JIDC | THE JOURNAL OF INFECTION IN DEVELOPING COUNTRIES

Coronavirus Pandemic

Severe pacemaker pocket infection during the COVID-19 pandemic, transvenous lead removal

Milos Dusan Babic[1], Lazar Angelkov[1], Milosav Tomovic[1], Mihailo Jovicic[1], Darko Boljevic[1], Ivana Suluburic[1], Aleksandar Babic[1], Maja Milosevic[1], Milovan Bojic[1], Andrija Djuranovic[1]

[1] *Institute for Cardiovascular Diseases, Dedinje, Belgrade, Serbia*

Abstract

Introduction: The estimated infection rate after permanent endocardial lead implantation is between 1% and 2%. Pacemaker lead endocarditis is treated with total removal of the infected device and proper antibiotics. In this case report, we present a patient with delayed diagnosis and treatment due to the COVID-19 outbreak.

Case Report: An 88-year-old, pacemaker dependent woman with diagnosed pacemaker pocket infection was admitted to the University Cardiovascular institute. The patient had a prolonged follow-up time due to the COVID-19 outbreak. She missed her routine checkup and came to her local hospital when the generator had already protruded completely, to the point where she held it in her own hand. Transthoracic echocardiogram showed possible vegetations on the lead. Transesophageal echocardiography was not performed due to the COVID-19 pandemic. On the day after the admission the patient underwent transvenous removal of the pacemaker lead using a 9 French gauge rotational extraction sheathe (Cook Medical). The extracted lead was covered in a thin layer of vegetations. Further follow-ups showed good recovery with no complications.

Conclusions: A case showing delayed treatment of pacemaker pocket infection, due to delayed follow-up time during the COVID-19 pandemic. This patient underwent successful transvenous removal of the infected pacemaker lead, along with adequate antibiotic therapy, which has proven to be the most effective method of treating cardiac device-related endocarditis.

Key words: device-related endocarditis; COVID 19; pocket infection; pacemaker; transvenous removal.

J Infect Dev Ctries 2021; 15(9):1277-1280. doi:10.3855/jidc.15225

(Received 24 April 2021 – Accepted 19 May 2021)

Introduction

The number of cardiac implantable electronic devices (CIED) world wide has increased [1]. As a result, the number of complications, including CIED-related infection rates has also increased. The estimated infection rate after permanent endocardial lead implantation is between 1% and 2% [2,3]. If the treatment of pacemaker lead infection is delayed, complications such as destruction of the tricuspid valve, septic pulmonary embolism, and consequential abscess-forming pneumonia can occur [4].

We report a case of late-onset pacemaker lead endocarditis, caused by a pocket infection due to a delayed follow up which was in turn caused by COVID-19 pandemic, successfully treated with transvenous lead removal and intravenous antibiotics.

Case Report

An 88 year old woman was transferred to "Dedinje" Cardiovascular Institute, Belgrade, Serbia in May 2020, from her regional medical center, where she presented with a completely protruded pacemaker generator. Her medical history revealed that she was diagnosed with a complete Atrioventricular (AV) block in 2006 which was followed by permanent Single-Chamber (VVIR) pacemaker implantation in the right infraclavicular region. She was hospitalized in September 2019 for pocket evaluation, due to a pocket edema without clear signs of local infection. She had a significant loss of weight, which caused the pacemaker generator to exert pressure on the skin, this being the most likely cause of skin dehiscence and consequential infection. No extraction was indicated at this moment and regular check-ups were advised. Due to the COVID-19 outbreak, she missed her regular check-up until the aforementioned emergency hospital admission.

Patient's symptomes persisted for 3 months; she had low-grade fever of 37.6 °C and bilateral pretibial edema, along with chills and a general feeling of weakness.

Upon admission, the patient was confused with a body temperature of 37.6 °C. Physical examination

revealed dehiscence and skin loss of the generator pocket in the right infraclavicular region (Figure 1).

Her blood panel showed leukocitosis (White Blood Cell count of 10,9×10⁹/L), along with C-reactive protein (CRP) elevation (152,6 mg/L). Red blood cell sedimentation rate (SE) was increased (100 mm/h). Pocket site swabs were collected and later revealed methicillin-resistant Staphylococcus aureus. On the same day, three sets of blood cultures were taken, during an episode of fever (37,6 °C). Three days after, results from all blood cultures came in negative.

