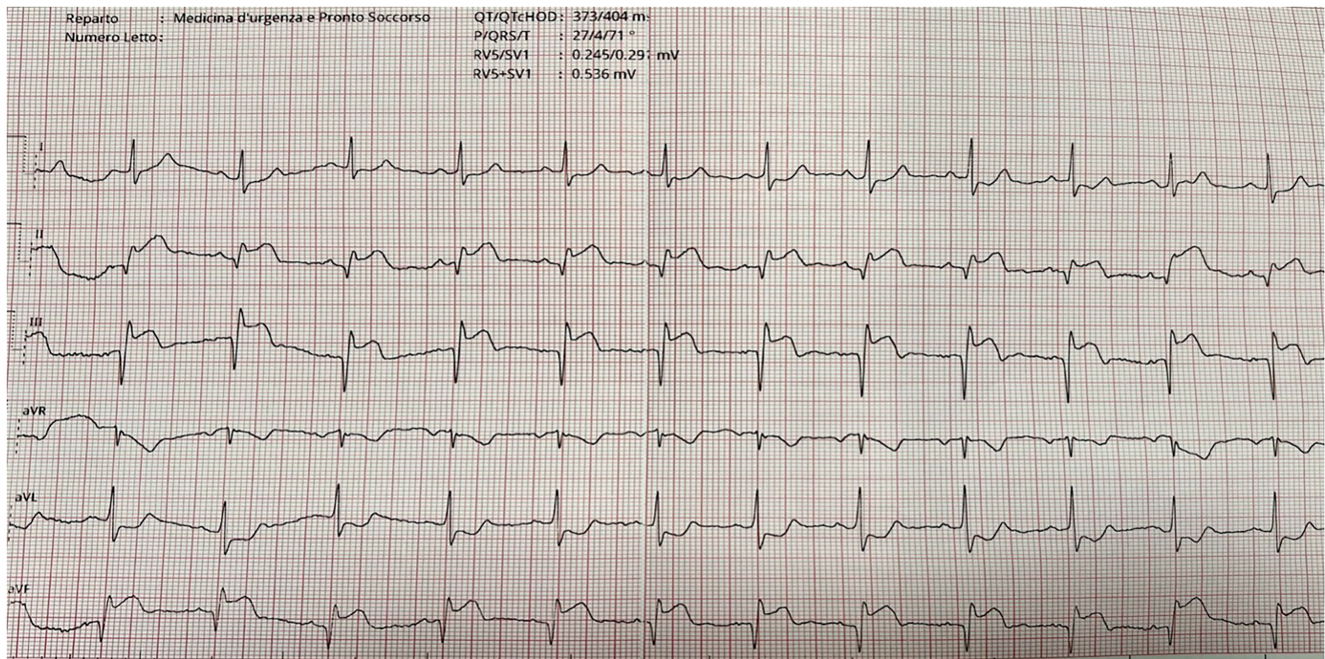
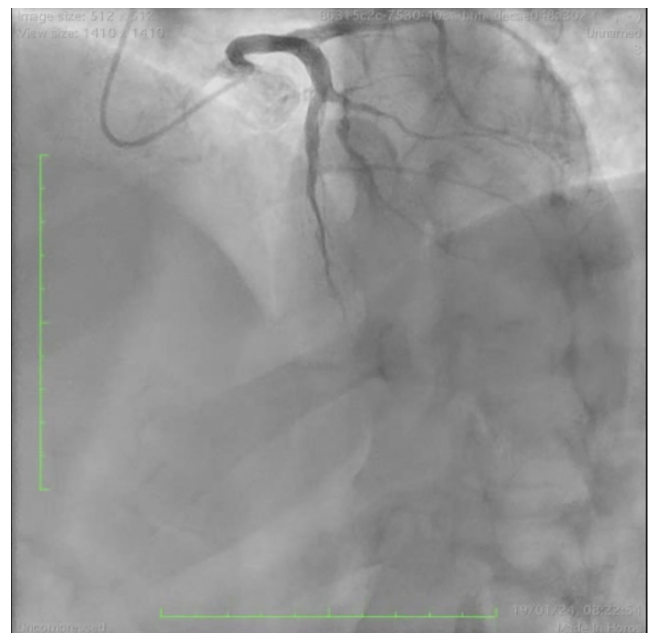


FIGURE 1 EKG showing ST elevation in inferior leads.

