Aortic Valve Replacement and Concomitant Coronary Artery Bypass Grafting in a Patient with Infective Endocarditis and Anomalous Origin of the Right Coronary Artery from the Opposite Sinus of Valsalva

Sachi Koyama, MD, Keiichi Itatani, MD, PhD, Shunei Kyo, MD, PhD, Rie Aoyama, MD, Yusuke Tubokou, MD, PhD, Hajime Fujimoto, MD, PhD, and Kazumasa Harada, MD, PhD

A 69-yr-old woman with anomalous origin of the right coronary artery from the opposite sinus of Valsalva (ACAOS) was diagnosed as having infective endocarditis affecting the aortic valve. Transthoracic echocardiography showed severe aortic stenosis and vegetations on the cusp of the aortic valve, which necessitated aortic valve replacement. Before the operation, computed tomography showed a right-ACAOS, with the artery running an interarterial course between the aorta and pulmonary artery. ACAOS running an interarterial course has been reported to be associated with an increased risk of ischemic cardiac events and sudden death. The patient was treated successfully by the aortic valve replacement with concurrent coronary artery bypass grafting using a saphenous vein graft for the right coronary artery.

Keywords: anomalous origin of a coronary artery from the opposite sinus (ACAOS), interarterial course, infective endocarditis, coronary artery bypass grafting

Introduction

Congenital coronary arterial anomalies are common, occurring in an estimated 0.3% to 1.3% of the population. Although most cases are clinically asymptomatic, some anomalies have been reported to be associated with an increased risk of myocardial ischemia and infarction, congestive heart failure, and/or sudden cardiac death. One of the highest-risk coronary malformations is anomalous origin of both the right and left coronary arteries from the opposite sinus of Valsalva (ACAOS), particularly in cases where the artery runs an interarterial course between the aorta and pulmonary artery. Anomalous origin of the left coronary artery from the opposite sinus of Valsalva (left-ACAOS) is an absolute indication for surgical intervention, whereas, the indication for surgery in patients with right-ACAOS still remains controversial. We performed aortic valve replacement and coronary artery bypass grafting in a patient with right-ACAOS presenting infective endocarditis of the aortic valve.

Case Report

A 69-yr-old woman with moderate aortic and mitral valve stenosis was referred to our out-patient clinic 2 yrs ago. She had undergone closed mitral commissurotomy 38 yrs ago and had remained in relatively
good physical condition until recently. She presented with high fever of sudden onset and was admitted to our hospital emergency department. Her blood pressure was 75/50 mmHg, pulse rate was 83 beats per minute and, body temperature was 39.6°C, and she was diagnosed as having sepsis with shock. There were no Roth’s spots or Osler nodes. Blood examination revealed the following: WBC, 8490/μL; Plt, 49000/μL; CRP, 23.44 mg/dL; CPK, 5 IU/l; APTT, 38.9 sec; and fibrinogen, 449 mg/dl. Transthoracic echocardiography showed mobile vegetations attached to the aortic valve (Fig. 1), and based on the findings, the patient was diagnosed as having infective endocarditis (IE) affecting the aortic valve, septic shock and DIC. Antibiotic treatment was started immediately with gentamicin and vancomycin. Blood culture on two occasions revealed growth of *Streptococcus agalactiae*. The DIC was successfully controlled after antibiotic therapy for 2 weeks. However, the serum CRP remained elevated and a low-grade fever persisted despite continuation of the antibiotic treatment. One month after hospitalization, the patient developed an acute embolic episode in the right dorsalis pedis artery; an echocardiography at this time revealed disappearance of the mobile parts of the aortic vegetations. We judged that the infective endocarditis was still active, and that the patient required aortic valve replacement (AVR). Before the operation, computed tomography (CT) showed anomalous origin of the right coronary artery arising from the left sinus of Valsalva at an acute angle, which is known as a risk factor for myocardial ischemia (Fig. 2A and B). Therefore, we decided to perform coronary artery bypass grafting for the right coronary artery (RCA).

We employed the median sternotomy approach and established cardiopulmonary bypass with aortic perfusion and bicaval drainage. Cardiac arrest was induced with antegrade blood cardioplegia after aortic cross-clamping. We performed aortotomy and found that the right coronary cusp and non-coronary cusp were fused completely, giving the appearance of a single leaflet, and that all the leaflets were thickened and sclerotic, although, the aortic annulus seemed to be normal. Vegetations were attached to the tips of all the leaflets (Fig. 3). We performed AVR with a 19 mm CEP MAGNA prosthetic valve (Edwards Lifescience Co.) and coronary artery bypass grafting using a saphenous vein graft for the RCA. Flow measurement using an ultrasonic flow meter showed a flow rate of 39 mL/min (DF 53%; Pulsatility Index 1.9) with a good flow pattern.

After the operation, the antibiotic treatment was continued for 4 weeks, and the patient remained afebrile after stopping the antibiotic therapy. Blood examination revealed improvement of the inflammatory response after surgery: the serum WBC decreased to 2870/μL, and the serum CRP to 0.7 mg/dL. Coronary computed tomography showed good patency of the saphenous vein graft (Fig. 4). The patient was discharged from the hospital one month later.

**Discussion**

Angelini et al. identify ACAOS as a particularly fatal variant, associated with a higher incidence of sudden death. In particular, left-ACAOS is considered to be an absolute indication for surgical intervention, whereas the indication for surgery in patients with right-ACAOS still remains controversial, although some reports mention that patients under 30 yrs undergo surgery. Some studies have reported sudden cardiac arrest. Therefore, conservative treatment may be suitable for patients with right-ACAOS even if he/she is asymptomatic. If a patient with right-ACAOS needs to undergo cardiac surgery, additional concomitant CABG for RCA may be reasonable to perform to prevent myocardial ischemia, congestive heart failure, and/or sudden cardiac arrest during the perioperative period. Richard A. Krasuski et al. reported that there was no difference in the 10-yr survival rate between medical and surgical management in patients with right-ACAOS (P = 0.65).
Fig. 2  (A) On computed tomography (CT), the anomalous right coronary artery (RCA) is seen to arise from the left coronary sinus, running an interarterial course between the aorta and pulmonary artery. (B) No lesion causing ischemia was detected. However, the RCA and left anterior descending (LAD) are seen to arise from the left sinus cusp.

Fig. 3  Operative findings. The right coronary cusp and non-coronary cusp are fused giving the appearance of one leaflet, and all the leaflets are thickened and sclerotic, although the annulus is not sclerotic. Vegetations were attached at the tip of all leaflets.

In our patient, right-ACAOS was clinically asymptomatic and diagnosed incidentally. However, AVR was performed because of active IE, along with concomitant CABG for the RCA. There has been no report about causal correlation of IE at the aortic valve and ACAOS; thus, IE itself was considered to happen by chance. Previously described revascularization techniques for ACAOS other than CABG are coronary unroofing, coronary artery implantation into the correct aortic sinus, and main pulmonary artery translocation. Coronary unroofing, which is preferred in young patients and patients with the intramural type, has the potential to distort the aortic valve. We selected CABG in this patient because we considered that simplicity of the procedure is important for this patient with active IE.

Conclusion

We performed AVR and CABG in a patient with right-ACAOS and active IE. The postoperative course was uneventful, with no significant cardiac events.

Disclosure Statement

None.
References