Mitral stenosis and acute ST elevation myocardial infarction

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Figure 1. Electrocardiogram showing 1.5- to 2-mm ST segment elevation in the inferior leads and atrial fibrillation with a fast ventricular rate.

We describe a patient who presented with acute (inferior wall) ST elevation myocardial infarction. Her echocardiogram showed severe mitral stenosis with ball valve thrombus in the left atrial body and thrombus in the left atrial appendage. Coronary angiogram revealed thromboembolic material in the right coronary artery. Mitral valve replacement was scheduled.

Coronary embolization is an infrequent cause of myocardial infarction. We describe a woman with severe rheumatic mitral stenosis who presented initially as acute (inferior wall) ST elevation myocardial infarction (STEMI) due to embolism of thrombus in the left atrium.

CASE DESCRIPTION

A 47-year-old woman presented with progressive exertional and nocturnal dyspnea of 1 year duration. She was hospitalized following a prolonged episode of retrosternal crushing pain of sudden onset on the day of admission. Examination revealed an irregularly irregular pulse at a rate of 120 beats per minute, a blood pressure of 100/70 mm Hg, respiratory rate of 14 breaths per minute, and a temperature of 36.7°C. Precordial examination revealed a tapping apical impulse, loud first heart sound and pulmonary component of second heart sound, opening snap, and a long mid-diastolic rumble over the apex. Other systems were normal.

Baseline laboratory reports were normal. An electrocardiogram showed atrial fibrillation with a fast ventricular rate and about 2 mm ST segment elevation in leads II, III, and aVF (*Figure 1*). A chest radiograph showed cardiomegaly with radiological signs of pulmonary arterial and venous hypertension and biatrial enlargement (*Figure 2*). A transthoracic echocardiogram showed severe mitral stenosis with a mitral valve area of 0.9 cm² and a ball valve thrombus of 2.1 cm moving freely within the left atrium and intermittently occluding the mitral valve orifice (*Figures 3 and 4*). The calculated pulmonary artery systolic pressure was 70 mm Hg. A transesophageal echocardiogram showed the left atrial appendage to be filled with thrombus (*Figure 4d*). Coronary angiogram showed thrombolysis in myocardial infarction (TIMI) grade 4 thrombus in the mid right coronary artery, with preserved antegrade flow (*Figure 5*). There were no atherosclerotic plaques or stenotic lesions in either the left or the right coronary systems.

The patient was treated conservatively with intravenous unfractionated heparin, aspirin, clopidogrel, digoxin, furosemide, and spironolactone. With the treatment, the patient experienced symptomatic relief and hemodynamic stability, and she was referred for mitral valve replacement.

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Figure 2. Chest radiograph in the posteroanterior view showing several radiological features of mitral stenosis: (1) cephalization (“upturned moustache” sign or Antler sign), (2) widened carinal angle, (3) dilated right descending pulmonary artery, (4) enlarged left atrial appendage with “straightening” of the left heart border, (5) dilated left atrium with a “shadow through shadow,” or “double density” appearance, and (6) Kerley B line due to interstitial pulmonary edema.

Figure 3. (a) Transthoracic echocardiogram parasternal long-axis view showing mitral stenosis with a thickened posterior mitral leaflet and the “hockey stick” or “elbow” sign of the anterior mitral leaflet (red arrow). (b) Parasternal short-axis view at the mitral valve level showing the characteristic “fish-mouth” appearance with a mitral valve area of 0.9 cm². (c) Doppler interrogation of the mitral valve showing the elevated mean and peak transmitral gradients and the pressure half-time. (See also supplementary videos.)

DISCUSSION

This case demonstrates a rare and atypical presentation of acute STEMI due to coronary artery embolism in a patient with mitral stenosis. Since the first postmortem description of coronary embolism was published by Virchow in 1856, several such cases have been reported in clinical and postmortem studies. Coronary embolism appears to be the most reasonable explanation for acute myocardial infarction with angiographically normal coronary arteries (1). Wenger and Bauer (2) found 11 cases of coronary artery embolism in 17,469 consecutive autopsy cases at Mount Sinai Hospital, New York, with a general necropsy incidence of 0.06%.

Mitral stenosis is a well-known cause of systemic and pulmonary embolism, and the presence of atrial fibrillation enhances this risk. Scant data are available on the incidence of coronary embolism in patients with mitral stenosis with or without associated atrial fibrillation. Mitral stenosis presenting for the first time as acute STEMI is rare. In the study by Prizel et al (3), coronary artery embolic infarcts comprised 13% of the autopsy-studied infarcts. Underlying diseases predisposing to coronary emboli included valvular heart disease (40%), cardiomyopathy (29%), coronary atherosclerosis (16%), and chronic atrial fibrillation

Figure 4. (a, b, and c) Transthoracic echocardiogram apical four-chamber view showing the ball valve thrombus moving freely within the left atrium, intermittently obstructing the mitral valve (red arrows). (d) Transesophageal echocardiogram showing the left atrial appendage filled with clot. (See also supplementary videos.)

Figure 5. Coronary angiogram showing thrombus (arrows) in the (a) mid right coronary artery and (b) normal left coronary artery.

(24%). Mural thrombi were present in 18 (33%).

1. Roberts WC. Coronary embolism: a review of causes, consequences and diagnostic considerations. *Cardiovasc Med* 1978;3(7):699–710.
2. Wenger NK, Bauer S. Coronary embolism: review of the literature and presentation of fifteen cases. *Am J Med* 1958;25(4):549–557.
3. Prizel KR, Hutchins GM, Bulkley BH. Coronary artery embolism and myocardial infarction. *Ann Intern Med* 1978;88(2):155–161.

SUPPLEMENTARY MATERIAL

Three videos are available online. **Video 1** (available at http://www.baylorhealth.edu/Documents/BUMC%20Proceedings/2015%20Vol%2028/No_2/28_2_Jayaprakash_Vid1.mp4) is a parasternal long-axis view showing the dilated left atrium and the restricted mobility of the anterior and posterior mitral leaflet with severe mitral stenosis. **Video 2** (available at http://www.baylorhealth.edu/Documents/BUMC%20Proceedings/2015%20Vol%2028/No_2/28_2_Jayaprakash_Vid2.mp4) is a parasternal short-axis view showing the “fish-mouth” mitral valve orifice. **Video 3** (available at http://www.baylorhealth.edu/Documents/BUMC%20Proceedings/2015%20Vol%2028/No_2/28_2_Jayaprakash_Vid3.mp4) is an apical four-chamber view showing the ball valve thrombus in the dilated left atrium.