Aneurysms of the sinus of Valsalva following infective endocarditis

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Introduction

Aneurysms of the sinus of Valsalva associated with infective endocarditis are rare. They can present during an episode of acute endocarditis or as late sequelae, with or without rupture. Their management involves repair of the annulus and closure of the aneurysm with a Dacron patch. We report a case of a 46-year-old male who presented four years after a prosthetic valve replacement with an enlarging aneurysm. We also present a review of the available literature.

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Aneurysmal lesions around the aortic annulus consist of a diverse group of lesions. The differential diagnosis includes left ventricular aneurysms, septic pseudoaneurysms, ascending aortic aneurysms, left coronary artery aneurysms and aneurysms of the sinus of Valsalva.[1]

Aneurysms of the sinus of Valsalva are most commonly congenital in origin.[2] Acquired sinus of Valsalva aneurysms may be caused by medionecrosis,[3] syphilis,[4] atherosclerosis,[5] infective endocarditis,[6] Behçet's disease,[7-9] penetrating injuries[10,11] and tuberculosis. Aneurysms of the sinus of Valsalva due to infective endocarditis are rare. Infection of native or prosthetic valves can lead to aneurysmal dilatation when the aortic annulus and sinotubular junction are involved. The management of these aneurysms can pose challenges.

We report the successful management of an aneurysm of the sinus of Valsalva in a patient with a prosthetic valve, who had previously undergone aortic valve replacement for acute endocarditis.

Case report

A 46-year-old man who had had an aortic valve replacement 11 years previously for acute bacterial endocarditis presented with increasing shortness of breath. His original presentation 11 years ago had been pyrexia, cough and dizziness of 10 weeks' duration. Blood cultures were positive for Streptococcus, which was sensitive to benzylpenicillin. A transthoracic echocardiogram had shown extensive vegetations on the aortic valve with no evidence of aortic root abscesses. The left ventricle was not overloaded. An urgent aortic valve replacement with a 25 mm Bjork-Shilley tilting disc mechanical valve was performed.

The aortic valve was found to be bicuspid, with a flail left coronary cusp. The non-coronary cusp was perforated, with large vegetations and mural granulations. Small annular abscesses were noted under the right coronary ostium and on the annulus close to the interventricular septum. Infected material was excised and the prosthetic valve implanted using interrupted Teflon-buttressed sutures to obliterate the small abscess cavities. The patient recovered well from the surgery and was on regular follow-up.

Four years following surgery, a follow-up echocardiogram revealed a paravalvular leak and an abnormal root. The leak was not significant and the patient was asymptomatic. Further follow-up revealed worsening regurgitation and a pouch, increasing in size, at the level of the aortic annulus (figure 1). He did not have any markers of recurrent endocarditis. The left ventricular diastolic dimensions increased over a period of seven years and the decision was made to replace the valve. An aortogram revealed the abnormal pouch at the aortic root (figure 2).

At a second operation the prosthetic valve sutures were found to be dehisced over 2.4 cm of the valve circumference between the left and right coronary ostia. There was a posteriorly placed aneurysm 2.5x2.5x4 cm in size. There were no vege-

Figure 1. Transoesophageal echocardiogram showing the aneurysmal pouch to the right upper corner and the prosthetic valve in the centre

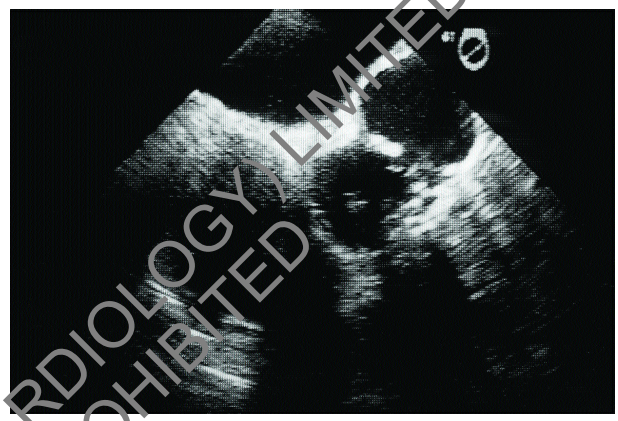

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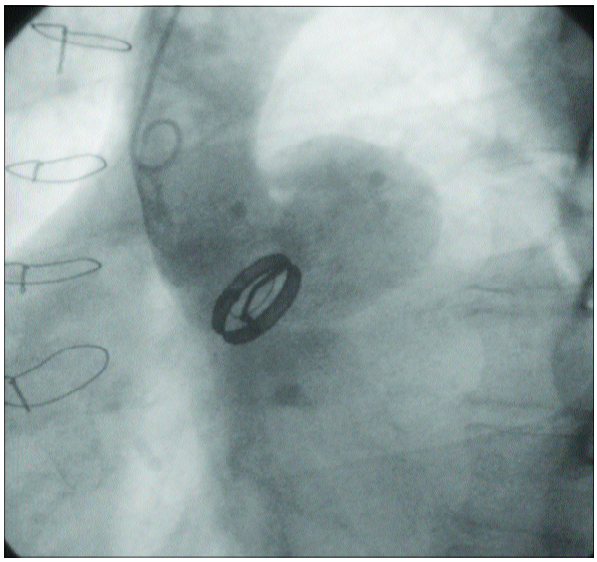
Figure 2. Aortogram showing the aortic root with an abnormal pouch



tations or abscesses; the aneurysmal cavity was lined by smooth membranous tissue. The mitral valve was normal. The prosthetic valve was explanted and replaced with a 25 mm Aortec mechanical valve, using interrupted Teflon-pledgeted sutures. The mouth of the aneurysmal pouch was closed using a double layer of autologous pericardium and a Dacron patch. Following closure of the aortotomy, the patient was weaned off bypass.

