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Campylobacter fetus pacemaker lead endocarditis complicated by mycotic aneurysm and *Clostridioides difficile* infection: a case report

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ABSTRACT:

— ***Background:*** *Campylobacter fetus* (*C. fetus*) is an uncommon human pathogen but is notably associated with invasive infections, including endocarditis and vascular involvement, particularly in elderly or immunocompromised patients with cardiovascular disease. Cardiac implantable electronic device infections are associated with substantial morbidity and mortality, and management may be complicated by treatment-related adverse events such as *Clostridioides difficile* infection (CDI).

— ***Case Report:*** We report the case of a 74-year-old man with multiple comorbidities and a permanent pacemaker who presented with fever and nonspecific neurological symptoms following a self-limited episode of gastroenteritis. Blood cultures yielded *C. fetus*, and transesophageal echocardiography confirmed pacemaker lead endocarditis. Despite targeted therapy, he developed a rapidly progressive probable mycotic abdominal aortic aneurysm requiring urgent endovascular repair. Complete pacemaker and lead extraction followed by epicardial system implantation was performed. Prolonged imipenem therapy was complicated by hospital-acquired CDI due to ribotype 027, successfully treated with oral vancomycin. The patient completed therapy and remained free of recurrent infection, with no clinically apparent aneurysm-related complications at two-year follow-up.

— ***Conclusions:*** This case highlights the potential of *C. fetus* to cause endovascular infections in high-risk patients and supports maintaining a low threshold for endocarditis and vascular involvement, alongside careful management of treatment-related complications.

— ***Keywords:*** *Campylobacter fetus*, Pacemaker lead endocarditis, Mycotic aneurysm, *Clostridioides difficile* infection.

INTRODUCTION

Cardiac implantable electronic device (CIED) infections are among the most serious complications of CIED procedures and are associated with substantial morbidity and mortality[1].

Campylobacter fetus (*C. fetus*) is a fastidious, Gram-negative, microaerophilic bacillus with a characteristic spiral or corkscrew-like morphology. It accounts for approximately 1% of *Campylobacter spp.* infections and is predominantly associated with invasive disease[2-4]. *C. fetus* exhibits tropism for vascular endothelium and has been implicated in mycotic aneurysms, thrombophlebitis and endocarditis, including prosthetic valve and CIED infections[2-8]. Unlike *C. jejuni* and *C. coli*, it rarely causes gastroenteritis. The

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virulence of *C. fetus* depends on bacterial inoculum and host factors, particularly immunosuppression and comorbidity burden[2-8].

We describe a rare case of *C. fetus* pacemaker lead endocarditis complicated by a rapidly progressive probable infrarenal mycotic abdominal aortic aneurysm (AAA) and subsequent *Clostridioides difficile* infection (CDI) during prolonged antibiotic therapy, highlighting the importance of a multidisciplinary approach to complex infections.

Case Presentation

A 74-year-old man with type 2 diabetes mellitus, arterial hypertension, dyslipidemia, stage 3a/b chronic kidney disease according to Kidney Disease: Improving Global Outcomes (KDIGO), cerebrovascular disease, ischemic heart disease and a permanent pacemaker implanted in 2016 due to complete atrioventricular block, presented with postural instability and gait disturbance. One week earlier, he had a self-limited episode of gastroenteritis. He denied recent travel, animal exposure, consumption of raw or unpasteurized foods or contact with sick individuals.

On examination, he was febrile (38.8°C), tachycardic and disoriented, with no focal neurologic deficits. Laboratory evaluation revealed leukocytosis (11,470/mm³) with neutrophilia and elevated C-reactive protein (from 36 to 79.42 mg/L). Head computed tomography (CT), lumbar puncture, chest radiography and urine culture were unremarkable. Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infection was detected by molecular testing of a nasopharyngeal swab. Given his clinical stability and mild SARS-CoV-2 infection, he was discharged with close follow-up.

