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Right Coronary Artery Ostial Stenosis after Re-do Aortic Valve Replacement

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Coronary ostial stenosis after aortic valve replacement (AVR) is a rare but life-threatening complication. Here, we report a case of right coronary artery ostial stenosis in a patient who had a history of re-do AVR and normal preoperative coronary angiographic findings. The patient was successfully treated with a drug-eluting stent. (Korean J Med 2017;92:537-540)

Keywords: Postoperative complications; Aortic valve stenosis; Percutaneous coronary intervention

INTRODUCTION

Coronary ostial stenosis is a rare postoperative sequela with an incidence of 1 to 5% after aortic valve replacement (AVR) [1]. Ostial stenosis can occur in both coronary arteries, but the incidence is known to be higher in the left main coronary artery compared with the right coronary artery (RCA) [2]. Various myocardial ischemic symptoms can occur and usually appear from 1 to 6 months postoperatively. Here, we present a right coronary artery ostial stenosis 3 years after re-do AVR for a failed mechanical aortic valve that was successfully managed with coronary stent implantation.

CASE REPORT

A female patient aged 43 years visited the hospital for dyspnea on exertion (New York Heart Association functional class III) that developed 2 months ago. The patient had undergone mitral (29 mm, Regent, St. Jude Medical, St. Paul, MN, USA) and aortic (23 mm, Regent, St. Jude Medical) prosthetic mechanical valve replacement 26 years ago due to dyspnea on exertion with severe rheumatic aortic and mitral stenosis. The patient again complained of dyspnea on exertion 3 years ago, and transthoracic echocardiography (TTE) showed an increased pressure gradient (PG) through the prosthetic aortic valve (peak/mean PG 92/48 mmHg, peak velocity 4.8 m/s) compared to 1 year prior (peak/mean PG 62/36 mmHg, peak velocity 4.1 m/s). Increased

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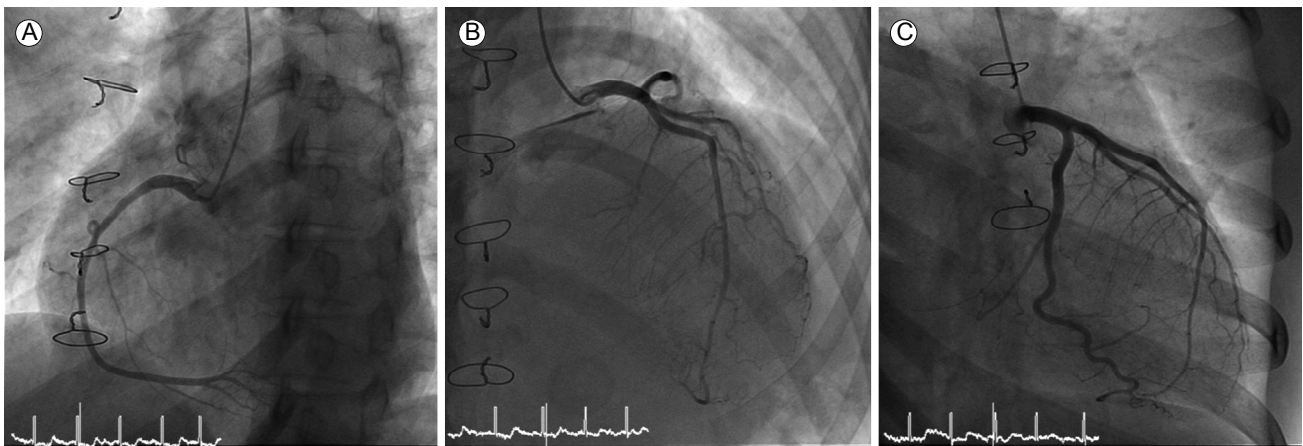


Figure 1. Coronary angiography before re-do aortic valve replacement. (A) Right coronary artery. (B) Left anterior descending artery. (C) Left circumflex artery.

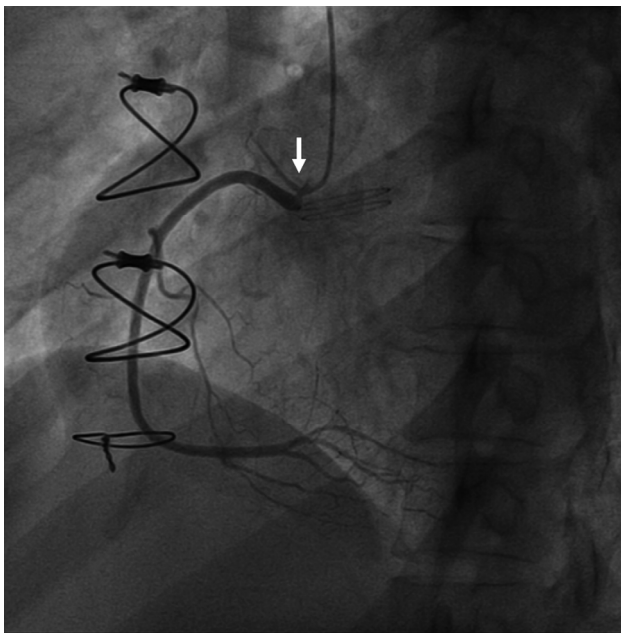


Figure 2. Coronary angiography of a severely narrowed right coronary artery ostium after re-do aortic valve replacement (white arrow).

echogenicity at the strut and narrowing of the annulus were observed. Trans-esophageal echocardiography revealed pannus formation on the prosthetic aortic valve; therefore, re-do AVR was performed with a 19 mm prosthetic mechanical valve (On-X, Cryolife, Kennesaw, GA, USA). During the procedure, severe pannus formation was found inferior to the previous prosthetic aortic valve, particularly below the right coronary cusp.

