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Refractory diffuse coronary artery spasm post aortic valve replacement

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Abstract

Postoperative coronary artery spasm occurs rarely after valve replacement surgery. We report the case of a 64-year-old man with normal coronary arteries who underwent aortic valve replacement. Nineteen hours postoperatively, his blood pressure plummeted with an elevated ST-segment. Coronary angiography demonstrated a 3-vessel diffuse coronary artery spasm, and direct intracoronary infusion therapy was performed with isosorbide nitrate, nicorandil and sodium nitroprusside hydrate within 1 h of onset. Nonetheless, there was no improvement, and the patient was resistant to treatment. The patient died due to prolonged low cardiac function and pneumonia complications. Prompt intracoronary vasodilator infusion is considered effective. However, this case was refractory to multi-drug intracoronary infusion therapy and was not salvageable.

Keywords: Coronary spasm • Perioperative myocardial infarction • Aortic valve replacement

INTRODUCTION

Postoperative coronary artery spasm (CAS) is an infrequent life-threatening event after cardiac surgery that can occur without an underlying coronary disease.

With prompt diagnosis and intracoronary vasodilator treatment, the prognosis is relatively good. However, reports on multi-drug vasodilator-resistant CAS despite the absence of coronary artery abnormalities are few.

This report describes a case of diffuse CAS after aortic valve replacement (AVR) refractory to intracoronary vasodilator infusion therapy.

CASE REPORT

A 64-year-old Japanese man with a 14-year history of dialysis was admitted for elective surgery for severe aortic valve stenosis (NYHA class II). Other important clinical problems were hypertension, paroxysmal atrial fibrillation and chronic obstructive pulmonary disease with advanced emphysematous. The oral medications were an angiotensin II receptor blocker, calcium channel blocker and alpha-blocker. There was no history of angina pectoris; the preoperative coronary angiography results were normal (Fig. 1A and D). Preoperative cardiac catheterization confirmed severe aortic stenosis and aortic valve regurgitation II with a 79% left ventricular ejection fraction (LVEF). The aortic valve was replaced with a 23-mm bioprosthetic prosthesis (INSPIRIS RESILIA; Edwards Lifesciences) with thoracic aorta cross-clamping time, 77 min; operation time, 209 min; and bleeding, 180 ml.

Postoperatively, the patient was admitted to the intensive care unit under intubation and sedation. The immediate postoperative period was uneventful; the patient showed regular sinus rhythm and no ischaemic changes, with good left ventricular contractility.

On postoperative day 1 (18 h post-surgery), the patient remained stable and was extubated. After 90 min of extubation, his blood pressure decreased, and his electrocardiogram showed leads II, III, and aVF ST-segment elevation. The patient was immediately re-intubated. Emergent transthoracic echocardiography showed no bioprosthetic prosthesis dysfunction signs, but the LVEF dropped 20%. As marked haemodynamic and electrical instability persisted, the patient was promptly moved to the angiography room; intra-aortic balloon counterpulsation (IABP) was started to stabilize the circulation. Coronary angiography showed sub-occlusive spasms in the left and right coronary (Fig. 1B and E). Intra-coronary administration of isosorbide dinitrate, nicorandil, and sodium nitroprusside hydrate was ineffective (Fig. 1C and F). IABP and catecholamine stabilized circulating dynamics and continued intravenous isosorbide nitrate and nicorandil reduced myocardium-derived enzyme.

Two days later LVEF had improved to ∼40% and IABP was weaned off. However, he developed an intractable pneumonia with pneumothorax for which surgical intervention is not possible and died 20 days postoperatively.

