

## Unusual Presentations of Infective Endocarditis

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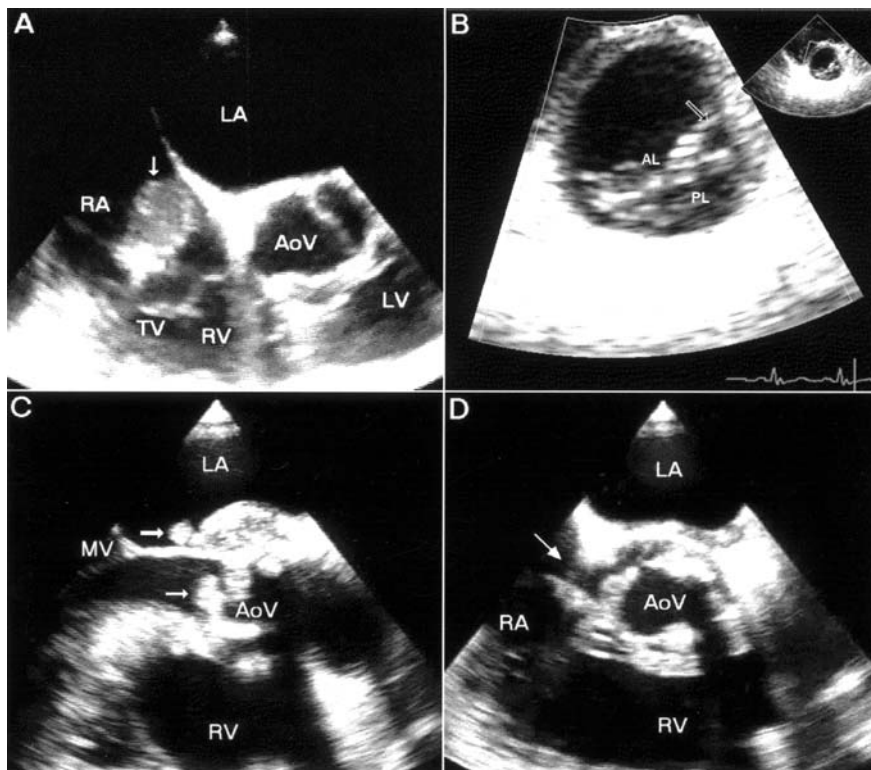
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The clinical spectrum of infective endocarditis is diverse and varies according to the underlying heart condition and microbiologic agent. Echocardiographic evidence of endocardial involvement – vegetations, abscess, new or partial dehiscence of prosthetic valve, new valvular regurgitation – is a major criterion necessary for the definite clinical diagnosis of infective endocarditis [1]. We present three highly unusual cases of infective endocarditis.

### Patient Descriptions

#### Patient 1: Pacemaker endocarditis

A 57 year old man was admitted due to intermittent fever during the previous year. He was treated with ampicillin, prescribed by his family doctor, during the 5 days preceding the present admission. He had a permanent pacemaker that was inserted 3 years previously due to sick sinus syndrome. Transthoracic echocardiography revealed a large mobile mass in the right heart chambers consistent with vegetation, myxoma or thrombus. Subsequent transesophageal echocardiography detected a mass (diameter 2.5 cm) attached to the ventricular electrode of the pacemaker above the level of the tricuspid valve [Figure A]. These findings suggested the diagnosis of pacemaker endocarditis and the patient underwent urgent operation. The mass, which was attached to the pacemaker electrode, was removed. Pathologic examination of the mass revealed collection of necrotic tissue with fibrin fibers but no bacterial growth. The clinical course was complicated by spleen infarct (paradoxical emboli across patent foramen ovale, that was also present). Repeat transesophageal echocardiography was normal. Despite wide-spectrum antibacterial treatment, the patient continued to have subfebrile temperature; drug fever was suspected and all the antibiotics were stopped. After discontinuation of the antibacterial therapy the



**[A]** Mid-esophageal short axis view of the patient with vegetation on the electrode of pacemaker. LA = left atrium, RA = right atrium, RV = right ventricle, TV = tricuspid valve, AoV = aortic valve, LV = left ventricle. Arrow depicts large vegetation on the electrode of pacemaker. **[B]** Short axis view of the patient with perforation of the mitral valve. AL = anterior leaflet of the mitral valve, PL = posterior leaflet of the mitral valve. Arrow depicts perforation of the anterior leaflet of the mitral valve near the anterolateral commissure. **[C]** Mid-esophageal long axis view of the patient with periaortic abscess. AoV = bioprosthetic aortic valve, MV = mitral valve. The narrow arrow depicts vegetation on the biologic aortic valve, and the wide arrow depicts vegetation on the anterior aspect of the mitral annulus. **[D]** Mid-esophageal short axis view of the patient with periaortic abscess. Arrow depicts communication between the abscess cavity and the right atrium.

fever disappeared and the patient was discharged in good condition.

