Usefulness of a 6 Fr Right Judkins Catheter for Mechanically Extracting a Massive Intracoronary Thrombus From an Ectasic Right Coronary Artery

A report on two different cases of thrombectomy

Satoru ONODA,¹ MD, Makoto MUTOH,¹ MD, Tetsuya ISHIKAWA,¹ MD, Hiroshi SAKAMOTO,¹ MD, Junichi YAMAGUCHI,¹ MD, Hisayuki OKADA,¹ MD, Tetsushi TSURUSAKI,¹ MD, Takeyuki KUBOTA,¹ MD, Shinichiro TAKIZAWA,¹ MD, Hidenori YAGI,² MD, Chikara MORI,² MD, Hidetaka NAGASAWA,² MD, Takahiro SHIBATA,² MD, Satoru YOSHIDA,² MD, Kamon IMAI,¹ MD, Toshinobu HORIE,¹ MD, *and* Seibu MOCHIZUKI,² MD

SUMMARY

In order to bail out the slow-flow phenomenon (slow flow) created by a massive thrombus in an ectasic right coronary artery, a thrombus was mechanically extracted with a 6 Fr right Judkins (JR) catheter, which proved to be more useful than a usual thrombectomy using a RescueTM PT system catheter (Rescue). In case 1, the Rescue was used in combination with thrombolysis but failed to alleviate the slow flow that was implicated in a large infarction. On the other hand, in case 2, aggressive thrombectomy with a 6 Fr JR catheter with an 8 Fr Amplatz guiding catheter successfully extracted the massive intracoronary thrombus, restoring good coronary flow. Therefore, mechanical extraction with a 6 Fr JR catheter is safe and useful in cases of massive thrombus when diffuse coronary artery ectasia complicates an acute myocardial infarction. In addition, this method should be applicable to cases of acute coronary syndrome with massive thrombus. (Jpn Heart J 2004; 45: 673-678)

Key words: Myocardial infarction, Thrombectomy, No-reflow phenomenon, Coronary ectasia

DIFFUSE coronary artery ectasia (CAE) without coronary stenosis complicates several types of ischemic heart diseases owing to the deterioration of coronary flow reserve.¹⁾ However, when acute myocardial infarction (AMI) occurs in a case of CAE, which is often the case,^{2,3)} current reperfusion therapies (thrombolysis, ballooning and stenting, and thrombectomy with a RescueTM PT system

From the ¹Division of Cardiology, Saitama Cardiovascular and Respiratory Center, Saitama, ²Division of Cardiology, Department of Internal Medicine, The Jikei University School of Medicine, Tokyo, Japan.

Address for correspondence: Satoru Onoda, MD, Division of Cardiology, Saitama Cardiovascular and Respiratory Center, 1696 Itai, Kohnan-cho, Osato-gun, Saitama 360-0105, Japan.

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catheter (Rescue) and thrombusterTM, and distal protection with a PercuSurgeTM GuardWireTM system) are limited with respect to preventing development of a no reflow phenomenon (no reflow) due to the large arterial size and a massive intracoronary thrombus. Therefore, a system for treating AMI occurring in conjunction with CAE is needed.^{4,5)}

In the present study, we report the usefulness of a 6 Fr right Judkins (JR) catheter in mechanically extracting a massive intracoronary thrombus in order to successfully bail out the no reflow in a case of AMI with CAE. In addition, we propose this novel aggressive approach may also be useful in cases of AMI with massive thrombus.

CASE REPORTS

Case 1 (An unsuccessful case with Rescue): In January 10, 2003, a 38-year-old man was admitted to the emergency department of our hospital complaining of severe anterior chest pain. His coronary risk factors were hyperlipidemia, hypertension, smoking, diabetes mellitus, and obesity (BMI = 35), but none were being treated. There was no mention of Kawasaki disease in his medical history, but he had suffered from prodromal effort angina pectoris (e-AP) for a few weeks. Since the ST segment was elevated in leads II, III, and aV_f of an electrocardiogram (ECG) and the asynergy of a broad inferior lesion was observed with ultrasound cardiography (UCG), we made a diagnosis of inferior AMI. An emergency coronary angiogram (CAG) was then performed. The CAG revealed massive thrombus at the site from # 2 to 3 of the diffusely ectatic right coronary artery (RCA) (TIMI grade 2: Figure 1A). The RCA was not supplied by collaterals from the left ectatic coronary artery (LCA) (not shown). After changing the guiding catheter to a 7 Fr JR, first, tisokinase (mutant *t*-PA 2,600,000 U) and urokinase (480,000 U) were administered into the RCA. We repeatedly aspirated the thrombus with Rescue several times (Figure 1B), however, only a few pieces of small red thrombus could be extracted (Figure 1E). These were implicated in the resistant no reflow (Figure 1C). Intra-aortic balloon pumping (IABP) could not be applied due to severe obesity, so antiplatelets (aspirin and ticlopidine) and anticoagulant therapies (intravenous heparin and warfarin) were continued. Stressed cardiac radionuclide scintigraphy (stress-RS) at day 30 revealed that the ischemic lesion was not detected in the LCA territory and the viability of the broad inferior lesion of myocardium was barely detectable. A CAG at day 60 revealed slow coronary flow and haziness from # 2 to 3, suggesting residual thrombus (Figure 1D), but PCI was not performed due to the lack of viability. In the chronic phase about 1 year later after the onset of AMI, the broad inferior wall of the left ventricle (LV) with the thinning of the wall was akinesis and measured ejection fraction (EF) of LV with UCG was 47%.

