Pseudoaneurysm of the Mitral-Aortic Intervalvular Fibrosa in a Patient After Radio Frequency Catheter Ablation of Atrial Fibrillation

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A pseudoaneurysm of the mitral-aortic intervalvular fibrosa (MAIVF) is a rare disease. It often occurs in patients with infective endocarditis, especially as a complication after aortic valve replacement. This report describes a pseudoaneurysm of the MAIVF in a patient after radio frequency catheter ablation of atrial fibrillation.

Case Report

A 27-year-old man was seen in our outpatient department for follow-up 4 weeks after catheter ablation of atrial fibrillation. On physical examination, his blood pressure was 125/85 mm Hg, and his pulse was 82 beats per minute. Lung and heart examination findings were unremarkable, and abdominal examination findings were normal. No skin lesions or peripheral edemas were noted. Blood chemistry values were within normal limits. He had no history of aortic valve endocarditis or connective tissue abnormalities.

Two-dimensional transthoracic echocardiography (TTE) showed a pseudoaneurysm in the region of the MAIVF without color flow evidence of communication between the left ventricular outflow tract and the left atrium on a nonstandard parasternal long-axis view (Figure 1). It showed expansion in systole and collapse in diastole (Video 1). No aortic or mitral regurgitation was noted on color flow imaging. No regional wall motion abnormality was revealed. The left ventricular ejection fraction was within normal limits. There was no evidence of pericardial effusion. Subsequent 3-dimensional echocardiography showed that a pocketlike lesion in the region of the
MAIVF protruded into the left atrium in systole and collapsed in diastole (Figure 2). Preoperative and postoperative TTE performed at the time of admission and discharge showed no other pathologic findings.

Discussion

The MAIVF is a thin, translucent membranous area located between the root of the aorta and the mitral valve and is the junction between the left half of the noncoronary cusp and the adjacent third of the left coronary cusp of the aortic valve and the anterior mitral leaflet. The anterior edge of the MAIVF is contiguous with the left fibrous trigone, and the posterior edge is contiguous with the right fibrous trigone. Its posterior and lateral limits are defined by the left atrium, its inferior limit by the left ventricular outflow tract, and its superior limit by the pericardium. The pseudoaneurysm commonly occurs in patients with a prosthetic aortic valve with or without valvular infective endocarditis. There was also a report of a case secondary to chest trauma. In our case, the patient was seen for follow-up 4 weeks after ablation of atrial fibrillation. His preoperative and postoperative TTE at the time of admission and discharge did not show any abnormal structures of the heart. Thus, it is possible that the pseudoaneurysm may have been associated with ablation of the atrial fibrillation, which to our knowledge has not been described previously.

The potential mechanisms of this ablation procedure in this patient may have included involvement in the area of the MAIVF. Although no immediate rupture occurred, this area may be predisposed to local pressure. Therefore, sharp hypertension from any possible condition can result in rupture of this area and subsequent pseudoaneurysm formation. Mitral valve injury was reported in the ablation procedure.

Clinically, patients with a pseudoaneurysm of the MAIVF may be asymptomatic. Once the pseudoaneurysm has developed, it is prone to rupture into the pericardium, resulting in fatal cardiac tamponade. In addition, patients may have angina pectoris due to compression of the left coronary artery by the pseudoaneurysm of the MAIVF. Another unusual manifestation is stroke, resulting from embolization of the thrombus within the pseudoaneurysm of the MAIVF.

Echocardiography is very useful in the detection and characterization of a pseudoaneurysm of the MAIVF. A pseudoaneurysm of the MAIVF is located by TTE in the region between the root of the aorta and the anterior mitral leaflet, appearing as an expansion into the left atrium in systole with retraction or collapse in diastole. Color Doppler imaging is very helpful in identifying the communication between the left ventricular outflow tract and the left atrium due to rupture of the pseudoaneurysm.

![Figure 1](image1.png) Figure 1. Nonstandard parasternal long-axis view showing a pseudoaneurysm in the region of the MAIVF with expansion in systole (arrow). AAo indicates ascending aorta; LA, left atrium; LV, left ventricle; and RVOT, right ventricular outflow tract.

![Figure 2](image2.png) Figure 2. Parasternal left ventricular 3D echocardiographic long-axis view showing a pocketlike lesion in the region of the MAIVF protruding into the left atrium in systole (arrow). Abbreviations are as in Figure 1.
A pseudoaneurysm of the MAIVF should be differentiated from an aortic ring abscess. Transesophageal echocardiography, however, is more sensitive in detecting abnormalities of the aortic and subaortic structures.\(^1\)\(^,\)\(^15\) However, it is more difficult to distinguish a smaller pseudoaneurysm from an abscess. Compared with intervalvular pseudoaneurysms, ring abscesses are smaller and nonpulsatile and show either no flow or continuous systolic and diastolic flow.\(^1\)\(^,\)\(^4\) In addition, although suboptimal image quality remains a problem, real-time 3-dimensional (3D) echocardiography yields anatomic information comparable with that of conventional 2-dimensional echocardiography and provides useful anatomic insight.\(^1\)\(^6\) In our case, the location of the pseudoaneurysm and the relationship to the adjacent structures were clearly shown by real-time 3D echocardiography.

The natural history of MAIVF pseudoaneurysm remains unclear. Surgery should be considered even in asymptomatic patients because of the risk of possible rupture into the pericardium.\(^1\)\(^4\) Most reported cases have undergone surgical correction. But in 1 case without surgery, the intervalvular pseudoaneurysm had no change in size during a 4-year follow-up period.\(^1\)\(^7\) In addition, successful percutaneous closure of an MAIVF pseudoaneurysm has been reported.\(^2\) In our case, the patient refused surgery for the intervalvular pseudoaneurysm, so clinical follow-up was recommended.

In summary, a pseudoaneurysm of the MAIVF is a rare disease. Although it is often an uncommon complication of infective endocarditis, it may be associated with radio frequency catheter ablation of atrial fibrillation. Although a pseudoaneurysm of the MAIVF may be asymptomatic, the region of the MAIVF should be observed carefully by TTE. When necessary, transesophageal echocardiography or real-time 3D echocardiography should be performed to make a definitive diagnosis.

References