

Marinade technique: A strategy for thrombus burden reduction in acute coronary syndrome

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Primary percutaneous coronary intervention (PPCI) is the gold standard treatment for ST-segment elevation myocardial infarction [1]. However, a large thrombus burden in ST-segment elevation myocardial infarction has an increased risk of no-reflow and distal embolization and represents a technical challenge [2]. Several devices are being developed and tested to overcome this problem. We present a case combining manual aspiration and local intracoronary thrombolysis with the "marinade" technique that achieved procedural success.

A 25-year-old man, a current smoker with a previous history of obesity, polysubstance drug abuse, and an earlier episode of deep vein thrombosis in his right leg and heterozygous to the factor V Leiden mutation, was admitted with acute chest pain and ST-segment elevation in the anterior leads on the electrocardiogram. Urgent PPCI was performed after a loading dose of 300 mg of aspirin and 180 mg of ticagrelor. The angiography showed an acute occlusion of the ostial proximal left anterior descending coronary artery (LAD) and distal embolization of the second diagonal artery (Figure 1A). Repeated thrombus aspiration, infusion of glycoprotein IIb/IIIa inhibitors, and balloon angioplasty failed to restore distal flow (Figure 1B). Through a GuideLiner 6 French extensor catheter and distal occlusion of the vessel with a 3.5 × 12 mm balloon catheter ("marinade technique"), local infusion of fibrinolytic was administered (3 bolus of 5 mg of tenecteplase each for 5 minutes) (Figure 1C). In this way, we achieved TIMI grade 3 flow in the LAD artery (Figure 1D) with residual stenosis of 70%, with luminal area of 5 mm² measured by

intravascular ultrasound. For PPCI, a total of 10000 IU of unfractionated heparin was given. Triple antithrombotic therapy with aspirin, ticagrelor, and unfractionated heparin was maintained for seven days when a new coronary angiography was performed. The LAD presented TIMI grade 3 flow and the absence of significant stenosis. Optical coherence tomography showed simple plaque erosion with scarce red thrombus burden without significant plaque rupture and adequate luminal area at the LAD (Figure 1E–F). A transthoracic echocardiogram showed moderate reduced systolic dysfunction and an intraventricular thrombus. The patient was discharged on aspirin 100 mg per day, clopidogrel 75 per day, and apixaban 5 mg every 12 hours during the first month.

The combined use of intracoronary fibrinolytic infusion with distal coronary occlusion, previously referred to as the marinade technique, may prove beneficial for patients undergoing PPCI after failed intracoronary thrombus aspiration.

The marinade technique relies on the advantages of intracoronary fibrinolysis, encouraging the dissolution of the thrombus with both proximal and distal occlusion of the coronary vessel. For drug administration, an extension guide catheter is introduced into the vessel, followed by immediate inflation of a 1:1 balloon after the thrombus, blocking the distal flow for 5 minutes, intensifying the fibrinolytic effect.

Further potential benefits of this maneuver include protecting the distal circulation from microembolism and potentially promoting ischemic postconditioning of the heart during reperfusion after balloon retrieval [3–5].

