

## Case Report

# A rare case of pacemaker lead endocarditis successfully treated with open heart surgery

Darko Boljevic<sup>1</sup>, Aleksandra Barac<sup>2,3</sup>, Petar Vukovic<sup>1,2</sup>, Dejan Kojic<sup>1</sup>, Milovan Bojic<sup>1</sup>, Jelena Micic<sup>2,4</sup>, Salvatore Rubino<sup>5</sup>, Bianca Paglietti<sup>5</sup>, Aleksandra Nikolic<sup>1,2</sup>

<sup>1</sup> "Dedinje" Cardiovascular Institute, Belgrade, Serbia, School Of Medicine, University of Belgrade, Belgrade, Serbia

<sup>2</sup> Faculty of Medicine, University of Belgrade, Belgrade, Serbia

<sup>3</sup> Clinic for Infectious and Tropical Diseases, Clinical Center of Serbia, Belgrade, Serbia

<sup>4</sup> Clinic for Gynecology and Obstetrics, Clinical Center of Serbia, Belgrade, Serbia

<sup>5</sup> Department of Biomedical Sciences, University of Sassari, Sassari, Italy

### Abstract

**Background:** Cardiac device-related endocarditis has emerged as a serious complication in the era of advanced medical technology. Pacemaker related infections are rare and life-threatening with incidence from 0.06% to 7% and high mortality rate (30-35%). Diagnosis is hard, frequently delayed and could be even missed due to poor clinical findings. The average delay in diagnosis is 5.5 month. We report a case of the late-onset of pacemaker lead endocarditis caused by *S. epidermidis* successfully treated with open heart surgery.

**Case Report:** Patient with persistent high fever for 11 month and suspicion for infective endocarditis was admitted in Cardiovascular Institute. No clinical signs of endocarditis were observed. TTE revealed large vegetation 30 × 17 mm attached to the atrial electrodes with high embolic potential. This finding was verified by transesophageal echocardiography (TEE), although CT scan did not reveal vegetation. Blood cultures were negative. A sternotomy with cardiopulmonary bypass was performed and electrodes were extracted with large vegetation. Intraoperative finding revealed large thrombus with vegetation around pacemaker leads. Cultures of the electrodes and vegetation revealed *Staphylococcus epidermidis*. Surgery was followed up with antibiotic treatment for 6 weeks. He has been followed up for the next 2 years, and without complications.

**Conclusion:** The absence of criteria for endocarditis and negative blood cultures should not keep the physician from ruling out lead endocarditis. This complication carries high risk of mortality if left untreated.

**Key words:** pacemaker; endocarditis; device-related; *Staphylococcus*; lead infection.

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### Introduction

Implantation of cardiac electronic devices has become a routine procedure widely available in recent years. Use of these devices increased as their functions and indications have widened [1-3]. Cardiac device-related endocarditis (CDE) has emerged as a serious complication in the era of advanced medical technology. It is a rising problem due to growing number of elderly patients with comorbidities, limited electrode life-time, an increasing number of abandoned leads, and subclinical symptoms [1,4]. Pacemaker lead endocarditis is rare and serious complication of implantation of cardiac electronic devices with incidence from 0.06% to 7% [1,5] and high mortality rate (30-35%) [6].

We report a case of the late-onset of pacemaker lead endocarditis which required open heart surgery, as the only possible therapeutic option.

### Case Report

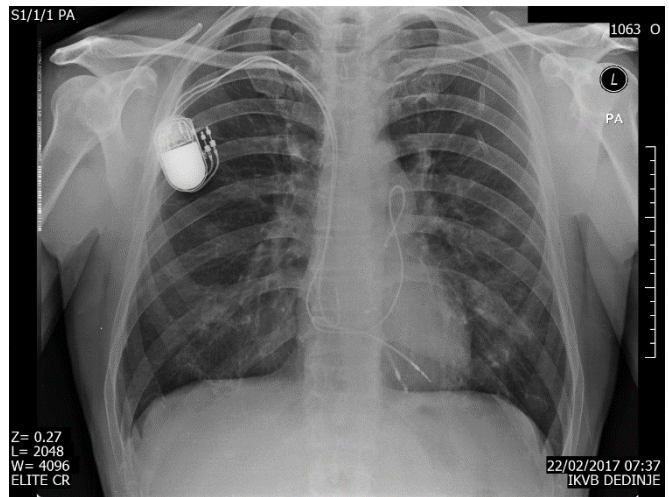
A 55-year-old man was transferred to "Dedinje", Cardiovascular Institute, Belgrade, Serbia, in February 2017, from regional medical center where he was admitted due to high fever, fatigue and cold chills. His medical history revealed that he was diagnosed with sick sinus syndrome in 2007 and had implantation of permanent pacemaker (DDDR). Two years later due to persistent pocket infection the generator was removed from the right infra-clavicular region but the electrodes were left positioned. He was asymptomatic for the next six years and regularly followed up, without need for pacemaker implantation. In April DDDR was implanted due to repeated sick sinus syndrome, via left subclavian artery with generator placed in the left infra-clavicular region. Since then, three times he has been admitted to the local hospital due to fever. In March 2016 he was admitted due to pericarditis. In August

2016 he was admitted due to a new episode of fever, chills and hemoptysis, when pneumonia and multiple pulmonary abscesses were confirmed by CT scan. He was treated with meropenem and vancomycin for 3 weeks. Bronchoscopy was performed in order of ruling out cancer as a possible cause. It did not reveal pathological processes. Control CT scan showed regression of infection. Transthoracic echocardiography (TTE) at that time of point showed to be normal. Despite optimal antibiotics therapy and regression of imaging signs of infection low-grade fever persisted.