However, preoperative diagnostic coronary angiography (CAG) demonstrated no significant lesions (Fig. 1).

When the patient was recently admitted due to dyspnea on exertion, the pressure gradient through the prosthetic aortic valve was not significantly increased (peak/mean PG 45/17 mmHg, peak velocity 3.4 m/s) in TTE, and a treadmill exercise test showed inducible ischemia. Diagnostic CAG via right radial access demonstrated no significant left coronary artery stenosis; however, severe luminal narrowing of the RCA ostium was noted (Fig. 2). A Judkins 6F Right 3.5 guiding catheter (Terumo, Tokyo, Japan) was used for RCA, and a 0.014 in Runthrough NS guidewire (Terumo) was introduced. Intravascular ultrasound (IVUS) of the RCA ostium showed severe discrete eccentric narrowing with a homogeneous low echogenic plaque (Fig. 3A). Direct stenting was performed with a 4 mm × 12 mm stent (Xience Xpedition, Abbott, Abbott Park, IL, USA) and follow-up IVUS showed good stent positioning (Fig. 3B). There were no vascular complications, and the patient was discharged on the third day of admission. The patient did not complain of dyspnea or chest pain immediately after the procedure or during follow-up outpatient visits after discharge.

DISCUSSION

To the best of our knowledge, this is the first reported case of percutaneous coronary intervention (PCI) on RCA ostial

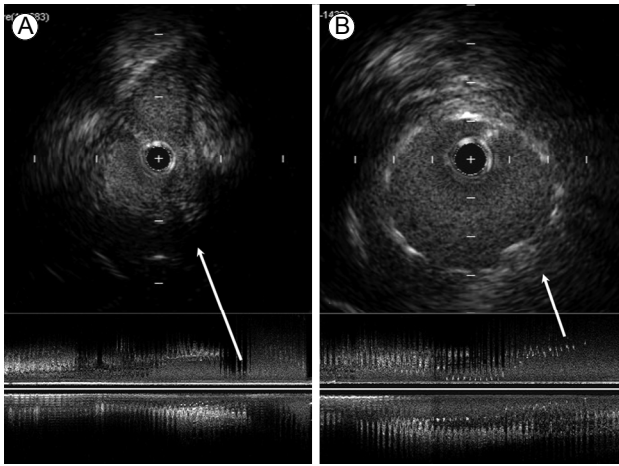


Figure 3. Intravascular ultrasound (IVUS) images. (A) IVUS image before stent implantation showing severe discrete eccentric narrowing of the right coronary artery ostium with a homogeneous low echogenic plaque (white arrow). Conus branch is located at 12 o'clock in the picture. (B) IVUS image after stent implantation showing good stent positioning (white arrow).

stenosis after re-do AVR. Coronary ostial stenosis after AVR is rare and occurs most often in the left main coronary artery, but the RCA can also be affected. An autopsy report revealed that thickened tissue in the aortic root and proximal coronary artery showed fibrosis and intimal thickening and no evidence of atherosclerosis on histological examination [1]. This phenomenon has been proposed to be due to turbulent flow around the prosthetic valve leading to obstruction of the coronary ostia. Fibrotic thickened tissue protrusion was also observed in our case, which was confirmed with homogeneous low echogenicity on IVUS.

Although the pathophysiological mechanism of coronary ostial stenosis after AVR is not well understood, various mechanisms could have mutually influenced this case according to previous studies. First, there could be micro-injury and local hyperplastic reaction related to cardioplegic fluid infusion and over dilation of the vessel by the tip of the catheter during AVR [3]. Another mechanism is an immunological reaction to the heterograft; however, occurrence after mechanical-valve implantation in this case makes this less likely [4]. Since recurrent pannus or fibrotic thickening adjacent to the prosthetic aortic ring developed after AVR, genetic predisposition could be another plausible cause. The apolipoprotein E $\epsilon 4$ allele has been suggested

to predispose patients to a pathologically increased proliferative repair response after arterial injury [2]. Finally, coronary ostial stenosis could be due to late complications of the surgical procedure. Anecdotal reports demonstrate the rare occurrence of coronary ostial stenosis, and right ostial occlusion from aortotomy sutures and ostial post-traumatic fibrosis due to aortic retractor has been described [5]. Although postoperative outcomes after re-do aortic valve surgery are acceptable and have low early and long-term mortality [6], development of mechanical complications after valve surgery can still occur [7].

Coronary ostial stenosis after AVR triggers myocardial ischemic conditions such as unstable angina, left ventricular heart failure, ventricular arrhythmias, or sudden death [8]. High clinical suspicion is crucial, and thorough evaluation through coronary artery angiography and intravascular imaging, if possible, are vital for timely management. In the drug-eluting stent era, PCI is an efficient and safe approach for revascularization as several reports have shown excellent early and late outcomes with coronary stent implantation [9,10].

Coronary ostial stenosis after AVR is a rare phenomenon, and high clinical suspicion is crucial when patients present myocardial ischemic symptoms after AVR, especially with a reoperation history. Several mechanisms are involved in the development of fibrotic thickened tissue protrusion adjacent to coronary ostium. Early reperfusion strategies are important for clinical outcomes, and PCI has shown promising early and late outcomes.

중심 단어: 대동맥판막, 재협착, 관상동맥 스텐트

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