

# “Mother and Child Technique” Combined with Super Selective Pharmacological Intervention for Large Intracoronary Thrombus

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## ABSTRACT

Primary percutaneous intervention (PCI) in acute ST elevation myocardial infarction (MI) is a preferred way of treatment nowadays. Sometimes it becomes difficult to get good myocardial blood flow during PCI if clot burden is large. In this case of an elderly lady, the use of “Mother and Child Technique” combined with super selective pharmacological intervention is demonstrated to achieve good blood flow when conventional means are not working.

**Key words:** *Mother and child technique. Primary percutaneous intervention. Intracoronary thrombus.*

## INTRODUCTION

Acute ST-elevation myocardial infarction (MI) has always been a catastrophic event. Primary percutaneous intervention (PCI) has shown to decrease the mortality in patients with acute MI. Primary PCI in patients with a large thrombus burden is a demanding clinical situation associated with impaired clinical outcomes.<sup>1</sup> Mechanical and pharmacological management of coronary thrombosis has been shown to effectively remove a variable fraction of intracoronary thrombus. Pharmacological therapies as well as different mechanical therapies have been used to remove clot from coronary arteries.

In rare circumstances, the clot burden may be so large that this becomes very difficult to extract clot and restore flow despite available means (aspiration catheters). Here, the authors have demonstrated a new technique with a self-made “Mother and Child catheter” with larger internal luminal diameter (ILD) along with super selective pharmacological management to retrieve clot.

**Procedure:** This is the case summary of a 65 years old woman without any risk factors for coronary artery disease. She presented with 3 days history of intermittent shortness of breath and chest discomfort. Because of cardiogenic pulmonary edema, she required artificial ventilation. On admission, her EKG revealed 3-4 mm ST segment elevation in precordial leads. She was brought to cardiac catheterization laboratory with diagnosis of acute anterior wall myocardial infarction for possible primary PCI. Patient was pre-treated with Aspirin 300 mg, Clopidogrel 600 mg and bolus of

unfractionated intravenous Heparin. Her coronary angiogram performed through right femoral artery revealed totally occluded mid left anterior descending artery (LAD) just after S1 with large clot burden and non-obstructive disease in the rest of the vessels (Figure 1). It was decided to proceed with primary PCI of mid LAD.

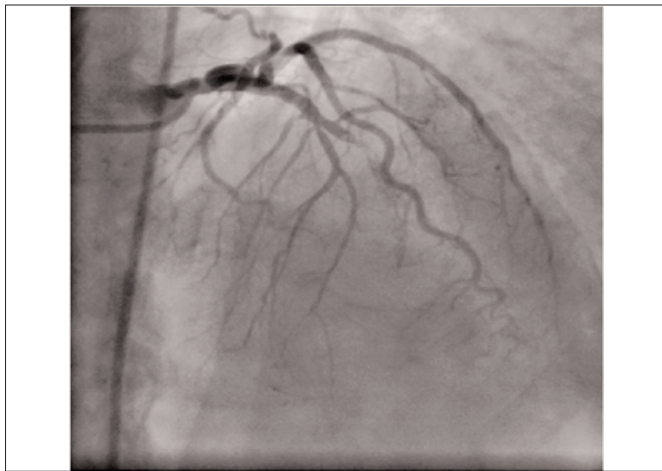
Left main was engaged with judkins left (JL) 3.5 6F (cordis), internal diameter (I.D.) 0.070 inches (1.8 mm) 100 cm long catheter. LAD was wired with Cougar XT (HT) 0.014 x 190 cm (Medtronic) wire. Aspiration done with 6F export aspiration (Medtronic) I.D. 0.054 inches (1.37 mm) catheter. Despite repeated attempts the flow could not be restored and each time export aspiration catheter tends to clog off. Activated clotting time was kept more than 250 second. Balloon dilatation done with Nimbus Pico (clear stream) 2.5 x 15 mm at 2-4 atm. in mid LAD but still unable to restore flow. Mother and Child Technique with 6F and 8F catheters was used to retrieve thrombus. A 100 cm JL 3.5 8F (cordis), I.D. 0.88 inches (2.2 mm). Guiding catheter was cut from proximal end at about 20 cm and mouth of the proximal end was opened using the dilator of 8F femoral sheath. This catheter was used as “mother catheter”. A 100 cm multipurpose A1 (MPA1) 6F (cordis), I.D. 0.070 inches (1.8 mm) was used as “child catheter”. This was introduced through proximal end of 8F JL3.5 8F catheter (Figure 2). The 6F MPA1 tip was kept inside the tip of 8F JL3.5 catheter and left main vessel was engaged with JL3.5 8F catheter. LAD was wired again with Cougar XT (HT) 0.014 x 190 cm (Medtronic) wire. Over the wire 6F MPA1 catheter advanced into the LAD and passed up to the mid LAD (Figure 3). Aspiration was done with the help of a 20 cc syringe through MPA1 6F catheter. After three aspirations and taking out large thrombus, the flow was restored in the left anterior descending artery. Keeping in view the large thrombus and also some residual thrombus in distal LAD, super selective pharmacological therapy with Abciximab bolus and half dose (125 KU) of intracoronary streptokinase was given.

