Staphylococcus Capitis Endocarditis: Living with S.Capitis

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ABSTRACT. We report the case of a 76-year-old white male who underwent Dual Chamber transvenous pacemaker placement in 1999 due to sick sinus disease. He had a history of Chagas disease and chronic renal failure. He underwent a generator replacement in 2008. He presented with a febrile syndrome with probable respiratory focus. He had been prescribed antibiotics, but this treatment was not successful; he was therefore referred to our institution. The patient continued to have mild fever for several days after hospitalization. The blood cultures drawn on admission grew Staphylococcus capitis. A transesophageal echocardiogram was obtained due to suspicions of vegetation on the pacemaker leads. The patient commenced cefalotin, and lead extraction was indicated. During removal of the catheter, the ventricular lead was broken; it was therefore abandoned in the right ventricle. Owing to the high risk of conventional surgery, the lead was abandoned and suppressive antibiotic therapy with cefalexin was indicated. An epicardial catheter was then implanted. The patient was discharged under suppressive antibiotic therapy with cefalexin, and during 2-year follow-up he remained without symptoms or fever.

KEYWORDS. Chagas disease, infective endocarditis, permanent pacemaker, Staphylococcus capitis.

Introduction

The use of pacemakers and defibrillators has been increasing over time in Argentina.1 This increase in the number of devices has led to an increase in device-associated endocarditis. The estimated incidence of infection is between 0.13% and 19.9% for pacemakers. Endocarditis associated with devices constitutes 10% of all device infections.2 Endocarditis is associated with higher mortality, morbidity, and an increase in hospital costs.3

Staphylococcus capitis endocarditis in patients with pacemakers is rare, with very few cases reported in the literature. We observed a patient with S. capitis endocarditis secondary to an implanted pacemaker in whom the catheter could not be removed.

Case report

A 76-year-old white male underwent DDD transvenous pacemaker placement in 1999 due to sick sinus disease. He had a history of Chagas disease and chronic renal failure. He underwent a generator replacement in 2008. He presented with a febrile syndrome with probable respiratory focus; the CT scan showed pulmonary nodules, and the biopsy was negative for neoplastic cells and positive for inflammatory cells (Figure 1). He had...
been unsuccessfully treated with antibiotics, so he was referred to our institution in May 2009.

The patient continued to have a mild fever for a few days after hospitalization. The blood cultures drawn on admission to the hospital grew *S. capitis*. A transesophageal echocardiogram was performed to check for suspected vegetation on the pacemaker leads. The patient commenced cefalotin and lead extraction was indicated.

The echocardiogram showed (Figure 2) a mild increase in left ventricle (LV) size, mild decrease in LV systolic function, severe increase in right ventricular (RV) size, moderate to severe decrease in RV systolic function, severe tricuspid valve regurgitation, and Pulmonary artery systolic pressure of 60 mmHg. The pacemaker lead presented in the right ventricle with a mobile mass of 12 × 7 mm.

During the removal of the catheter, the ventricular lead was broken and it was abandoned in the right ventricle. The infection was microbiologically confirmed by positive cultures from the generator pocket and leads. During hospitalization he suffered acute tubular necrosis due to the antibiotics, so daptomycin was indicated. Owing to the high risk of conventional surgery, the lead was abandoned and suppression antibiotic therapy with cefalexin was indicated. An epicardical catheter was then implanted.

The initial computed topography (CT) images were interpreted as multiple septic emboli, and after appropriate antibiotic treatment the images of the emboli disappeared. RV dysfunction was interpreted as RV overload. The patient was discharged under suppressive antibiotic therapy with cefalexin, and during 2-year follow-up he remained without symptoms or fever.

**Discussion**

Several studies have identified some characteristics associated with cardiovascular implantable electronic device (CIED) infection. In a single-center case-control study, subjects were more likely to have diabetes mellitus and heart failure, and to have undergone generator replacement; renal dysfunction had the strongest association with device infection. This patient had renal dysfunction—one of the most important risk factors of device infection—and a recent generator replacement.

