

## SURGICAL TECHNIQUE

# Intimal Detachment of the Left Main Coronary Artery in a Marfan Patient with Acute Aortic Dissection: An Alternative Technique for Coronary Revascularization

Joon Young Song, M.D.,\*† Tae Youn Kim, M.D.,\*† Jong Bum Choi, M.D.,\*† and Ja Hong Kuh, M.D.\*†

\*Department of Thoracic and Cardiovascular Surgery, Chonbuk National University Medical School, Jeonju, South Korea; and †Research Institute of Clinical Medicine of Chonbuk National University, Biomedical Research Institute of Chonbuk National University Hospital, Jeonju, South Korea

**ABSTRACT** In patients with acute type A aortic dissection, intimal detachment associated with circumferential dissection of the left main coronary artery (LMCA) is a rare but lethal complication. We report a Marfan patient with dissection and intimal detachment of the LMCA that was caused by acute aortic dissection involving the left aortic sinus and that was reconstructed using a short reversed saphenous vein graft. doi: 10.1111/jocs.12746 (*J Card Surg* 2016;31:348–350)

Intimal detachment of the left main coronary artery (LMCA) associated with acute aortic dissection is very rare, but when it occurs, it is essential to perform aggressive coronary revascularization concomitant with aortic repair.<sup>1</sup> This report describes an alternative surgical technique for coronary revascularization in a Marfan patient with intimal detachment of the LMCA associated with acute aortic dissection.

## PATIENT PROFILE

A 40-year-old male presented with sudden-onset severe anterior chest pain, profuse sweating, and

vomiting. On admission, his blood pressure was 140/46 mmHg and his heart rate was 77 bpm. Marfan syndrome was diagnosed by Ghent criteria.<sup>2</sup> Electrocardiography revealed nonspecific findings for myocardial injury, except for nonspecific T wave changes (Fig. 1A). Transthoracic echocardiography showed severe aortic valve regurgitation, aortic root dilatation, and a dissection flap in the ascending aorta. His creatinine kinase-MB isoenzyme level was mildly elevated (5.58 ng/mL), but his troponin-I level was in the normal range (0.1 ng/mL). Computed tomographic (CT) angiography showed that the aortic dissection flaps extended to the aortic sinuses proximally (Fig. 1B) and to the bifurcation of the abdominal aorta distally. The sinus dimensions were 5.0 cm. Written informed consent was obtained from the patient for publication of this case report.

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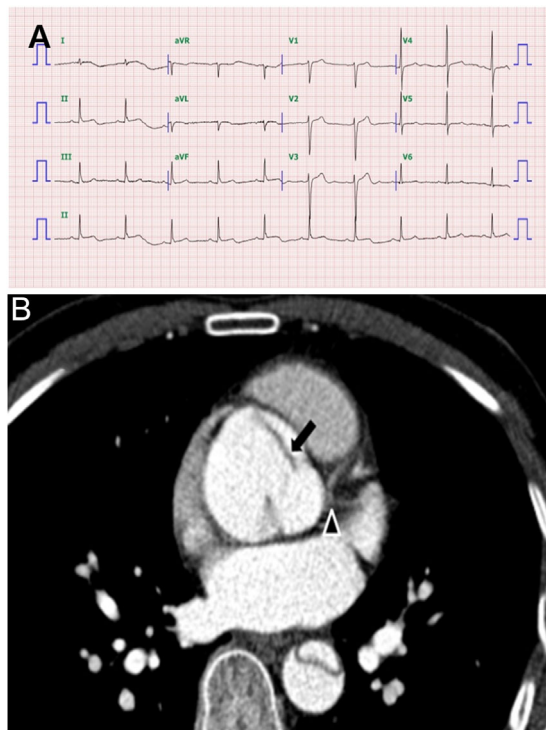
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Address for correspondence: Jong Bum Choi, M.D., Department of Thoracic and Cardiovascular Surgery, Chonbuk National University Medical School, 20 Geonji-Ro, Deokjin-Gu, Jeonju, Chonbuk 561-712, South Korea. Fax: +82-63-250-1480; e-mail: jobchoi@jbnu.ac.kr

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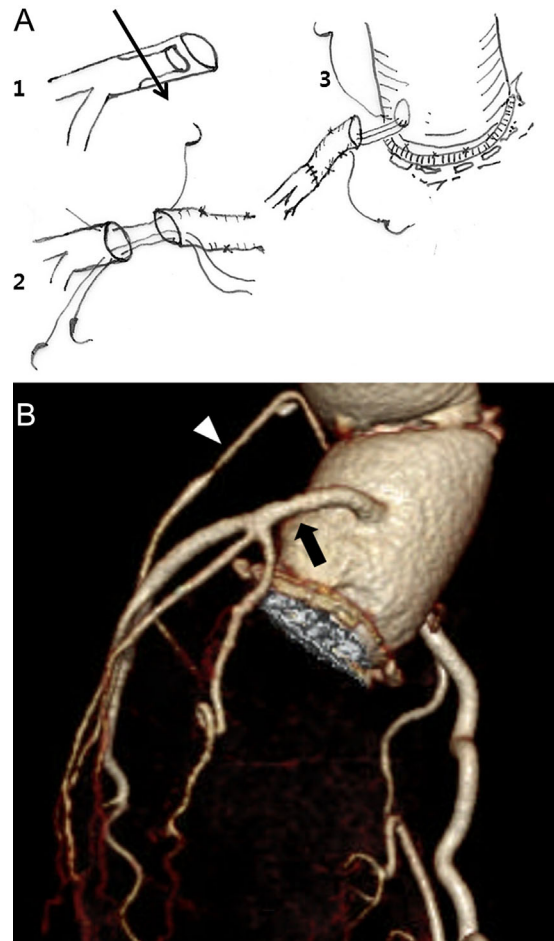
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Emergent surgery was performed through a median sternotomy. Cardiopulmonary bypass was instituted with a right axillary artery cannula via a side graft and two separate venous cannulas. Using moderate hypothermia, the aorta was clamped and opened transversely and myocardial protection was maintained with



