



## Direct Reimplantation of a Transected Coronary Artery in Acute Type A Aortic Dissection

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### Abstract

A 52-year-old male patient was admitted for acute type A aortic dissection. Circumferential detachment of the Right Coronary Artery (RCA) ostium was detected intraoperatively. The proximal RCA was dissected, the intimal RCA was circumferentially detached with inner intussusception, and only adventitia was partially connected to the aortic root. Instead of performing coronary artery bypass grafting surgery to the RCA, direct RCA implantation to the Valsalva ascending graft was performed after repairing the dissected lumen of the proximal RCA. Cardiopulmonary bypass weaning was smooth, and no complications related to the RCA were observed.

**Keywords:** Aorta; Aortic dissection; Acute aortic syndrome

### Introduction

Retrograde aortic root dissection toward the coronary ostium is uncommon. However, acute myocardial ischemia is a potentially fatal condition in this situation, and repairing dissected coronary arteries to prevent myocardial malperfusion is very important. In this case, we repaired dissected Right Coronary Artery (RCA) ostium and directly reimplanted it to the aortic root rather than Coronary Artery Bypass Grafting (CABG).

### Materials and Methods

A 52-year-old male patient was admitted due to acute-onset seizure-like movement. Chest Computed Tomography (CT) revealed an acute type A aortic dissection from the aortic root to the descending aorta. The intimal tear site on chest CT was expected to reach the ascending aorta (Figures 1A-1C). No abnormalities were detected in another preoperative work-up, and Electrocardiography (ECG) showed a normal sinus rhythm without ST-segment abnormalities. Thus, we planned an emergent surgery.

Cardiopulmonary Bypass (CPB) was made via the left femoral artery and right atrium after median sternotomy. Then, a total circulatory arrest was performed at 26.5°C rectal temperature and underwent direct cardioplegia infusion. Hemiarch replacement distal anastomosis was also performed using a 26-mm Gelweave (Vascutek, Inchinnan, United Kingdom) graft under selective cerebral perfusion guidance. Furthermore, proximal ascending aorta anastomosis was also planned. However, we found that aortic dissection should involve the RCA ostium, and the intimal layer of the RCA ostium was circumferentially detached from the aortic root (Figure 2A, 2B). The intimal layer of the RCA was found to have inner cylinder intussusception. Thus, CABG was planned after RCA ostium ligation. However, we decided that direct reimplantation of the RCA ostium can be performed. Thus, the surgical plan was changed. First, the proximal aortic root anastomosis was performed using a 28-mm Gelweave™ Valsalva graft. Then, the dissected layers around the RCA ostium are carefully mobilized and conjoined with the reinforced continuous over-and-over suture using a 7-0 monofilament polypropylene suture (Prolene®, Ethicon, Raritan, USA) (Figure 2C). The false lumen of the dissected RCA was utterly obliterated, and the RCA ostium was directly anastomosed to the Valsalva portion using the Gelweave™ Valsalva graft (Figure 2D). CPB weaning was smooth without ST abnormalities on ECG. No anastomosis-related complications, including bleeding and postoperative myocardial infarction, and no ST abnormality changes occurred in the intensive care unit. The RCA morphology was also examined with coronary CT after moving the patient to the general ward, which revealed no stenosis or visible intimal flap around the RCA (Figure 1D). In addition, no ECG abnormalities were observed during the follow-up.

