ECHOCARDIOGRAPHIC ASSESSMENT OF ANEURYSM OF THE AORTIC VALVE CAUSED BY INFECTIVE ENDOCARDITIS
—A Case Report—

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No aneurysm of the aortic valve associated with infective endocarditis has yet been reported. This report describes the clinical echocardiographic and pathologic findings in a patient who developed infective endocarditis resulting in aneurysm of the non-coronary cusp with aortic regurgitation. Surgical treatment was performed because of gradual expansion of the aneurysm and gradual thinning of its wall.

Two-dimensional and color Doppler echocardiographies proved useful for the initial diagnosis and serial follow-up of this unusual case and for its successful surgical management.

CASE REPORT

History and physical examination

A 46-year-old man was admitted to our hospital for the evaluation of general fatigue, low grade fever and palpitation. On admission, the blood pressure was 118/58 mmHg. A grade 3/6 holodiastolic murmur and a grade 2/6 early systolic murmur were audible along the left sternal border. Chest X ray showed cardiomegaly with a cardiothoracic ratio of 56%. Electrocardiogram showed normal sinus rhythm, and its voltage was high in the left chest leads. Hematological studies revealed normochromic and normocytic anemia, and the leukocyte count was 5200/mm³. The erythrocyte sedimentation rate was 40 mm (1 hour). Serological testing for C-reactive protein was moderately positive. Blood cultures carried out several times before initiation of therapy were all sterile.

C O M B I N E D two-dimensional and color Doppler echocardiographies are commonly and widely used to evaluate cardiac valvular abnormalities in patients with infective endocarditis. Their use has made it possible to diagnose precisely and to assess serial patho-anatomic changes in the valve. Valvular aneurysms, although uncommon, have been reported in some patients with infective endocarditis, but most such aneurysms have been limited to the mitral valve.¹ ² No aneurysm in the aortic valve has been reported.

We present a rare case with aortic valvular aneurysm caused by infective endocarditis, and we report serial changes in the valve lesion observed by means of the two-dimensional echocardiography.

Key words:
Aortic valve
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Echocardiographic findings

Two-dimensional echocardiographic findings are shown in figures 1 and 2. An echocardiogram performed 7 days before admission showed a moderate enlargement of the left ventricle (end-diastolic dimension = 66 mm). A non-coronary cusp of the aortic valve was found to prolapse toward the left ventricular outflow tract during diastole, associated with a dilated aortic root. Two-dimensional color Doppler echocardiography demonstrated a large amount of regurgitant jet spreading from the coaptation of the aortic cusps to the apex of the left ventricle, confirming severe aortic regurgitation. However, an echocardiogram on the 7th hospital day (Nov. 5) showed a remarkable change in the configuration of the non-coronary cusp. The echocardiogram revealed the cystic formation of the non-coronary cup with an echolucent cavity prolapsed toward the left ventricular outflow tract throughout diastole (right and upper panels in Figs. 1 and 2). This abnormal cystic cavity disappeared during

ejection period. The color Doppler echocardiogram demonstrated two different regurgitant jets; one large jet was spread from the coaptation of the cusps and the other small jet was from the abnormal cleft between the aortic annulus and the echolucent cavity. No flow was detected in the cavity.

This aneurysmally dilated non-coronary cusp was considered to be caused by infective endocarditis, although repeated blood cultures were sterile. Antibiotic therapy (penicillin G, 1.2 x 10^7 units/day i.v.) was initiated and continued for 10 days, but a favorable response was not obtained, and a low-grade fever persisted. At this stage, gentamycin (80 mg/day i.m.) was added for 7 days, however, the cavity gradually increased in size, and its wall became thinner (left lower panel in Figs. 1 and 2). The cavity continued to increase in size, reaching 2.0 x 2.0 cm on the 36th hospital day (right lower panel in Figs. 1 and 2) despite intensive medical treatment.

Because of the failure of the medical treatment, aortic valve replacement was undertaken on the 42th hospital day. The aortic valve was replaced with Björk-Shiley prosthesis. Inspect-
tion of the excised aortic valve showed the cystic formation of the non-coronary cusp with a perforation (8 mm in diameter) at the side of the ascending aorta (Fig. 3). The wall near the top of the aneurysm (at the side of left ventricle) had become thinner without perforation. There were many erosions with small vegetations on the annulus of the non-coronary cusp. The other valves were intact macroscopically and histologically. Moreover, the tissue near the annulus of the specimen was swabbed for bacteriological examination but no growth was detected in the culture. Hematoxylin-eosin staining sections showed that the middle layer of the non-coronary cusp was dissected and its surface was covered with dense fibrin. Infiltration of neutrophils, necrosis with abscess formation, increased vascularity and granulation were observed in the wall of the aneurysm (Fig. 4).

DISCUSSION

We reported an unusual case of “dissecting” aneurysm of the aortic valve in a patient with infective endocarditis involving only the aortic valve. Serial echocardiographic studies were very helpful in assessment of the changes in size and appearance of the aneurysm. This case resisted medical therapy, but early choice of surgical treatment was possible.

In this case, blood cultures were sterile and no growth of bacteria was detected in the cultured specimen of the aortic valve. However histological examination showed compatible findings with those observed generally in prolonged cases of infective endocarditis. Therefore, we think this case was infective endocarditis. Mycotic aneurysms involving the mitral valve, mitral annulus, subvalvar aortic root, sinus of Valsalva, aortic annulus, and the left ventricular outflow tract have been previously reported. To our knowledge, aneurysm involving only the aortic valve, with aneurysmally dissected cusp, has not yet been reported. The present case is the first report of aortic valvular aneurysm caused by infective endocarditis. The mechanisms of the genesis of this aortic valvular aneurysm are not clear. Several possibilities may be considered. One possibility is that, in this patient, the infective process may have weakened the aortic valve at the side of the ascending aorta, and dissection might have occurred at the lesion of erosion on the surface of the valve (Fig. 5). Diastolic aortic-left ventricular pressure gradient might have encouraged the growth of the dissection.

In this case, careful and serial echocardiographic examinations were very useful in the visualization of an aneurysm of the aortic valve and in following the growth of its size and wall thickness. Further observations are needed to
Fig. 4. The schematic illustration and photomicrographs of sections of the non-coronary cusp
A: Remarkable infiltration of neutrophils, fibroblastic proliferation and fibrin deposition. H & E stain, x 42.
B: The dissecting middle layer covered with dense fibrin in the aneurysmal region of the non-coronary cusp. H & E stain, x 63.

Fig. 5. The schematic illustration of the speculative process of the formation of aortic valvular aneurysm in this case. Inflammatory processes might weaken the surface tissue of the aortic valve at the side of the ascending aorta. Dissection might occur at the lesion of erosion on the surface of the valve. Diastolic intraaortic pressure might encourage the growth of the dissection.
AML = anterior mitral leaflet; NCC = non-coronary cusp

clarify the mechanism for the genesis of the aneurysm of the aortic valve associated with infective endocarditis.

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