3 | METHODS (DIFFERENTIAL DIAGNOSIS, INVESTIGATIONS AND TREATMENT)

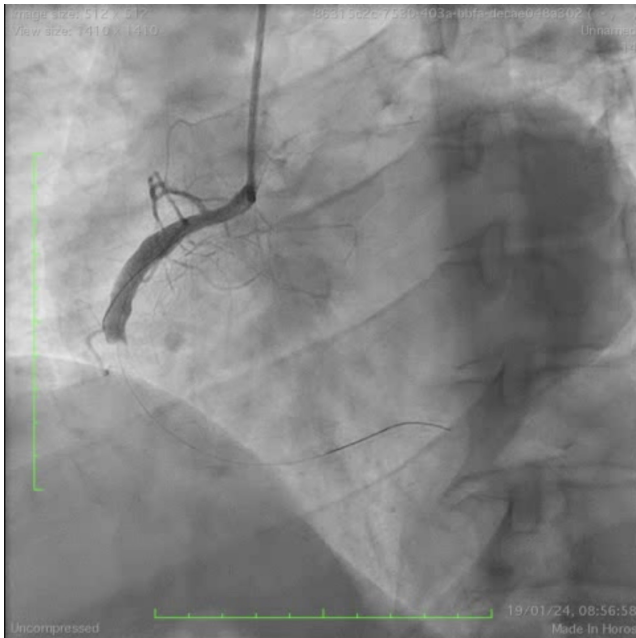
EKG showed ST elevation in inferior leads (Figure 1). Since the diagnosis was clear and the patient strongly symptomatic, the patient underwent immediately to coronary angiography without the possibility to determine cardiac enzymes at admission in Emergency Department.

From right radial artery, urgent coronary angiography revealed critical stenosis of diagonal branch (Video 1) and acute total occlusion of dominant, ectatic right coronary artery (RCA) with high thrombotic burden (Video 2). Ticagrelor loading dose was administered and Cangrelor bolus followed by infusion was started. Despite several attempts to perform coronary angioplasty with both semi-compliant and noncompliant balloon of different diameter (up to 4.0 mm) and manual aspiration (Figures 2 and 3, Video 3), persistent TIMI 0 flow was observed. Mechanical aspiration thrombectomy was executed. After leaving a Sion Blue guidewire (ASAHI Intecc, USA) distal in RCA, the right radial 6 Fr sheath was replaced by a Glidesheath Slender 7 Fr and the guiding catheter removed. Then, the Penumbra Red68" Neurovascular Catheter (Penumbra Inc, Alameda, USA), was advanced over the Sion Blue guidewire until reaching the site of thrombotic occlusion. Mechanical aspiration thrombectomy was performed (Figure 4) and the catheter was kept on suction and retrieved in right arm (Video 4). After that, both Glidesheat Slender and Penumbra Neurovascular Catheter were



VIDEO 1 Left coronary artery angiography.

removed (Video 5). The angiography showed TIMI II flow with minimal residual distal thrombosis. Drug-coated balloon (DCB) angioplasty with Magic Touch 4.0×30 mm (Concept Medical, Florida, USA) was performed (Figures 5 and 6) but no-reflow phenomenon appeared. Through a microcatheter, a local injection of epinephrine was made with rapid resolution of the no-reflow. In the end, intra-aortic balloon pump through right femoral artery was positioned and the procedure was stopped (Video 6).



VIDEO 2 Right coronary artery angiography.

