Demonstration of Prosthetic Aortic Valve Dehiscence in a Patient With Noninfectious Aortitis by Multimodality Imaging

Findings of Echocardiography and Computed Tomography

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A 43-year-old man who had undergone aortic valve replacement (St. Jude Medical) for aortic regurgitation 9 years ago, presented to the emergency department with a sudden onset of chest pain. He began to have intermittent squeezing chest pain when he tried to lift a heavy object 2 weeks ago. When he arrived at our hospital, he reported chest pain persisting for >30 minutes. Electrocardiography and laboratory evaluation showed no evidence of myocardial ischemia (Figure 1). On physical examination, body temperature of 36.0°C, blood pressure of 167/77 mmHg, and a holodiastolic murmur were noted. Peripheral stigmata of endocarditis were not found. He had no history of night sweats and weight loss. C-reactive protein was 0.14 mg/dL (normal range, <0.6 mg/dL), and the white blood cell count was 6100/μL. Blood culture was negative. Transthoracic echocardiography revealed the rocking motion (Movie I in the online-only Data Supplement) of the prosthetic aortic valve and severe paravalvular leakage (Figure 2; Movies II and III in the online-only Data Supplement). The pressure half-time of paravalvular regurgitation was 193 ms. Holodiastolic flow reversal in the descending thoracic aorta suggesting severe regurgitation was also found. On transesophageal echocardiography, the location of the paravalvular leakage was the left anterior aspect of the prosthetic valve (Movie IV in the online-only Data Supplement). ECG-gated computed tomography (Movie V in the online-only Data Supplement) showed a large tissue defect at the left anterior aspect of the prosthetic valve (Figure 3A). Three-dimensional computed tomography (CT) simulated the surgical field and revealed the location, size, and shape of the paravalvular dehiscence (Figure 3B). There was no evidence of vegetation or abscess. The ascending aorta was dilated up to 5 cm without mural thickening. The patient underwent an urgent Bentall operation to replace the partially detached prosthetic valve and dilated ascending aorta. In the surgical field, there was a 4 cm paravalvular defect at the junction of the left coronary sinus and the right coronary sinus (Figure 4). The size and shape of the dehiscence were correlated well with those identified by using the 3-dimensional CT.

The sewing ring of the valve was found to be partially detached from the aortic annulus. Although the tissue in this region was friable, there were no gross findings compatible with infective endocarditis. Under the microscope, the annular tissue showed a combination of acute and chronic inflammation (Figure 5). In the aortic wall, necrotic vascular endothelial cells and fibrosis were found, suggesting aortitis. Pathologists suggested vasculitis such as Behçet disease as a possible diagnosis. Although pathologists rechecked the specimen (aortic valve) obtained from the previous surgery performed 9 years ago, fibromyxoid degeneration without inflammation was seen. The patient had a past medical history of recurrent oral ulcer and pathologically proven erythema nodosum in the calf area, which was suggestive of Behçet disease. In addition, he had a history of back pain that improved with exercise. Marginal sclerotic changes along the sacroiliac joints were shown on pelvic radiograph, and the human leukocyte antigen B27 was positive. These findings are characteristic of ankylosing spondylitis. Therefore, colchicine (1.2 mg/d) and methylprednisolone (16 mg/d) were prescribed for Behçet disease and ankylosing spondylitis, respectively. A cardiac pacemaker was implanted for recurrent nonsustained ventricular tachycardia resulting from atrioventricular dissociation during the postoperative recovery period. Then, the patient recovered and was discharged uneventfully.

The dehiscence of prosthetic aortic valve is an uncommon complication, which is reported in 0.1% to 1.3% of patients who undergo aortic valve replacement.1,2 The known risk factors for the dehiscence are bacterial endocarditis, concomitant aneurysm of the ascending aorta, and severe calcification of the native aortic valve. Noninfectious aortitis resulting from ankylosing spondylitis or Behçet disease is a well-documented complication of the rheumatic disease.3 However, to the best of our knowledge, the dehiscence of a prosthetic valve because of noninfectious aortitis has not yet been reported. Although echocardiography is the modality of choice for the evaluation of cardiac valve, visualization of prosthetic valve dysfunction by using echocardiography is sometimes difficult because of

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the acoustic shadowing caused by the prosthetic valve itself. Recent advances in technology have made it possible for ECG-gated CT to emerge as a complementary imaging modality to identify prosthetic valvular disorder. ECG-gated cardiac CT with a 3-dimensional reconstruction method can provide additional information regarding the size, location, and shape of the dehiscence. This case demonstrated that cardiac CT was useful in providing a 3-dimensional view of the lesion that correlated well with the surgical findings. The additional anatomic information on the thoracic aorta and the coronary artery obtained by CT may also be helpful for surgical planning.

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Disclosures
None.

References

Figure 1. ECG indicates right bundle-branch block, and this finding does not show interval change in comparison with previous ECGs. There is no evidence of myocardial ischemia.

Figure 2. Transthoracic echocardiography shows a severe regurgitant jet (arrows) beside the prosthetic valve.

Figure 3. A, An oblique sagittal computed tomography (CT) image shows the paravalvular tissue defect (arrowheads) between the aortic annulus and the valvular sewing ring at the anterior side of the prosthetic aortic valve (arrow). B, A 3-dimensional volume rendering CT image demonstrates a large defect (arrows) at the left anterior aspect of prosthetic aortic valve (asterisk) between the left and right coronary sinuses. Ao indicates ascending aorta; LA, left atrium; LCA, left coronary artery; LV, left ventricle; PA, pulmonary artery; and RA, right atrium.

Figure 4. Intraoperative photograph clearly demarcates the para-valvular dehiscence (arrows) between the aortic annulus and the sewing ring of the valve (asterisk) and correlates well with the results obtained by using computed tomography imaging.
Figure 5. Pathological specimen (hematoxylin-eosin stain; original magnification, ×100) from the aortic annulus showed a combination of acute and chronic inflammation. Mixed acute and chronic inflammatory infiltrates were present consisting of macrophages, lymphocytes, and neutrophils. No infectious microorganism was identified by Gram or periodic acid-Schiff staining.
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The current online version of the article has been corrected. The authors regret the error.
Movie Legend


Movie 2, 3. Cines of the transthoracic echocardiography showing severe paravalvular leakage (Movie 2) and severe regurgitant jet (Movie 3). Best viewed with Windows Media Player.

Movie 4. Cines of preoperative transesophageal echocardiography depicting the location of paravalvular leakage at the left anterior aspect of prosthetic valve. Best viewed with Windows Media Player.

Movie 5. Electrocardiogram (ECG)-gated computed tomography showing the rocking motion of the prosthetic aortic valve, and a large tissue defect at the left anterior aspect of the valve. Best viewed with Windows Media Player.