

# Acute Myocardial Infarction That Resulted From Poor Adherence to Medical Treatment for Giant Coronary Aneurysm

## The Importance of Patient Education in the Chronic Phase of Kawasaki Disease

Yoshihiro MOTOZAWA,<sup>1</sup> MD, Hiroki UOZUMI,<sup>2</sup> MD, Sonoko MAEMURA,<sup>1</sup> MD, Ryo NAKATA,<sup>1</sup> MD, Keisuke YAMAMOTO,<sup>2</sup> MD, Masataka TAKIZAWA,<sup>2</sup> MD, Hidetoshi KUMAGAI,<sup>1</sup> PhD, Yuichi IKEDA,<sup>1</sup> MD, Issei KOMURO,<sup>1</sup> MD, and Hiroshi IKENOUCI,<sup>2</sup> MD

### SUMMARY

Coronary arterial complications associated with Kawasaki disease (KD), such as a giant coronary aneurysm, determine the relative risk of future cardiac events and require lifelong medical treatment. Here, we describe a 24-year-old man who developed myocardial infarction due to poor adherence to medical treatment for a giant coronary aneurysm in the chronic phase of KD. He was hospitalized two hours after the onset of chest pain. The presence of the giant coronary aneurysm made primary percutaneous coronary intervention (PCI) difficult. However, we were able to perform primary PCI successfully utilizing previous coronary computed tomography (CT) angiographic pictures as a reference. This case provides valuable insight for the management of coronary arterial complications associated with KD. Patients in the chronic phase of KD are usually asymptomatic, even in the presence of giant coronary aneurysms which have been reported to have a high risk of morbidity and mortality. Therefore, patient education is critical for preventing poor adherence to medical treatment for coronary arterial complications. In preparation for potential coronary intervention in the future, it is also useful to perform coronary CT angiography, coronary magnetic resonance (MR) angiography, and/or coronary angiography on a regular basis while patients remain free from serious cardiac events. (Int Heart J 2015; 56: 551-554)

**Key words:** Mucocutaneous lymph node syndrome, Percutaneous coronary intervention, Coronary computed tomography angiography, Adolescent

Coronary aneurysm, a major complication of Kawasaki disease (KD), requires long-term medical treatment because it can lead to myocardial ischemia, infarction, and sudden cardiac death.<sup>1-6)</sup> The formation of coronary aneurysms has dramatically decreased since intravenous immunoglobulin (IVIG) therapy was first introduced in 1984.<sup>7)</sup> However, there are still many outpatients who suffered from KD before IVIG therapy was established. Here, we present a 24-year-old man who developed myocardial infarction due to poor adherence to medical treatment for a giant coronary aneurysm, although he was regularly followed up in our outpatient clinic.

### CASE REPORT

A young man, who had a history of KD at the age of 4 years, developed two giant coronary aneurysms (one measuring 9 mm in diameter at the bifurcation of the left main trunk and the other measuring 7 mm in diameter at the proximal

right coronary artery) despite high-dose aspirin treatment in the acute phase. Although the patient had been treated with dual antiplatelet therapy with aspirin and ticlopidine since then, coronary MR angiography revealed thrombus formation in the left coronary aneurysm at the age of 19 years. He was referred to our outpatient cardiology clinic for management of the thrombus, and warfarin anticoagulation therapy was initiated. At the age of 24 years, he was admitted to our hospital two hours after the onset of chest pain. A standard 12-lead ECG revealed ST-segment elevation in V<sub>1-4</sub> and abnormal Q waves in V<sub>1-3</sub>. He indicated that he had been noncompliant with his anticoagulation therapy; he took his medicines only for a week before his regular visits to our outpatient clinic. Consistent with his statement, his PT-INR was 1.07 when hospitalized.

Although the rapid troponin T test was negative, he was diagnosed with acute myocardial infarction based on the clinical presentation and typical ECG findings. He was immediately transferred to the catheterization laboratory, and emergent coronary angiography was performed. The angiographic picture revealed total occlusion of the left anterior descending

From the <sup>1</sup> Department of Cardiovascular Medicine, Graduate School of Medicine, The University of Tokyo and <sup>2</sup> Department of Cardiovascular Medicine, Japanese Red Cross Medical Center, Tokyo, Japan.