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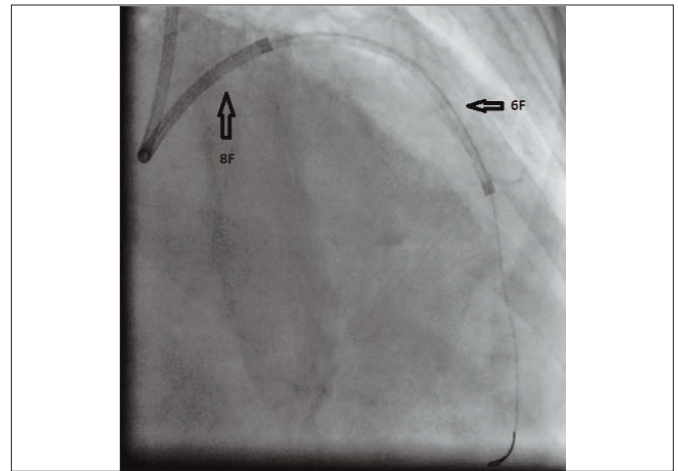
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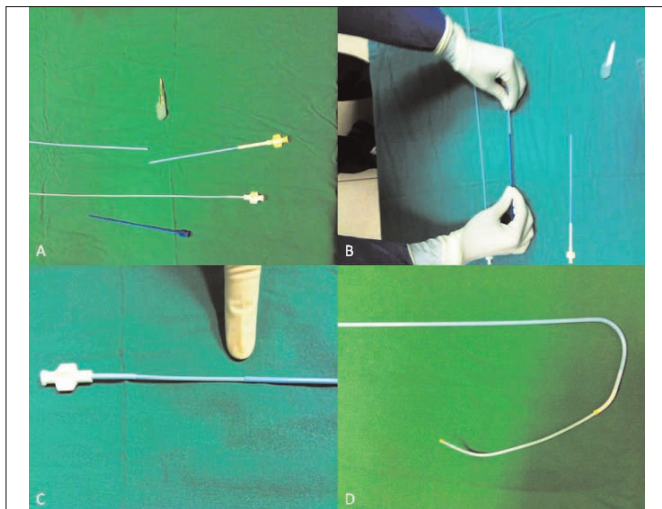
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**Figure 1:** Mid LAD with large clot burden.



