

Aortic root abscess complicating bacterial endocarditis

Demonstration by computed tomography

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SUMMARY A 68 year old man with an aortic valve prosthesis was admitted to hospital with *Staphylococcus aureus* endocarditis. Despite antibiotic treatment he continued to be pyrexial. Computed tomography identified a probable abscess between the root of the aorta and the left atrium. The presence of an abscess in this location was subsequently confirmed at operation. Computed tomography is a useful additional diagnostic method for identifying this potentially lethal complication of bacterial endocarditis.

One of the most serious potential complications of bacterial endocarditis is the development of a valve ring abscess. This complication is frequently found in necropsy studies of patients with endocarditis,¹ particularly in those with prosthetic valves.² Hitherto echocardiography has been the only means of detecting this complication non-invasively. We report a case of an aortic root abscess complicating prosthetic valve endocarditis, which was successfully identified before operation by computed tomography.

Case report

A 68 year old man was admitted with an 18 hour history of pyrexia, rigors, and confusion. He had a longstanding history of rheumatic valve disease, affecting his aortic and mitral valves, which had necessitated aortic valve replacement three years previously (Ionescu-Shiley prosthesis). On admission he was pyrexial with a temperature of 38.0°C. He was agitated and disorientated. There were no systemic manifestations of bacterial endocarditis and no new cardiovascular findings. *Staphylococcus aureus* was grown from each of six successive broths. Antibiotic treatment was started with flucloxacillin 2 g given intravenously four hourly and gentamicin 80 mg intravenously 12 hourly. Back titration was carried out with minimum inhibitory and minimum bactericidal dilutions of 1/128.

There was an initial improvement in his clinical condition with resolution of his agitation and confusion. Nevertheless, he remained pyrexial. By day 7 his erythrocyte sedimentation rate had risen from 14 mm in the first hour on admission to 120 mm in the first hour and his white blood count from $16.1 \times 10^9/l$ to $22.2 \times 10^9/l$ (82% neutrophils). On day 11 he developed a widespread erythematous macular eruption, and in view of the possibility of penicillin hypersensitivity his antibiotic treatment was changed to rifampicin 600 mg 12 hourly by mouth together with erythromycin 500 mg six hourly by mouth. The rash faded, but his pyrexia continued with fever up to 39.0°C, although back titration results on the new regimen remained satisfactory (minimum bactericidal dilution 1/128). His continuing pyrexia probably represented an abscess, and further investigations were directed towards this possibility. Abdominal ultrasound examination proved negative. Similarly echocardiography, by an experienced echocardiographer, failed to provide any evidence of abscess formation.

COMPUTED TOMOGRAPHY

Computed tomograms of the abdomen showed three well defined lesions in the spleen measuring 1 cm, 3 cm, and 7 cm in the maximum transverse diameter, the largest situated inferiorly and extending to the capsule. The lesions were homogeneous and of low attenuation (less than the surrounding spleen but greater than water attenuation). They did not enhance centrally or peripherally during an injection of meglumine diatrizoate. As none of the lesions contained gas their appearance was non-specific, being compat-

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ible with abscesses, infarcts, aged haematomas, or even tumour deposits.³ In the clinical context abscesses seemed to be the most likely lesion.

In addition to the abdominal examination a limited computed tomographic study of the thorax was undertaken to visualise the region of the aortic root. Figure (a) is an image from this study and represents a 1 cm thick axial section obtained during an infusion of meglumine diatrizoate on a Picker 1200 SX CT scanner using a scan time of 1.5 s, 130 kV, and 155 mA. The section is just above the level of the aortic valve cusps and is partly degraded by artefacts from the metallic components of the prosthetic valve. It shows a fairly well defined rounded mass of approximately 4 cm in the maximum transverse diameter interposed between the ascending aorta and the left atrium. Sections above and below this level showed that the mass extended superiorly to just below the right main pulmonary artery and inferiorly behind the aortic valve to reach the region of the anterior leaflet of the mitral valve. The attenuation of the mass (25 Hounsfield Units) was less than that of the major vascular chambers and channels (60 Hounsfield Units), which were enhanced by the contrast infusion. As precontrast images were not obtained it was not possible to

determine whether or not the mass enhanced with contrast. The appearances were considered to be compatible with an abscess, although a definitive diagnosis could not be made as the only pathognomonic feature of an abscess—namely, associated gas—was absent. Alternative possibilities included dilatation or dissection of the aortic root; for either of these possibilities to apply the presence of an associated thrombus needed to be inferred to account for the differential enhancement of the mass and the true aortic lumen.

OPERATIVE FINDINGS

Three days later he developed a high degree of atrioventricular block, the ventricular rate falling as low as 25 beats/minute. A temporary pacing wire was inserted, and in view of the additional evidence of an aortic root lesion he underwent an urgent operation on day 20. At operation a large abscess cavity 3 cm in diameter was found after removal of the existing prosthetic valve. The abscess cavity was centred on the posterior commissure but extended over the adjacent portions of the left coronary and non-coronary sinuses. Inferiorly the abscess extended into the root of the mitral leaflet. Bacteriological swabs were taken