Address for correspondence: Yoshihiro Motozawa, MD, Department of Cardiovascular Medicine, Graduate School of Medicine, The University of Tokyo, 7-3-1 Hongo, Bunkyo-ku, Tokyo 113-8655, Japan. E-mail: mozayoshi@gmail.com

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coronary artery (LAD) just after the giant aneurysm (Figure 1). The presence of the giant coronary aneurysm made the coronary intervention difficult. However, we were able to wire the LAD utilizing the previous coronary CT angiographic picture as a reference (Figure 2). The thrombus in the aneurysm was subsequently aspirated, and the anteroseptal myocardium was reperfused.

The procedure required only 100 minutes to reperfuse the lesion. The peak CK and peak CK-MB levels were 6143 IU/L

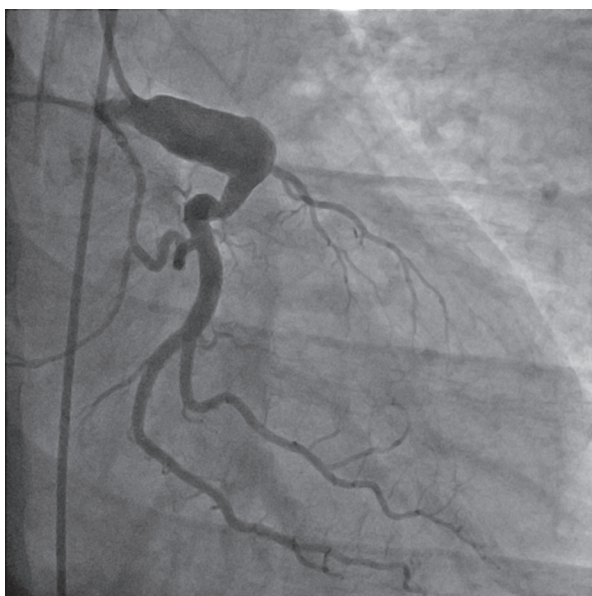
and 310 IU/L, respectively. Anticoagulant therapy was then administered to resolve the remaining thrombus in the giant left main trunk aneurysm. The follow-up coronary angiography on day 10 showed that the thrombus was gradually decreasing in size (Figures 3 and 4). The patient was educated on the importance of compliance with medical treatment for giant coronary aneurysms and was discharged with an optimal PT-INR. Because his adherence to the medical treatment improved remarkably, there has been no recurrence of myocardial infarction.

## DISCUSSION

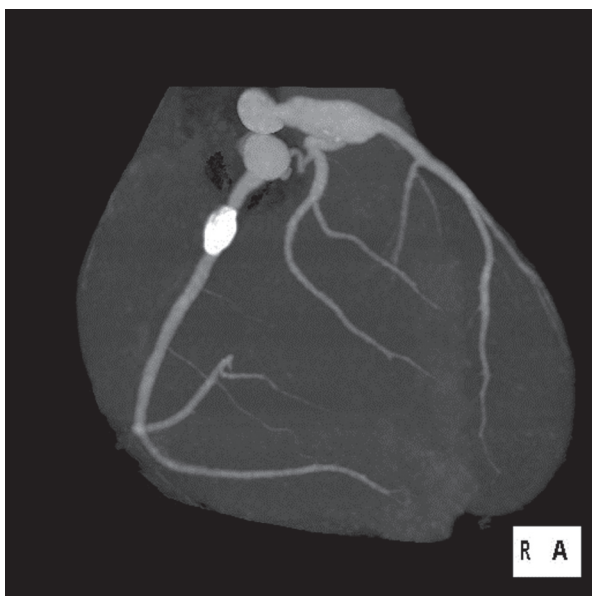
The present case highlights two teaching points regarding the management of coronary arterial complications associated with KD.

First, it is critical to educate patients with coronary arterial complications associated with KD on the importance of compliance with medical treatment because poor adherence to medication may result in a fatal cardiac event that could be otherwise prevented. They would also need to be educated to seek immediate medical care when they experience chest symptoms since delays in the administration of reperfusion therapy may lead to a poor outcome in ST-elevation myocardial infarction (STEMI).<sup>8,9)</sup>