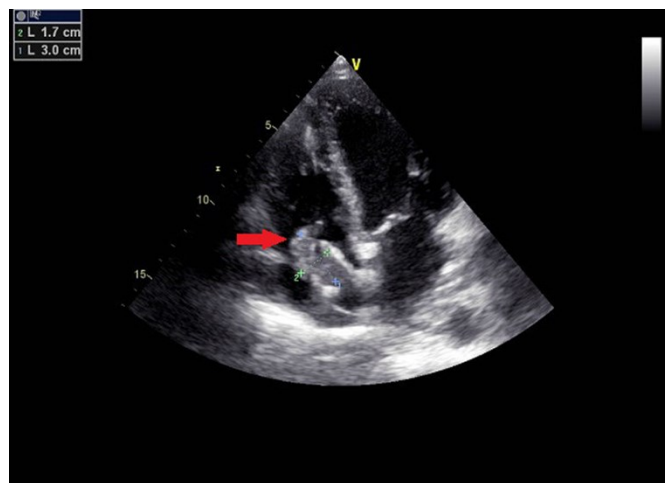
Patient’s health problems persisted for 11 months; he had low-grade fever with loss of 15 Kg in weight. In February 2017 he had persistent high fever and when it reached 39.5°C he was admitted in the local hospital. Suspicion for infective endocarditis was made after TTE exam and he was transferred to Cardiovascular Institute “Dedinje” with present high fever, fatigue and cold chills. Physical examination revealed no abnormalities except high body temperature (39°C). No clinical signs of endocarditis were observed. The pocket of generator showed no erythema, fluctuation, warmth or tenderness and was not painful. The laboratory values showed increased levels of C-reactive protein (CRP) (87.5 mg/l) and increased erythrocyte sedimentation rate (SE) (100 mm/h) and leucocytosis ( $10.6 \times 10^9/l$ ), but no left deviation in the white blood cell count. Other biochemical laboratory results were within the limits of referent values. Chest X-ray showed no signs of electrode displacement, pulmonary congestion or inflammation (Figure 1). TTE revealed large vegetation 30 × 17 mm attached to the atrial electrodes with high embolic potential (Figure 2). There was no pericardial effusion and all chambers had normal aspect. This finding was verified by transesophageal echocardiography (TEE), although CT scan did not reveal vegetation (Figure 3). The same day, three sets of blood cultures were taken, in the moment when high fever was present. Therapy with vancomycin (2 gr/day) and gentamycin (160 mg/day) were initiated. Three days after, results from all blood cultures came as negative (three from the local hospital and three from cardiovascular hospital).

Heart Team made decision to do open heart surgery. A sternotomy with cardiopulmonary bypass was performed and electrodes were extracted with large vegetation. This invasive approach was chosen because of huge size of vegetation. Intraoperative finding revealed large thrombus with vegetation around pacemaker leads. Tricuspid valve was not affected.

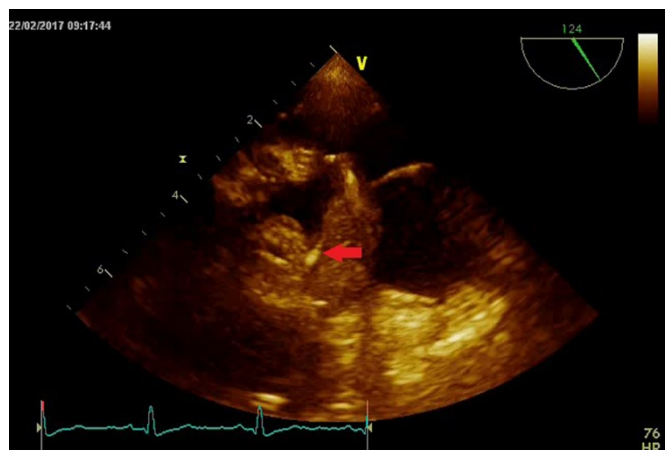
**Figure 1.** Chest X-ray presenting no signs of electrode displacement.



**Figure 2.** Transthoracic echocardiography – large vegetation 30 × 17 mm attached to the pacemaker leads.



**Figure 3.** Visualization of the large vegetation by transesophageal echocardiography.



Whole mass was extracted as well as generator from the left infra-clavicular region (Figures 4, 5).

Cultures of the electrodes and vegetation revealed *Staphylococcus epidermidis*. Susceptibility testing showed sensitivity of *S. epidermidis* to all antibiotics from antibiogram and the same treatment protocol was continued for the next 6 weeks.

