Transesophageal Echocardiographic Evaluation of Aortitis

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Summary: Aortitis is an uncommon infection which may occur in patients with preexisting atherosclerotic disease of the aorta. The clinical features in two patients presenting with fever and nonspecific symptoms are reviewed. In these patients, transesophageal echocardiographic features of wall thickening and false aneurysm formation were suggestive of the diagnosis of aortitis. Both patients were taken for surgical excision of the descending aorta and subsequently improved.

Key words: transesophageal echocardiography, aortitis, mycotic aneurysm, endocarditis, aortic dissection

Introduction

Transesophageal echocardiography (TEE) has been shown to diagnose accurately diseases of the thoracic aorta, including aortic dissection, aortic transection, aortic intramural hematoma, and penetrating atherosclerotic ulcers.¹ The use of TEE in the evaluation of patients with aortitis has not been well defined.

Case Reports

Case No. 1

A 60-year-old man presented with 6 months of intermittent chest and back discomfort, fevers, and chills which had pro-

gressed in the 3 weeks prior to admission. Physical examination on admission showed an oral temperature of 99.5 but was otherwise unremarkable. The white blood cell count was elevated at 13,800 with a left shift. Chest x-ray revealed widening of the mediastinum and normal lung fields. A computed tomography (CT) scan showed a widened descending aorta with periaortic fluid that was suggestive of rupture. To characterize the aortic process further, TEE was performed, which showed normal left ventricular function and no significant valvular disease. The ascending aorta was moderately dilated with no evidence of dissection. The descending thoracic aorta had heavy atherosclerosis and mild aneurysmal dilatation. Distal to the subclavian artery, the wall of the aorta was markedly thickened with focal echolucent regions within the wall. The aorta had the appearance of two separate lumens in a short-axis projection. On a long-axis projection, a narrow neck could be visualized connecting the true lumen with a separate echolucent cavity (Fig. 1). A large echolucent area external to the wall was consistent with periaortic hemorrhage. A 3 × 1 cm freely mobile echo density, thought to be thrombus, was present within the true aortic lumen just distal to the neck of the false cavity (Fig. 2). Aortography was performed at the time of coronary arteriography and confirmed the finding of a saccular aneurysm of the descending aorta.

The patient was taken to surgery for repair of the ruptured aortic aneurysm with a 25 mm dacron graft. On gross inspection, the aorta was heavily atherosclerotic and the wall measured > 1 cm in thickness. A large mobile thrombus was found within the aortic lumen and was removed. Cultures from intraoperative specimens later grew *Staphylococcus aureus*. The patient tolerated the procedure well, was treated with oxacillin and gentamicin for 6 and 2 weeks, respectively, and was discharged 2 weeks following the surgery.

Case No. 2

A 64-year-old woman presented with complaints of months of malaise and the acute onset of myalgias, rigors, and mid-chest and back discomfort. On presentation, her examination revealed a rectal temperature of 101.3 but was otherwise unremarkable. Laboratory data revealed an elevated white blood count of 21,700 with a left shift. The patient continued to spike temperatures as high as 103.8. Cultures were begun and em-

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FIG. 1 Transesophageal echocardiography short-axis projection showing the descending thoracic aorta in Case No. 1 with the appearance of two separate lumens. Color Doppler flow was present within both lumens. A long-axis projection was necessary to demonstrate the communication between the two lumens. A = descending aorta lumen, * = false lumen.

FIG. 2 Transesophageal echocardiography long-axis projection of the descending thoracic aorta in Case No. 1 shows a large intraluminal thrombus within the true lumen which was attached near the neck of the pseudoaneurysm.

piric antibiotics were started. The first set of blood cultures was positive for *Streptococcus pneumonia* in both bottles, though the subsequent three sets were negative. On Day 6 of the patient's hospital stay, a CT scan was performed to rule out an abdominal source of infection; it showed periaortic soft tissue thickening at the level of the diaphragm which extended inferiorly for 4 cm. She defervesced over several days, but on Day 10 she had recurrent lower back discomfort. A follow-up CT scan showed bulging of the right lateral wall of the aorta at the level of the diaphragm but no change in the periaortic soft tissue density. An aortogram showed focal saccular aneurysm of the distal thoracic and distal abdominal aorta with no evidence of rupture or dissection.