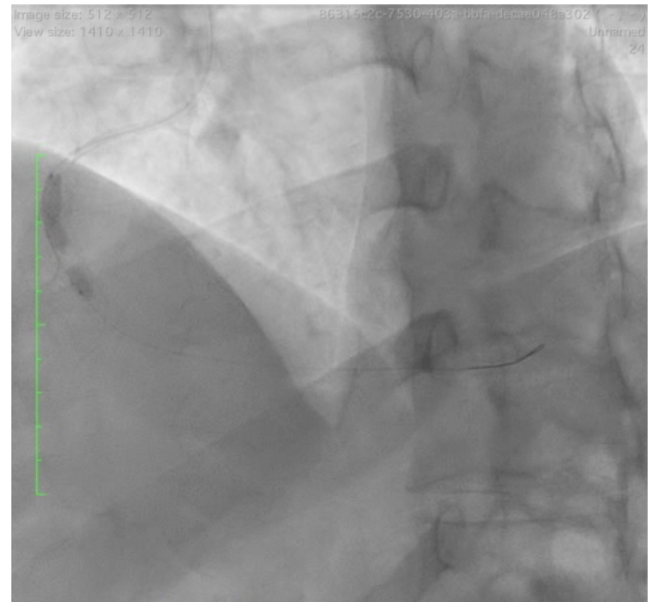


FIGURE 3 Coronary angioplasty with semi and noncompliant balloon of different diameter.

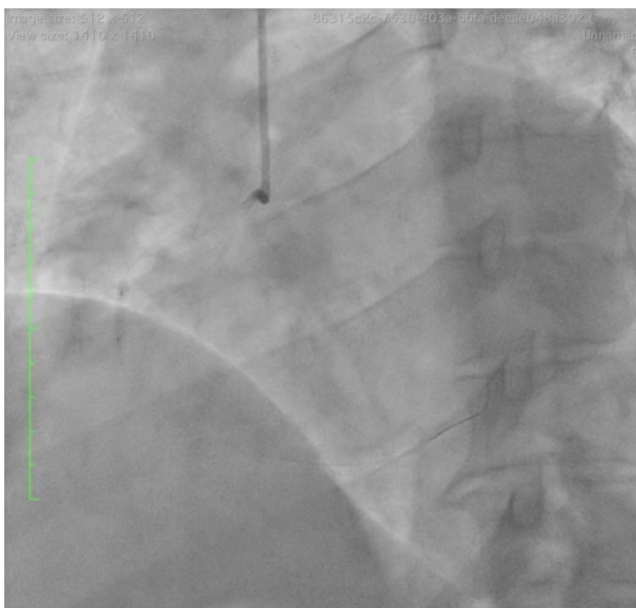
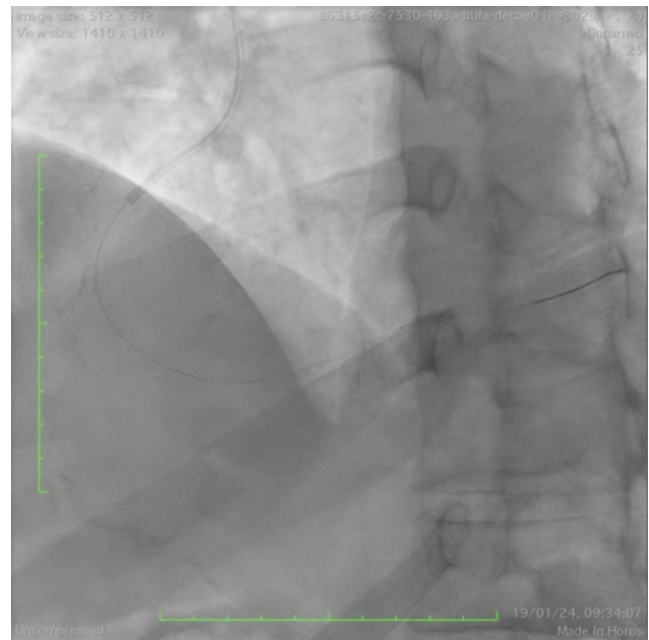


FIGURE 2 Coronary angioplasty with semi and noncompliant balloon of different diameter.



