

## Coronary Artery Bypass Grafting for Coronary Aneurysms due to Kawasaki Disease

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**We report a 23-year-old man who underwent coronary artery bypass grafting (CABG) for coronary aneurysms associated with Kawasaki disease using the left internal thoracic artery (LITA) and right gastroepiploic artery (RGEA) after a second myocardial infarction (MI). Preoperatively, this patient showed repetitive occlusion and recanalization of coronary artery flow without coronary stenosis. Indication of bypass surgery in Kawasaki disease is usually associated with stenosis. However, even an aneurysm alone should be an indication of surgery if there is any kind of ischemic event. (Ann Thorac Cardiovasc Surg 2001; 7: 307–10)**

**Key words:** Kawasaki disease, coronary aneurysm, coronary artery bypass grafting

### Introduction

Kawasaki disease or mucocutaneous lymph node syndrome (MCLS) which was reported by Kawasaki in Japan in 1967,<sup>1</sup> causes coronary artery aneurysms and obstruction. Coronary artery bypass grafting (CABG) was performed in a young patient with coronary aneurysms due to Kawasaki disease. This patient's coronary disease showed repetitive occlusion and recanalization of coronary artery flow. He suffered myocardial infarction twice before surgery. We discuss the timing and indication of bypass surgery for Kawasaki disease.

### Case Report

A 23-year-old man with Kawasaki disease was brought to our hospital emergency room for acute antero-septal myocardial infarction (MI). Emergent coronary an-

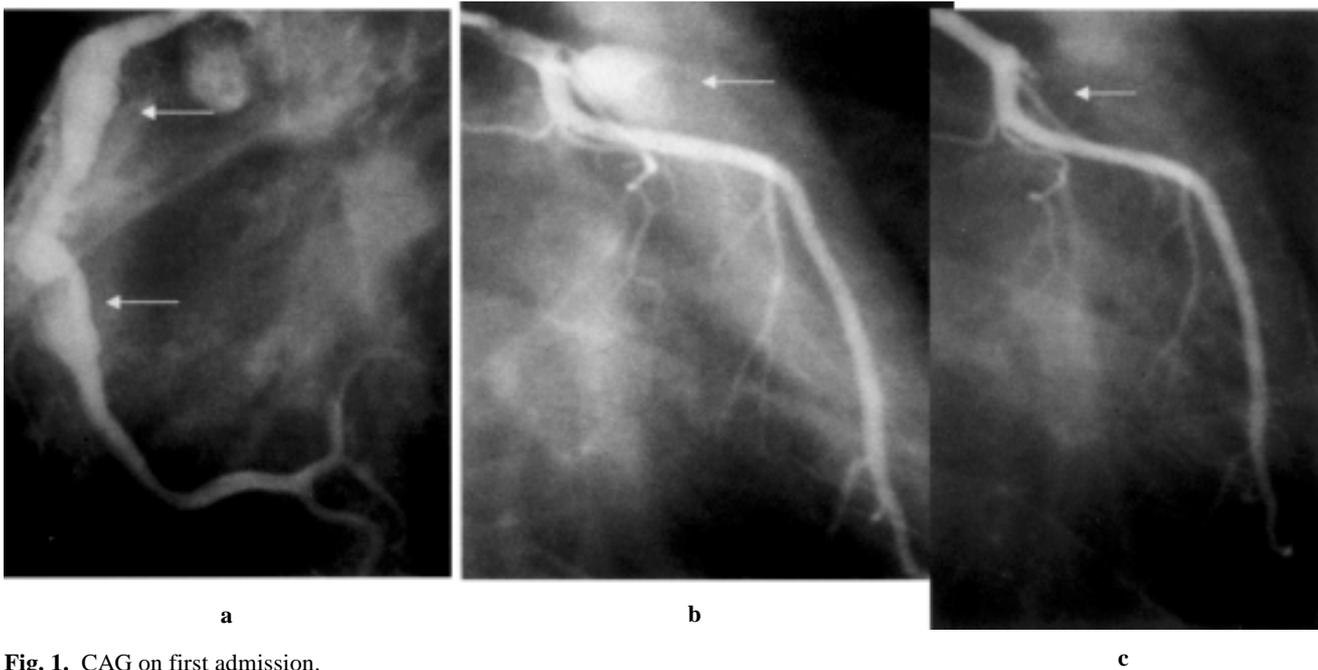
giography (CAG) revealed occlusion distal to an aneurysm of the left anterior descending artery (LAD) (Fig. 1b) and calcified aneurysms of the proximal portion of the right coronary artery (RCA) without stenosis (Fig. 1a). On the second CAG of the first admission, the LAD showed complete occlusion proximal to the aneurysm (Fig. 1c) and left ventriculography (LVG) showed anterior akinesis; thus it was considered that there was no viability in that region. The patient was given anticoagulant therapy without an operation. Three months later, the patient returned to our hospital for acute inferior MI. Emergent CAG showed complete obstruction of the proximal RCA (Fig. 2a) and recanalization of LAD (Fig. 2c). There was collateral flow to the posterior descending artery (PD) from LAD. Percutaneous transluminal coronary recanalization was performed (Fig. 2b). The cardiac failure necessitated 5 days of intra-aortic balloon pumping (IABP) support. LVG showed akinesis of anterior and inferior walls and the septum. Ejection fraction (EF) was 32%. There was no stenosis or obstruction of the coronary artery distal to the aneurysm. However surgery was recommended because of the second infarction. Following preparation with 800 ml of autotransfusion, CABG was performed with the left internal thoracic artery (LITA) anastomosed to the LAD, and the right gastroepiploic artery (RGEA) to

