

Aortic Valve Destruction and Pseudoaneurysm of the Sinus of Valsalva Associated with Infective Endocarditis

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We report the successful surgical treatment of a case of aortic valve destruction and pseudoaneurysm of the sinus of Valsalva associated with infective endocarditis (IE) in an 80-year-old woman. Multidetector-row computed tomography revealed an abnormal cavity in the left posterior aortic root. We had made the diagnosis of the aortic valve destruction and saccular pseudoaneurysm of the sinus of Valsalva associated with IE. Aortic valve replacement and patch plasty of the left sinus of Valsalva was performed successfully. A histopathologic examination of the resected aortic valve leaflet revealed inflammatory changes consistent with IE. We describe the surgical technique used in this rare case of pseudoaneurysm of the sinus of Valsalva resulting from IE. (Ann Thorac Cardiovasc Surg 2010; 16: 142–144)

Key words: infective endocarditis, Valsalva, multidetector-row computed tomography

Introduction

A pseudoaneurysm of the sinus of Valsalva is a very rare and serious complication of infective endocarditis (IE). Its rapid progress, high rates of rupture and recurrence, and detrimental effects on the systemic condition mean that it is often fatal. We report on the successful surgical treatment of aortic valve destruction and pseudoaneurysm of the sinus of Valsalva associated with IE.

Case Report

An 80-year-old woman was admitted to our hospital with complaints of high fever and general fatigue. She had received dental treatment 2 weeks prior to presentation. A chest roentgenogram indicated cardiomegaly. Trans-thoracic echocardiography revealed aortic regurgitation

and aortic valve stenosis with a small vegetation on the valve. Despite negative blood cultures, aortic valve insufficiency because of IE was strongly suspected. Coronary angiography was not possible because of aortic valve insufficiency resulting from IE, so multidetector-row computed tomography (MDCT) was performed instead. It revealed no significant stenosis of the coronary arteries, but an abnormal cavity in the left posterior aortic root was found (Fig. 1). This cavity communicated with the aortic root via a small hole. Based on these results, a diagnosis of saccular pseudoaneurysm of the sinus of Valsalva, associated with IE, was made. The patient was initially treated with diuretics and antibiotics for 3 weeks and showed progressive improvement. Surgery was subsequently performed, using mild hypothermic cardiopulmonary bypass and cardioplegic arrest. The surfaces of the heart and the aorta were severely inflamed. The ascending aorta was transected 2 cm above the ostium of the right coronary artery, as observed from inside the aorta. We confirmed that the hole (5 mm in diameter) was located in the left sinus of Valsalva at the midpoint of the left coronary ostium and the right-left commissure, adjacent to the aortic annulus that communicated with the pseudoaneurysm. Perforation and vegetation of the left aortic valve leaflet were found. The aortic valve was excised, together with

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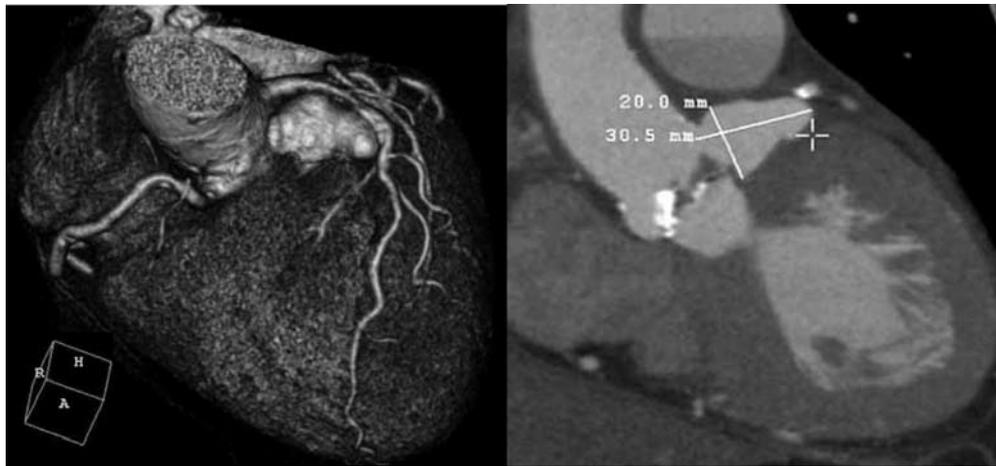


