



## An unexpected germ: atypical presentation of *Vagococcus fluvialis* pocket infection in a cardiac pacing device

### *Un germen inesperado: presentación atípica de infección de bolsillo de dispositivo de estimulación cardíaca por Vagococcus fluvialis*

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#### Keywords:

cardiac implantable electronic devices, complications, pocket infection, endocarditis, *Vagococcus fluvialis*.

#### Palabras clave:

dispositivos de estimulación eléctrica cardíaca implantables, complicaciones, infección de bolsillo, endocarditis, *Vagococcus fluvialis*.

#### ABSTRACT

Advances in cardiac implantable electronic devices (CIED) technology have enabled them to play a relevant role in heart disease. Although complications have decreased, CIED-related infection persists as one of the problems that has the greatest impact on the patient and the health system. Infections due to unusual germs generate additional morbidity and increased costs of care but can have a favorable course with early diagnosis and treatment. The case of a patient with clinical signs and symptoms of CIED pocket infection by *Vagococcus fluvialis*, without systemic infection or endocarditis, is presented for the first time in the literature. Timely treatment allowed a favorable evolution. New diagnostic and therapeutic challenges come from the hand of more complex patients.

#### RESUMEN

El avance en la tecnología de los dispositivos de estimulación eléctrica cardíaca (DEEC) ha permitido que ocupen un papel relevante en enfermedades cardíacas. Aunque las complicaciones han disminuido, la infección relacionada con DEEC persiste como uno de los problemas que mayor impacto tienen para el paciente y el sistema de salud. Las infecciones por gérmenes inusuales generan morbilidad adicional y costos aumentados en la atención, pero pueden cursar con una evolución favorable con un diagnóstico y tratamiento tempranos. Se presenta por primera vez en la literatura, el caso de un paciente con signos y síntomas clínicos de infección de bolsillo de DEEC por *Vagococcus fluvialis*, sin infección sistémica ni endocarditis. El tratamiento oportuno permitió una evolución favorable. Nuevos retos diagnóstico y terapéuticos vienen de la mano de pacientes más complejos.

#### INTRODUCTION

Advances in cardiac implantable electronic devices (CIED) technology have enabled them to play a relevant role in complex diseases such as heart failure or sudden arrhythmic death. Although complications have decreased, CIED-related infection persists as one of the problems that has the greatest impact on the patient and the health system.<sup>1</sup>

Antibiotic prophylaxis has consistently reduced infection rates<sup>2</sup> and is a settled

recommendation.<sup>3,4</sup> However, various series report current infection rates close to 1-2%. The causative agents are usually *Staphylococcus aureus* and *Staphylococcus epidermidis* (or another coagulase-negative). Other infectious microorganisms such as *Enterococcus*, *Streptococcus*, *Candida*, etc.<sup>4</sup> have also been reported. Atypical microorganisms, such as *Vagococcus fluvialis*, have a different clinical course, from slowly developing infections to rapidly progressive courses.<sup>5</sup>

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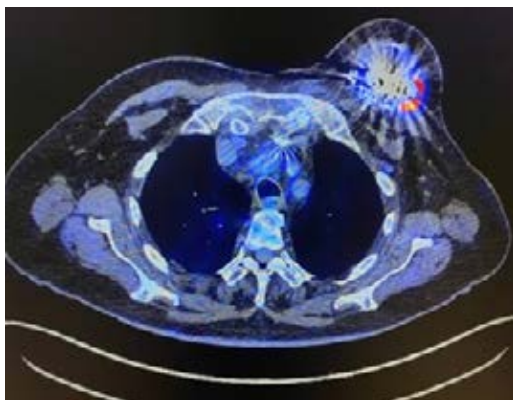
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## CASE PRESENTATION

An 84-year-old male patient with a history of type 2 diabetes mellitus, arterial hypertension, atrial fibrillation, and heart failure with reduced left ventricular ejection fraction (LVEF) (30%). Additionally, an atrioventricular block was documented, reason for which he has a cardioresynchronizer (CRTD) as a primary prevention strategy and treatment of heart failure.

After a trauma in the vicinity of the device implantation site, a larval picture of local inflammatory signs began that was intensifying and made him consult four months after the initial event. Significant edema, warmth, and redness in the device area are documented on initial evaluation. He had no fever or compromised general condition. The initial paraclinical tests included a normal blood count and CRP. A transesophageal echocardiography was performed, which showed a normal LVEF and ruled out endocarditis. Blood cultures were negative. A PET CT was performed that showed increased uptake, thickening of the walls of the generator pocket, a moderate amount of surrounding inflammatory fluid, and mediastinal lymphadenopathies (Figure 1).