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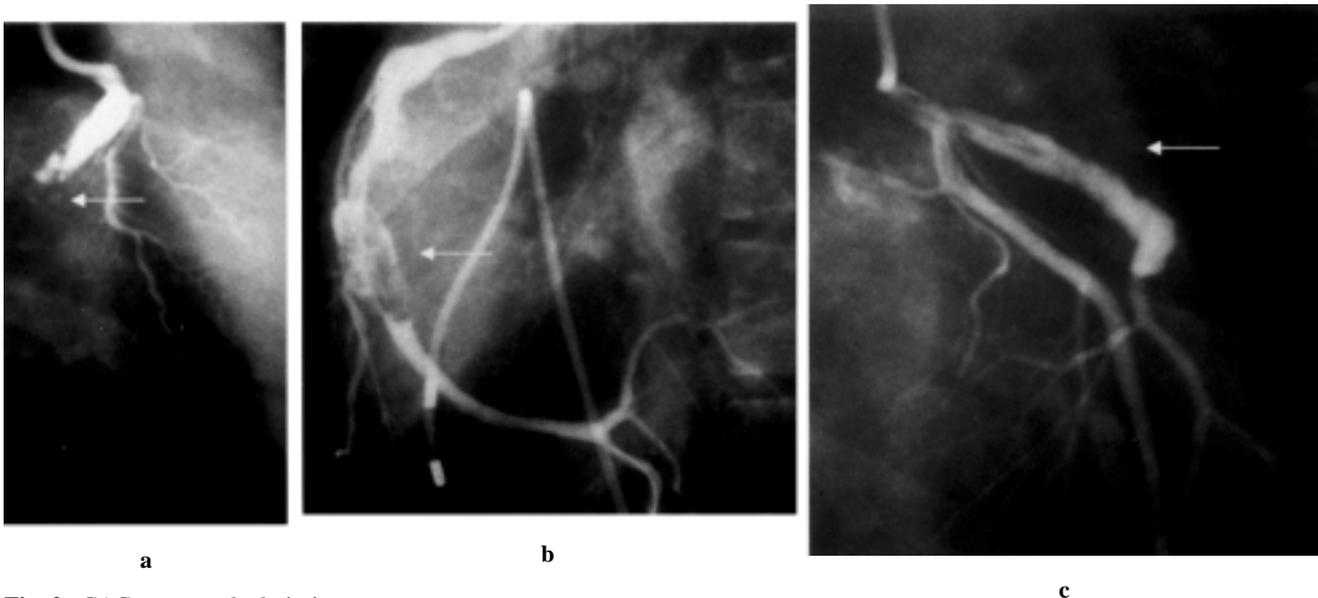
Received January 15, 2001; accepted for publication March 30, 2001.

