



## Case Report

# Thrombectomy using aspiration catheter- An effective first line approach for resistant thrombi in patient of acute myocardial infarction

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## ABSTRACT

Acute myocardial infarction is caused by the rupture or erosion of an atherosclerotic plaque, initiating intraluminal thrombosis resulting in partial or complete occlusion of a coronary artery. Primary percutaneous coronary intervention (PCI) is the preferred treatment and is effective in opening the infarct-related artery. These results can be further improved with thrombus aspiration which reduces stent thrombosis and improves myocardial blush. In acute presentation, there is a high load of thrombus in the infarct-related artery and stent placement in such a case increases the chances of the thrombus shifting both proximally and distally in the microvasculature. In such patient, deferred stenting along with the attempt of thrombus aspiration has the potential for complete thrombus removal with improvement in TIMI flow which eliminates the need of stenting. Here, we present an interesting case report pertaining to the feasibility of multiple thrombus aspiration attempts (>25) as first approach in young patient (Male/32 years/no comorbidities) with late presentation of STEMI and a large resistant thrombus load on an angiogram. We also re-assessed the need of stenting after 5 days of thrombus aspiration attempt along with continued anticoagulation from the first contact with patient.

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## 1. Introduction

Myocardial infarction (MI) is the lethal manifestation of CHD and can present as sudden death.<sup>1</sup> Acute myocardial infarction with ST-segment elevation is caused by the rupture or erosion of an atherosclerotic plaque, initiating intraluminal thrombosis resulting in partial or complete occlusion of a coronary artery.<sup>2–4</sup> Primary percutaneous coronary intervention (PCI) is the preferred treatment for myocardial infarction with ST-segment elevation and is effective in opening the infarct-related artery.<sup>5–7</sup> Real-life data confirm that primary PCI is performed faster and results in lower mortality if performed in high-volume centres.<sup>8</sup>

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These results can be further improved with thrombus aspiration as this approach reduces stent thrombosis and improves myocardial blush.<sup>9</sup> However, in acute situations, there is a high load of thrombus in the infarct-related artery and the coronary vascular resistance is also high. Stent placement in such a case enhances the chances of the thrombus shifting both proximally and distally in the microvasculature. The occlusion of microvasculature by thrombus leads to the no-reflow phenomenon.<sup>10</sup> Deferred stenting is a novel strategy that aims to postpone stent placement for a fixed time window after stable distal flow has been achieved. The period of deferment allows gradual resorption of thrombus, improvement in TIMI flow, decrease in vasospasm and decreased periprocedural complications of slow flow. Further, not infrequently the

stent placement may be deferred altogether.<sup>11</sup> The use of stent retrievers for thrombus removal in acute ischaemic stroke has also been shown to be safe and effective.<sup>12</sup> Here, we report the case of successful thrombus removal using thrombus aspiration catheters and deferred stenting in a young man with late presentation of STEMI and high resistant thrombus burden with a good TIMI flow and improved EF during follow-up.

## 2. Case Presentation

A 32-year-old non-hypertensive, non-diabetic male patient with no history of any co-morbidities presented to emergency department of our hospital with complaint of left sided non-radiating chest pain on & off associated with breathing difficulty and perspiration since past two days. Patient was a non-smoker and non-alcoholic with no family history of cardiac disease. On primary survey, patient had dyspnea at rest (NYHA class IV) with respiratory rate of 28/min, room air oxygen saturation of 98%, a regular pulse of 90/min and a blood pressure of 140/70 mmHg. Lungs were clear on auscultation and no added cardiac sound heard other than S1S2.

### 2.1. Investigations

Initial ECG showed ST segment elevation in anterior lead (V1-V4) with poor R wave progression. A chest X-ray showed normal cardiac shadows with no evidence of collapse, or consolidation. Transthoracic echocardiography (TTE) revealed Distal IVS (intravascular septum), Apex & Anterior wall akinetic, Moderate LV (left ventricular) systolic dysfunction, resting regional wall motion abnormalities (RWMA) present and reduced LVEF (Left ventricular ejection fraction) (30-35%).

### 2.2. Treatment

After an initial evaluation, 180 mg loading dose of ticagrelor, 300 mg of ecospirin, 80mg of atorvastatin and unfractionated heparin as an initial IV bolus dose (5000 IU) were administered in emergency department before shifting the patient to Cathlab. The patient was taken for immediate coronary angiography.

