

Dynamic Aortic Pouch: A Rare Etiology of Aortic Regurgitation

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ABSTRACT

The causes of aortic regurgitation (AR) include rheumatic heart disease, infective endocarditis, and various congenital and degenerative defects. We report an unusual case of AR in a 72-year-old man due to an aortic root pouch. The diagnosis AR was made by cardiac echocardiography, and the cause was revealed by cardiac catheterization and 64-slice cardiac computed tomography. During aortic valve replacement, a saccular pouch between the noncoronary cusp and the right coronary cusp of the aortic valve was noted.

INTRODUCTION

Aortic regurgitation (AR) is typically due to primary disease of the aortic valve leaflet or the wall of the aorta. Common causes include rheumatic fever, infective endocarditis, trauma, and congenital defects, such as bicuspid aortic valve [Enriquez-Sarano 2004; Bekerredjian 2005]. Less common causes include systemic lupus erythematosus, rheumatoid arthritis, and marked dilatation of the ascending aorta [Enriquez-Sarano 2004; Bekerredjian 2005]. We report an unusual cause of AR: a pouch-like structure located between the noncoronary cusp and the right coronary cusp of the aortic valve.

CASE REPORT

A 72-year-old man was admitted owing to a worsening exertional dyspnea for 6 weeks, orthopnea, paroxysmal nocturnal dyspnea, and leg edema. His history was significant for hypertension, coronary artery disease with 3 stent implantations, and a percutaneous transluminal coronary angioplasty 4 months prior. He denied a history of fever or infective endocarditis. The patient had the following: blood pressure, 156/66 mm Hg; pulse, 56 beats/min; temperature, 36.3°C. A physical examination revealed bilateral basal rales and a grade II/VI diastolic blowing murmur at the left secondary intercostal space. The blood count and chemistry results were unremarkable.

An echocardiography evaluation revealed a left ventricle ejection fraction of 56%, severe AR (pressure half-time,

405 milliseconds), and moderate mitral regurgitation. The left ventricular end-diastolic and end-systolic diameters were 63 mm and 44 mm, respectively. A pouch-like structure near the aortic root (Figure 1) was noted, and a type A aortic dissection was suspected. An angiography examination revealed severe AR and a pouch-like structure near the aortic root. A 64-slice computed tomography (CT) scan showed a diverticular structure between the left atrium and the aortic root (Figure 2). The location of the pouch appeared to be underneath the aortic valve, and it was noted to expand during systole and contract during diastole (Figure 3). No vegetations were noted on the mitral or aortic valve.

An aortic valve replacement was performed because of the severe AR with related symptoms [Bekerredjian 2005]. Intraoperatively, a saccular pouch was identified beneath the noncoronary cusp and the right coronary cusp of the aortic valve (Figure 4). Aortic root dilatation and separation of the mitral and aortic annulus by the pouch was noted. No dissection was found. The

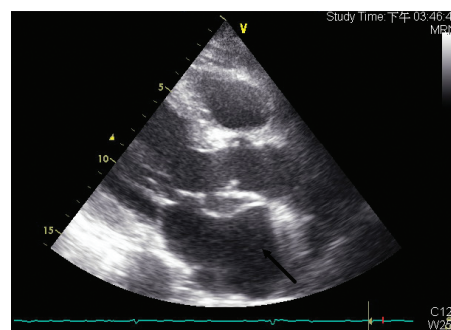


Figure 1. Echocardiography reveals a dissection-like structure in the aortic root.

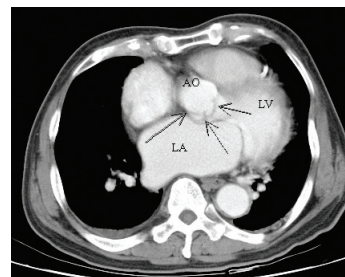


Figure 2. Sixty-four-slice CT scan showing an unusual pouch-like structure (arrows) between the left atrium (LA) and the aortic root (AO).