The explanted prosthetic valve had grown coagulase-negative Staphylococcus after prolonged incubation, hence the patient was treated with antibiotics for four weeks. Post-operatively he developed complete heart block which required a permanent pacemaker. He remains well five months following his procedure, with no evidence of infection on transoesophageal echocardiography, no sinus dilatation and no paravalvular leak. His C-reactive protein and white cell count remain within normal limits.

Discussion

Aneurysm of the sinus of Valsalva is the result of separation of the aortic media of the sinus from the media of the hinge line of the valve cusp. This area gives way under aortic pressure to form an aneurysm. These aneurysms can be congenital or acquired, congenital lesions being more common.[2] Acquired aneurysms can be due to medionecrosis, syphilis, atherosclerosis, endocarditis, penetrating injuries and Behçet's disease. Most remain asymptomatic but rupture can occur into one of the cardiac chambers or, rarely, into the pericardium. The acquired lesions usually exhibit more diffuse involvement of the sinus, multiple sinuses and extension into the ascending aorta.

Aneurysmal dilatations around the aortic root following endocarditis are uncommon, and can occur in a native or a prosthetic valve.[12,13] With prosthetic valve endocarditis, aneurysms can occur in the immediate post-operative period or later.[14] In 5–10% of cases congenital aneurysms may be complicated by endocarditis.[15,16]

It can be postulated that the infective process thins out the media of the sinotubular junction and, after exposure to long-standing high pressures, this area weakens and becomes aneurysmal. The lesion can progress and enlarge, deforming the annulus and thus causing aortic regurgitation, or can protrude into one of the chambers and form intracardiac fistulous tracts. Both these conditions eventually lead to congestive heart failure.

A distinction needs to be made between aortic root abscess, pseudoaneurysm, a sinus of Valsalva aneurysm caused by endocarditis and a congenital aneurysm complicated by endocarditis. The first two are distinguished by their size. An aortic root abscess is small in size, non-pulsatile and with either no flow or a continuous flow at the site of paravalvular leak. Pseudoaneurysms are characterised by marked pulsatility-systolic expansion and diastolic collapse.[12] Echocardiography, computed tomography and magnetic resonance imaging (MRI) have shown value in the diagnosis of these lesions.[1,17-20] Transoesophageal echocardiography (TOE) can identify and distinguish most lesions around the aortic root.[12,20] TOE with Doppler ultrasonography shows the wall of the aneurysm and turbulent flow within the unruptured aneurysm. Rupture is diagnosed if echocardiographic discontinuity occurs at the edge of the aneurysm, and if flow between the aneurysm and the receiving chamber can be demonstrated. MRI offers direct multiplane depiction without the need for contrast material and shows turbulence within the aneurysm. Gradient images may delineate the site of fistula formation and can be used to determine the extent of shunting. Aortography can also identify these lesions.

Viewed from the aorta, the aneurysms appear as excavations of the sinus of Valsalva which protrude into the underlying cardiac chamber. Treatment of these lesions usually involves surgical repair. This can be accomplished by direct closure or a Dacron patch can be used to close the mouth of the aneurysm and strengthen the annulus.[21,22] The latter method reduces tension in the suture line and allows good debridement of infective material.[21]

Our case had certain unique features. The onset of aneurysm formation was late and at regular follow-up there was no evidence of active ongoing infection. There was no evidence of vegetations, sinuses or abscess formation on pre-operative echocardiogram; this was confirmed intra-operatively. The aneurysm was on the left half of the aortic annulus, in contrast to the more common right-sided lesions as reported by other series. Dehiscence of some of the valve sutures might suggest that the paravalvular leak played a role in the growth of aneurysm. However, repair with a Dacron patch and replacement of the valve was feasible, and yielded a good result.

Conclusion

Aneurysms of the sinus of Valsalva can occur during active endocarditis or as a late sequel. These should be distinguished from other lesions around the aortic annulus that present in similar fashion. Repair of such lesions is always possible, with good results. Regular follow-up and timing of surgery are crucial in restoring ventricular function.

Key messages

- Aneurysms of the sinus of Valsalva are most commonly congenital in origin
- Infective endocarditis, penetrating injury and tuberculosis can also cause these aneurysms
- Echocardiography and scans are useful in their diagnosis
- Treatment usually involves surgical repair

Conflicts of interest

None declared.

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