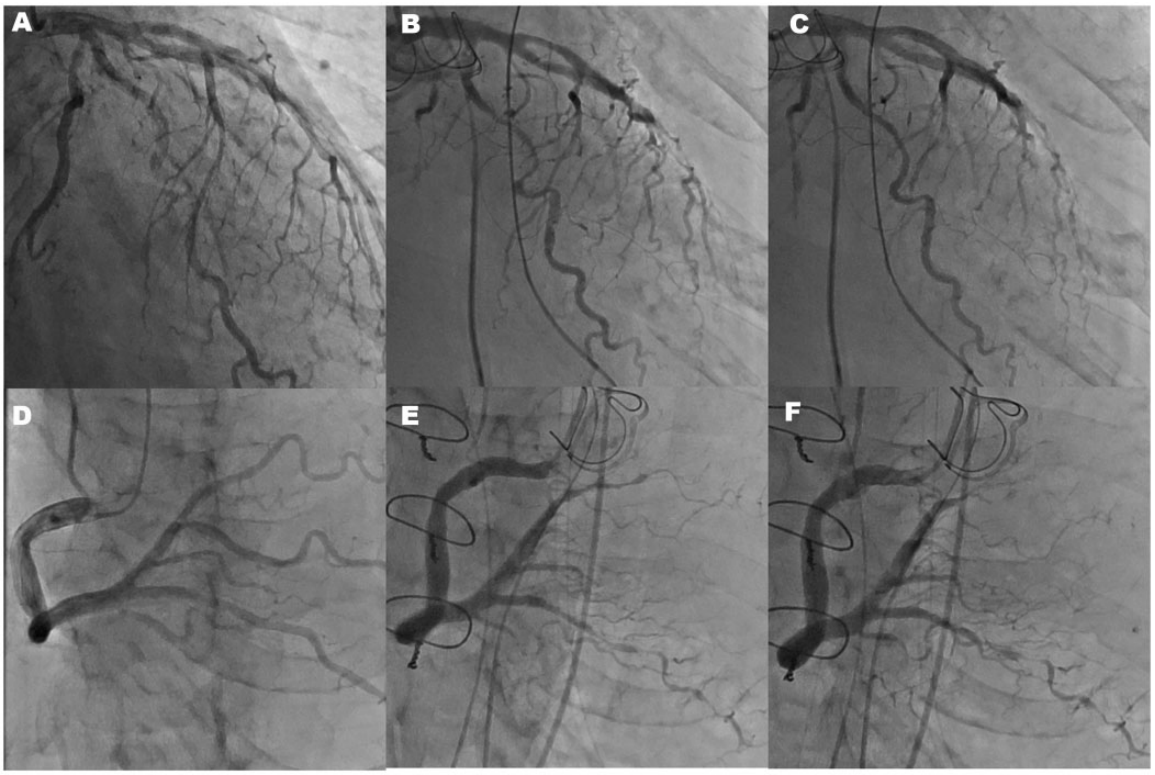
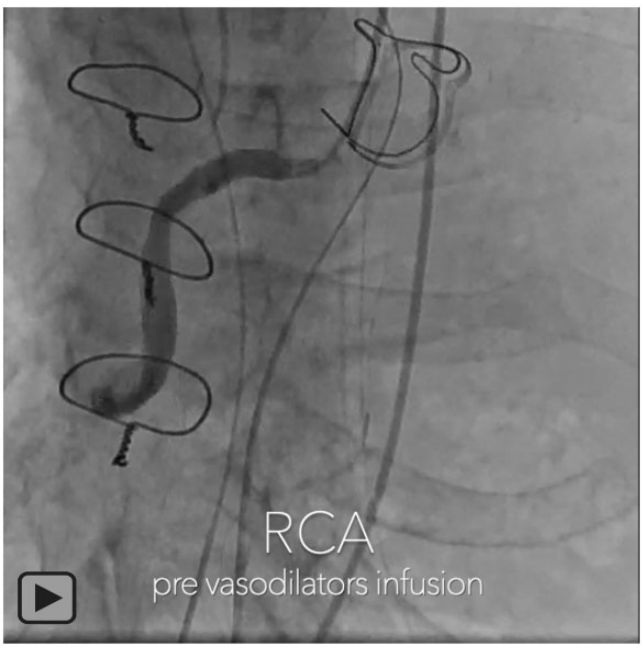


Figure 1: (**A**) Preoperative angiogram of the left coronary artery (LCA). (**B**) Postoperative angiogram of LCA showing the diffuse spasm. (**C**) Intracoronary vasodilator infusion did not ameliorate LCA spasm. (**D**) Preoperative angiogram of the right coronary artery (RCA). (**E**) Postoperative angiogram of RCA showing the diffuse spasm. (**F**) Intracoronary vasodilator infusion did not ameliorate RCA spasm. (All details are in the supplemental material, Video 1).



Video 1: Coronary angiography.

DISCUSSION

Most cases of postoperative CAS are reported post-coronary artery bypass surgery; however, a few post-valvular surgery cases, such as after AVR, have also been reported. Pragliola *et al.* and Formica *et al.* summarized previous cases of coronary spasm after valve replacement, most of which were right coronary artery only or diffuse [1, 2]. Once confirmed by angiography from collapse or electrocardiogram changes, CAS treatment, direct intracoronary injection of nitrates or calcium channel blockers, is usually effective. The prognosis is better if mechanical support for circulation (intra-aortic balloon pumps, extracorporeal membrane oxygenation, or an assisted artificial heart) is used.

Lorusso *et al.* [3] reported that 28% of CAS after coronary artery surgery were diffuse CAS and were unresponsive to multi-drug direct intracoronary vasodilator infusion. Tsuchida *et al.* [4] reported multi-drug direct intracoronary vasodilator treatment-resistant CAS post-AVR in 1993.

In this case, direct intracoronary infusion was refractory even in the acute phase, but cardiac function improved with IABP and intravenous vasodilators. However, the patient developed life-threatening pneumonia because of prolonged intubation.

ECMO is reported to provide full circulatory support, such that catecholamine infusions that may aggravate cardiac artery spasm by the alpha-adrenergic effect can be discontinued. ECMO was not used in the acute phase because IABP stabilized the circulation. Considering refractory CAS, aggressive use of ECMO may have hastened cardiopulmonary improvement and improved prognosis.

After onset the severe pneumonia with pneumothorax, ECMO could not be used due to no prospects for improvement in lung function because of diagnosis as inoperable due to chronic obstructive pulmonary disease with advanced emphysematous.

Multi-drug vasodilator coronary infusion resistance CAS after valve replacement is rare and life-threatening. Aggressive ECMO use may contribute to improved prognosis.

CONCLUSION

CAS is a rare cause of ischaemia following AVR. The patient was promptly treated with intracoronary infusion of vasodilators but was refractory to multiple drugs.

SUPPLEMENTARY MATERIAL

Supplementary material is available at *ICVTS* online.

Conflict of interest: none declared.

Data availability

The data underlying this article are available in the article and in its online supplementary material.

Reviewer information

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