Successful Endovascular Treatment for Simultaneous Multiple Thromboemboli Following Myocardial Infarction

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ABSTRACT: An 81-year-old female was referred for myocardial infarction with heart failure. She was successfully treated with percutaneous coronary intervention (PCI), and left ventriculogram revealed an apical thrombus 20 mm in diameter. Multiple simultaneous thromboemboli occurred in her right renal artery, supramesenteric artery (SMA), and right popliteal artery on the fifth day after PCI despite anticoagulant therapy. Emergency endovascular therapy (EVT) with an aspiration catheter and ballooning were performed to the popliteal and renal artery, in addition to additional stenting of the SMA because of an intramural hematoma. This one session of emergency EVT was sufficient to save this patient, and no sequelae were observed after this treatment.

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Whereas anticoagulant therapy is essential for treatment of thromboemboli, additional endovascular treatments such as aspiration thrombectomy and balloon dilation should also be considered when the patient has an acute organ ischemia. Accordingly, an early interventional strategy with catheter angioplasty including thrombectomy may become an important option to achieve better outcomes for such patients. The present paper describes a successful one-session treatment for simultaneous multiple emboli due to an apical thrombus from the left ventricle after myocardial infarction.

Case Report. An 81-year-old female was referred from another hospital with dyspnea. Her electrocardiogram showed ST elevation in the anterior leads, which suggested myocardial ischemia of the anterior wall. Emergency coronary angiography revealed 99% stenosis in the middle portion of the left anterior descending artery. A favorable blood flow was achieved by coronary intervention using two Endeavor stents (Medtronic, Inc), and left ventriculography showed a 20-mm diameter ball-like thrombus at the left ventricular apex (Figures 1 and 2). The thrombus looked like the protruding type; anticoagulant treatment was initiated using a drip infusion of unfractionated heparin and oral warfarin with careful monitoring. Two-dimensional echocardiogram 3 days after starting anticoagulant treatment revealed that the thrombus was obviously more mobile than on the day before. Daily cardiac echo monitoring showed no thrombus in the left ventricle on day 4, and the patient had no complaints or neurological deficits. The patient suddenly complained of severe abdominal pain and right lower leg pain the next day, with pallor, no pulse, and paresthesia. Both contrast-enhanced computed tomography (CT) for abdomen and duplex ultrasound on the right lower extremity were performed immediately after the onset. CT images showed a right renal infarction, and thrombus blocking the flow of the supramesenteric artery (SMA) and the right popliteal artery, all of which were presumably derived from the left ventricular apical thrombus. Fortunately, there was no evidence of cerebral infarction or neurological deficit. Aspiration thrombectomy using a hydrophilic 0.035˝ guidewire (Radifocus; Terumo, Inc) and 6 Fr guiding catheter (Hearthrail ST01; Terumo, Inc) was performed for the right popliteal artery and that restored blood flow to the arteries below the knee (Figure 3). Angiogram of the SMA confirmed the acute thrombotic occlusion. Aspiration thrombectomy was performed using a 0.014˝ guide wire (Runthrough NS; Terumo, Inc) with an aspiration catheter (6 Fr Thrombus III; Kaneka, Inc) to avoid any injuries inside the vessel. Removing clots did not restore the blood flow, and intravascular ultrasound revealed an intramural hematoma inside the SMA. Two bare-metal Driver stents (4.0 x 30 mm and 3.0 x 30 mm; Medtronic, Inc) were implanted into...
the SMA. Stenting restored excellent blood flow (Figure 4). Finally, aspiration thrombectomy to the right renal artery restored the blood flow to the kidney (Figure 5).

Systemic inflammatory response syndrome and intestinal bleeding with bacterial enterocolitis occurred following endovascular treatment, and the patient was intubated to secure respiration and given a blood transfusion, antibiotics, and ventilation with positive end-expiratory pressure. Daily continuous hemodialysis filtration was administered to manage multiple organ failure. She recovered 14 days after treatment in the intensive care unit, and was discharged. Angiography confirmed excellent blood flow through all treated vessels prior to discharge.

Discussion. Multiple emboli due to intracardiac thrombi are severe life-threatening complications, especially left ventricular thrombus that could cause acute myocardial infarction.2 Surgical intervention is generally recommended to remove the intraventricular thrombus,3 but that indication and its efficacy are controversial. On the other hand, anticoagulant therapy is essential for left ventricular thrombus,4 especially in cases of immobile thrombus. Surgical intervention was certainly considered in the present case, but not applied because of the patient’s age and impaired cardiac function. First, anticoagulant therapy was started and continued using intravenous unfractionated heparin and oral warfarin following PCI, while monitoring intraventricular thrombus. However, echocardiogram showed no thrombus in the left ventricular cavity on the fourth day, in spite of daily observation. The thrombus was apparently gone, and the patient did not complain of any symptoms. Furthermore, there was no elevation of creatine phosphokinase observed in blood samples. This suggested the thrombus could have been trapped, presumably around the aortic arch, where it could not be detected by ultrasound. The patient was carefully monitored. She suddenly complained of severe abdominal pain and right leg pain the following day. Emergency CT revealed a right kidney infarction and thrombus inside the SMA. Doppler ultrasonography showed
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an occlusion of the right popliteal artery. Angiography and EVT with aspiration thrombectomy were performed to resolve her multiple organ ischemia. Fortunately, direct thrombus aspiration for right popliteal artery using guiding catheter restored the blood flow and most of her leg pain was diminished. Next, the SMA was treated with thrombus aspiration and angioplasty. Thrombectomy itself could not restore the blood flow using only a 6 Fr aspiration catheter. Balloon angioplasty was performed, thus causing an unexpected dissection and intramural hematoma inside the SMA that blocked the blood supply to the intestine. A coronary bare-metal stent was inserted to resolve this situation. Two bare-metal stents were implanted and angiography showed excellent recovery of the blood flow. Finally, EVT was applied to the right renal artery using only aspiration with Thrombuster III, but it proved to be very successful and the blood flow was completely restored. All the interventions were performed within 6 hours after the onset of her symptoms. Though this octogenarian patient had to overcome life-threatening complications, including an infection, systemic inflammatory response syndrome, and multiple organ failure after the EVT, the immediate endovascular complete revascularization minimized plural organ ischemia and provided an excellent outcome.

Summary. This report presented a case of left ventricular thrombus after myocardial infarction that caused simultaneous multiple emboli that required aggressive EVT to achieve complete revascularization. One session of EVT for simultaneous multiple emboli was effective and saved the patient’s life.

References