A 7000 IU of unfractionated heparin was administered during the procedure. 6F sheath was inserted from right radial artery and angiogram was performed using 5F tiger. The CAG revealed total occlusion with a dense thrombus in the mid-segment of the LAD. 6F 3.5 EBU was used to start the angioplasty. After crossing the lesion with a treumo floppy guidewire, TIMI 0 flow had persisted in the LAD. Hence over that wire, we performed manual thrombus aspiration as an initial strategy using 6F thrombosuction device (thrombuster II, Asahi, Japan), multiple times (approximately 25 times) to remove the thrombus from LAD. The color of the thrombus was mixed

(red and white). Still, TIMI 0 flow had persisted in the LAD. Different sizes of PTCA balloons (1.5 \* 10mm, 2.5 \* 15mm, 3 \* 15mm) were used over the guidewire to dilate the lesion. This resulted into minimal clearance of the thrombus from the mid segment of LAD. Eventually, the distal thrombus was visualized. Now thrombosuction device was again passed over guidewire to distal LAD. Through that device, intracoronary bolus dose of Inj. Abxicimab 0.25 mg/kg and Inj. Nikorandil 1 mg were administered. Post that thrombosuction device was removed from distal LAD. Subsequently, wide open LAD with TIMI 3 flow was observed. There was no residual thrombus and patient got symptomatically better with no complain of chest pain.

Post-procedure, the patient was transferred to the intensive cardiac coronary care unit where the patient was treated with Inj. Abxicimab 0.125 ug/m/kg body weight/min for 12 hours via infusion and Inj. unfractionated heparin 500IU/hr infusion for 24 hours. Also, acetylsalicylic acid 75 mg/day, ticagrelor 90 mg/ twice a day, and atorvastatin 80mg/day was administered. ECG showed sinus rhythm, T-wave inversion in anterior lead (V1-V4) and LVEF marked an improvement from 30-35% to 45%.

### 2.3. Outcome and follow-Up

The patient was kept under observation for two days. During hospital stay, he was evaluated for possible etiology of AMI. All laboratory parameters were within normal limits and patient was discharged from the hospital with no complication during the course of treatment.

## 3. Discussion

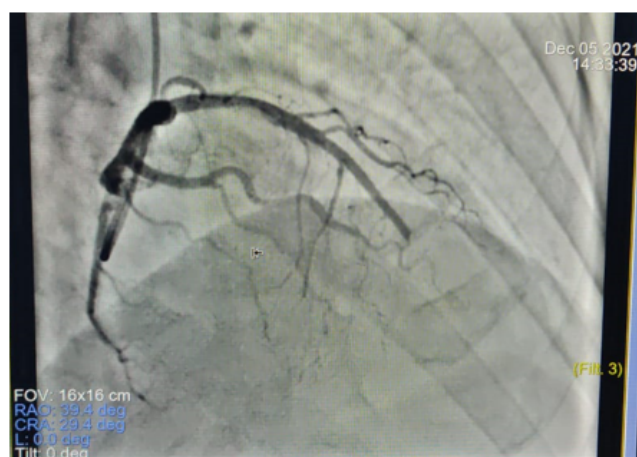
The patient in our study was a young male of 32 yrs with late presentation (>48 hrs) of acute myocardial infarction with ejection fraction of 30-35%. Angiography showed mixed resistant thrombi in LAD which was removed using thrombus aspiration technique with about 25 runs without the need of angioplasty. Then ejection fraction returned to normal value with no residual thrombi and complications. We reviewed case reports, trials or thrombus aspiration as first approach along with deferred stenting in the literature and analysed the benefit of this strategy. A case report by Pradhan et al.<sup>11</sup> mentioned a case of 45-year-old patient with acute MI presented after 8 hours with ejection fraction of 38% and angiographic findings of significant stenosis with grade IV thrombus in proximal LAD. Due to high thrombus burden, stenting was deferred and the patient was put on IV eptifibatide (a glycoprotein IIb IIIa inhibitor) infusion followed by subcutaneous low molecular weight heparin. After 5 days, his angiogram showed moderate stenosis and the thrombus in LAD was almost absent. Due to significant obstruction in LAD, a direct stenting procedure was performed with no residual thrombosis or complications

as the end result. An another similar case report of 54-year-old male with late presentation (>48 hrs) of acute myocardial infarction in which angiography showed a large thrombi in Left Circumflex artery (LCx). Having failed both aspiration thrombectomy and pharmacological thrombolysis, thrombectomy was attempted via thrombus retrieval device and the patient was discharged stable 2 days later and has remained symptom-free ever since.<sup>13</sup> Svilaas et al.<sup>14</sup> in their randomized trial study of 1071 patients also concluded that thrombus aspiration is applicable in a large majority of patients with myocardial infarction with ST-segment elevation, and it results in better reperfusion and clinical outcomes than conventional PCI, irrespective of clinical and angiographic characteristics at baseline.

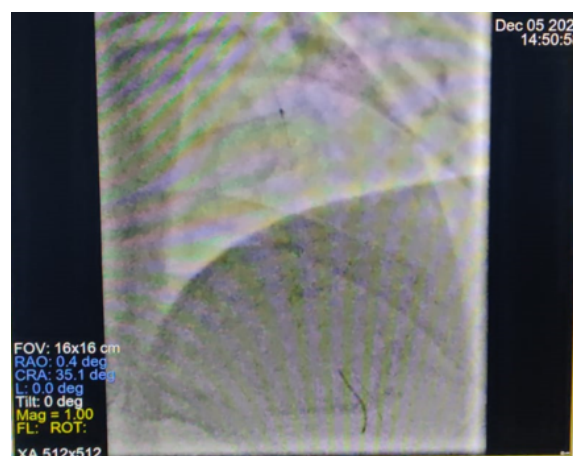
While performing manual thrombus aspiration in the present case, red and white coloured thrombi were observed. And studies from the past have observed that white thrombi had less ischemic time and had smaller vessels when compared with those with red thrombi. More importantly, white thrombi were associated with less mortality and a trend toward less MACE than seen in patients with red thrombi.<sup>15</sup>

