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FACTORS INFLUENCING THE DECISION TO ABANDON OR REMOVE A PACEMAKER LEAD

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Contribution

GEPB and XR concieved the idea and designed the case report. COU, HGG, GG and LA collected the pictures. DAIM, MMT and JZ helped in report writing, while final review was made by RP. All authors contributed equally to the submitted case report.

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ABSTRACT

We presented a case of a 68-year-old female patient with a device implanted six years ago due to symptomatic sinus pauses. A new device was implanted five years ago due to first pacemaker failure. She was admitted for persistent fever associated with infective endocarditis as a result of pacemaker lead. During the evaluation, two pacemakers pockets with their respective generators were detected. According to the patient, the device had not been removed due to the high risk of the procedure. When making the decision to abandon a pacemaker or implantable cardioverter defibrillator leads, potential future complications should be considered.

Key Words: Leads; Pacemaker; Abandoned; Extraction; Infective endocarditis.

INTRODUCTION

With the wide use of pacing therapy and the increasing longevity of the pacing population, the number of abandoned non-functional leads has increased.[1]We presented a case of a 68-year-old female patient with a pacemaker implanted six years ago due to symptomatic sinus pauses. A new device was implanted five years ago due to lead failure. She was admitted for persistent fever associated with infective endocarditis (IE) as a result of pacemaker lead. During the evaluation, two pacemakers pockets with their respective generators were detected. When making the decision to abandon a lead, potential future complications should be considered.

CASE REPORT

We presented a case of a 68-year-old female patient with a pathological history of arterial hypertension and heart failure associated with Chagas cardiomyopathy (hospitalization two weeks in advance due to heart failure). The patient had a dual pacemaker, which was implanted six years ago due to symptomatic sinus pauses. A new device was implanted five years ago due to lead failure. According to the patient, the device was not removed due to the high risk of the procedure.

She came to the clinic with persistent fever (up to 39°C). Upon admission, she was conscious and without any focal neurological deficits. Her temperature was 38°C, pulse 90 beats/minute, blood pressure 155/95 mmHg, respiratory rate 18 breaths per minute, and oxygen saturation 95% at room temperature. During the evaluation, two pacemakers pockets with their respective generators were detected. Examination of the respiratory system, abdomen, neurological and musculoskeletal system revealed no abnormalities. A complete laboratory test showed a high white blood cell count of 18x103 /mm ^{3} (4-10) with predominant neutrophilia and elevated C-reactive protein of 12 mg/dL (normal <1 mg/dL.

The patient had neither HIV nor any other immunocompromised conditions.

The chest X-ray showed the two devices with their respective cables and signs of heart failure (Figure 1). Hemocultures were positive for Methicillin-resistant Staphylococcus aureus(a germ probably related to recent hospitalization due to heart failure). A transthoracicechocardiogram showed multiple images compatible with vegetations on the right atria, left chambers dilation, and mild mitral regurgitation, with a left ventricular ejection fraction of 40% and diffuse hypokinesis. Upon suspicion of IE, a transesophageal echocardiogram (TEE) was requested. The TEE showed multiple, mobile and irregular images compatible with vegetations on the right atria and others attached to the pacemaker lead, the largest one being 15 x 10 mm.(Figure 2). Our patient had two major (Vegetation and blood cultures) and two minor (fever) Duke criteria. After confirmed diagnosis of catheter-associated IE, the recommended vancomycin (1 g IV every 12 h) plus rifampicin (600 mg PO every 12 h) therapy was administered. Complete removal of the two percutaneous devices was performed (the electrocardiogram revealed sinus bradycardia with a heart rate of 38-45/minute. No temporary pacemaker was required at hybrid laboratory with surgical capability and superior fluoroscopy, and the staff was trained on both lead removal and heart surgery. In the laboratory and under general anesthesia, the leads were dissected free from any subcutaneous adhesions. We used manual traction with conventional and locking stylets, and dilation with polypropylene sheaths (Cook Vascular Inc., Leechburg, PA, USA).Reimplantation was performed in the absence of systemic involvement, when blood cultures drawn 24 h after system removal remained negative for at least 72 h.The patient had no complications associated with IE or treatment thereof. She was discharged on follow-up by the cardiology and infectology departments, and completed the course of antibiotics for 6 weeks.

Figure 1: A frontal chest X-ray in a patient with pulmonary edema shows cardiomegaly, and bilateral pleural effusions. X-ray showing the two definitive pacemakers with their respectivecatheters. A) Two-chamber pacemaker implanted in 2012 and B) Two-chamber pacemaker implanted in 2013.

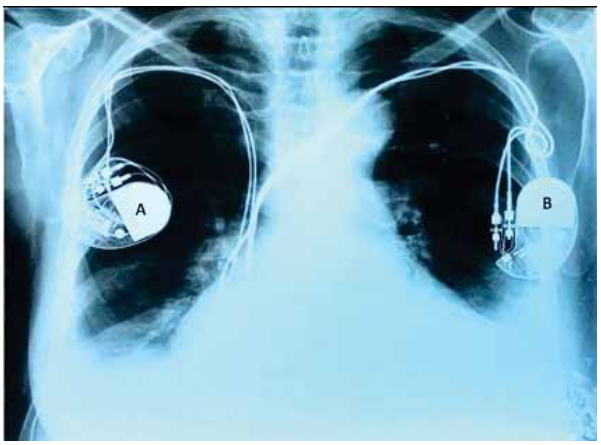
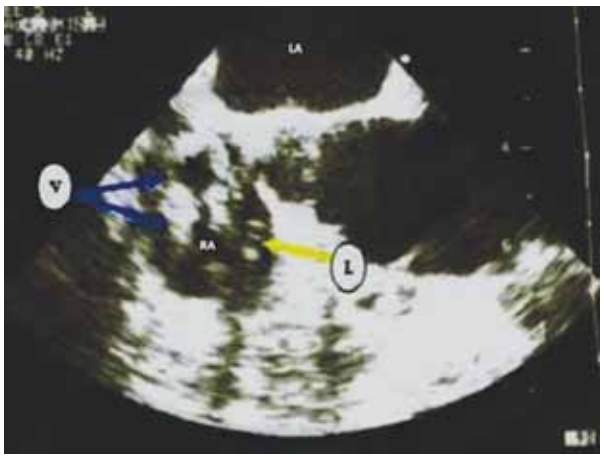