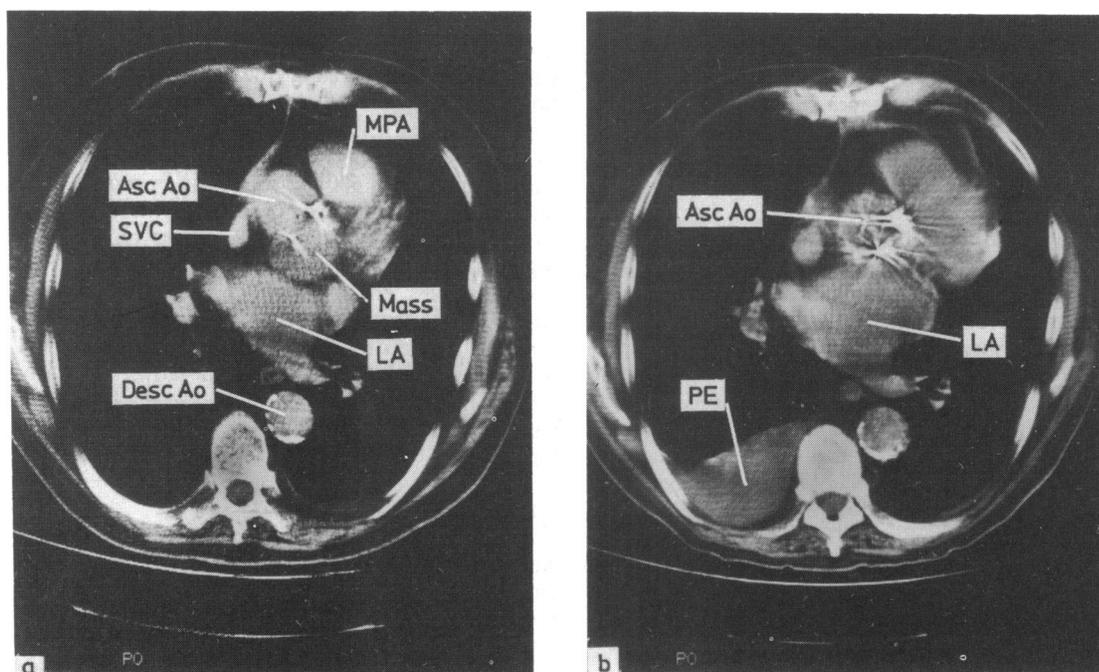


Figure Computed tomograms: (a) preoperatively the abscess is seen as a rounded mass situated between the ascending aorta and the left atrium; (b) after surgical drainage of the abscess and replacement of the aortic prosthetic valve the ascending aorta and the left atrium became normally closely apposed. Artefacts from the prosthetic valve are seen on both images. MPA, main pulmonary artery; Asc Ao, ascending aorta; SVC, superior vena cava; LA, left atrium; Desc Ao, descending aorta; PE, pleural effusion.

from the abscess cavity, but there was no growth on culture. A Carpentier-Edwards prosthesis was inserted.

His initial postoperative progress was satisfactory with resolution of his pyrexia and improvement in his general alertness. Although improvement continued it was thought advisable to defer possible splenectomy. The computed tomogram was repeated four weeks postoperatively and showed no change in the size of the splenic abscesses. Rifampicin and erythromycin were withdrawn. A few days later the patient again became pyrexial. Treatment with clindamycin 300 mg six hourly was therefore started. With this treatment his pyrexia resolved completely and conservative management continued. As a safeguard a further computed tomographic scan was carried out eight weeks postoperatively. The abdominal images showed that the splenic lesions had enlarged and coalesced. Figure (b) represents a section from the thoracic examination; its level corresponds closely with that of Figure (a). The aortic root had assumed normal close apposition to the anterior surface of the left atrium with no evidence of recurrence of the abscess. As the patient was considered well enough to withstand further surgery a splenectomy was performed, and the spleen was found to contain a single large abscess. The postoperative course was uneventful, and he was discharged three weeks later, 14 weeks after his original admission, without any further antibiotic treatment.

Discussion

The value of computed tomography in the investigation of intra-abdominal abscesses is widely recognised. In the present case it proved useful both in identifying the splenic abscesses and in the timing of splenectomy. An additional benefit of the technique was the demonstration of an aortic root abscess. While computed tomography has been used in the detection of mediastinal and pericardial abscesses^{4,5} there has been no previous documentation of its role in the diagnosis of valve ring abscesses. In view of this the diagnosis of the ring abscess in this case was presumptive particularly as the clinical picture could be accounted for by the splenic abscesses. The patient was, therefore, managed conservatively and surgery only undertaken when evidence of atrioventricular conduction disturbance developed.

Over the past few years several authors have highlighted the value of cross sectional echocardiography in the identification of valve ring abscesses.⁶⁻¹⁰ These reports have concentrated on abscesses complicating endocarditis in native valves. The multiple echoes generated by prosthetic valves may make abscess identification more difficult in this group. Further-

more, inevitably a proportion of patients are poor echocardiographic subjects. These two difficulties may explain the failure of cross sectional echocardiography to identify the aortic root abscess in the present case.

We have at present no indication of the proportion of aortic root abscesses which can be identified by computed tomography. The abscess in this case was particularly large, and smaller abscesses may be less readily identifiable. Similarly, we do not know the relative value of the technique in assessing native valves and different types of prosthetic valves. These various factors require prospective assessment. Nevertheless, the present case illustrates that computed tomography is potentially useful in the non-invasive assessment of possible valve ring abscess formation.

Valve ring abscesses are a common finding in necropsy studies of patients with endocarditis.^{1,2} Little is known of the natural history of this complication. Non-invasive assessment using echocardiography and computed tomography may potentially provide this additional information and, in particular, answer the question of whether or not the identification of an abscess should, as has been suggested,¹⁰ be regarded as an indication for urgent surgical intervention.

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