Due to evidence suggestive of infection at the device implant site, he was taken to a CRTD explant with electrode extraction and temporary pacemaker implantation.



**Figure 1:** Positron emission tomography-computed tomography (PET-CT) scan: hyperenhancement in the pocket area, thickening of the generator pocket walls, moderate amount of inflammatory fluid around it, and mediastinal adenopathies.

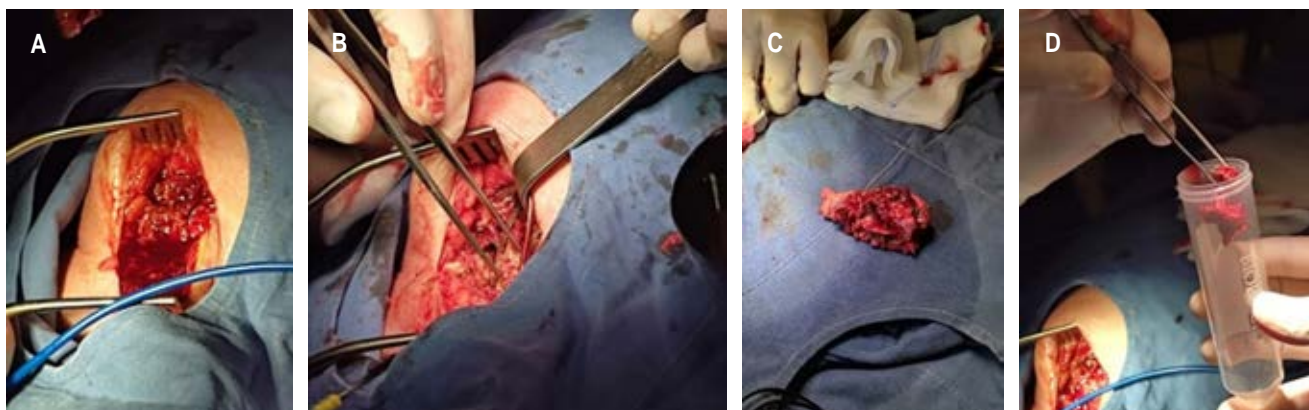
During the procedure, abundant fibrotic but very friable tissue was observed that compromised the capsule and the underlying tissue, which was mostly resected and without evidence of purulent material coming out. Subsequently, manual extraction of electrodes is performed. Resected tissue and electrode tips are sent for microbiological analysis and pathology (Figure 2).

Immediately after withdrawal, empirical antibiotic therapy recommended by infectology with cefazolin and daptomycin is initiated, which is received for three days. The subsequent evolution of the patient is favorable. The final report of the electrode and tissue culture shows growth of *Vagococcus fluvialis* (Figure 3), for which antibiotic therapy with ampicillin-sulbactam was adjusted, which he received for an additional 11 days. At the end of the antibiotic cycle, a single-chamber pacemaker was implanted on the contralateral side, with antibiotic prophylaxis with vancomycin.

## DISCUSSION

Improvements in CIED technology have allowed their use in increasingly complex diseases and patients. Likewise, the longevity of the population and the higher prevalence of heart rhythm diseases in older patients explain the notable increase in implantation rates in various countries.<sup>6</sup> Concomitantly, the risks related to the procedure may increase given the profile of patients operated on: CIED-related infection has significant impacts on morbidity, mortality, and costs for the health system,<sup>7</sup> therefore it is important to perform an active search once the suspicion is made. Antibiotic prophylaxis has proven to be an indispensable resource to reduce the risk of infection. Several studies have evaluated the use of combined therapies and compared them with cephalosporins as an initial alternative. However, they have not consistently shown additional benefits: incremental therapy with vancomycin reduced the risk of infection by 23% (although not statistically significantly).<sup>8</sup>

Despite prophylaxis, infection rates between 1-4% continue to be reported in various series. In a recent study reported by the authors, the device infection rate was less than 1% in



**Figure 2:** **A-B)** Fatty fibrotic tissue involving capsule and underlying tissue, absence of purulent material. **C)** Very friable tumor-like tissue, which is mostly resected. **D)** Sent for analysis, including electrode tip.