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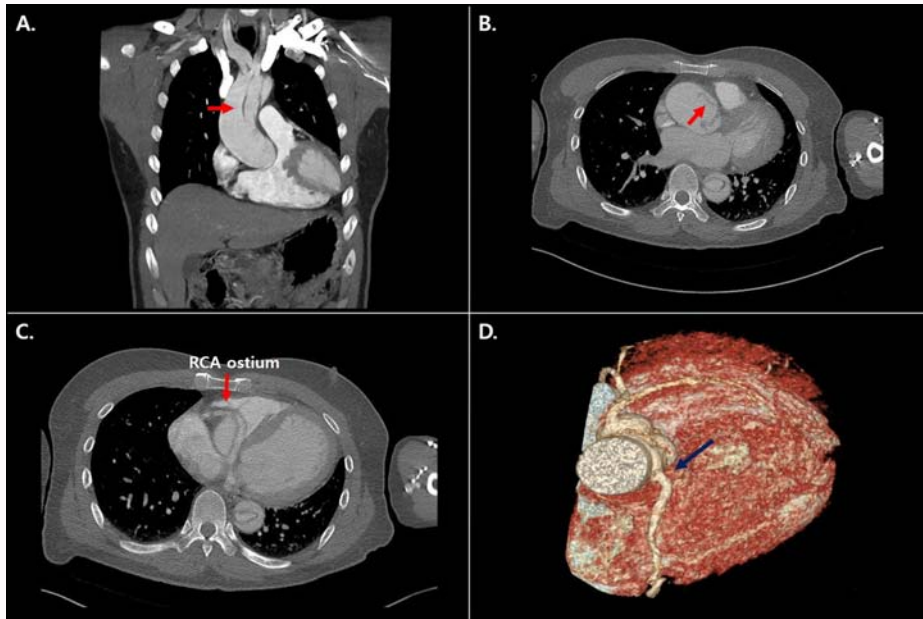
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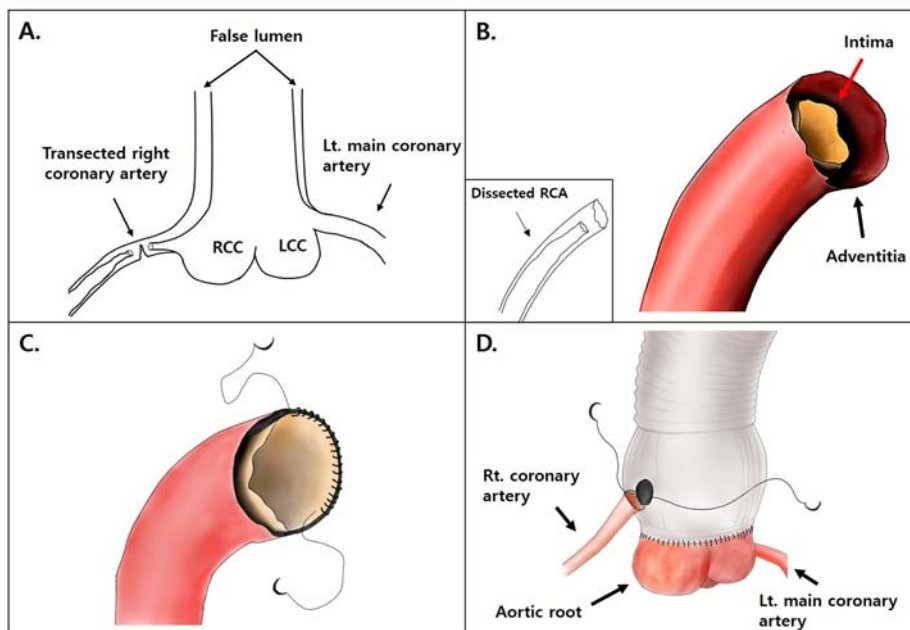
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**Figure 1:** A-C) Preoperative computed tomography scan findings. Red arrows indicate the aortic flap; D) postoperative computed tomography scan findings. The blue arrow indicates an intact right coronary artery ostium without stenosis. (RCA: Right Coronary Artery).



**Figure 2:** Acute type A aortic dissection involving Right Coronary Artery (RCA). A) Aortic dissection involved RCA ostium and RCA were transected; B) transected right coronary artery ostium; C) careful mobilization around dissected layers and then conjoined with reinforced over-and-over continuous suture; D) direct RCS ostium anastomosis to Valsalva graft. (LCC: Left Coronary Cusp; RCC: Right Coronary Cusp).

## Discussion

Although retrograde aortic root dissection toward the coronary ostium is relatively uncommon, the incidence of coronary malperfusion in acute type A aortic dissection is reported to range from 5.7% to 11.3% [1,2] with a high mortality rate [3]. However, surgical outcomes depend on the degrees of myocardial damage, intraoperative appropriate coronary revascularization, and postoperative management for low cardiac output. Coronary malperfusion by acute type A aortic dissection may not be easily detected even intraoperatively. Moreover, the degrees of coronary

malperfusion, including the location and size, the existence of reentry, and the flow pattern may affect the onset and severity of coronary malperfusion [4]. In this patient, the RCA ostium transection was not detected in preoperative CT, and no evidence of myocardial injury was observed preoperatively. Furthermore, no cardioplegia injection complications were encountered intraoperatively.

This study showed that direct reimplantation of the transected coronary artery to the aortic graft in acute type A aortic dissection is a feasible option. Neri et al. [3] distinguished three main types of lesions based on the dissection flap extension within the coronary artery in

widely varied situations, i.e., from the isolated ostial dissection to the circumferential detachment with inner intussusception; this case was classified as type C (circumferential detachment with an inner cylindrical intussusception). CABG could be a treatment option for this type; however, it should only be considered as a rescue procedure for competitive flow and coronary re-dissection risk with complete graft-dependent perfusion of large myocardial territories [3]. Considering the long-term patency of the vein graft on CABG, coronary reattachment after the repair is the first treatment option. The transected RCA ostial tissue was very friable but showed a relatively dense appearance after an over-and-over reinforcing suture surrounding the RCA ostium with careful tissue mobilization sufficient to reimplant the aortic graft. Furthermore, the Valsalva graft was used to shorten the distance between the transected RCA ostium and graft to reduce coronary tension. Cabrol procedure [5], use of a semicircular hood pericardial patch [6], or saphenous vein reconstruction [3] can also address coronary tension. However, in this case, the Valsalva graft was a better option because it can sufficiently shorten the distance between the transected RCA ostium and graft without requiring additional anastomosis time as compared to other options.

In summary, direct reimplantation of the transected coronary artery using Valsalva graft in acute type A aortic dissection can be performed in selected patients and is expected to have good long-term surgical outcomes.

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