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Case Report

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Very late-onset pacemaker pocket infection presenting as a giant granulomatous mass

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ABSTRACT

Pacemaker-related infections are most commonly observed during the early postoperative period; however, in rare instances, they may present many years after device implantation. We report an unusual case of a giant granulomatous pacemaker pocket infection occurring 10 years after the initial implantation. The patient presented with localized inflammatory signs without systemic manifestations. Following complete surgical removal of the device and the associated mass, histopathological examination confirmed xanthogranulomatous inflammation. *Staphylococcus epidermidis* was isolated from tissue cultures. Complete device extraction combined with prolonged antimicrobial therapy resulted in full clinical resolution, followed by successful contralateral reimplantation. This case highlights the importance of maintaining long-term vigilance in patients with cardiac implantable electronic devices.

Keywords: Pacemaker, pocket infection, xanthogranulomatous inflammation, cardiac implantable electronic device, late-onset infection

INTRODUCTION

Permanent pacemaker implantation is a cornerstone therapy in the management of advanced atrioventricular conduction disorders and symptomatic bradyarrhythmias.[1] Although the majority of cardiac implantable electronic device (CIED)–related infections occur within the first year after implantation, late-onset infections presenting several years later are uncommon but clinically significant.[2] Such infections may manifest as localized generator pocket infections or progress to systemic endovascular involvement, frequently necessitating complete device and lead removal. We present a rare case of a giant granulomatous pacemaker pocket infection developing 10 years after implantation, emphasizing the importance of recognizing atypical and delayed presentations.

CASE

A 78-year-old woman with a history of dual-chamber (DDDR) pacemaker implantation performed 10 years earlier for complete atrioventricular block was admitted with progressive swelling, erythema, and warmth over the left pectoral pacemaker pocket. She denied fever, chills, weight loss, or other constitutional symptoms. One year before presentation, she had noticed mild serous discharge from the implantation site, which resolved spontaneously without medical evaluation.

On physical examination, vital signs were stable, and there were no signs of systemic infection. Electrocardiography demonstrated a paced rhythm. Transthoracic echocardiography revealed preserved left ventricular systolic function (ejection fraction 50%), mild-to-moderate mitral and tricuspid regurgitation, and no evidence of lead-associated vegetations. Soft tissue ultrasonography demonstrated a well-defined cystic lesion measuring approximately 12×7 cm overlying the generator pocket (**Figure 1**).

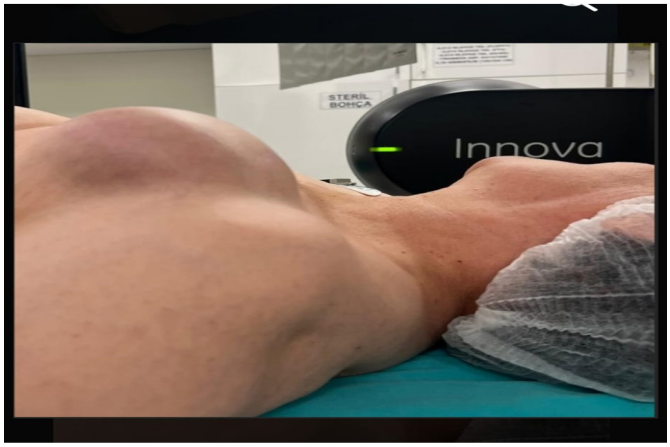

Figure 1. Preoperative external view of the left pectoral region showing prominent swelling over the pacemaker site

Given the high suspicion of a chronic pocket infection, the patient underwent complete device and lead extraction under sterile conditions. Intraoperatively, purulent material and extensive granulomatous tissue surrounding the generator and leads were identified (**Figure 2**). The encapsulated mass was excised in its entirety and submitted for histopathological

examination (**Figure 3**). Tissue cultures were obtained from the generator, leads, and pocket tissue. A temporary pacemaker was implanted, and empiric intravenous vancomycin and piperacillin–tazobactam therapy was initiated.