After the surgery patient was afebrile, hemodynamically stable and was discharged after 3 weeks in good health condition. He has been followed up for the next 2 years, and did not present complications.

## Discussion

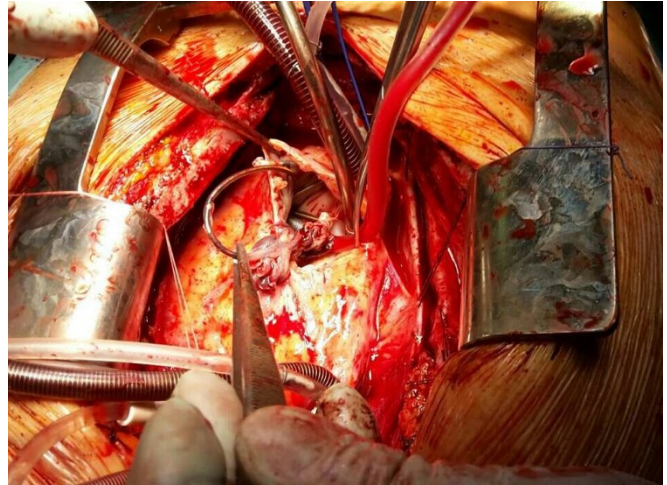
Pacemaker related infections are rare and life-threatening. The infection may be limited to the generator of pacemaker along with the pocket in which is implanted, it may involve only the leads or it may include the whole pacemaker system [6]. In addition, it is possible to affect heart valves, especially tricuspid valve [7]. We reported a case of pacemaker lead endocarditis caused by *S. epidermidis* successfully treated with open heart surgery.

CDE is divided into early- and late-onset categories. Early endocarditis is usually defined as occurring within the first six months after implantation but some authors reported to be within six weeks [8], three months or even one year following insertion of the PM [9-11]. Diagnosis is hard, frequently delayed and could be even missed due to poor clinical findings of infective endocarditis. Based on several reports, the average delay in diagnosis is 5.5 months (range 1 to 27 months) [11]. In our case, the symptom onset was very late, after one year. Time from symptom onset to the surgery was 11 months.

The diagnosis of pacemaker infections is established by the nature of the clinical symptoms, results of blood cultures and echocardiography and radiological imaging. Blood culture positivity in these patients is less common than patients with native valve endocarditis. About 15% of blood cultures are negative in the cases with CDE [12]. The most commonly isolated microorganisms belong to *Staphylococcus* sp. In our patient, *S. epidermidis* was isolated after surgery, from the cultures of electrodes and vegetation, while blood cultures were sterile. *S. epidermidis* infections are usually hospital acquired [11]. As the part of the normal human flora of the skin and mucous membranes, *Staphylococcus* sp. commonly colonized intravenous catheters and prosthetic implants and cause infections.

TTE is method with high sensitivity and specificity for detection of vegetation attached to the pacemaker

**Figure 4.** Extraction of pacemaker lead with large vegetation without affection of tricuspid valve.



**Figure 5.** Large vegetation caused by *Staphylococcus epidermidis* attached to the pacemaker leads.



leads [7]. However, review of literature suggests that TTE is inadequate [8,11,13]. Victor et al. found that TTE was useful for diagnosis in only 30% of patients, but in other hand TEE was able to diagnose 96% of the patient population [12]. Therefore, TEE should be done in patients with pacemaker and prolonged fever of unknown origin, and should be always performed if CDE is suspected. CT is a diagnostic method that has not been evaluated so far for vegetation visualization [11], but in our case huge vegetation mass was not revealed by thoracic CT scan.

If CDE is suspected, it is suggested to combine prolonged antibiotic therapy with removal of leads or entire device [11]. Removal of the leads can be performed by percutaneous extraction or by open heart surgery. Percutaneous extraction can be used if the

vegetation is less than 10 mm, the tricuspid valve is not involved, the time passed from implantation is shorter than 1 year and if the patient is not pacemaker-dependent. In other situations, surgical extraction should be considered [8-11,13,14]. In presented patient vegetation size measured by TTE was 30x17 mm, and surgical removal was preferable treatment method due to the high risk of embolization. Surgical removal in such cases is recommended because of the potential threatening mechanical damage of heart wall or the tricuspid valve, which consequently could create a hemipericardium, heart tamponade and lead to lethal outcome [6,11,15].

The diagnosis of pacemaker lead infection should be always considered in the presence of fever, recurrent pulmonary complications, septicemia or persistent evidence of infection at the implantation site. The absence of criteria for endocarditis and negative blood cultures should not keep the physician from ruling out lead endocarditis. This complication carries high risk of mortality if left untreated. Complete removal of the device, including all leads and the generator followed by antibiotics is the most efficient treatment.

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### Corresponding author

Aleksandra Barac, MD, PhD, Scientific Associate  
Clinic for Infectious and Tropical Diseases, Clinical Center of Serbia  
Faculty of Medicine, University of Belgrade  
Bul. Oslobođenja 16, 11000, Belgrade, Serbia  
Tel: +381631869502  
Email: aleksandrabarac85@gmail.com

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