The diagnosis of endocarditis was made using the modified Duke criteria, which includes two positive blood cultures drawn on admission to the hospital and a transesophageal echocardiogram suspicious for vegetation. Infection for the same microbiological agent was microbiologically confirmed by positive cultures from the generator pocket and leads.

Pulmonary nodules are rare complications of CIED infections; in some series, the rate of septic pulmonary emboli at admission was 11%. In most cases the diagnosis was made by CT, just like the present patient. Most cases resolved with antibiotic treatment.

There is abundant evidence that the optimal therapy for CIED combines complete device extraction with a prolonged course of parenteral antibiotics. Reported mortality rates for CIED range from 31% to 66% in cases managed with antibiotics alone; in contrast to 13–21% among patients who undergo complete device removal followed by prolonged treatment with systemic antibiotics.

Percutaneous techniques are currently the method of choice for transvenous lead extraction; catheter fracture
is a rare complication of the percutaneous technique, and is seen in 5% of procedures.\textsuperscript{7}

The risk of incomplete or failed extraction increases with: implant duration, less experienced physicians, ventricular leads implantation, and young patients.\textsuperscript{8}

The patient had undergone a ventricular lead implant 10 years previously, so had two of the risk factors for extraction failure.

The decision to avoid surgical treatment with cardiopulmonary bypass was based on the euroSCORE.\textsuperscript{9} The calculated euroSCORE mortality for this patient was 37%; therefore, suppression antibiotic therapy was indicated.

The decision to abandon the RV lead was taken because the fracture was proximal, and, to the best of our knowledge, the only way to take out the lead was by conventional surgery with sternotomy. We considered that the risk of conventional surgery was too high and decided to leave the catheter.

With the development of transvenous pacemakers, the incidence of infective endocarditis due to coagulase-negative staphylococci has become more common. \textit{S. capitis} is present in the normal flora of the skin of the scalp, face, ears, and neck.\textsuperscript{10} \textit{S. capitis} accounts for 5% of pathogenic isolates of coagulase-negative staphylococci and has been shown to cause pneumonia, urinary tract infection, catheter-related bacteremia, and cellulitis. Only two cases of pacemaker-related endocarditis caused by \textit{S. capitis} have been previously described, but the present case is the only one that received suppression antibiotic therapy.\textsuperscript{10,11} A variety of antibiotic regimens has been used successfully in the management of \textit{S. capitis} endocarditis. It is generally assumed that \textit{S. capitis} responds to nafcillin, cephalosporins, and vancomycin with or without rifampin.

Cefalotin was the first-choice treatment, but as the patient suffered acute tubular necrosis the antibiotic was changed to daptomycin.

\textbf{Figure 2:} Echocardiographic subxiphoid view with the abandoned lead in the right ventricle.
Daptomycin is a cyclic lipopeptide effective in the treatment of Gram-positive infections, including those caused by multiresistant pathogens. This drug has rapid bactericidal action and low nephrotoxicity. Patients with severe renal failure show a decrease in renal clearance and an increase in the elimination half-life. The presence of renal failure at the start of daptomycin therapy is not associated with an increase in the rates of severe adverse effects. Daptomycin has a good safety and efficacy profile for the treatment of infections in patients with chronic renal insufficiency. Daptomycin was administered during the hospitalization and cefalexin was indicated at discharge.

The prognosis of *S. capitis* endocarditis seems to be good; the two patients with pacemaker endocarditis by *S. capitis* reported in the literature have survived. However, Baman et al. identified several clinical and echocardiographic variables that identify patients with cardiac device-related infection who were at high-risk of mortality. All-cause 6-month mortality was 18% and independent variables associated with death were systemic embolization, moderate or severe tricuspid regurgitation, abnormal RV function, and abnormal renal function. The present patient had all these clinical variables, but in the reported series there was no *S. capitis* endocarditis. To the best of our knowledge there are no data about *S. capitis* endocarditis and suppressive treatment, which is why follow-up of this patient is so important. Suppressive antibiotic treatment may be an option for patients with high risk of conventional surgery, especially in patients with incomplete or failed extraction.

**References**