Figure 1. Coronary angiogram (CAG) and aspirated thrombus in case 1. **A:** RCA before PCI in LAO view. **B:** A view of thrombectomy with Rescue. **C:** Resistant slow flow after thrombectomy. **D:** RCA at day 60. **E:** Aspirated red thrombus with Rescue. The length of black bar is 1 cm.

Case 2. (A successful thrombectomy with JR catheter) On May 18, 2003, a 70-year-old woman was admitted to our emergency department complaining of severe anterior chest pain. Her only coronary risk factor was hyperlipidemia and she had no prodromal e-AP. The clinical diagnosis was the same as in case 1 due to the similar changes in ECG and UCG. An emergency CAG revealed thrombotic occlusion at the site of # 1 (TIMI grade 0: Figure 2A). The RCA was not supplied by collaterals from the diffuse ectasic LCA (not shown). First, an IABP was inserted. Tisokinase (2,600,000 U) was then directly administered into the RCA, and about 10 minutes later, the coronary flow was restored to TIMI-grade II (Figure 2B). PCI was not performed due to concerns about the development of no reflow as in case 1 so the patient was transferred back to the coronary care unit. Antiplatelet and anticoagulant therapies were started, and we decided to extract the thrombus mechanically subacute phase of infarction. Two days later, AMI reoccurred with chest pain and additional elevation of ST segments so an emergency PCI was performed. As shown in Figure 2C, a thrombotic occlusion

Figure 2. CAG and aspirated thrombus in case 2.

A: RCA before PCI in LAO view upon initial admission to emergency. **B:** RCA after thrombolysis. **C:** RCA at recurrent chest pain at day 3. **D:** A view of thrombectomy with JR. **E:** RCA after flow successfully restored. **F:** RCA at day 13. **G:** Aspirated red thrombus with JR. The length of black bar is 1 cm. Note the difference compared with Figure 1E.

resembling a crab claw was observed at # 2. In order to extract the massive intracoronary thrombus, a guiding catheter was constructed as follows. A 20 cm long end tip of a 8 Fr Amplatz 0.75 (Brite Tip) was cut off and connected with the cut off and split end tip of a 7 Fr sheath. A 6 Fr JR 4 (Mach 1) was selected as the aspiration catheter. After crossing the guide wire, the JR was inserted back and forth between # 2 and # 4-AV with extracting thrombus facilely for three times (Figure 2D). In order to completely extract the thrombus from the guiding catheter, all of the devices (guiding catheter, aspiration catheter, and guide wire) were extracted from the sheath and flushed, and the guiding catheter was constructed and the wire was crossed again. After these procedures, a massive red thrombus without white plaque was extracted (Figure 2G). Good coronary flow was achieved (Figure 2E) and the patient subsequently made satisfactory progress. At

day 13, after warfarin, flow in the RCA was good without thrombus (Figure 2F), and the myocardium in the RCA related lesion was observed to be viable in the left ventriculogram (not shown). About 6 months after the onset of AMI, the inferior wall was found to be viable using stress-RS and UCG and the EF of the LV was about 70%.

DISCUSSION

The major finding of this case report is that although current reperfusion techniques are not effective against CAE in cases complicated with an AMI,^{4,5)} particularly in cases of massive thrombus as seen in case 1, mechanical extraction of a massive intracoronary thrombus with a 6 Fr JR catheter was proved to be safe and effective. Thrombectomy with Rescue was reported to be effective at aspirating a thrombus, restoring coronary flow and preventing the establishment of no-reflow, and salvaging the infarcted myocardium,⁶⁾ however, as in these cases of massive thrombus in CAE, it was inadequate and limited as observed in case 1. The potential of thrombectomy was clearly demonstrated by the amount of aspirated thrombus (Figures 1E and 2G), the coronary flow (Figures 1C&D and 2E&F), the residual viability of the related lesion, and LV function in the chronic phase. This may be because the cross-sectional area of the 6 Fr JR catheter was 2.49 mm², while that of the Rescue was 0.65 mm². Major possible complications, which did not occur, during aggressive mechanical thrombectomy include collapse of the RCA due to strong aspiration or secondary embolism due to the extracted thrombus falling into the RCA or aorta. The JR catheter was aligned almost straight on the guide wire, so the massive thrombus could be extracted without major injury to the arterial wall. Although mechanical aspiration thrombectomy with a catheter is widely used in cases of acute pulmonary thromboembolism,⁷⁾ our method for extracting a massive intracoronary thrombus is not widely used. The genesis of massive red thrombi in both cases was not obvious, but in cases of RCA-related myocardial infarction, there often exists a massive thrombus due to the properties of RCA-related myocardial infarction.⁸⁾ Therefore, intracoronary thrombi have to be completely extracted in order to prevent no-reflow, the major adverse factor of the clinical course.^{9,10)} Thus, we propose that this mechanical aspiration would be applicable to cases of inferior AMI if current thrombectomy techniques (Rescue, thrombusterTM, and PercuSurgeTM GuardWireTM system) are ineffective.

In conclusion, we have described a highly effective mechanical aspiration technique using a 6 Fr JR catheter which may become a standard procedure not only in cases of CAE, but also in cases of acute coronary syndrome with a massive thrombus to alleviate the slow flow phenomenon.

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