997 patients.<sup>9</sup> In addition, it is known that multiple factors can influence a higher risk of infection: diabetes, heart failure, previous anticoagulation, the presence of two or more electrodes, and the time of the procedure, among others.<sup>10</sup>

Related risk factors can be classified as patient-related, procedure-related, and device-related. Regarding the patient, chronic kidney disease, diabetes mellitus, chronic obstructive pulmonary disease, the use of corticosteroids, and a history of previous device infection are important. In those related to the procedure, postoperative hematoma and the use of anticoagulants are important. Moreover, in relation to the device, abdominal pockets, and epicardial leads, the use of a defibrillator (with or without resynchronization therapy) increases the risk.<sup>10,11</sup> The PADIT authors found significant risk factors for infection and created a score to predict that risk (prior procedures [P], age [A], depressed renal function [D], immunocompromised [I], and procedure type [T]). A score  $\geq 7$  poses a risk of hospitalization for infection  $\geq 3.4\%$ .<sup>12</sup>

The pathogens responsible for the infection are predominantly gram-positive (72.3%), with *Staphylococcus aureus* (31.6%) and coagulase-negative *Staphylococcus* (29.9%) being the most frequent.<sup>8</sup> Less frequent germs are *Corynebacterium* species, *Propionibacterium acnes*, Gram-negative bacilli, *Candida* spp, and non-tuberculous mycobacteria.

There are even unusual germs called atypical. A recent series found that they were responsible for 5.4% of device infections. Among the pathogens identified were *Pantoea* species, *Kocuria* species, *Cutibacterium acnes*, *Corynebacterium tuberculostearicum*, *Corynebacterium striatum*, *Stenotrophomonas maltophilia*, and *Pseudozyma ahidis*. They are recognized as pathogens when there are two positive blood cultures or tissue or electrode cultures with the growth of said microorganism.<sup>5</sup> Infection by such atypical germs usually evolves favorably and responds well to directed antibiotic treatment and removal of the device.

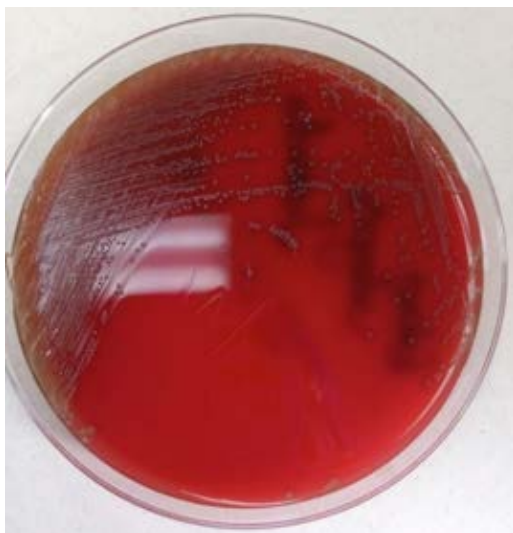
The case presented is, to our knowledge, the first reported case of CIED infection related to *Vagococcus fluvialis*. *Vagococcus* spp. is a gram-positive, catalase-negative, facultatively anaerobic coccus that comprises 14 species, of which only 2 cause infection in animals, including *Vagococcus fluvialis*. It is associated with infections in pigs, cattle, cats, and horses.<sup>13</sup> It was initially described by Hashimoto et al. in 1974, then in 1989, it was classified by Collins et al.,<sup>14</sup> but the first time it was reported in humans was in 1997 by Teixeira et al.,<sup>15</sup> when it was isolated from the peritoneal fluid of a dialysis patient who had been bitten by a lamb. Subsequently, it has been reported in bone infections,<sup>16</sup> dental infections,<sup>17</sup> and in some cases of endocarditis.<sup>18</sup> *Vagococcus fluvialis* infections usually occur in skin, soft,

and osteoarticular tissues and more frequently in diabetic patients. In humans, it is difficult to identify their role as a pathogen because they are usually part of polymicrobial cultures.<sup>13</sup>

The evolution of the patient was very favorable after the extraction. Latent presentation, with few systemic inflammatory symptoms and scant inflammatory response in paraclinical tests, should guide the search for unusual germs. The clinical history, always valuable, shows how a trauma near the device implant site could be related to the development of the infection. Although common pathogens should always be sought out, we can sometimes find unusual culprits.

### CONCLUSIONS

Infection of the pocket of cardiac electrical stimulation devices is a known problem that increases the morbidity and mortality of patients, therefore it is essential to perform an active search once the suspicion is made. The diagnostic process not only involves sophisticated paraclinical tests, but also a clinical history that evaluates risk factors and circumstances that favor certain types of germs. Early, targeted treatment based on an interdisciplinary group favors the best outcomes.



**Figure 3:** Colony formation of *Vagococcus fluvialis* on MacConkey agar.

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