Transthoracic echocardiogram (TTE) showed possible vegetations on the lead (Figures 2 and 3). Transesophageal echocardiography (TEE) was not performed due to the COVID-19 pandemic (high risk of possible transmission due to respiratory droplets during the procedure), and it was also not necessary for the further treatment plan.

On the day after the admission the patient underwent transvenous removal of the pacemaker lead. The extraction was conducted through the subclavian vein using a rotational extraction sheathe (Cook Medical) (Figure 4). The electrode, along with the vegetation and the pacemaker generator were successfully extracted, with no signs of septic embolisation. (Figure 5). The material from the lead was not sent to further analyses, the generator pocket swabs taken on the day of the admission were intended to be used to guide the antibiotic therapy according to the antibiogram, should it have shown resistance of the Bacterium to the already prescribed broad spectrum antibiotics. Prior to the extraction of the infected pacemaker, a temporary pacemaker had been implanted into the right ventricle via the right femoral vein due to the patient being pacemaker dependant (complete AV block).

The patient was treated with Meropenem and Teicoplanin (dose adjusted according to creatinine

Figure 1. VVIR generator outside the pocket.

Figure 2. TTE shows (the four-chamber view). possible vegetations on the pacemaker lead.

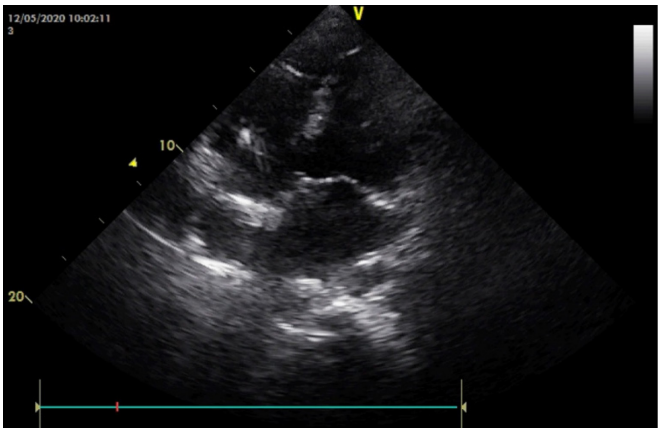


Figure 3. The subxiphoid view – sleeve like vegetation attached to the pacemaker lead.

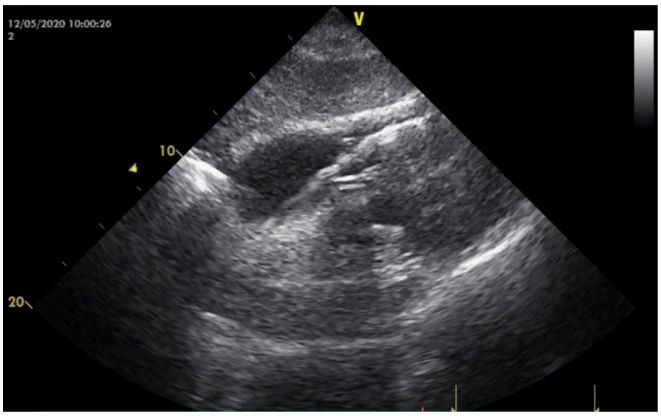
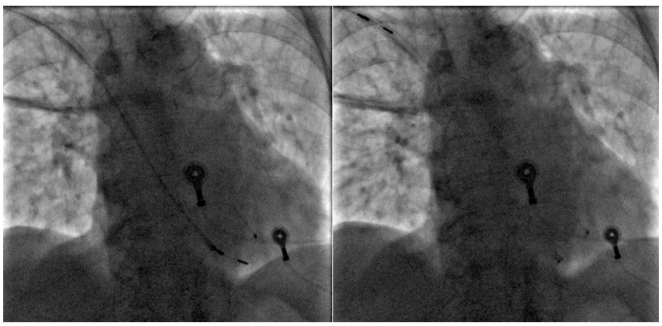


Figure 4. Transvenous lead extraction via subclavian approach. Note the presence of a temporary pacemaker electrode due to the underlying rhythm being complete AV block.



clearence, initial serum creatinine was 220 μmol/L, the reason being chronic kidney failure).