VIDEO 3 Manual thrombus aspiration.

4 | CONCLUSION AND RESULTS (OUTCOME AND FOLLOW-UP)

Routine laboratory test after the procedure revealed a hemoglobin drop with 1g loss after 48h. At 3 days the coronary angiography showed TIMI III flow with negligible distal dissection (Video 7). During the hospital stay the patient remained asymptomatic. The ejection fraction at discharge was mildly reduced (about 50%) and 2 days

after the control angiography the patient was discharged in good conditions, optimal functional status without the need for cardiac rehabilitation.

Our case demonstrated that mechanical aspiration thrombectomy with Penumbra Neurovascular Catheter from radial artery is feasible and relatively safe. However, the use of the dedicated device is to be preferred in the rare scenarios of acute ectatic coronary artery occlusion with high thrombotic burden.

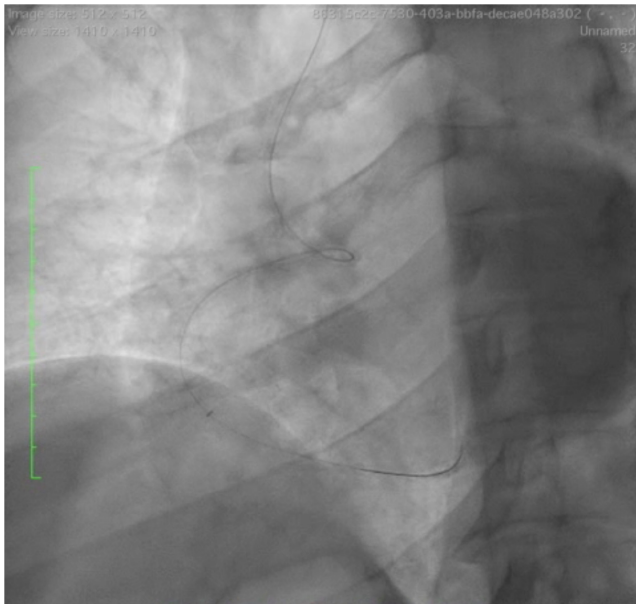
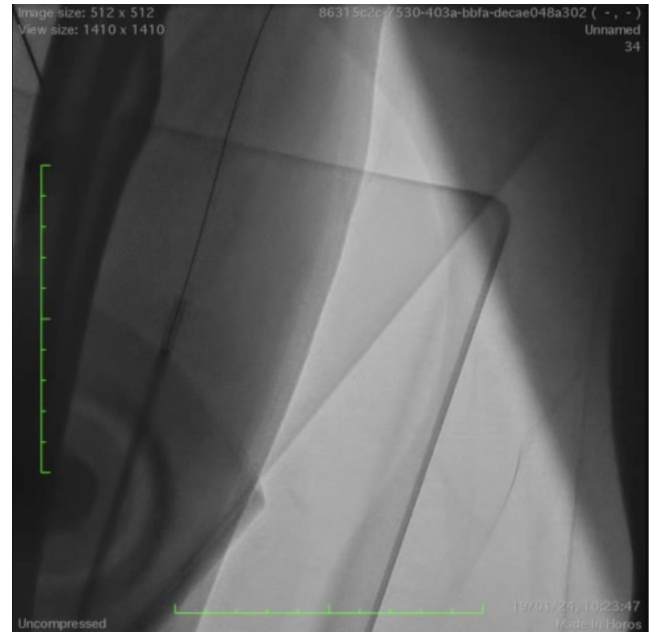
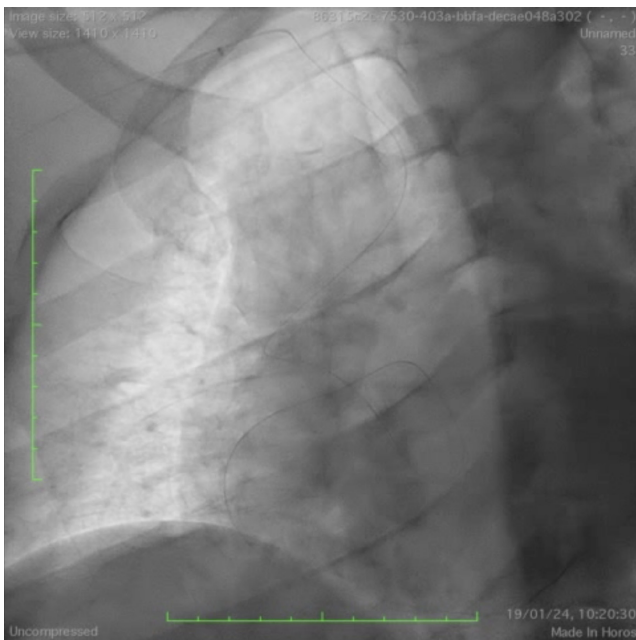