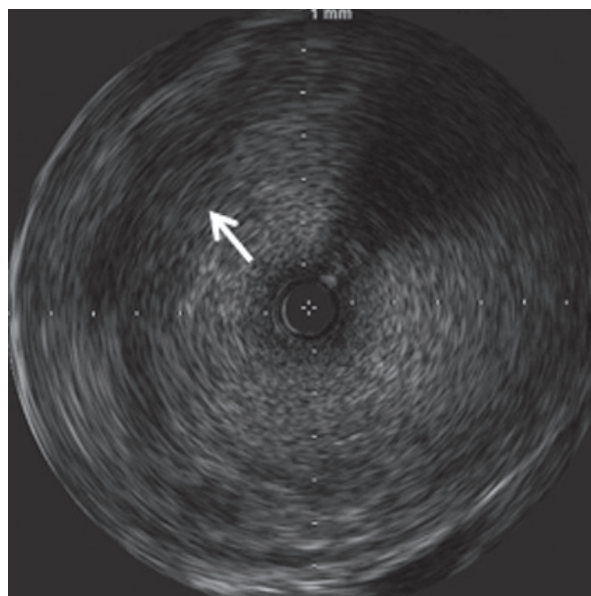
KD is complicated by coronary aneurysms in 20% of patients if not treated in the acute phase.<sup>1,10)</sup> IVIG therapy in the acute phase decreases its occurrence to about 5%.<sup>1,2,11,12)</sup> Even though coronary aneurysms emerge, they spontaneously regress in approximately one-half of the cases.<sup>1,10,13,14)</sup> However, coronary aneurysms that do not regress can lead to coronary arterial thrombosis and/or stenosis that may result in myocardial ischemia, infarction, or sudden cardiac death.<sup>1-6)</sup> In particu-



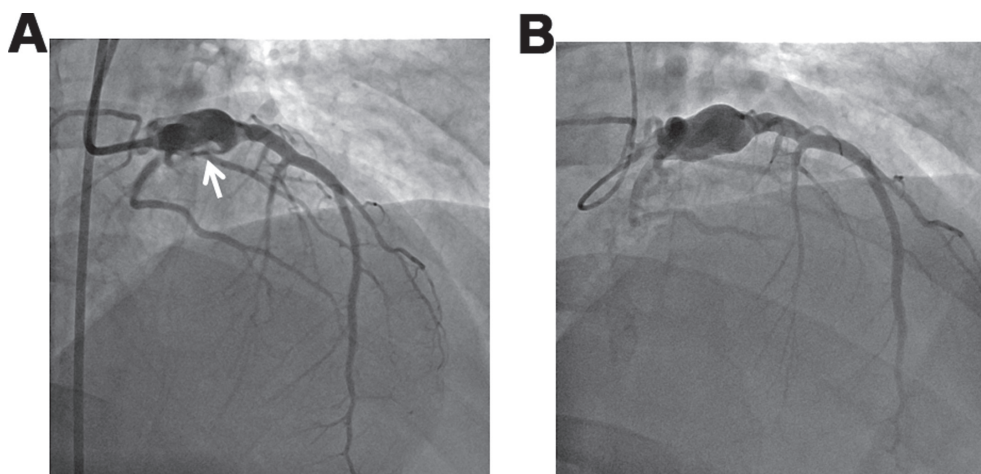
**Figure 1.** Right anterior caudal view of the left coronary artery. The LAD was completely occluded just after the giant left main trunk aneurysm.



**Figure 2.** Coronary CT angiography performed 3 years before the acute myocardial infarction.



**Figure 3.** An intravascular ultra-sound (IVUS) image of the aneurysm measuring 12 mm in diameter in the left main trunk. The thrombus (white arrow) partially remained in the aneurysm, even after the thrombus was aspirated.



**Figure 4.** **A:** Right anterior view of the left coronary artery after thrombus aspiration. The thrombus (white arrow) persisted in the coronary aneurysm. **B:** The same view 10 days after the anticoagulation therapy. The thrombus decreased in size.

lar, giant coronary aneurysms with an internal diameter > 8 mm, which was presented in this case, have been reported to have the highest risk of morbidity and mortality. One-third of such giant aneurysms eventually become occluded and develop myocardial infarction.<sup>4,5)</sup> Warfarin anticoagulation therapy has been demonstrated to be highly effective at reducing the risk of myocardial infarction or sudden cardiac death in patients with coronary aneurysm. Notably, antiplatelet therapy is proven to be less effective.<sup>2,5)</sup>

One important caveat is that patients who develop KD in childhood do not necessarily understand the risk of coronary arterial complications associated with KD because pediatricians mainly communicate with their parents in the acute phase and their parents usually take care of the medication. Coronary arterial complications require lifelong medical treatment, so patients have to manage the risk themselves in adulthood. However, the lack of understanding of the risk can easily lead to poor adherence to the medical treatment because these patients are basically asymptomatic. Indeed, there are several case reports in which patients developed cardiac events immediately after they stopped taking medicine or visiting an outpatient clinic in their adolescence. Thus, patients with coronary arterial complications associated with KD have to be educated seriously and repeatedly by cardiologists on the importance of compliance with medical treatment.