#### Patient 2: Perforation of the mitral valve in a drug addict

A 26 year old drug addict was evaluated for chills that persisted for 2 weeks and a prominent systolic murmur. Echocardiographic examination [Figure B] revealed a large mobile vegetation on the anterior leaflet of the mitral valve and a perforation of the leaflet near the anterolateral commissure of the mitral valve, which caused

significant mitral regurgitation. *Staphylococcus epidermidis* grew from blood cultures and appropriate antibacterial therapy was administered. The patient refused further treatment.

#### Patient 3: Periaortic abscess with right atrial communication

A 76 year old man, 1 year after biologic aortic valve replacement, was admitted due to fever and weakness during the preceding week. Blood cultures were positive for *Staphylococcus aureus*. Transthoracic echo-

cardiography was negative, but transesophageal echocardiography [Figure C] revealed mobile vegetations on the prosthetic aortic valve and a vegetation on the anterior mitral valve leaflet. An echogenic mass consistent with abscess was found around the posterior aspect of the prosthetic aortic valve. There was evidence of communication between the aortic abscess and the right atrium with vegetations present at the atrial side. The patient was referred for urgent surgery. Periaortic abscess involving the interventricular septum was resected and the communication into the right atrium was closed with a pericardial patch. The aortic prosthesis was replaced and the aortic root was reconstructed with plication by a pericardial patch. The vegetation was removed from the anterior aspect of the mitral annulus. After 2 weeks the patient was discharged from hospital.

### Comment

Today echocardiography is the main diagnostic tool for the diagnosis of infective endocarditis. Since a definite pathologic diagnosis is usually not obtained, evidence of endocardial involvement in the presence of positive blood cultures is sufficient for the definite clinical diagnosis of infective endocarditis [1].

In permanent pacemaker endocarditis *Staphylococcus aureus* is the prevailing microorganism (50%), especially in the first 12 months after implantation, with coagulase-negative staphylococci accounting for another 25%. Permanent pacemaker endocarditis most likely originates during the implantation procedure itself, with a long latent period before overt clinical manifestation [2]. In the first patient this latent period was 3 years.

Antibacterial treatment before admission is the most frequent cause of culture-negative endocarditis, as was the case in the first patient. Prospective studies comparing the use of antibiotics alone with a combination of antibacterial therapy and removal of pacemaker are lacking, and the management of patients with permanent pacemaker endocarditis remains controversial. Removal of the pacemaker is generally recommended. Conservative therapy is more likely to be successful in cases of

infection with coagulase-negative staphylococci [2]. After removal of the pacemaker, antibacterial therapy should be continued according to the microbiologic agent. In the first patient drug fever was suspected and all the antibiotics were stopped prematurely after the repeat transesophageal echocardiography was normal. Antimicrobial therapy would be simpler in this patient if the microbiologic agent were identified.

Right-sided endocarditis is prevalent in intravenous drug abusers. Methicillin-susceptible *Staphylococcus aureus* is the causative organism in about 60–70% of these patients. The tricuspid valve is most frequently affected (more than 70%), followed by left-sided valves. Most of these patients have no predisposing cardiac conditions. Right-sided infective endocarditis usually responds to antimicrobial therapy. Perforation of the mitral leaflet can be caused by coexistent aortic valve endocarditis but was found at necropsy in 11% of 63 patients with active infective endocarditis located on the mitral valve only [3]. *S. aureus* or *S. epidermidis* was the responsible organism in 51% of these patients, as it was in our second patient. Unfortunately, this patient refused any further therapy.

The yield of conventional echocardiography in the diagnosis of prosthetic valve endocarditis is low, 20–30%. Transesophageal echocardiography is the method of choice with over 90% accuracy. It is limited in very early cases when vegetations have not yet fully developed. The resolution of transesophageal echocardiography is 1–2 mm [4]. Peri-annular extension and abscess formation are common (56–100%) in prosthetic valve endocarditis. Aortic root abscesses may rupture into adjacent chambers and may create single or multiple intracardiac fistulas. Secondary involvement of the anterior mitral leaflet occurs as a result of direct extension of the infection from the aortic valve (“mitral kissing vegetation”) or as a result of an infected aortic regurgitant jet [3].

Acquired left ventricle-right atrial shunt is rare, with only a few cases reported (after aortic valve replacement, atrioventricular canal repair, or chest trauma). Septic perforations of interventricular septum

have been reported postmortem. Acquired left ventricle-right atrial communication due to infective endocarditis was reported in an elderly patient. The diagnosis was made by transesophageal echocardiography and confirmed by cardiac catheterization [5]. In our third patient, paravalvular abscess was complicated by communication into the right atrium, extending into the interventricular septum and the mitral valve. Mortality in aortic root abscess is high even after surgery and especially in a prosthetic aortic valve. Despite this the third patient was successfully operated and discharged home.

In summary, all patients with staphylococcal or gram-positive bacteremia should undergo echocardiographic assessment, while in patients after valve replacement the diagnostic workup should include transesophageal echocardiography. Patients with intracardiac devices and fever should always be evaluated for infective endocarditis, blood cultures should be drawn before antibiotic administration, and transesophageal echocardiography is highly recommended.

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