Fig. 1. Preoperative multidetector-row computed tomography (MDCT) demonstrated a pseudoaneurysm in the left posterior aortic root.

the vegetation lying on the left cusp. The damaged annulus and the sinus of Valsalva were thoroughly debrided. The fistula was then closed from inside the sinus of Valsalva, and patch plasty of the left sinus of Valsalva was successfully performed. The aortic valve annulus was reconstructed, using 4-0 polypropylene mattress sutures with a tailored autologous pericardial patch and pledgets (Fig. 2). Aortic valve replacement (AVR) was then performed, using a 19 mm mosaic porcine bioprosthesis (Medtronic, Inc., Minneapolis, MN) that was secured to the reconstructed aortic annulus. The cardiopulmonary bypass was easily discontinued. No bacteria were detected in cultures from the valve tissue. The administration of antibiotics was continued for 4 weeks following surgery. Postoperative pathological examination of a specimen of the aortic valve revealed inflammatory changes consistent with IE. The postoperative course was uneventful, and no signs of infection were observed. Postoperative MDCT and echocardiography showed a disappearance of the pseudoaneurysm and an improved shape of the sinus of Valsalva.

Discussion

A pseudoaneurysm of the sinus of Valsalva is quite rare. Acquired aneurysms of the sinus of Valsalva caused by medionecrosis, syphilis, arteriosclerosis, endocarditis, or injury are more diffuse, involving more of the sinus or multiple sinuses.¹⁾ In our case, the pseudoaneurysm was located at the left sinus of Valsalva, and the orifice of the aneurysm was adjacent to the aortic annulus. Moreover,

the tissue surrounding the orifice of the aneurysm was inconsistent with a true aneurysm. It therefore seems very likely that a perforation or rupture of the sinus of Valsalva occurred initially and that the pseudoaneurysm was formed subsequently. Based on the patient's history and the pathological examination, we concluded that the formation of the pseudoaneurysm in this case was a result of IE. A rupture of the sinus of Valsalva aneurysm after IE is rare. In a review by Anguera et al. from the Aorto-Cavitary Fistula in Endocarditis Multicenter Study, they state that only 76 cases (1.6%) of aortocavitary fistula formation were detected in 4,681 cases of IE.²⁾

Various complications of IE can occur during the active phase of infection, and periannular extension of cardiac valvular infection is especially dangerous. The occurrence of mycotic sinus of Valsalva pseudoaneurysms is less common. It occurs as an extension of infection from a paravalvular myocardial abscess complicating endocarditis,³⁾ and it clinically has an insidious onset with vague symptoms and poor prognosis if untreated. The clinical suspicion of mycotic pseudoaneurysms is often low. A few magnetic resonance imaging (MRI) findings of mycotic sinus of Valsalva pseudoaneurysms have been recently reported.⁴⁻⁶⁾ MDCT is the noninvasive imaging of a mycotic sinus of Valsalva pseudoaneurysm, the same as a cardiac MRI. Unlike MDCT and MRI, however, transesophageal echocardiography is moderately invasive. Although transthoracic echocardiography would not have detected this patient's pseudoaneurysm, the clinical service thought that the MDCT study provided the information necessary for clinical management, precluding the need for further investigations.