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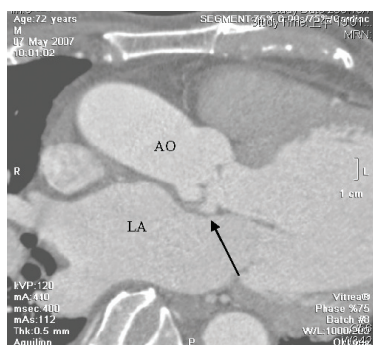


Figure 3. Sixty-four-slice CT scan showing a pouch-like structure expanding during 40% of the cardiac cycle (A) and contracting during 70% of the cardiac cycle (B). LA indicates left atrium; AO, aortic root.

patient was discharged 2 weeks after surgery in good condition. A follow-up cardiac echocardiography examination revealed no AR or mitral regurgitation. A pathologic examination of the aortic valve showed fibrosis and degenerative changes.

DISCUSSION AND CONCLUSIONS

We have described a pouch-like structure on the aortic root just between the ventricle outlet and the aortic valve that collapsed during diastole, consequently leading to collapse of the aortic valve and to AR. We believe the term *aortic pouch* is appropriate because it is descriptive of the defect and its location (beneath the aortic valve).

Echocardiography is useful in diagnosing, determining the cause of, and estimating the severity of AR, and for visualizing valve cusps, valve prolapse, a flail leaflet, vegetations, or dilatation of the aortic root [Zoghbi 2003]. Angiography is useful for determining the severity of the AR but not for visualizing the detailed structure of the aortic valve or aortic root. Sixty-four-slice CT has shown utility in the diagnosis of AR [Alkadhi 2007]. In this case, 64-slice CT showed the detailed structure and dynamic changes of the pouch and aortic valve.

Common causes of primary valve disease include rheumatic fever, infective endocarditis, trauma, and congenital defects, such as bicuspid aortic valve. Less common causes of AR include systemic lupus erythematosus, rheumatoid arthritis, and marked dilatation of the ascending aorta. Dilatation of the ascending aorta may be due to aortoannular ectasia, Marfan syndrome, Ehlers-Danlos syndrome, osteogenesis imperfecta, aortic dissection, syphilitic aortitis, connective tissue diseases, and idiopathic aortic root dilation [Enriquez-Sarano 2004; Bekerredjian 2005]. We found reports of aneurysms affecting the aortic valve and leading to AR [Makayama 1998; Raval 2002; Sasaki 2002; Halkos 2004; Alkadhi 2007], but no reports of a structure like that in our patient.

We postulate 2 possible causes of the aortic pouch: (1) trauma caused by catheter injury that made a part of the aortic cusp weak and intolerant of the diastolic pressure gradient or (2) fibrosis and degeneration of the aortic valve secondary to aging.

In summary, we have described an unusual cause of AR: a pouch-like structure beneath the aortic valve. After aortic valve replacement, the patient's symptoms resolved, and no residual AR remained.

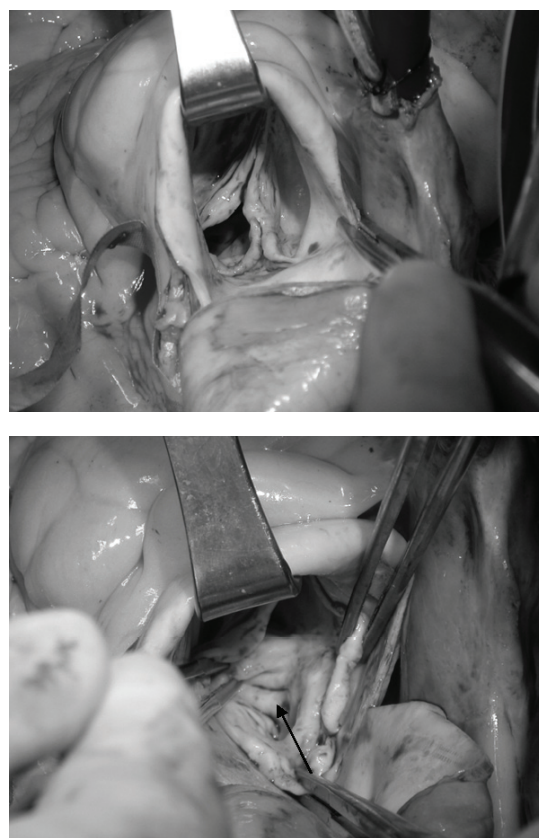


Figure 4. Intraoperative photographs of 3 cusps of the aortic valve (A) and the pouch identified beneath the noncoronary cusp and the right coronary cusp (B).

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