FIGURE 4 Mechanical aspiration thrombectomy using the Penumbra Neurovascular Catheter.



VIDEO 5 Catheter removal from right arm.



VIDEO 4 Neurovascular catheter retrieval after mechanical thrombectomy.

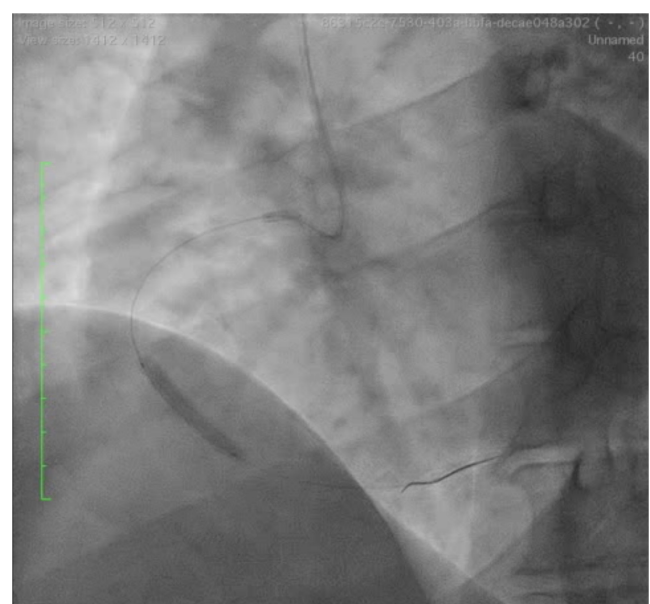


FIGURE 5 Drug-coated balloon angioplasty.

5 | DISCUSSION

This case report describes a challenging but successful case of inferior acute MI treated with mechanical aspiration thrombectomy using the Penumbra Neurovascular Catheter Red68" from radial artery. To the best of our knowledge, this is the first case in literature on the use of a Neurovascular Catheter for coronary mechanical thrombectomy.

Despite the limited evidence on the routinary use of the manual thrombus aspiration, specific setting and rare case requires it. The benefit of mechanical aspiration is represented by the possibility to generate a constant suction by a dedicated pump, reducing the limit of decreasing aspiration force that occurs during manual aspiration⁵ and the possibility of minimize distal embolization which may increase infarct size.⁶ The most important side effect is the hemoglobin drop observed after the utilization of this technique.