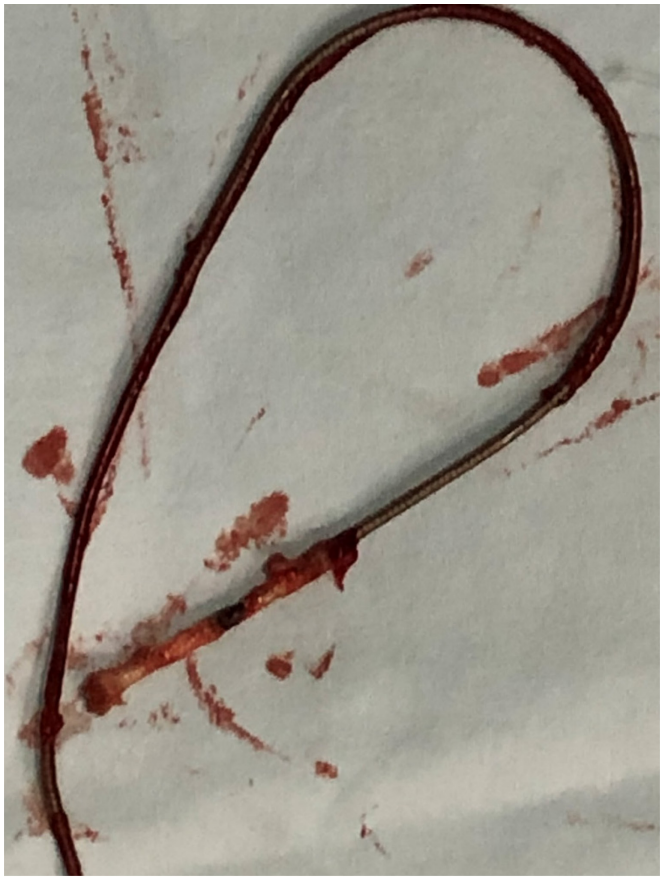
After 7 days and and the decline of all inflammatory parameters to normal range, the new Dual Chamber (DDD/R)pacemaker had been implanted in the left infraclavicular region.The patient was transferred to a regional hospital for further follow up and continuation of parenteral antibiotic therapy according to the protocol for treatment of Infective Endocarditis (for a total duration of parenteral antibiotic therapy of three weeks). On her further follow-ups, our patient showed no signs of pocket infection, on either side, telemetry exams of the new DDD/R pacemaker were in order.

Discussion

Pacemaker related infections are rare and life-threatening. Antimicrobial therapy alone is often unsuccessful and associated with a high mortality, especially in cases of staphylococcal bacteremia, therefore, complete removal of the device is required [5,6].

A variety of percutaneous lead-removal techniques are available, and only a small minority of patients require open heart surgery for a complete device removal [7].

Figure 5. Pacemaker electrode after successful transvenous removal. Note the thin vegetation on the electrode.



The diagnosis of pacemaker lead infection is established by clear signs of pacemaker pocket infection, nature of symptoms, echocardiography and radiological imaging. Results of blood cultures were negative, but blood culture negative endocarditis is found in about 15% of cases of cardiac device-related endocarditis (CDE) [8].

Polewczyk *et al*. revealed that presence of large vegetations was less frequent in patients with local pocket infections. This phenomenon suggests two separate mechanisms of lead-related infective endocarditis: one of them caused by extension of the infective process from the pocket along the lead to the endocardium, often treated before the formation of vegetations and the second form "*in situ*" associated with intracardiac lead abrasion, more often with the development of vegetations. Our case is consistent with this data [9].

TTE method for detection of vegetations attached to pacemaker leads is often inadequate [10,11]. Victor et al. found that TTE was useful in diagnosing CIED lead infection in only 30% of patients, but on other hand TEE was able to diagnose 96% CDE [7]. Therefore, TEE should be done in patients with an implanted pacemaker and prolonged fever of unknown origin, and should be always performed if CDE is suspected. In this case TEE was not performed due to the COVID-19 pandemic (high risk of possible transmission due to respiratory droplets during the procedure). Also, because TTE revealed suspicious vegetations on the lead, TEE was not necessary for further treatment plan.

Optimal treatment is still a matter of debate, especially in pacemaker-dependant patients. Removal of the leads can be performed by percutaneous extraction or by open heart surgery and there has been no study comparing transvenous and surgical removal of leads.

Studies show that the presence of large vegetations (> 10 mm) is a relative contraindication to a transvenous removal due to the percieved risk of embolic events [12]. Surgical removal of the device has been suggested in these circumstances to avoid complications such as pulmonary embolism [7,13]. Ruttmann et al. on the other hand, reported that the transvenous extraction of endocardial leads with large vegetations (> 10 mm) is feasible. They described that, although pulmonary embolism does occur, it does not influence the survival rate, quality of life or length of hospital stay [4].