For better evaluation of the distal thoracic aorta, a TEE was performed. A short-axis projection showed a thickened aortic wall with a double lumen, and color-flow Doppler was evident in each lumen (Fig. 3). In a long-axis projection, a deep ulceration was seen which connected to a false aneurysm (Fig. 4). Because of suspicion that this represented an infected aneurysm with rupture, the patient was taken to surgery for debridement and for replacement by graft of the thoracic and abdominal aortic aneurysm. On gross inspection, the walls of both the thoracic and abdominal aorta were thickened and inflamed, and contained ulcerated atherosclerotic plaque and pseudoaneurysm formation in two places. The diseased portion of the descending aorta was replaced with an in situ dacron graft. Intraoperative cultures were negative. The remainder of the patient's hospital stay was unremark-

FIG. 3 A transesophageal echocardiography short-axis view of descending thoracic aorta (A) in Case No. 2 shows the separate true and false lumens. The narrow communication between the two lumens could be visualized in a long-axis projection. A = descending aorta lumen, * = false lumen.

FIG. 4 Transesophageal echocardiography long-axis projection of the proximal descending aorta (A) of Patient No. 2 showing the focal dilatation of the false cavity. A = descending aorta lumen, * = false lumen.

able, and she was discharged after receiving a total of 40 days of intravenous antibiotics.

Discussion

While Osler first termed aortic wall infections as "mycotic," fungal infections are rare and more common agents are bacterial causes, including gram-positive organisms (staphylococcus and streptococcus, as in our two patients), and gram-negative organisms.^{2,3} The majority of these infections occur in the abdominal aorta and result in either formation or enlargement of a preexisting aneurysm.³ Infections may arise from contiguous spreading, vascular manipulation, or bacterial seeding of an atherosclerotic segment.³ Most patients, such as ours, have preexisting aortic atherosclerotic disease that provides a nidus for the infection. Intraluminal thrombus, as seen in our patient, has been previously reported. When recognized, patients usually require surgical therapy because, if left untreated, there may be catastrophic rupture of the aneurysm.^{2,3}

The clinical presentation is similar to that of any endovascular infection with fever, leukocytosis, and positive blood cultures. Depending on the location of the involved segment, other features may be present, including a pulsatile abdominal mass with abdominal aorta involvement or back pain with thoracic aorta involvement. By any imaging modality, the disorder is recognized by a new saccular dilatation of the aorta, or enlargement of an existing aneurysm. Aortography has long been the test of choice and is characterized by the non-specific findings of saccular dilatation of the aorta, especially if the changes are noted in atypical locations or in an otherwise normal appearing aorta.² Computed tomography scans have also been recently used and may show nonspecific signs, including a peripheral rim of enhancement of a thickened aortic wall with an irregular margin.

To our knowledge, there are only three previous case reports describing the use of TEE in the detection of aortitis.⁴⁻⁶ In these cases, as in ours, echocardiography revealed thickened aortic walls with focal saccular aneurysms of the descending aorta with flow into the abscess cavity. In both of our patients, a direct narrow communication could be visualized between the aortic lumen and the false cavity in the longitudinal plane. In the short-axis projection, this gave a double-barrel, double-lumen appearance to the aorta.

Aortic atherosclerosis predisposes to the formation of both aortitis and noninfectious entities including intramural hematoma and penetrating ulcers. Transesophageal echocardiogra-

phy in these cases shows aortic wall thickening with intramural echolucent areas and, in cases of large penetrating ulcers, may lead to pseudoaneurysm formation. It therefore may be difficult, if not impossible, to distinguish between these entities and aortitis by TEE. Of note, the three previous cases and our two cases all resulted in the formation of a pseudoaneurysm which does not occur in patients with intramural hematoma. Because of similar imaging characteristics, distinguishing between these conditions rests on clinical evidence of intravascular infection of unknown source.

Transesophageal echocardiography is being used increasingly in the evaluation of patients with suspected endocarditis and aortic disease due to its excellent resolution. By TEE, as with other imaging modalities, findings of thickened aortic walls with the formation of a saccular aneurysm may be suggestive of the diagnosis of aortitis. In patients with appropriate symptoms, including fever or positive blood cultures, this diagnosis should be considered when TEE findings are suggestive so that early surgical intervention can be considered. The aorta should be routinely evaluated as part of a TEE ordered for suspected endocarditis.

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