A rare presentation of late right coronary artery spasm following aortic valve replacement

Alireza Alizadeh-Ghavidel[1], Hosseinali Basiri[2], Ziae Totonchi[3], Yalda Mirmesdagh[1], Farshad Jalili-Shahandashti[3], Behnam Gholizadeh[3]

Case Report

Abstract

BACKGROUND: Coronary artery spasm (CAS) is defined as a reversible, sudden epicardial coronary artery stenosis that causes vessel occlusion or near occlusion.

CASE REPORT: In this article, we present a clinical case of CAS in a 48-year-old woman undergoing elective aortic valve replacement surgery for aortic stenosis. On the 3rd post-operative day, the patient suffered from chest pain and dyspnea. Emergent coronary angiography demonstrated a significant spasm of the ostium portion of the right coronary artery.

CONCLUSION: This case shows that delayed coronary spasm should be considered as a cause of hemodynamic instability after valvular surgery.

Keywords: Aortic Valve Replacement, Coronary Artery Vasospasm, Coronary Artery Disease, Postoperative Complication

Date of submission: 8 Sep 2013, ***Date of acceptance:*** 16 Apr 2014

Introduction

Coronary artery spasm (CAS) is defined as a reversible, sudden, intense epicardial coronary artery stenosis that causes vessel occlusion or near occlusion and therefore limits coronary blood flow.[1]

The occurrence of CAS is mostly after coronary artery bypass surgery. However, its incidence after valve replacement is uncommon.[2,3]

We report a case of delayed right coronary artery (RCA) vasospasm, after aortic valve replacement (AVR).

Case Report

A 48-year-old woman with symptomatic severe aortic stenosis [New York Heart Association (NYHA class II)] was admitted for elective AVR. There was a history of patent ductus arteriosus closure by catheterization and coarctation stenting 7 years before. However; there was no history of angina pectoris in the past. Preoperative cardiac catheterization confirmed important aortic stenosis with left ventricular ejection fraction (LVEF): 60%. It also revealed dilated aortic root, ascending aorta and aortic arch. Coronary angiography was normal (Figure 1). Aortic valve was replaced by a 23 mm mechanical prosthesis (St. Jude Medical); aortic cross-clamping lasted 55 min. The early post-operative period in critical care unit (ICU) was uneventful. The electrocardiogram showed normal sinus rhythm and no any ischemic changes (Figure 2).

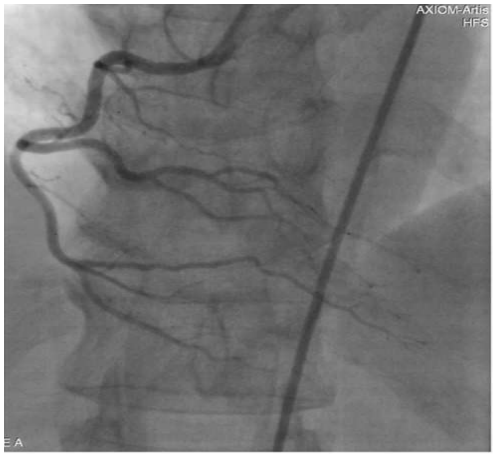

Figure 1. Pre-operative right coronary artery angiography

On admission at ward (3 days after surgery), the patient suffered from typical chest pain and dyspnea. New onset ST segment elevation occurred in inferior leads, and ST-T dynamic changes were also occurred in pericardial leads (Figure 3) with hemodynamic

1- Heart Valve Disease Research Center, Rajaie Cardiovascular Medical and Research Center, Iran University of Medical Sciences, Tehran, Iran
2- Cardiovascular Intervention Research Center, Rajaie Cardiovascular Medical and Research Center, Iran University of Medical Sciences, Tehran, Iran
3- Rajaie Cardiovascular Medical and Research Center, Iran University of Medical Sciences, Tehran, Iran
Correspondence to: Farshad Jalili-Shahandashti, Email: jalilishfarshad@gmail.com

