Exceptionally large vegetation on pacemaker lead developed years after implantation

Kalp pili elektrody üzerinde implanatasyondan yıllar sonra ortaya çıkan olağanüstü büyük vejetasyon

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ABSTRACT

With the increasing use of cardiac implantable electronic devices in recent years, infective endocarditis associated with these devices has become more common. Early diagnosis and treatment are important to manage this infection successfully. However, the diagnosis of cardiac implantable electronic device endocarditis is not always easy, as there may be no local inflammation signs or the clinical presentation can mimic other systemic infections. Herein, we report a case of pacemaker-related infective endocarditis clinically mimicking pneumonia. Echocardiographic examination was performed due to the patient’s seven years history of pacemaker implantation. A giant vegetation was seen on the pacemaker lead. Interestingly, her vegetation grew to a giant size asymptotically during this long period of time. After the diagnosis of infective endocarditis, the patient was managed successfully with pacemaker lead system removal and appropriate antibiotic therapy.

Keywords: Infective endocarditis; pacemaker; vegetation.

Recently, the rate of cardiac implantable electronic device (CIED) infections has increased due to increased CIED implantations worldwide. This type of infection can present as either a local pocket infection or systemic infection, leading to associated endocarditis (LAE). Cardiac implantable electronic device-related infective endocarditis (IE) is present in up to 23% of all cardiac device infections and the mortality rate of CIED-related IE ranges from 10.0 to 23.2%. Prompt recognition and management may improve outcomes, while the treatment of CIED infections with LAE includes the prompt removal of all CIED hardware and a prolonged course of intravenous antibiotic therapy. Herein, we describe a case with an extremely large vegetation attached to the pacemaker lead in the right atrium, which was protruding into the right ventricle during diastole.

CASE REPORT

An 83-year-old woman presented with a history of fever and cough for two days. Upon admission to the hospital, she had a temperature of 38.5°C and a cough productive of yellowish sputum. Her past medical history included a seven-year history of a pacemaker implantation for atrial fibrillation. She was taking warfarin for anticoagulation. She denied any history of dental procedures, skin infections, or recent travel.

On physical examination, she was afebrile with a heart rate of 90 beats per minute. Cardiovascular examination revealed a regular rhythm with a heart sound of grade II/VI systolic ejection murmur. The lungs were clear to auscultation. The abdomen was soft and nontender with normal bowel sounds. The rest of the examination was unremarkable.

Laboratory findings revealed a white blood cell count of 12,000/mm³ with a normal differential, hemoglobin of 12.5 g/dL, platelet count of 220,000/mm³, and normal coagulation parameters. C-reactive protein was elevated at 10.2 mg/dL. Blood culture revealed growth of coagulase-negative Staphylococcus aureus. Transthoracic echocardiography showed a large vegetation measuring 2.5 cm on the right atrial aspect of the pacemaker lead, protruding into the right ventricle during diastole. A transesophageal echocardiogram confirmed the presence of the vegetation.

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our hospital, chest X-ray showed bilateral pulmonary infiltrates. Due to the presence of pulmonary infiltrates and high concentration of C reactive protein (157 mg/L), the patient was diagnosed with pneumonia. Thereafter, parenteral antibiotic treatment including ciprofloxacin, meropenem, and teicoplanin was initiated. However, the patient maintained a low-grade fever and her procalcitonin level was high (32 ng/mL). Therefore, the antibiotic spectrum was extended and other possible foci of infection were investigated.

The patient’s urine culture was negative and prosthetic infections related to the right knee replacement were excluded. The Brucella agglutination test produced negative results. Thoraco-abdominopelvic computed tomography showed no infectious focus. However, she underwent dual chamber (DDD) mode pacemaker implantation seven years ago due to a total atrioventricular block. Infective endocarditis was suspected and transthoracic echocardiography (TTE) was performed to search for vegetation, although there was no sign of a pocket infection. The TTE revealed a mobile mass suggestive of a vegetation 1.7x3.8 cm in size, adhering to the atrial side of the pacemaker lead, and protruding into the right ventricle during diastole.