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**Fig. 1.** CAG on first admission.

- a: White arrows show the right coronary aneurysm.
- b: White arrow shows occlusion distal to the left coronary aneurysm on first admission.
- c: Second CAG on first admission. White arrow shows complete occlusion proximal to the aneurysm of the left anterior descending artery (LAD).



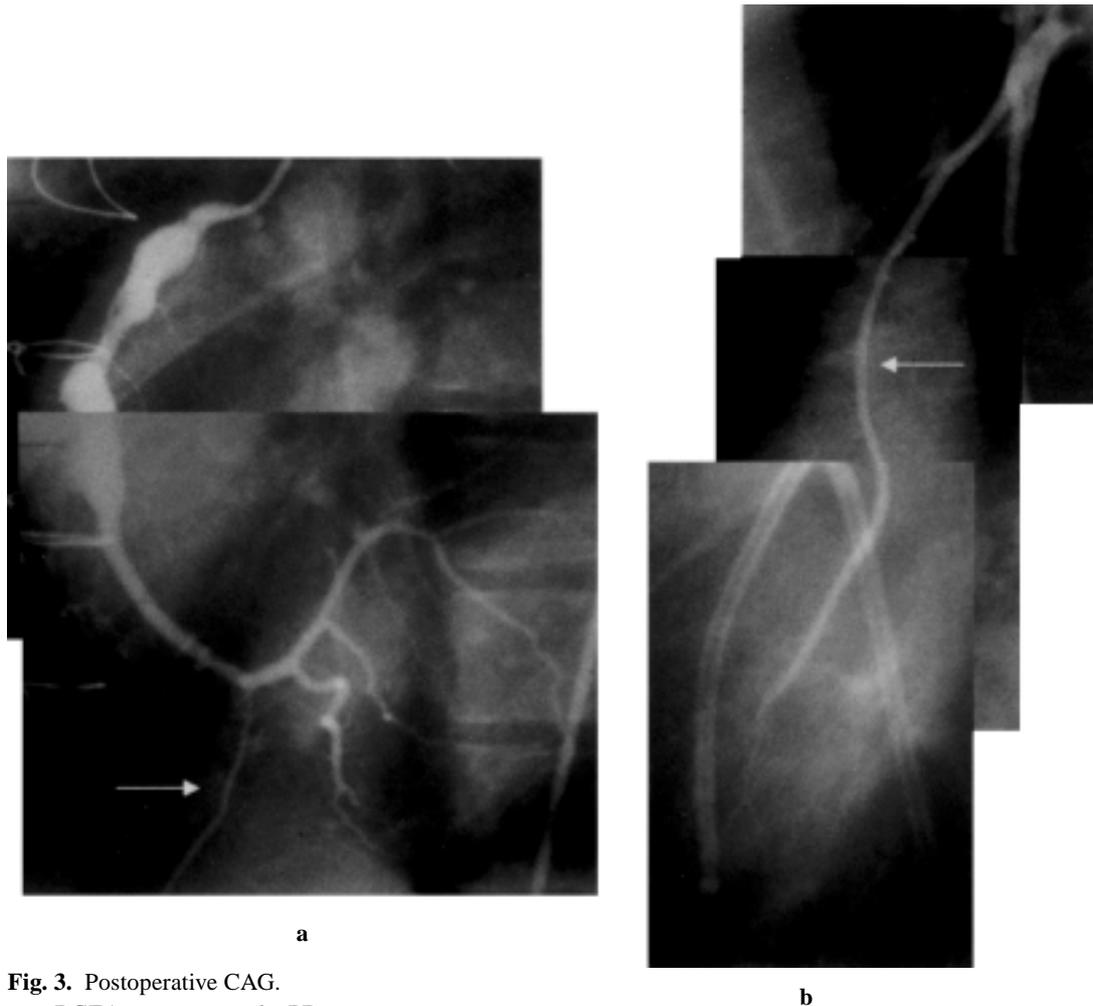
**Fig. 2.** CAG on second admission.