**Figure 1.** Preoperative electrocardiography (EKG) and computed tomographic angiography. (A) Preoperative EKG revealed a nonspecific T wave abnormality without ST elevation or pathologic Q wave. (B) Preoperative computed tomographic angiography showed only a deep dissection flap (black arrow) in the left aortic sinus at the level of the left coronary artery (black arrowhead).

intermittent retrograde blood cardioplegia. All sinuses and commissures were dissected and both coronary arteries were also dissected circumferentially. The intima of the right coronary artery was intact, but the intima of the LMCA was detached from the ostium. The proximal dissected portion of the LMCA was excised about 6.0 mm and the intact distal portion was anastomosed to a reverse saphenous vein graft of 1.5 cm with 10 simple interrupted 7-0 polypropylene sutures. The aortic root, which had thick and shortened aortic leaflets, was replaced with a modified button-Bentall technique<sup>3</sup> using a 23-mm On-X mechanical valve (On-X Life Technologies, Austin, TX, USA) and a 30-mm Valsalva graft (Sulzer Vascutek, Renfrewshire, UK). The proximal end of the vein graft of the LMCA was beveled and anastomosed to a low opening in the aortic graft with a continuous 5-0 polypropylene suture (Fig. 2A). The dissected layers of the right coronary artery button were reapproximated with BioGlue (CryoLife, Inc., Kennesaw, GA, USA) and anastomosed to the aortic graft. The ascending aorta and the lower portion of the aortic arch were replaced with a beveled 28-mm Vascutek graft with a side branch during a 32-minute period of circulatory arrest with bilateral selective antegrade cerebral perfusion. After the distal anastomosis was completed, a cerebral perfusion cannula was removed from the left carotid artery and



**Figure 2.** (A) Reconstruction of the dissected left main coronary artery with severed intima. (1) The left main coronary artery was trimmed at the healthy intimal portion. (2) A short reversed saphenous vein graft was anastomosed to the healthy distal portion of the left main coronary artery with 10 simple interrupted 7-0 polypropylene sutures. (3) The vein graft was beveled and anastomosed to an opening in the aortic graft. (B) Six months following surgery, computed tomographic angiography showed the intact lumen of the reconstructed left main coronary artery (black arrow) and near closure of the additional saphenous vein graft (white arrowhead).

antegrade cardiopulmonary bypass was resumed through the right axillary artery side-graft cannula and a side branch of the aortic graft. Bypass surgery was performed using a saphenous vein graft to the left anterior descending artery due to concern that there was insufficient flow due to intimal swelling of the reconstructed LMCA. Aortic cross-clamp time and cardiopulmonary bypass time were 251 minutes and 301 minutes, respectively. Postoperatively, the patient recovered without complications. Six months following surgery, CT angiography revealed the patent reconstructed LMCA (Fig. 2B). The additional bypass graft to the left anterior descending artery had narrowed, probably due to competition flow. Postoperative echocardiography revealed an LVEF of 55% without any regional wall motion abnormalities.

## DISCUSSION

In patients with acute type A aortic dissection, the extension of the dissection into the coronary artery causes coronary malperfusion.<sup>4</sup> In patients with acute type A aortic dissection, 6.1–15% present with coronary malperfusion, which more frequently involves the right coronary artery.<sup>1,4,5</sup> Coronary artery dissection with an intact intima can easily be repaired by reapproximating the dissected sinus with BioGlue or with Teflon felt.<sup>6</sup> In cases of coronary intimal detachment, however, bypass surgery is necessary.<sup>4,5</sup> In patients with acute aortic dissection, left sinus dissection is absent or mild and intimal detachment of the LMCA is very rare.<sup>7</sup> There are two surgical options for restoring perfusion to the left coronary territory. The first option is proximal suture closure of the LMCA and bypass surgery using two or more grafts to the left coronary artery system.<sup>4–7</sup> This is a simple, commonly used procedure, but it requires two or more grafts. When the distal LMCA is nearly intact after the proximal dissected portion is excised, it can be extended with a short reversed saphenous vein graft. Although end-to-end anastomosis of the vein graft and the distal LMCA can be performed using a continuous suture technique,<sup>7</sup> it may be better to use simple interrupted sutures for anastomosing the two obtusely beveled ends to prevent purse-string narrowing of the friable, swollen arterial lumen. To ensure sufficient perfusion to the left coronary system immediately after surgery, we performed another vein bypass graft from the ascending aortic graft to the left anterior

descending artery. Using a short vein graft may also be useful for repairing intimal detachment of the right coronary artery. In this case, postoperative coronary CT angiography revealed a well-reconstructed LMCA, but long-term follow-up is required.

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