Figure 2: Transesophageal echocardiography two-dimensional mid esophageal modified view showing multiple, mobile and irregular images compatible with vegetations on the right atria, the largest being 15 x 10 mm. V : vegetation; L: leads. RV: right ventricle; RA: right atrium.



DISCUSSION

IE associated with a permanent and implantable electronic device is an uncommon complication, but with a high mortality rate if inadequately treated. All infections represent an indication to remove the device and all implanted leads, and to administer any appropriate antibiotic therapy. [2,3] Some authors recommend implantation of a new device after 72 hours to 14 days depending on the clinical condition.[2-4]

Some major questions from this case are: Was percutaneous removal of pacemaker leads feasible? Do abandoned pacemaker leads pose any risks for the patient?

Major events during percutaneous removal included exsanguination from vascular laceration, tricuspid valve avulsion, and cardiac perforation with tamponade. A risk stratification scheme was developed, which identified clinical variables associated with the risk of major events during lead extraction. Patients with the oldest implanted pacing lead of 1 to 10 years or the oldest intracardiac converter-defibrillator (ICD) lead of 1 to 5 years as intermediate risk and those with an oldest pacing lead >10 years or ICD lead >5 years as high risk for lead extraction.[5]Ours was an intermediate-risk case (only one criterion was met: pacemaker lead aged 1–10 years). Intermediate-risk procedures can be performed safely using a percutaneous strategy with surgical support.

In addition, one of the most serious complications in patients with pacemaker leads is IE. Cardiac implantable electronic devices (CIED)-associated IE is an infection of the intracavitary segment of the lead, which may extend to adjacent structures. The lead-related IE was associated with some predisposing factors. The risk factors for IE can be divided into patient-dependent and procedure-related factors. Some of the patient-dependent risk factors are diabetes, heart failure, chronic renal failure, oral anticoagulant use, steroid use, hematoma formation.[6] The problem of procedure-related risk factors potentially leading to IE is slightly different. The number and types of implanted leads and the newly discovered phenomenon of intracardiac abrasion of the leads are the most commonly cited predisposing factors.[7]

The occurrence of large vegetations is related to an increased risk of endothelial injury followed by an increased risk of thrombosis. This may occur in the presence of several leads.[8] In our case, the patient had four leads (a higher risk of IE with a high risk of vegetation and embolism).

The transvenous approach is the gold standard for lead removal in patients with or without infections. Some studies show that procedure-related factors, such as lead implant duration, the number and type of leads (especially atrial and unipolar leads), and the number of preceding procedures involving the device (upgrading, implantation of additional leads), are the most important causes of potential complications during lead removal.9

CONCLUSION

In conclusion, a greater number of leads result in a higher risk of complex infection (IE with a high risk of vegetation and embolism) and complications during percutaneous removal. The patient should be carefully considered when deciding whether to abandon or to remove a lead before starting another procedure in order to avoid the above-mentioned problems.

REFERENCES

1. Kusumoto F, Schoenfeld M, Wilkoff B, Berul C, Birgersdotter-Green U, Carrillo R,et al. 2017 HRS expert consensus statement on cardiovascular implantable electronic device lead management and extraction. Heart Rhythm 2017;14(12):e503-e51.
2. Baddour L, Epstein A, Erickson C, Knight B, Levison M, Lockhart P, et al. Update on cardiovascular implantable electronic device infections and their management: a scientific statement from the American Heart Association. Circulation 2010;121:458-77.
3. Podoleanu C, Deharo J. Management of cardiac implantable electronic device infection. ArrhythmElectrophysiol Rev 2014;3(3):184-9.
4. Imai K.Lead extraction ina non-infectious situation it's becoming a major cause gradually.JCardiol 2018;72(4):314-5.
5. Kancharla K, Acker N, Li Z, Samineni S, Cai C, Espinosa R. Efficacy and Safety of Transvenous Lead Extraction in the Device Laboratory and Operating Room Guided by a Novel Risk Stratification Scheme. JACC ClinElectrophysiol 2019;5(2):174-82.
6. Klug D, Balde M, Pavin D, Hidden-Lucet F, Clementy J, Sadoul N, et al. Risk factors related to infections of implanted pacemakers andcardioverter-defibrillators: results of a large prospective study. Circulation 2007;16(12):1349-55.
7. Polewczyk A, Jacheć W, Janion M, Podlaski R, Kutarski A. Lead dependent infective endocarditis: the role of factors predisposing to its development in an analysis of 414 clinical cases. Pacing ClinElectrophysiol 2015;38(7):846-56.
8. Polewczyk A, Jachec W, Tomaszewski A, Brzozowski W, Czajkowski M,Polewczyk A, et al. Lead-related infective endocarditis: factors influencing the formation of large vegetations. Europace 2017;19(6):1022-30.
9. Jacheć W, Polewczyk A, Polewczyk M, Tomasik A, Janion M, Kutarski A. Risk factorspredictingcomplicationsof transvenousleadextraction.BioMed Res Int 2018;18:1-14.