Two blood-culture (BC) sets obtained at the initial visit yielded curved Gram-negative bacilli with a "seagull wing" morphology after 58.6 hours. The patient was contacted and subsequently admitted with persistent fever and new-onset low back pain. Two additional BC sets were obtained before antimicrobial therapy. Lumbosacral spine CT excluded spondylodiscitis, and transthoracic echocardiography (TTE) showed no vegetations.

Empirical therapy with ceftriaxone (2 g intravenously once daily) and azithromycin (500 mg intravenously once daily) was initiated, targeting possible *Haemophilus, Aggregatibacter, Cardiobacterium, Eikenella* and *Kingella* (HACEK) organisms or *Campylobacter spp. C. fetus* was identified in all four BC sets by matrix-assisted laser desorption/ionization–time-of-flight mass spectrometry. Disk diffusion testing, interpreted using European Committee on Antimicrobial Susceptibility Testing (EUCAST) criteria for *C. jejuni/C. coli* as surrogates, showed susceptibility to macrolides and tetracyclines and resistance to fluoroquinolones. The meropenem minimum inhibitory concentration by E-test was 0.047 mg/L, interpreted as susceptible using non-species-specific EUCAST pharmacokinetic/pharmacodynamic breakpoints. These results represent extrapolated interpretations rather than validated *C. fetus*-specific susceptibility data.

On hospital day 3, therapy was changed to imipenem 500 mg intravenously every 8 hours, with dosing based on renal function. Blood cultures became negative 24 hours after imipenem initiation, and all subsequent cultures remained sterile (Figure 1).

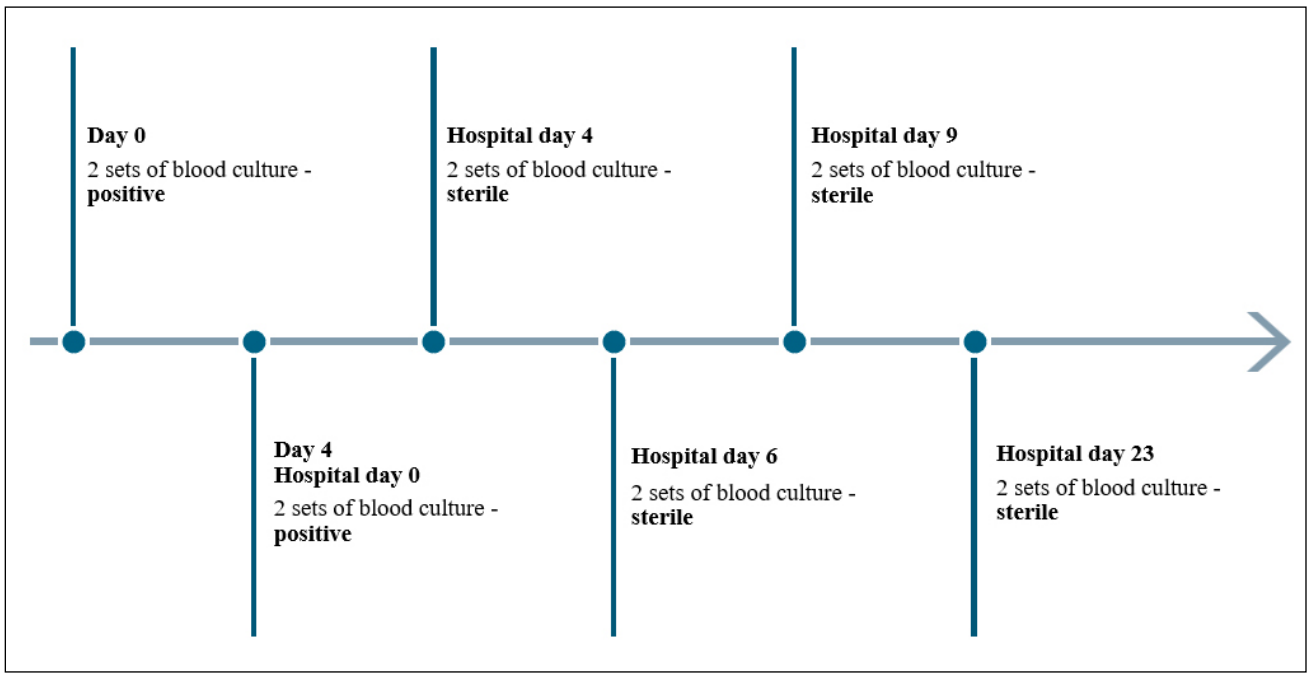

Figure 1. Chronology of blood cultures.