### 3.1. Learning points/take home messages

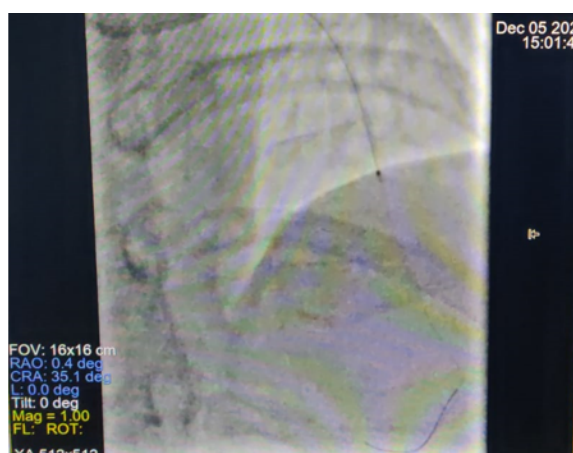
1. PCI with thrombus suction is the first line therapy for patient with Acute MI showing Single Vessel Disease.
2. In case of late presented acute MI with resistant thrombi, thrombus aspiration with optimum efforts and delaying PCI should be taken into consideration.
3. Individualized management approach is the key while managing the patient with acute MI having resistant thrombus.



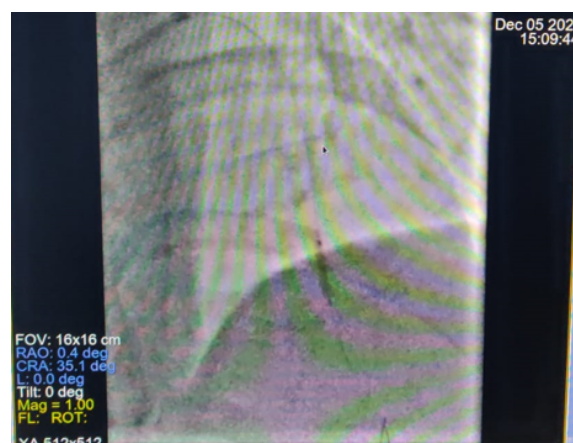
**Fig. 1:** RAO cranial 30° showing LAD mid segment total occlusion with thrombus.



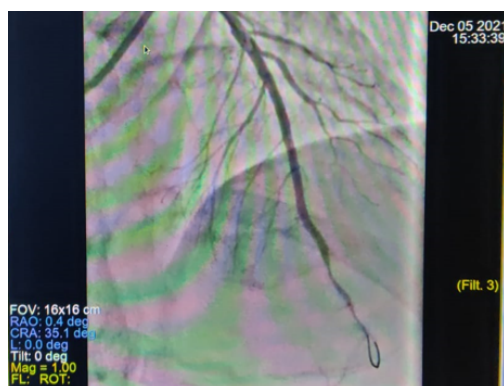
**Fig. 2:** Different sizes of balloon angioplasty done to totally occluded LAD.



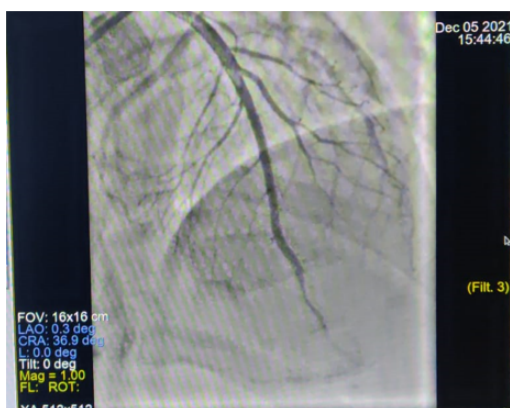
**Fig. 3:** Multiple aspiration run of 6FThrombuster done to aspirate thrombus.



**Fig. 4:** Another 2.5 x 12 mm balloon inflated in the LAD to establish flow in Distal LAD.



**Fig. 5:** Intracoronary Abxici-mab bolus dose administered.



**Fig. 6:** Widely opened distal LAD seen.

#### 4. Patient's Perspective

I was suffering from a very bad chest pain since past two days. Initially I thought it was due to gastritis or something but then I started feeling breathing difficulty and suddenly the pain increased way too much. When I came to the emergency department of the hospital, I along with my relative were explained about the condition I was suffering from and the required treatment options. Post treatment I was completely relieved from the pain and most importantly without the need for any stenting, I was told that my heart function is also improving. I feel grateful for the treatment and I sincerely convey my gratitude to all the doctors involved in this case.

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None.

#### 6. Conflict of Interest

None.

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