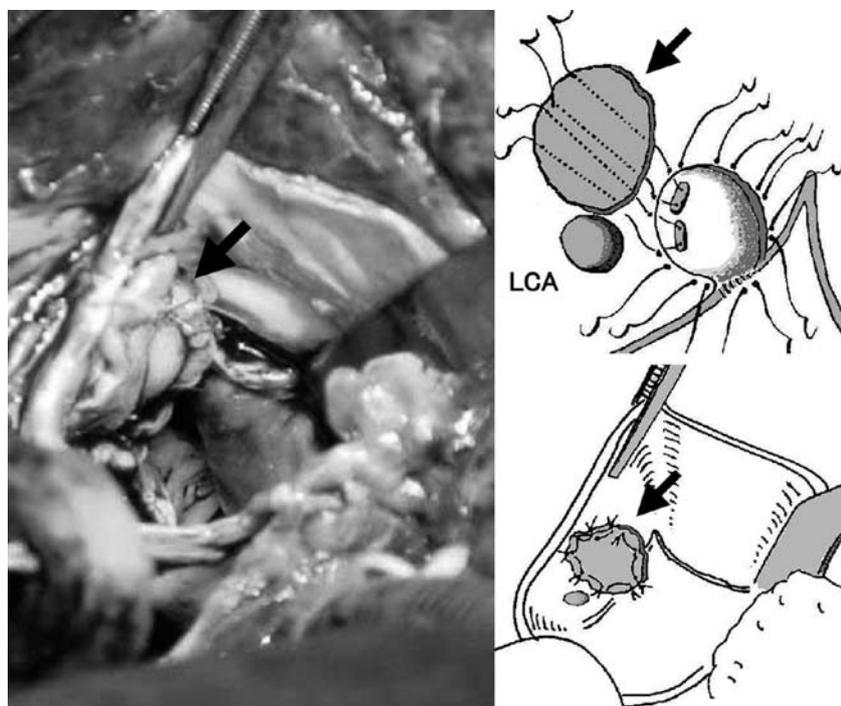


Fig. 2. The intraoperative view and the schemas. The left sinus of Valsalva and the aortic annulus were completely reconstructed by using an autologous pericardium patch (arrows).

MDCT, by virtue of a superior field of view, is more sensitive than echocardiography for the detection of mycotic sinus of Valsalva pseudoaneurysms.

Patients with infection limited to the leaflets of the native valve can be treated by valve replacement. However, if the infection extends into or beyond the annulus, aggressive debridement of the periannular structures is then necessary. Nevertheless, debridement sometimes produces annular tissue damage, and aortic root replacement (ARR) is preferred over AVR in these cases.⁷ We chose a less invasive strategy and reconstructed the destroyed annulus, using autologous pericardium, and performed AVR with a porcine bioprosthetic valve.

In conclusion, we report a rare case of aortic valve destruction and pseudoaneurysm of the sinus of Valsalva associated with IE and describe the surgical technique employed. We successfully performed plasty of the left sinus of Valsalva and completely reconstructed the aortic annulus, using a tailored patch of autologous pericardium. The long-term outcome of this treatment remains unknown, and careful follow-up is required. MDCT was useful for the examination of the aortic root. We suggest that it be routinely performed in patients with aortic valve and/or aortic root endocarditis.

References

1. Kirklin JW. Congenital aneurysms of the sinus of Valsalva. In: Kirklin JW, Barratt-Boyes JG, eds; *Cardiac Surgery*, 2nd ed. New York: Churchill Livingstone, 1993; pp 825–39.
2. Anguera I, Miro JM, Vilacosta I, Almirante B, Anguita M, et al. Aorto-cavitary fistulous tract formation in infective endocarditis: clinical and echocardiographic features of 76 cases and risk factors for mortality. *Eur Heart J* 2005; **26**: 288–97.
3. White CS, Plotnick GD. Case 33: sinus of Valsalva aneurysm. *Radiology* 2001; **219**: 82–5.
4. Winkler ML, Higgins CB. MRI of perivalvular infectious pseudoaneurysms. *AJR Am J Roentgenol* 1986; **147**: 253–6.
5. Salanitri GC, Huo E, Miller FH, Gupta A, Pereles FS. MRI of mycotic sinus of Valsalva pseudoaneurysm secondary to *Aspergillus* pericarditis. *AJR Am J Roentgenol* 2005; **184** (3 Suppl): S25–7.
6. McCuskey WH, Loehr S, Smidebush G, Link KM. Detection of mycotic pseudoaneurysm of the ascending aorta using MRI. *Magn Reson Imaging* 1993; **11**: 1223–6.
7. Hagl C, Galla JD, Lansman SL, Fink D, Bodian CA, et al. Replacing the ascending aorta and aortic valve for acute prosthetic valve endocarditis: is using prosthetic material contraindicated? *Ann Thorac Surg* 2002; **74**: S1781–5.