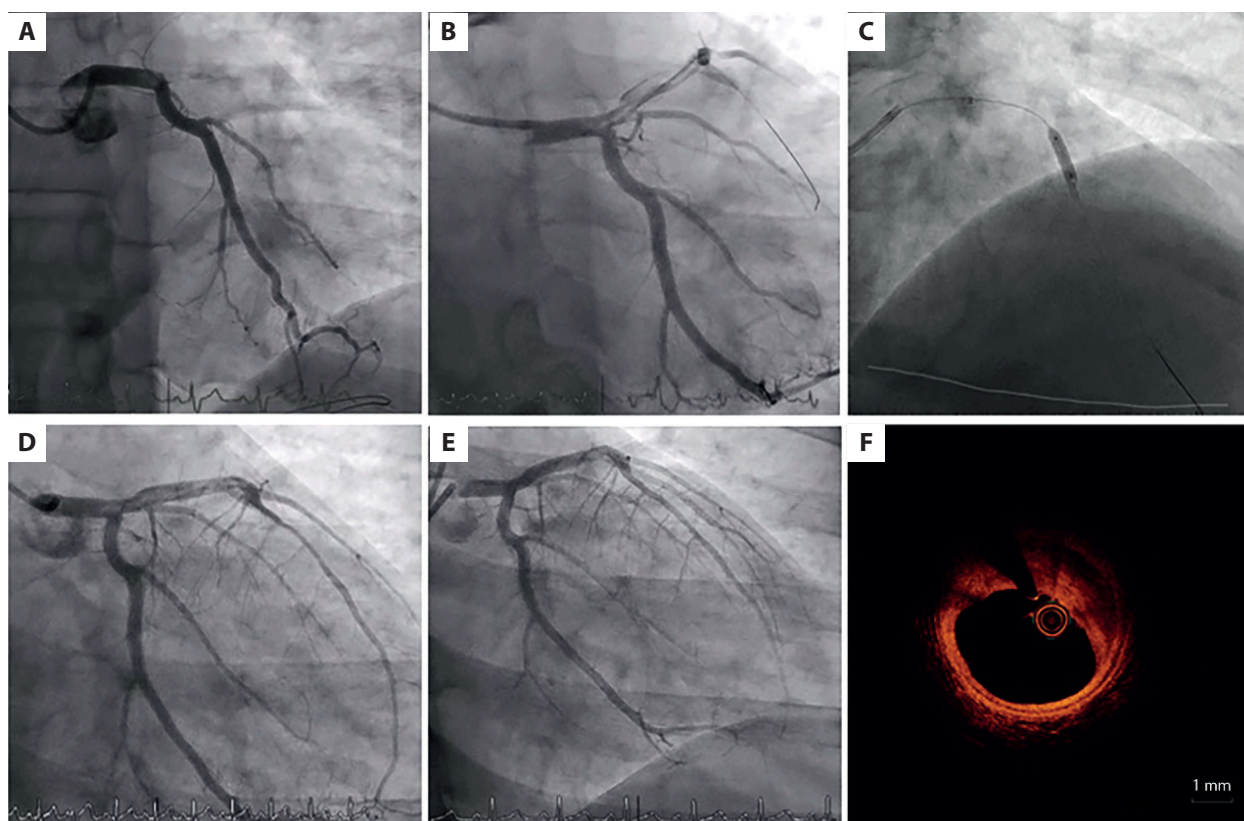


Figure 1. **A.** Initial angiography showing a complete occlusion of the ostial left anterior descending coronary artery. **B.** Angiography after thrombus aspiration, glycoprotein IIb/IIIa inhibitors infusion, and balloon angioplasty. **C.** Marinade technique. **D.** Angiography after the marinade technique with TIMI grade 3 flow in the left anterior descending coronary artery. **E-F.** Final angiography and optical coherence tomography of the left anterior descending artery

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REFERENCES

1. Byrne RA, Rossello X, Coughlan JJ, et al. 2023 ESC Guidelines for the management of acute coronary syndromes. *Eur Heart J.* 2023; 44(38): 3720–3826, doi: [10.1093/eurheartj/ehad191](https://doi.org/10.1093/eurheartj/ehad191), indexed in Pubmed: 37622654.
2. Ndrepepa G, Tiroch K, Fusaro M, et al. 5-year prognostic value of no-reflow phenomenon after percutaneous coronary intervention in patients with acute myocardial infarction. *J Am Coll Cardiol.* 2010; 55(21): 2383–2389, doi: [10.1016/j.jacc.2009.12.054](https://doi.org/10.1016/j.jacc.2009.12.054), indexed in Pubmed: 20488311.
3. Unzué L, García E, Teijeiro-Mestre R. Local fibrinolysis with distal occlusion: „marinade” technique [article in Spanish]. *Rev Esp Cardiol (Engl Ed).* 2022; 75(1): 86, doi: [10.1016/j.rec.2021.05.013](https://doi.org/10.1016/j.rec.2021.05.013), indexed in Pubmed: 34253458.
4. Damonte JI, Fernández AD, Agatiello CR, et al. Dual role of guide extension catheters for the management of high thrombus burden in STEMI: Case report and mini review. *Cardiovasc Revasc Med.* 2022; 45: 74–77, doi: [10.1016/j.carrev.2022.07.008](https://doi.org/10.1016/j.carrev.2022.07.008), indexed in Pubmed: 35909034.
5. Unzué L, García E, Del Río MR, et al. Local intracoronary fibrinolysis with distal occlusion: A series of cases using marinade technique. *Cardiovasc Revasc Med.* 2023; 53S: S239–S244, doi: [10.1016/j.carrev.2023.05.004](https://doi.org/10.1016/j.carrev.2023.05.004), indexed in Pubmed: 37202333.