**Figure 3:** MPA1 catheter advanced into the LAD and passed up to the mid LAD.

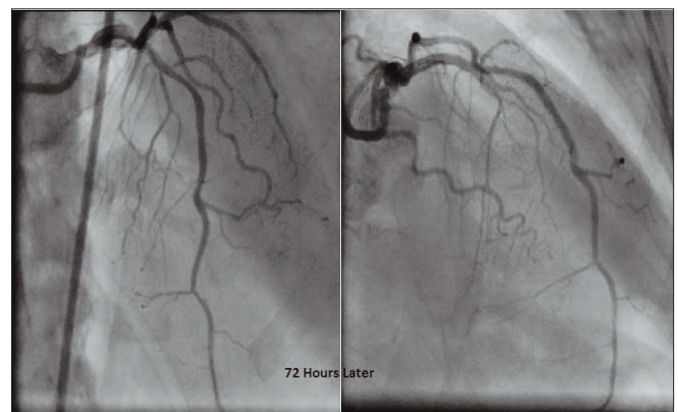


**Figure 2:** Panel A, JL 3.5 8F (Cordis) guiding catheter "Mother Catheter" cut at proximal end at about 20 cm, Panel B, Mouth of the proximal end of JL3.5 catheter was opened using the dilator of 8F femoral sheath, Panel C&D, A 100 cm multipurpose A1 6F (Cordis) "Child catheter" introduced through proximal end of 8F JL3.5 8F catheter.

After restoring flow, it was decided to defer any stenting and have a re-look angiogram after 72 hours. Patient was kept on anti-platelet agents. Re-look coronary angiogram after 72 hours showed patent LAD with TIMI 111 flow with myocardial blush grade of 2-3 and non-obstructive disease in mid LAD (Figure 4). It was decided not to stent the vessel and continue anti-platelet therapy. She was extubated after 4 days of her index admission and her subsequent hospital course was uneventful from cardiac point. After 2 months of follow up, patient is asymptomatic and doing well.

## DISCUSSION

Acute MI with ST-segment elevation is caused by the rupture or erosion of an atherosclerotic plaque, which leads to intraluminal thrombosis and hence resulting in complete occlusion of a coronary artery.<sup>1</sup> Primary PCI is now the preferred treatment for myocardial infarction



**Figure 4:** Patent LAD with non-obstructive disease in mid LAD 72 hours later.

with ST-segment elevation and is effective in opening the infarct-related artery with better outcome.<sup>2</sup> One of the problems which an interventional cardiologist can encounter during PCI is large clot burden and no-reflow. Sometimes, this becomes impossible to achieve good myocardial blush grade because of large clot burden and no-re-flow. This has been shown that use of a 6F compatible aspiration catheter for thrombus aspiration resulted in better myocardial blush grade and ST-segment elevation resolution and hence resulted in better reperfusion and clinical outcomes than conventional PCI, irrespective of clinical and angiographic characteristics at baseline.<sup>3</sup>

In this case we tried such an aspiration catheter multiple times but flow restoration and clot extraction could not be achieved despite repeated attempts. Due to the high frequency of suboptimal myocardial reperfusion after primary PCI in some cases many devices to extract clot and protect microcirculation have been used but with conflicting results.<sup>4,5</sup> Moreover, these devices are also not readily available in many catheterization laboratories.

This was one of the cases in which conventional means of extracting clot were unsuccessful and there was a

need to have larger caliber catheter to extract clot. The original idea of "Mother and Child Technique" was proposed by Takahashi *et al.* with the use of a 5F and 6F catheter (as mother and child catheters) to have better support and cross lesion especially in patients with chronic total occlusion.<sup>6</sup> In this case, more internal luminal diameter was required to get maximum clot retrieval. Therefore, 6F MPA1 catheter was used as child catheter and JL3.5 8F catheter as mother catheter to get larger ILD and maximum backup support to extract clot. Though there can be a concern regarding vessel injury with the use of such catheter due to its stiffness, we believe this can be easily used when any other maneuver is not working, and to be on safe side, one can use the shaft of balloon catheter to pass child catheter inside the vessel. This technique was found to be extremely helpful to remove clot when conventional means were not working. After the removal of most of the clot, super selective pharmacological treatment can get rid of some residual distal LAD clot to prevent clot formation again as suggested by Cortese *et al.*<sup>7</sup>

To our knowledge, this is the first case where the use of self-made "Mother and Child Catheter" was demonstrated with larger bore catheters and combined with the use of super selective pharmacological management to achieve flow and good myocardial blush grade.

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