Three sets of blood cultures were, then, drawn and antibiotics were switched to vancomycin and rifampicin. Transesophageal echocardiography (TEE) was performed to evaluate the vegetation size and any other endocardial involvement. The TEE confirmed a vegetative mobile mass of 4.7x2.4 cm in size and 8.2 cm² area on the lead (Figures 1 and 2). There were 2-3 degrees of tricuspid regurgitation and trivial mitral regurgitation; however, no vegetation on the other cardiac chambers or valves was observed.

The detailed patient history revealed that she occasionally suffered from chills, trembling, and fever for the previous five months; however, there was no specific clue for a possible cause of bacteremia. With an appropriate antibiotic therapy, the patient remained afebrile and no blood cultures produced microorganisms. The concentration of C-reactive protein decreased to 32 mg/L and the level of procalcitonin decreased to 0.297 ng/mL. During the fourth week of antibiotic therapy, the pacemaker generator and transvenous pacemaker leads were surgically removed (Figures 3a, b). Meanwhile, a new DDD pacemaker with three epicardial leads was implanted through the contralateral side. Pathological
examination of the removed material was reported as fibrin colonized with bacteria. Antibiotic therapy was continued for an additional four weeks after surgery.

**DISCUSSION**

Cardiac device-related IE is a serious disease with significant morbidity and mortality rates, which has become more frequent with the increased use of pacemakers and implantable cardioverter defibrillators (ICDs) in recent years.[1,2]

Patients with LAE may present with signs of local pocket inflammation and bacteremia or with systemic illness including fever, chills, sweats, and signs of sepsis. In our case, the presence of pacemaker implantation and signs of systemic infection led to a high clinical suspicion of IE. Therefore, we performed TTE which produced the definite diagnosis of IE.

The diagnosis of LAE is based on the modified Duke criteria.[3] Our case had one major (vegetation on echocardiography) and three minor criteria, which included a fever of >38 °C, predisposing heart condition (pacemaker), and peripheral (pulmonary) embolic event, which are compatible with a definite clinical diagnosis of IE. Greenspon et al.[4] reported that the clinical presentation of LAE varied based on the size of vegetation and patients with LAE with local pocket infection usually had a smaller vegetation, whereas those presenting with systemic manifestations of infection tended to have a larger vegetation. According to the authors of aforementioned study, patients who developed LAE soon after a CIED procedure were more likely to present with local infections. In contrast, those with LAE which occurred more than six months following a CIED procedure were more likely to present with signs of a systemic infection. This patient had a large vegetation, where a pacemaker was implanted seven years previously; therefore, the absence of any signs of pocket inflammation is not surprising.

Furthermore, the Heart Rhythm Society consensus statement on lead extraction emphasizes that device infections can be insidious and the only clinical manifestation may be chronic pain or local signs of infection at the pulse generator site. However, it does not indicate that the intravascular components of the system are left non-infected.[5] With rare exceptions, IE necessitates removal of the entire CIED system. Extraction of the CIED is a technically complex procedure with a risk profile including tears of the tricuspid valve, hemothorax, tamponade, pulmonary embolism, or lead migration. The presence and size of the vegetation in patients with IE are critical determinants in selecting the procedure. Vegetations <3 cm in patients with CIEDs typically do not preclude transvenous lead extraction. Conversely, vegetations ≥3 cm often require open surgical debridement.[3]

Timing from pacemaker implantation to the diagnosis of endocarditis is another variable which may favor surgical removal of the electrode system using cardiopulmonary bypass. This is because, 12 months after the implantation, the electrodes are attached to the right endocardium and are embedded in a dense fibrotic plaque, making electrode removal by direct traction dangerous.[6] Our case had a vegetation of 4.7x2.4 cm in size and the time from implantation to IE diagnosis was seven years. Therefore, our first choice was a surgical procedure. There was no growth in the blood cultures; however, this was an expected result, as the patient was on antibiotherapy, when the blood cultures were obtained.

In conclusion, IE should always be kept in mind in the differential diagnosis of CIED. The diagnosis can be challenging in the absence of local signs of infection. It should also be emphasized that one can develop CIED-related infections even after several years of implantation. Our case is also unique, since there is no another case in the literature such a long time after implantation with the largest vegetation reported to date.

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**REFERENCES**

