Intraprocedural Thrombus Formation in the Left Main Tract During Primary Percutaneous Coronary Intervention

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ABSTRACT
A 67 years old male presented with acute myocardial infarction. Emergency coronary angiography demonstrated subocclusive stenosis in the proximal Left Anterior Descending artery (LAD). Primary Percutaneous Coronary Intervention (PCI) was complicated with intraprocedural thrombosis in the distal Left Main Tract (LMT) following implantation of a stent in the mid LAD. The thrombus was successfully managed with heparin and quadruple antiplatelet therapy (abciximab, aspirin, clopidogrel, and cilostazol) after several attempts of thrombectomy adequate distal flow was achieved. The lesion in the proximal LAD was successfully treated using a kissing stent technique in the second stage.

Key Words: Myocardial infarction. Angioplasty. Thrombus. Percutaneous Coronary Intervention. Main tract.

INTRODUCTION
A thrombus formation during Percutaneous Coronary Intervention (PCI) is rare with observed rates of up to 1.7% in the Drug-Eluting Stent (DES) era.1,2 The presence of intracoronary thrombosis increases the incidence of acute complications with PCI and adverse clinical outcomes.3 To date, despite continuing refinements in pharmacotherapy and device technology including mechanical thrombectomy devices, the optimal management of thrombus containing lesions remains uncertain.4

This case report describes a challenging case of intraprocedural thrombosis in the left main tract during primary PCI.

CASE REPORT
A 67 years old man presented with severe chest pain beginning 3 hours before admission. At presentation, blood pressure was 120/70 mmHg and pulse rate was 72 bpm with normal respiratory rate and oxygen saturation. He was an active smoker (20 pack-years). Electrocardiogram showed Q-waves and ST-segment elevation in leads of V1-4. Troponin-I and creatine kinase-MB levels were elevated (0.99 ng/mL, 37.2 µg/L, respectively). Following administration of 300 mg of aspirin and 600 mg of clopidogrel and unfractionated heparin (bolus dose of 5,000 IU followed by infusion of 80 IU/hour), coronary angiography was performed via the right femoral artery. It showed sub-occlusive (> 99%) stenosis at the ostium of the Left Anterior Descending artery (LAD) with Thrombolysis In Myocardial Infarction (TIMI) flow grade-2 (Figure 1A). The proximal Left Circumflex Artery (LCX) and the Right Coronary Artery (RCA) had moderate stenosis. He refused to undergo emergency coronary artery bypass graft surgery.

The left coronary intervention was proceeded with a 7 Fr JL-4 SH guiding catheter (Vista Brite tip®, Cordis Co.) and a guidewire (Runthrough NS®, Terumo Co.) without additional dose of heparin due to prolonged Activated Clotting Time (ACT) of 461 seconds. The door to wire time was 68 minutes. The LAD ostium was opened using a 2.5 x 20 mm balloon (Maveric®, Boston Scientific Co., Figure 1B). A contrast injection following the implantation of a stent (3.0 x 28 mm Promus Element® stent, Boston Scientific Co.) in the mid LAD revealed a large newly-formed intraluminal filling defect in the Left Main Tract (LMT) extending into both the LAD and the LCX arteries (Figures 1C and 1D). The patient developed chest pain deteriorated into cardiogenic shock with blood pressure of 70/40 mmHg requiring an Intra-aortic Balloon Pump (IABP). At that time, 40 minutes after the first ACT test, the ACT was 84 seconds. An additional dose of 5,000 IU of unfractionated heparin and 12.5 mg of abciximab were administered intravenously and followed by infusion of 0.125 mcg/kg/minute of abciximab for 12 hours. Several attempts of thrombectomy using a 7 Fr Thrombuster-II® (Kaneka Corporation) restored TIMI 3 coronary flow. Subsequently, his vital status was stabilized without thrombus progression (Figure 1E). A decision was made to perform a staged intervention after the antithrombotic management because of the concerns for distal embozization and no-reflow phenomenon. He was weaned from IABP on the following day and received aspirin (100 mg/day), clopidogrel (75 mg/day), and cilostazol (200 mg/day) in addition to heparin infusion with dose adjustment to maintain the aPTT at 1.5 times control.
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The echocardiography on the next day after PCI showed an ejection fraction of 37% and ankyesia of the anterolateral LV wall, from base to apex, with adequate myocardial contrast perfusion except the apex. Repeat angiography and the IVUS interrogation 7 days later showed complete thrombus resolution (Figure 2). The residual stenoses in the LAD and LCX were treated with two additional stents (4.0 x 16 mm Promus Element stent for LAD, 3.5 x 24 mm Promus Element stent for LCX, Boston Scientific Co.) using kissing stent technique. Final angiography showed a good result with TIMI flow grade 3 (Figure 1F). The patient had an uneventful recovery and was discharged 2 days after the second procedure. At 6-month follow-up, he was doing well without any adverse events.

**DISCUSSION**

In patients with Acute Coronary Syndrome (ACS), the incidence of intracoronary thrombus reaccumulation is significantly higher with percutaneous transluminal coronary angioplasty, ranging from 8% to 51%. Chieffo et al. reported that Intraprocedural Stent Thrombosis (IPST), defined as an angiographically intraluminal filling defect within the stent, occurred in 0.7% of cases during elective implantation of Sirolimus-Eluting Stents (SES) in 670 patients in the absence of acute MI, thrombus-containing lesions, and residual persistent dissections.5 The predictors of IPST, which have been suggested so far in the literature, include persistent dissection, total stent length, bifurcation lesions, lower ejection fraction, undersizing of the stent, and stenting in acute MI.1,6,7 In this case, the IVUS performed 7 days later revealed no dissections related to stent placement. The prolonged ACT time of 461 seconds at the beginning of the procedure might be falsely elevated due to heparin contamination of blood sampled from the arterial sheath.

A newly formed thrombus is friable and prone to distal embolization during PCI. The best management strategy for coronary thrombotic lesions is still controversial.4 Thrombus aspiration is a treatment option which can improve both the procedural and the long-term outcomes.8,9 Adjunctive abciximab therapy in primary angioplasty for high-risk patients is known to be beneficial.10 In this case, the remained thrombus resistant to thrombecomy put the patient at high risk for procedure-related complications and even to death. Once his vital status recovered from the shock with IABP, multiple antiplatelet and anticoagulant medications followed by the staged PCI led to a good outcome. A staged PCI after multiple antiplatelet and anticoagulant agents may be an option to deal with an intraprocedural thrombotic complication during primary PCI when an acceptable distal flow had been obtained. Treatment also included an attempt at thrombectomy which restored TIMI-3 coronary flow.

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**REFERENCES**