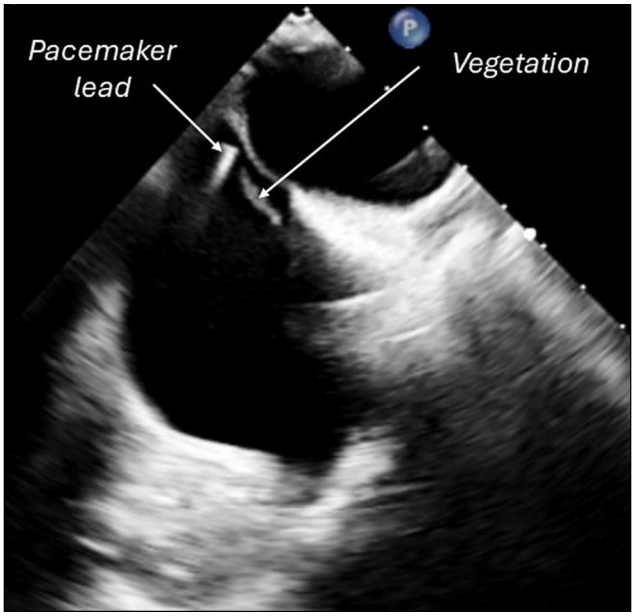

Figure 2. Transesophageal echocardiogram showing a vegetation attached to the permanent pacemaker lead within the right-sided cardiac chambers.

Figure 3. Sagittal contrast-enhanced abdominopelvic computed tomography showing infrarenal aortic aneurysm measuring 60 mm in maximal diameter with anterior sacculation and surrounding periaortic inflammatory changes.

On hospital day 5, transesophageal echocardiography (TEE) revealed a vegetation attached to the pacemaker lead within the right-sided cardiac chambers (Figure 2), confirming pacemaker lead endocarditis according to the modified Duke criteria. Gentamicin 3 mg/kg once daily was added for potential synergy but was discontinued after two weeks due to nephrotoxicity.

Persistent low back pain with abdominal radiation prompted contrast-enhanced abdominopelvic CT on hospital day 9, revealing an infrarenal AAA measuring 45 mm in maximal diameter. Repeat imaging on hospital day 11 showed rapid expansion to 60 mm, with periaortic inflammatory changes and features suggestive of impending rupture (Figure 3).

The patient underwent emergency endovascular aneurysm repair (EVAR) with placement of an aorto–bi-iliac stent-graft. Postoperative imaging on day 3 confirmed correct positioning without endoleak or periaortic collections.

After 33 days of imipenem therapy, complete CIED extraction was performed on hospital day 36, followed by implantation of a new epicardial system with an abdominal generator.

Four days later, the patient developed fever and diarrhea. Stool testing was positive for *Clostridioides difficile* ribotype 027 during a hospital outbreak. He received 10 days of oral vancomycin (125 mg every 6 hours), followed by secondary prophylaxis until one week after completion of systemic antibiotics. No CDI recurrence occurred.

As no extracted material was submitted for microbiological analysis, imipenem was continued for 42 days after device extraction. The patient was subsequently discharged to a rehabilitation unit. At two-year follow-up, he remained free of recurrent infection or clinically apparent aneurysm-related complications (Figure 4).

DISCUSSION

Campylobacter fetus is the species most often linked to systemic disease, with marked predilection for vascular structures, particularly in elderly, immunocompromised, or comorbid patients (cardiovascular conditions, diabetes mellitus, solid neoplasms, chronic renal failure and hepatic failure)[2-8], as in our patient. In two large French retrospective studies[3,4], *C. fetus* bacteremia was uncommon but frequently associated with vascular infection and endocarditis, predominantly in older men with significant comorbidities.