- a: White arrow shows occlusion of the proximal RCA on second admission.
- b: After PTR, thrombosed right coronary aneurysms can be seen.
- c: Recanalized LAD without stenosis brings collateral flow to the PD.

the PD without aneurysm ligation or excision. The postoperative course was uneventful. The CAG showed patent LITA-LAD and RGEA-PD grafts (Fig. 3), but the EF was about the same (34%) even though the left ventricular size was decreased.

## Discussion

Among children with Kawasaki disease, 15% to 25% may develop coronary aneurysms.<sup>2)</sup> According to Kato's report, 55% of the small or moderate-sized aneurysms are



**Fig. 3.** Postoperative CAG.

a: RGEA was seen on the PD.

b: LITA was anastomosed to the LAD.

fully regressed within 2 years of follow-up, and 4.7% of the patients may develop myocardial infarction.<sup>3)</sup> The standard indication of CABG for Kawasaki disease has been reported to be coronary stenosis associated with coronary aneurysm.<sup>4)</sup> However the presence of thrombus and distal embolization in coronary aneurysms without stenosis was confirmed in the present case. Abnormal blood flow patterns inside an aneurysm have been associated with thrombus formation.<sup>5)</sup> Calcification, fissuring, deposits of protein-like material and hyaline degeneration have all been reported to be found in the thickened intima of aneurysms secondary to Kawasaki disease.<sup>6)</sup> This intima itself might favor the formation of thrombosis. Kawachi et al. reported that thrombus can develop in aneurysms despite strict anticoagulant therapy.<sup>7)</sup> Medical therapy might not be effective for prevention of thrombus formation of coronary aneurysms

in Kawasaki disease. The mortality rate with myocardial infarction in Kawasaki disease is 22% after the first infarct, 66% after the second infarct, and 87% after the third infarct.<sup>3)</sup> In the present case, without improvement of postoperative LV function, the operation is too late. Thus, bypass surgery should be done after the first infarction, even though the aneurysms are not associated with stenosis. Aneurysm alone should be an indication of surgery for Kawasaki disease if the patient has any kind of ischemic event.

Other concerns of CABG are graft conduit and the treatment of aneurysms. In the early cases of CABG for Kawasaki disease, saphenous vein grafts (SVG) were used but the long-term patency of SVG was reported to be poor.<sup>8)</sup> At present because of good long-term patency and growing ability, ITA is the reported first choice of graft conduit for Kawasaki disease.<sup>9)</sup> GEA is also con-

sidered good for an arterial graft.<sup>10)</sup> In the treatment of coronary aneurysms, one report proposed excision of coronary aneurysms with coronary revascularization.<sup>11)</sup> But coronary aneurysm rupture is considered extremely rare;<sup>12)</sup> here we performed only bypass grafting without aneurysm excision or ligation. Postoperative CAG showed slender sign of internal thoracic artery and gastroepiploic artery grafts, because there was no significant stenosis of the native coronary artery. Dincer et al. found that the ITA graft began to function after native recipient coronary artery had become stenotic or occluded, despite the fact that the graft appeared occluded in the first angiographic study.<sup>13)</sup> So, in the future if significant stenosis of the native coronary artery were to occur, the grafts would be expected to grow because both grafts were arterial.

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