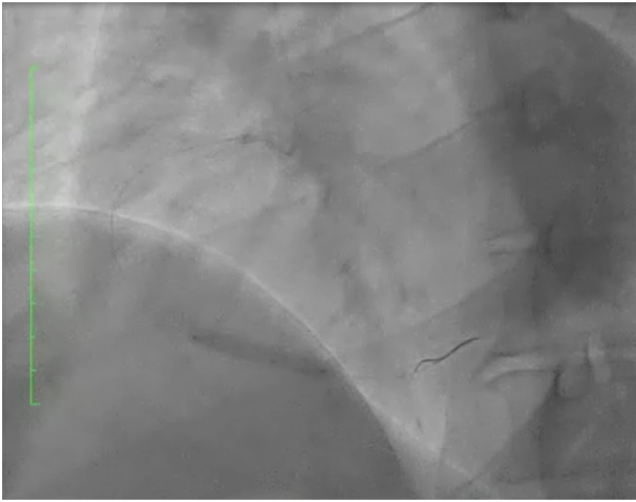


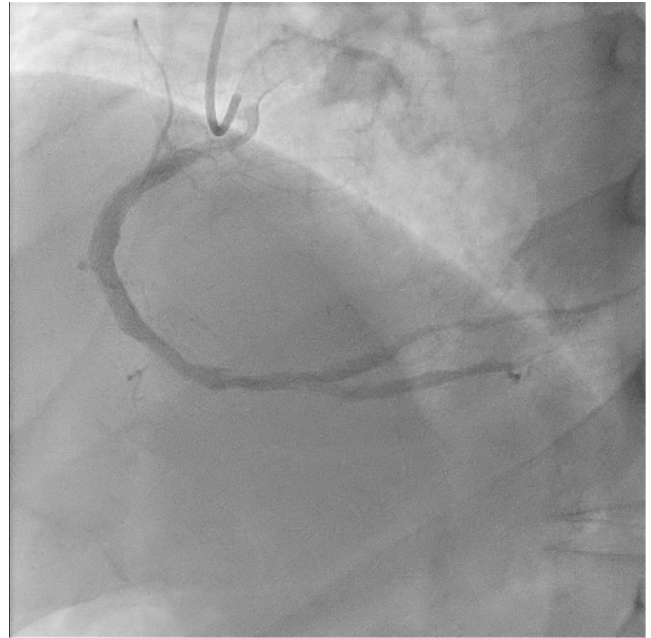
FIGURE 6 Drug-coated balloon angioplasty.



VIDEO 6 Final right coronary angiography.

The major limit of this case was the use of a not dedicated coronary device without guiding catheter, with the high risk of embolization retrieving the catheter in the radial sheath.

Of note, the choice of the Penumbra Neurovascular Catheter instead of the appropriate device (Penumbra Cat Rx) exclusively depended on the unavailability of the product in our laboratory. The use off-label of this device is not to be intended of choice during an acute MI requiring thrombus aspiration, preferring, if available, the dedicated catheter. Another important issue of this procedure was the debatable choice to perform a DCB-only angioplasty. In our opinion, the major goal of the procedure was



VIDEO 7 Three days right coronary angiography control.

to provide a homogeneous delivery of the antiproliferative drug with the suppression of endothelial inflammation avoiding permanent stent implantation during the acute phase in order to prevent stent-associated acute and long-term complications.

AUTHOR CONTRIBUTIONS

Michele Cacia: Conceptualization; data curation; formal analysis; investigation; methodology; writing – original draft; writing – review and editing. **Cristina Nesta:** Methodology. **Vittorio Pascale:** Data curation; visualization. **Marco Vatrano:** Validation; visualization. **Giulia Galiano Leone:** Supervision; visualization. **Emilia De Luca:** Investigation; methodology. **Alessandro Ferraro:** Investigation. **Vincenzo Antonio Ciconte:** Data curation.

ACKNOWLEDGMENTS

The authors thank the physicians of the Radiology Unit for the great support during the procedure.

FUNDING INFORMATION

None.

CONFLICT OF INTEREST STATEMENT

None relevant to this issue.

DATA AVAILABILITY STATEMENT

Data sharing not applicable—no new data generated. Data sharing is not applicable to this article as no new data were created or analyzed in this study.

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CONSENT

Written informed consent was obtained from the patient to publish this report in accordance with the journal's patient consent policy.

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How to cite this article: Cacia M, Nesta C, Pascale V, et al. Mechanical thrombectomy using neurovascular catheter from radial artery during acute myocardial infarction: A case report. *Clin Case Rep*. 2024;12:e9276. doi:[10.1002/ccr3.9276](https://doi.org/10.1002/ccr3.9276)