Although more than one year passed from CIED implantation and the patient is pacemaker-dependent (both are relative contraindications for transvenous removal), in this case it was shown that the transvenous removal was possible, especially as it has been done by an experienced physician.

Complete removal of the device, including all the leads, as well as generator, along with intravenous antibiotic treatment has proven to be the most effective modality of treating CDE.

In the case of this patient, the main problem was a prolonged follow-up time due to the COVID-19 outbreak. The patient missed her routine chek-up, lives alone, is an old woman, and came to her local hospital when the generator had already protruded, the main reason being the COVID-19 outbreak. During that time, the infection had already taken place and advanced to the point of CDE, which could have altogether been avoided with regular follow-ups.

References

1. Greenspon AJ, Patel JD, Lau E, Ochoa JA, Frisch DR, Ho RT, Pavri BB, Kurtz SM (2012) Trends in permanent pacemaker implantation in the United States from 1993 to 2009: increasing complexity of patients and procedures. J Am Coll Cardiol 60: 1540–1545.
2. Klug D, Balde M, Pavin D, Hidden-Lucet F, Clementy J, Sadoul N, Rey JL, Lande G, Lazarus A, Victor J, Barnay C, Grandbastien B, Kacet S (2007) Risk factors related to infections of implanted pacemakers and cardioverter-defibrillators: results of a large prospective study. Circulation 16: 1349-1355.
3. Tischer T, Hollstein A, Voss W, Wendig I, Lauschke J, Schneider R, von Knorre G, Bansch D (2014) A historical perspective of pacemaker infections: 40-years single-centre experience. Europace 16: 235–240.
4. Ruttmann E, Hangler HB, Kilo J, Höfer D, Müller LC, Hintringer F, Müller S, Laufer G, Antretter H (2006) Transvenous pacemaker lead removal is safe and effective even in large vegetations: an analysis of 53 cases of pacemaker lead endocarditis. Pacing Clin Electrophysiol: 29: 231-236.
5. Camus C, Leport C, Raffi F, Michelet C, Cartier F, Vilde JL (1993) Sustained bacteremia in 26 patients with a permanent endocardial pacemaker: assessment of wire removal. Clin Infect Dis 17: 46-55.
6. Viola G, Awan L, Ostrosky-Zeichner L, Chan W, Darouiche R (2012) Infections of cardiac implantable electronic devices: a retrospective multicenter observational study. Medicine (Baltimore) 91: 123-130.
7. Meier-Ewert HK, Gray ME, John RM (2003) Endocardial pacemaker or defibrillator leads with infected vegetations: a single-center experience and consequences of transvenous extraction. Am Heart J 146: 339-344.
8. Victor F, De Place C, Camus C, Le Breton H, Leclercq C, Pavin D, Mabo P, Daubert C (1999) Pacemaker lead infection: echocardiographic features, management, and outcome. Heart 81: 82-87.
9. Polewczyk A, Jachec W, Tomaszewski A, Brzozowski W, Czajkowski M, Polewczyk AM, Janion M, Kutarski A (2017) Lead-related infective endocarditis: factors influencing the formation of large vegetations. Europace 19: 1022–1030.
10. Edelstein S, Yahalom M (2019) Cardiac device-related endocarditis: Epidemiology, pathogenesis, diagnosis and treatment-review. Int J Angiol 18: 167-172.
11. Vaccarino GN, Nacinovich F, Piccinini F, Mazzetti H, Segura E, Navia D (2009) Pacemaker endocarditis: approach for lead extraction in endocarditis with large vegetations. Rev Bras Cir Cardiovasc 24: 570-573.
12. Klug D, Lacroix D, Savoye C, Goullard L, Grandmougin D, Hennequin JL, Kacet S, Lekieffre J (1997) Systemic infection related to endocarditis on pacemaker leads: clinical presentation and management. Circulation 95: 2098-2107.
13. Boljevic D, Barac A, Vukovic P, Kojic D, Bojic M, Micic J, Rubino S, Paglietti B, Nikolic A (2019) A rare case of pacemaker lead endocarditis successfully treated with open heart surgery. J Infect Dev Ctries 13: 1068-1071. doi: 10.3855/jidc.11941.

Corresponding author

Mihailo Jovicic MD
Department of Electrophysiology and Electrostimulation,
Cardiology Clinic; Institute for Cardiovascular Diseases – Dedinje,
Heroja Milana Tepića 1, 11040 Belgrade, Serbia
Phone: +381 645114172
Fax: (+381 11) 3601 714
Email: mikij94@gmail.com

Conflict of interests: No conflict of interests is declared.