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Case Report

Coronary Embolism from Prosthetic Aortic Valve due to Incompliant Warfarin Use: A Rare Cause of Acute Coronary Syndrome

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ABSTRACT

Acute ST-segment elevation myocardial infarction (STEMI) is a life-threatening condition for which revascularization should be accessed emergently. Most STEMI cases result from atherosclerotic plaque rupture. However, rare causes such as coronary artery dissection, the vasculitic involvement of the coronary arteries, and coronary artery embolism may result in pathophysiological mechanism. This paper presents the case of a young male patient with subacute anterior STEMI secondary to thrombus embolism from prosthetic aortic valve due to incompliant warfarin use.

Keywords: Coronary artery embolism, incompliant warfarin use, prosthetic aortic valve

INTRODUCTION

Acute ST-segment elevation myocardial infarction (STEMI) develops after coronary artery occlusion due to ruptured coronary artery plaque and results in myocardial necrosis. Coronary artery embolism is a rare cause of STEMI without underlying atherosclerosis. Atrial fibrillation is the most common underlying disease related to coronary artery embolism (1).

This paper presents the case of a young male patient with a prosthetic aortic valve. The patient was admitted to our hospital with subacute anterior STEMI due to coronary artery embolism that potentially originated from prosthetic aortic valve owing to incompliant warfarin use.

CASE PRESENTATION

A 17-year-old male patient with compression type chest and back pain, which started 3 hours before admission, was admitted to our emergency department. His past medical history revealed Benthall procedure (prosthetic aortic valve and ascending aorta graft replacement) performed two years ago due to severe aortic regurgitation and ascending aorta dilatation related with bicuspid aortic valve. His only daily medication was warfarin, which was not consumed for the last four days. The patient reported that he had not used any other medications and substances during that period. His vital signs were in normal range; physical examination was unremarkable, except the metallic sound of S2. His electrocardiogram was consistent with subacute anterior STEMI (Figure 1). Hypokinesia at anterior wall mid-basal segments with estimated left ventricular ejection fraction of 50% was established by bedside echocardiographic evaluation. Prosthetic aortic valve functions were normal, and neither thrombus nor vegetation was detected on the valve surface. The international normalized ratio (INR) level was 1.23, which was below the therapeutic range. Cardiac biomarkers were mildly elevated (CK-MB:8.6 (0-6.3 ng/mL) and Tn-I: 0.113 (0-0.04 ng/mL), and coronary angiography was performed emergently. His right coronary artery, circumflex artery, and left main coronary arteries were normal. A huge thrombus obstructing the lumen was detected in the left anterior descending artery (LAD) (Figure 2). Bileaflet prosthetic valve motion was also normal at fluoroscopy. Intracoronary tirofiban was administered, and maintenance infusion of unfractionated heparin and tirofiban was continued for 24 hours. Therafter, subcutaneous enoxaparin 2×0.6 cc was initiated, in addition to the administration of 100 mg of aspirin and 75 mg of clopidogrel. Transeosophageal echocardiography revealed no thrombus at the heart valves, with prosthetic aortic valve and left atrial appendage and normal prosthetic valve functions. A control coronary angiography was performed 72 hours later, indicating that thrombus in the LAD had disappeared (Figure 3). Rheumatological markers and thrombophilia genetic panel were negative. Homocysteine level was also in the normal range. The patient did not describe dark urine in the morning, and hemo-

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Figure 1. Electrocardiography on admission indicating pathological Q waves and ST segment elevation in anterior leads consistent with subacute anterior myocardial infarction

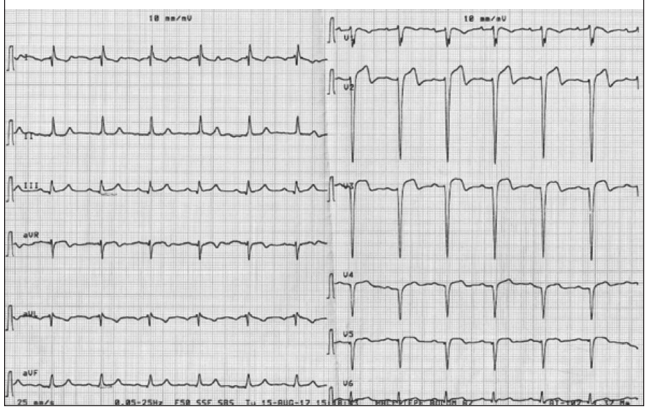
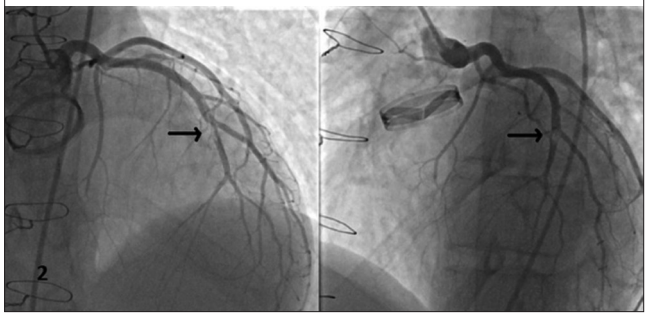