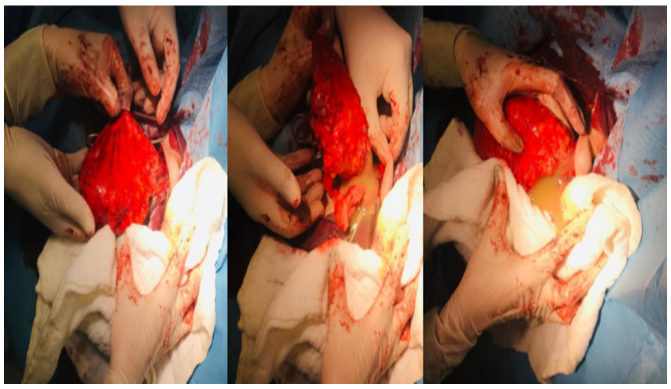

Figure 2. Granulomatous tissue excised from the pacemaker pocket during surgical exploration

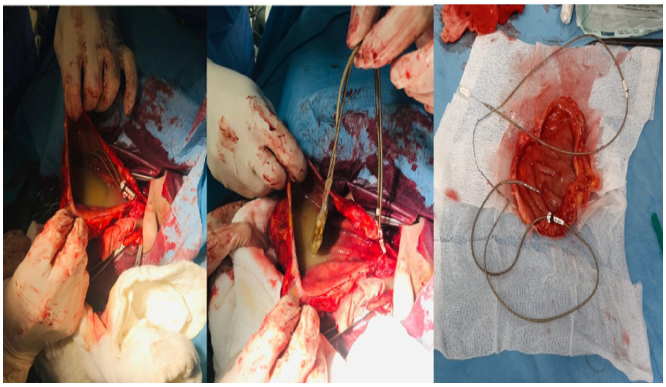

Figure 3. Intraoperative view showing pus accumulation and pacemaker leads within the pocket

Microbiological cultures yielded *Staphylococcus epidermidis*, and histopathological examination demonstrated chronic xanthogranulomatous inflammation characterized by lipid-laden macrophages and multinucleated giant cells.[3] Based on culture results, antimicrobial therapy was adjusted accordingly and continued for 14 days. Following completion of antibiotic treatment and confirmation of infection resolution, a new DDDR pacemaker system was successfully implanted in the contralateral subclavian region. The patient recovered uneventfully, with no evidence of recurrent infection during follow-up.

DISCUSSION

Pacemaker pocket infections typically represent early postoperative complications; however, delayed presentations occurring years after implantation have been increasingly reported, particularly in aging device populations.[2] Late-onset infections may result from hematogenous seeding, local trauma, repeated microinjury to the pocket, or reactivation of dormant bacterial biofilms on device surfaces.[4] Biofilm formation on device surfaces plays a key role in delayed infections and contributes to antimicrobial resistance.

Xanthogranulomatous inflammation is a rare form of chronic inflammatory response characterized histologically by lipid-laden macrophages, multinucleated giant cells, and fibrosis. Although most commonly described in the kidney and gallbladder, its occurrence in pacemaker pockets is exceptionally rare and may clinically mimic neoplastic or benign soft tissue masses, potentially delaying diagnosis.

Staphylococcus epidermidis, a common skin commensal organism, remains one of the most frequently isolated pathogens in CIED-related infections owing to its strong biofilm-forming capacity.[3] The cornerstone of management for established pacemaker pocket infections is complete removal of all hardware, including leads, followed by targeted antimicrobial therapy and delayed contralateral reimplantation. Conservative approaches without device extraction are associated with high relapse rates and are generally discouraged.

This case underscores the importance of maintaining a high index of suspicion for pacemaker pocket infections regardless of the time elapsed since implantation, even in the absence of systemic symptoms.

CONCLUSION

Very late-onset pacemaker pocket infections are rare but clinically important entities that should be considered in patients presenting with localized inflammatory findings, even many years after device implantation. A multidisciplinary approach involving cardiology, electrophysiology, and infectious disease specialists is essential. Complete device extraction, appropriate antimicrobial therapy, and contralateral reimplantation can result in favorable clinical outcomes.

ETHICAL DECLARATIONS

Informed Consent

Written informed consent was obtained from the patient included in this report. Signed consent forms are retained by the authors and are available upon request.

Peer Review Process

This report underwent external peer review.

Conflict of Interest

The authors declare no conflicts of interest.

Financial Disclosure

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Author Contributions

Concept and Design: BU, OKŞ; Data Collection: BU, İZ, TG; Analysis and Interpretation of Data: İZ, TG; Drafting of the Manuscript: BU, İU, OKŞ; Final Approval of the Version to be Published: All Authors

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