The risk of endocarditis among patients with *C. fetus* bacteremia appears clinically significant and may be comparable to that observed in *Staphylococcus aureus* bacteremia when echocardiography is systematically performed[4], supporting a low threshold for echocardiographic evaluation in high-risk patients, especially with CIEDs or valvular disease[3-5].

Antibiotic management is challenging because species-specific EUCAST breakpoints for *C. fetus* are unavailable[6,8-10]. Although macrolides may be active *in vitro*, they are suboptimal for invasive disease. Imipenem was selected instead of meropenem as a cost-effective carbapenem option, appropriate for severe infection based on prior reports, with limited published evidence of resistance[3-8]. Gentamicin was added for potential synergy[3-7], despite the lack of definitive susceptibility data for imipenem and gentamicin. The absence of species-specific breakpoints for *C. fetus* is a recognized limitation, and all susceptibility interpretations should be regarded as extrapolated from *C. jejuni*/*C. coli* criteria and/or non-species-specific guidance.

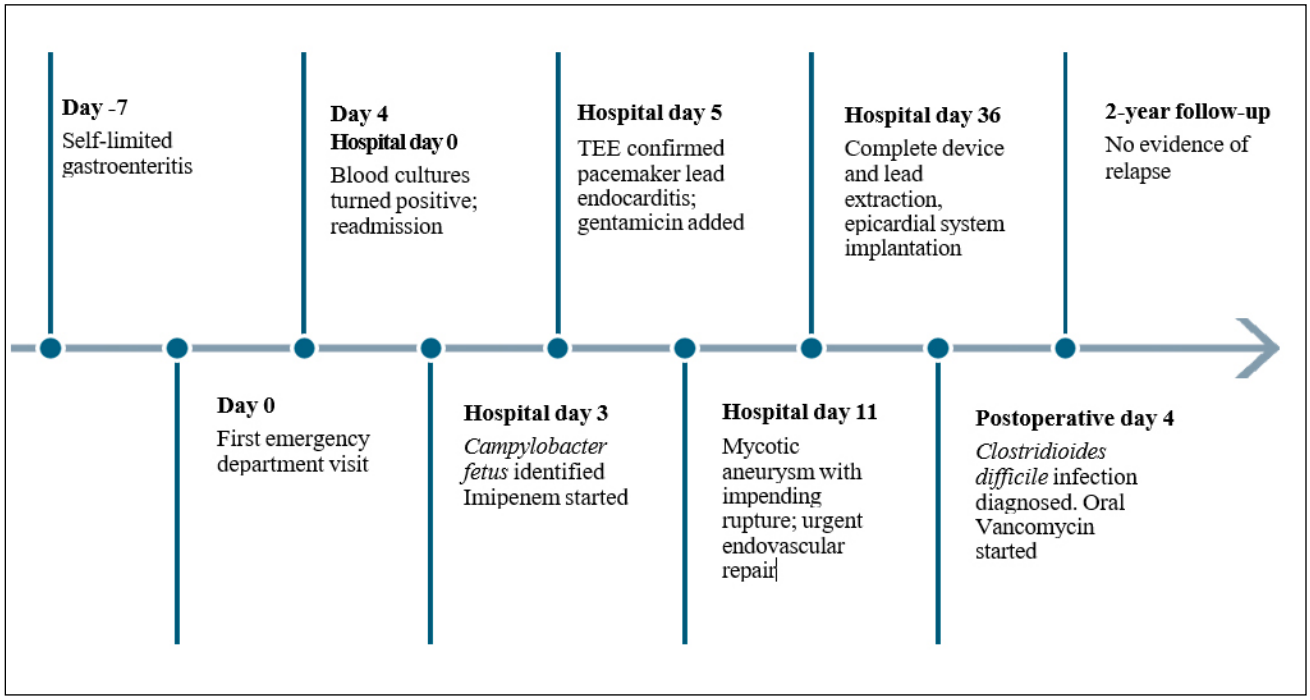

Figure 4. Clinical case timeline.