Figure 2. Emergent angiogram at right anterior oblique and left anterior oblique views indicating a huge thrombus at the mid portion of the left anterior descending artery

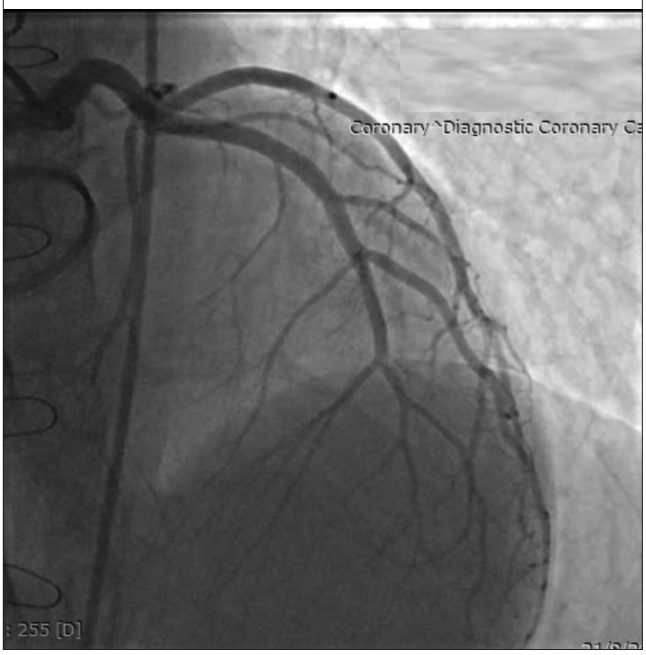


lytic parameters were normal. Other causes of arterial thrombus were excluded; coronary thromboembolism from the prosthetic aortic valve secondary to incompliant warfarin use and subtherapeutic INR level was proposed as the underlying mechanism. The patient was uneventfully discharged with a triple antithrombotic regimen (including warfarin, 100 mg of aspirin, and 75 mg of clopidogrel) for three months, and warfarin as well as aspirin was continued thereafter. As the past surgical reports were unavailable, the type of prosthetic valve could not be learnt from the patient. The target INR level during follow-up was determined as 3.0 owing to thromboembolic episode in conjunction with mechanical prosthetic aortic valve. Informed consent was obtained from the patient.

Main Points:

- An acute coronary syndrome due to coronary thromboembolism should be considered in differential diagnosis among patients with mechanical prosthetic heart valves.
- Effective therapeutic anticoagulation should be maintained in all patients with mechanical prosthetic heart valves.
- Monitoring of effective therapeutic INR levels is very important to prevent inadvertent embolic events in those patients.

Figure 3. Control angiogram at right anterior oblique view indicating the disappearance of thrombus at the left anterior descending artery after heparin and tirofiban infusion therapy



DISCUSSION

Plaque rupture is the most common cause of STEMI; of the other rare situations, coronary embolism results in STEMI. STEMI is a life-threatening condition that must be emergently treated with either mechanical or pharmacological revascularization. Primary percutaneous intervention is better than thrombolytic treatment to achieve thrombolysis in myocardial infarction grade 3 flow; accordingly, interventional treatment should always be preferred as the first option if available. Thrombus aspiration can be an option in selected patients with coronary artery embolism. There was a diversity between randomized controlled study results in regard to outcomes of thrombus apiration during primary PCI. Therefore, routine thrombus aspiration before PCI is not suggested by the American Heart Association (AHA) guidelines, and this option should be only considered in selected cases (1).

The prevalance of coronary artery embolism in patients with STEMI is estimated to be 13% by post-mortem series. Infective endocarditis, atrial thrombus, myxoma, prosthetic valves, calcific aortic stenosis, and biological glue used to repair aortic dissection are common causes of coronary artery embolism (2). Thrombus originating from aortic valve usually goes to left coronary artery presumably associated with aortic valve morphology (3). Anticoagulation with warfarin should be advised to the patients with mechanical prosthetic aortic valve, and the INR level should be maintained between 2.0–3.0 consistent with the recommendations of AHA/ACC guidelines to minimize the risk of thromboembolism. In patients with On-X aortic valve replacement, lower INR levels (1.5–2.0) are acceptable due to lower thromboembolic risk. Aspirin (75–100 mg/day) should be added in anticoagulant therapy (4). No consensus exists regarding the maintainence treatment of coronary embolism. Warfarin and as-

pirin were administered to the patient with STEMI considering mechanical prosthetic aortic valve, and clopidogrel was added for three months.

Similar cases with coronary artery embolism from the mechanical mitral valve, during and just after aortic valve replacement procedure and from blood cyst originated from mitral valve have been reported (5-7). To the best of our knowledge, no case report in the literature showing a coronary artery embolism from mechanical aortic valve as a result of incompliant use of warfarin and subtherapeutic INR level has been reported.

CONCLUSION

The most common cause of coronary artery occlusion is a ruptured unstable atherosclerotic plaque; however, coronary artery occlusion due to thromboembolic events should be included in the differential diagnosis of patients with acute coronary syndrome. Patients with prosthetic valves carry a high risk for thrombotic complications; accordingly, these patient groups should be effectively anticoagulated and monitored at regular intervals.

Informed Consent: Informed consent was obtained from the patient.

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