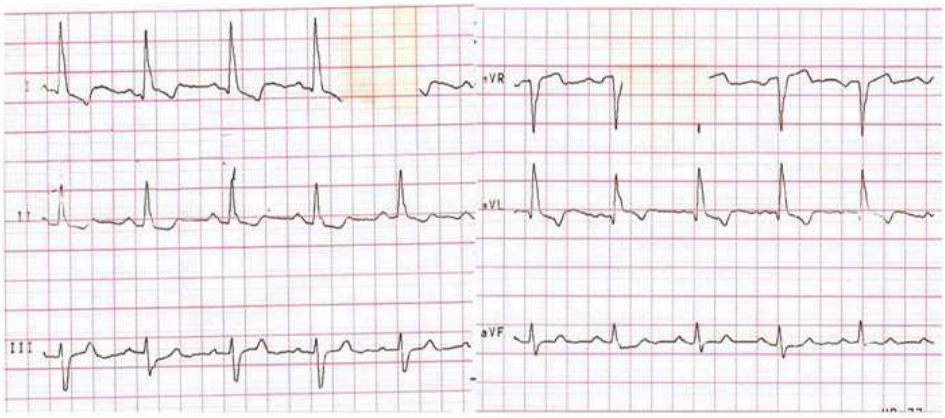

Figure 2. Early post-operative electrocardiogram

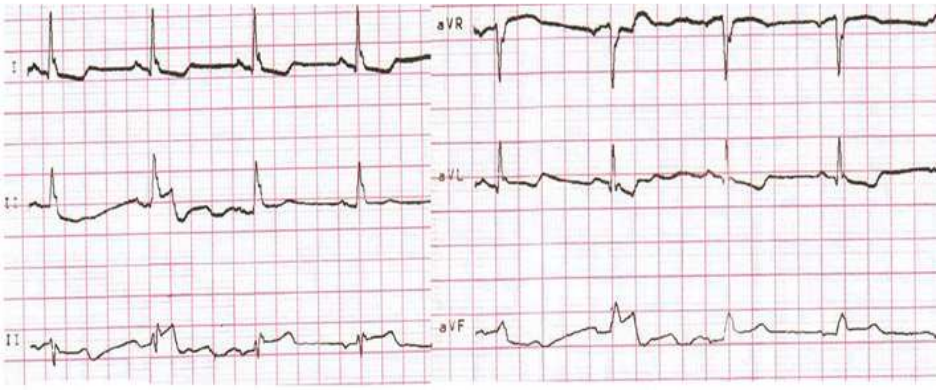

Figure 3. Electrocardiogram at the time of chest pain 3 days after the surgery

instability but no ventricular arrhythmia. Laboratory test showed troponin I: 0.46 μg/l and creatine phosphokinase-MB: 13 IU/l. Therefore, the patient underwent emergent trans- the thoracic echocardiography (TTE) and catheterization. Emergent TTE showed no signs of mechanical prosthesis dysfunction, dissection, pulmonary embolism or evidence of myocardial impairment. Since marked hemodynamic instability persisted, coronary angiography was performed. Non-selective aortic root injection and selective RCA angiography showed a pronounced spasm of the ostium portion of RCA with aortic gradient in coarctation site: 15-20 mmHg (Figure 4). Intravenous trinitroglycerin (TNG) was promptly administered. Coronary artery was relieved of vasospasm (Figure 5) and intravenous TNG was maintained for 24 h.

The remainder of the post-operative course was uneventful. There was no evidence of myocardial infarction [electrocardiogram (ECG), Enzymes]. Pre-discharge evaluation (TTE) showed normal aortic prosthesis, left ventricular functions and coronary perfusion. The ST-T change returned to normal (Figure 6), there was no evidence of myocardial infarction or even dysfunction (LVEF: 55%, mean pressure gradient: 17 mmHg and peak pressure gradient: 31 mmHg).

The patient was discharged on the 6th post-operative day under warfarin therapy.

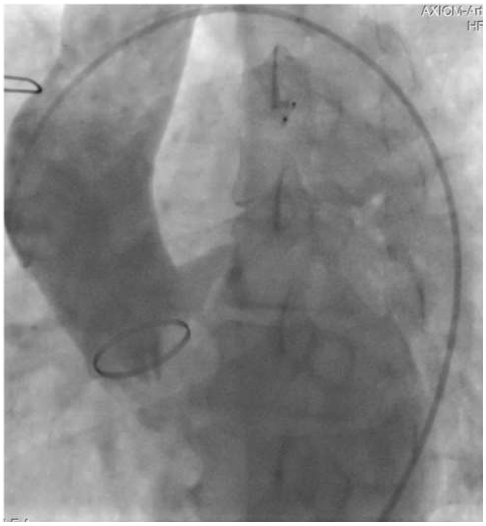

Figure 4. Non-selective aortic root injection angiography

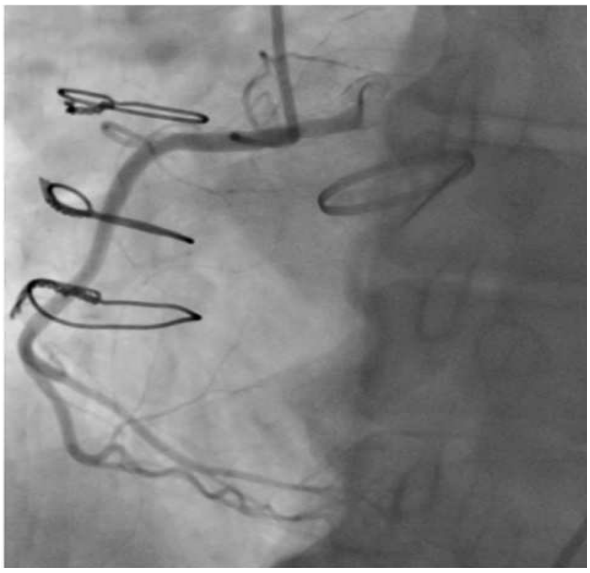

Figure 5. Selective right coronary artery angiography after infusion of intravenous trinitroglycerine