According to Delphi-based criteria[11], the aneurysm was considered a probable mycotic aneurysm based on the clinical and radiological findings, documented *C. fetus* bacteremia and pacemaker lead endocarditis. However, because no aneurysm tissue was submitted for microbiological analysis, direct microbiological confirmation was unavailable, precluding a definite classification.

Management of the probable mycotic aneurysm required balancing urgent treatment of a life-threatening lesion against the risks of placing prosthetic vascular material in the setting of recent infection. Although open surgery remains the traditional standard, EVAR is increasingly used in frail or highly comorbid patients[12-14], with favorable short-term outcomes and no clear long-term disadvantage in selected patients[12,13]. EVAR was chosen due to advanced age, comorbidity burden, aneurysm instability and institutional expertise.

Follow-up CT on postoperative day 3 confirmed correct stent-graft positioning, without endoleak or periaortic collection. No further surveillance imaging was performed after discharge because the patient missed appointments. Optimal antibiotic duration for mycotic aneurysm remains uncertain, ranging from 4-6 weeks to lifelong regimens[12-14], with most late infection-related complications occurring during the first postoperative year[12]. In our patient, BCs were negative from hospital day 4, and EVAR on day 11 represented the eighth day of culture negativity; imipenem was continued for 67 days (approximately 9.5 weeks) thereafter. Overall, imipenem was administered for a total of 75 days, including 42 days after complete device extraction. The absence of long-term suppressive therapy is a limitation given the prosthetic vascular material placed during recent infection.

At two-year follow-up, the patient remained asymptomatic, although the absence of post-discharge imaging precluded exclusion of silent graft- or aneurysm-related complications. Nonetheless, this favorable course suggests EVAR may be reasonable in similar high-risk patients.

Complete CIED extraction is recommended without delay in definite CIED-related endocarditis and is associated with better outcomes than conservative strategies[1]. In this case, extraction was deferred because of the need for emergency EVAR for a life-threatening probable mycotic aneurysm, renal optimization after aminoglycoside-associated nephrotoxicity, and transfer to a tertiary center with cardiac surgery expertise. Notably, epicardial systems may reduce reinfection risk compared to transvenous systems[1].

Prolonged imipenem therapy was complicated by hospital-acquired CDI due to ribotype 027, associated with increased severity and recurrence[15]. The infection was successfully treated with oral vancomycin. Secondary prophylaxis was individualized given advanced age, frailty, prolonged antibiotics and the hospital outbreak, although its role remains controversial[16-18] and should not be generalized.

Mortality in *C. fetus* endocarditis is difficult to estimate due to limited data, but has been reported at approximately 15% at three months[4]. Our patient had multiple high-risk features, making his long-term favorable outcome noteworthy.

CONCLUSIONS

This case highlights the potential of *C. fetus* to cause pacemaker lead endocarditis and vascular infection in patients with substantial comorbidity. Echocardiography should be considered in patients with *C. fetus* bacteremia, particularly with CIED or valvular disease. Vascular imaging should be guided by compatible symptoms, such as back or abdominal pain, persistent bacteremia, or other clinical features suggesting vascular involvement. Early source control and multidisciplinary management are essential. Prolonged antibiotic therapy may be complicated by CDI, emphasizing the need for clinical monitoring.

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Authors' Contributions:
Flávia Faria managed the patient, collected clinical data, and drafted the manuscript. Mariana Pereira Santos assisted in patient care and contributed to data collection and manuscript writing. Isabel Furtado assisted in patient care and provided specialized input and helped interpret findings. Andre Luz supervised the case management; Soraia Almeida contributed to the literature review and critical revision of the manuscript. All authors read and approved the final manuscript.

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Conflicts of Interest:
The authors have no conflict of interest to declare.

Ethics Approval:
Not applicable due to the design of the study.

Informed Consent:
Written informed consent was provided by the patient for the publication of this case report.

Data Availability:
The data used to support the findings in this study are included within the article.

AI Disclosure:
The authors used ChatGPT to enhance the grammatical quality of this manuscript. After using this tool, they carefully reviewed and edited the content as needed and took full responsibility for the final version.

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