Insufficient understanding of the risk of coronary aneurysm can lead to delays in seeking medical care when a serious cardiac event occurs. In the present case it took two hours for the patient to arrive at hospital from the onset of chest pain. The time from symptom onset to treatment is known as an important prognostic factor in STEMI.<sup>8,9)</sup> Therefore, the patients need to be informed about heart attack symptoms and appropriate actions they should take when the symptoms appear.

Second, it would be useful to perform coronary CT angiography, coronary MR angiography, and/or coronary angiography not only in the detection of coronary stenosis or thrombus formation, but also in preparation for future cardiac events even if patients are asymptomatic. It can be easily predicted that if myocardial infarction develops, the presence of the coronary aneurysm, especially when it is located at the bifurcation

of the left main trunk such as the case presented here, will make an emergent PCI technically difficult. Without using any previous pictures as a reference, the operation would have taken longer or potentially failed.

In summary, when cardiologists evaluate patients with coronary arterial complications associated with KD, they should educate these patients to prevent poor adherence to medical treatment. It should also be noted that performing coronary CT angiography, coronary MR angiography, and/or coronary angiography while these patients remain free from a cardiac event is critical for potential coronary intervention in the future.

## REFERENCES

1. Senzaki H. Long-term outcome of Kawasaki disease. *Circulation* 2008; 118: 2763-72. (Review)
2. Onouchi Z, Hamaoka K, Sakata K, *et al.* Long-term changes in coronary artery aneurysms in patients with Kawasaki disease: comparison of therapeutic regimens. *Circ J* 2005; 69: 265-72.
3. Burns JC, Shike H, Gordon JB, Malhotra A, Schoenwetter M, Kawasaki T. Sequelae of Kawasaki disease in adolescents and young adults. *J Am Coll Cardiol* 1996; 28: 253-7. (Review)
4. Tsuda E, Hamaoka K, Suzuki H, *et al.* A survey of the 3-decade outcome for patients with giant aneurysms caused by Kawasaki disease. *Am Heart J* 2014; 167: 249-58.
5. Sugahara Y, Ishii M, Muta H, Iemura M, Matsuishi T, Kato H. Warfarin therapy for giant aneurysm prevents myocardial infarction in Kawasaki disease. *Pediatr Cardiol* 2008; 29: 398-401.
6. Shiraishi J, Shiraishi H, Hayashi H, *et al.* Interventional treatment for very young adults with acute myocardial infarction. Clinical manifestations and outcome. *Int Heart J* 2005; 46: 1-12.
7. Furusho K, Kamiya T, Nakano H, *et al.* High-dose intravenous gammaglobulin for Kawasaki disease. *Lancet* 1984; 2: 1055-8.
8. Nallamothu BK, Bradley EH, Krumholz HM. Time to treatment in primary percutaneous coronary intervention. *N Engl J Med* 2007; 357: 1631-8. (Review)
9. Kim U, Son JW, Park JS, Kim YJ. Clinical impact of Q-wave presence on electrocardiogram at presentation of patients with ST-segment elevation myocardial infarction undergoing primary coronary intervention. *Int Heart J* 2014; 55: 404-8.
10. Kato H, Sugimura T, Akagi T, *et al.* Long-term consequences of

- Kawasaki disease. A 10- to 21-year follow-up study of 594 patients. *Circulation* 1996; 94: 1379-85.
11. Durongpisitkul K, Gururaj VJ, Park JM, Martin CF. The prevention of coronary artery aneurysm in Kawasaki disease: a meta-analysis on the efficacy of aspirin and immunoglobulin treatment. *Pediatrics* 1995; 96: 1057-61.
  12. Singh S, Bansal A, Gupta A, Kumar RM, Mittal BR. Kawasaki disease: a decade of experience from North India. *Int Heart J* 2005; 46: 679-89.
  13. Suzuki A, Kamiya T, Arakaki Y, Kinoshita Y, Kimura K. Fate of coronary arterial aneurysms in Kawasaki disease. *Am J Cardiol* 1994; 74: 822-4.
  14. Sasaguri Y, Kato H. Regression of aneurysms in Kawasaki disease: a pathological study. *J Pediatr* 1982; 100: 225-31.