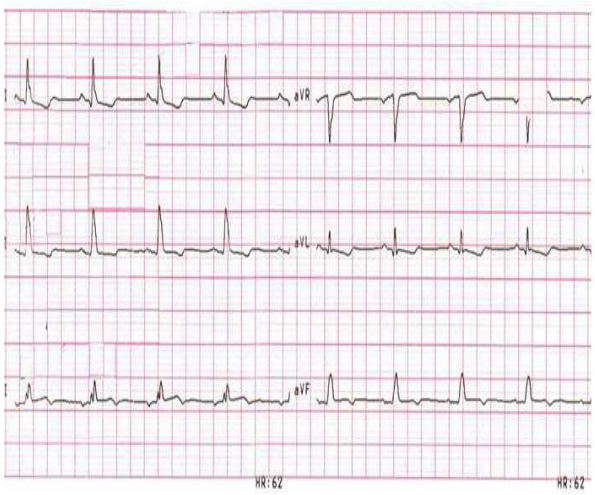

Figure 6. Electrocardiogram after transient right coronary artery spasm

Discussion

CAS is an abnormal transient and intense constriction of a segment of an epicardial artery resulting in myocardial ischemia. There are different but uncertain mechanisms of CAS including the autonomic nervous system, platelet aggregation, and vascular endothelium.[1,3] Endothelin, isosorbide dinitrate, and concomitant administration of calcium-channel blockers, have been implicated in the control of vascular tone and may be able to relieve patients from CAS during and after cardiac operations.[4,5] Post-operative coronary arterial spasm may be due to trauma during surgical manipulation, compression by chest drain tubes and hypothermia and vasoconstrictor factors during cardiopulmonary bypass released by platelets.[6] There are different manifestations of CAS range from asymptomatic ST elevation to hemodynamic instability. Therefore, CAS must be considered as a differential diagnosis of acute post-operative chest pain and circulatory instability. Most of the previously reported CAS cases were during and after coronary artery bypass graft, and there are few reports of post-operative coronary spasm after valve replacement procedure.[3,5]

In this case, emergency coronary angiography was performed since hemodynamic instability was not apparently related to mechanical prosthesis dysfunction or worsened ventricular function and the suspicious diagnosis was RCA occlusion by sewing ring of prosthesis or local dissection or RCA orifice tension by prosthesis. Finally, right CAS was evidenced. We speculate that the trauma during surgical manipulation may have had some influence in the development of spasm. Therefore, intracoronary nitrates were immediately infused and coronary artery was relieved of vasospasm In conclusion, this case shows that delayed coronary spasm should be considered as a cause of unexplained hypotension, circulatory collapse and hemodynamic instability after valvular surgery and proper attitudes should be promptly performed.

Acknowledgments

We thank Rajaie Cardiovascular Medical and Research Center, Tehran, Iran, for its support in order to get access to the data which was required for preparing this study.

Conflict of Interests

Authors have no conflict of interests.

References

1. Lanza GA, Careri G, Crea F. Mechanisms of coronary artery spasm. Circulation 2011; 124(16): 1774-82.
2. Paterson HS, Jones MW, Baird DK, Hughes CF. Lethal postoperative coronary artery spasm. Ann Thorac Surg 1998; 65(6): 1571-3.
3. Pinho T, Almeida J, Garcia M, Pinho P. Coronary artery spasm following aortic valve replacement. Interact Cardiovasc Thorac Surg 2007; 6(3): 387-8.
4. Fischell TA, McDonald TV, Grattan MT, Miller DC, Stadius ML. Occlusive coronary-artery spasm as a cause of acute myocardial infarction after coronary-artery bypass grafting. N Engl J Med 1989; 320(6): 400-1.
5. Tsuchida K, Takemura T, Kijima M, Matsumoto S.

Coronary artery spasm after aortic valve replacement. Ann Thorac Surg 1993; 56(1): 170-3.

6. Buxton AE, Hirshfeld JW, Untereker WJ, Goldberg S, Harken AH, Stephenson LW, et al. Perioperative coronary arterial spasm: long-term follow-up. Am J Cardiol 1982; 50(3): 444-51.

How to cite this article: Alizadeh-Ghavidel A, Basiri H, Totonchi Z, Mirmesdagh Y, Jalili-Shahandashti F, Gholizadeh B. **A rare presentation of late right coronary artery spasm following aortic valve replacement.** ARYA Atheroscler 2015; 11(1): 50-3.