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Case Report: We report a case of implantable cardioverter-defibrillator (ICD) pocket infection caused by *S. maltophilia* in an 85-year-old male. The patient recovered after ICD removal and antimicrobial therapy with ceftazidime.

Conclusion: As ICD implantation becomes more common, infection of the pocket space these devices are placed in will probably increase in number. Although rare, clinicians should consider rare pathogens such as *S. maltophilia* in their differential diagnosis.

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CASE REPORT

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Keywords: Ceftazidime, Implantable cardioverter defibrillator, Infection, Pocket infection, *Stenotrophomonas maltophilia*

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INTRODUCTION

Implantable cardioverter-defibrillator (ICD) device pocket infections are an infrequent but costly as well as potentially life-threatening infectious process [1]. Incidence rates of infection are as high as 5% at fifth year post-implantation, with the average associated cost estimated at \$30,000 to 50,000 [2]. The organisms most frequently implicated in ICD pocket infections include coagulase-negative staphylococci and *Staphylococcus aureus*, with a smaller proportion of infections caused by enteric gram-negative bacilli [3]. There have recently been significant increases in the rate of cardiac device implantation. However, this has been accompanied by a disproportionate rise in incidence of cardiac device-related infections, prompting growing concern for cases involving resistant and difficult-to-treat organisms [4]. We report a case of ICD pocket infection caused by *Stenotrophomonas maltophilia*, an opportunistic Gram-negative aerobic, glucose non-fermenting, motile bacillus often found as a culture contaminant.

CASE REPORT

An 85-year-old male patient was admitted directly to a tertiary care facility from his outpatient cardiology clinic after presenting with an ICD displaced to the nipple line with an open site emitting foul-smelling discharge (ICD placed approximately two years prior). The patient's past medical history was extensive and included heart failure with reduced ejection fraction, atrial fibrillation with warfarin anticoagulation and amiodarone rhythm control,

dyslipidemia, coronary artery disease, hypertension, chronic kidney disease, arthritis, prostate cancer, non-ST-elevated myocardial infarction, abdominal aortic aneurysm, and right below-knee amputation due to complicated arterial thrombosis. Of note, the patient also had an indwelling Foley catheter he reported had been in place for over one year, with catheter changes every other week. The patient was unable to provide a significant past relating history of infectious disease, and could not provide a timeline of when current infectious symptoms began. The patient's most recent hospitalization was approximately one month prior for revision of the pocket—revealing no infection at that time—and repositioning of the ICD. Physical examination was significant for fluctuant, erythema, warmth, and tenderness around an open crusted area of the left chest wall to where the ICD had displaced. The patient denied fevers or chills and had no complaints beyond the symptoms noted above.

Empiric treatment with oral clindamycin 300 mg four times daily was initiated by the patient's primary care provider one day prior to admission. Of note, the patient's daughter reported that he had an allergy to sulfamethoxazole-trimethoprim (SMZ-TMP), but his reaction was unknown. Due to concern for bacteremia secondary to pocket infection and potential urinary tract infection, the patient was admitted and empiric antibiotic therapy consisting of meropenem 500 mg every 8 hours and vancomycin 18 mg/kg subsequently dosed to a target trough serum concentration of 15 to 20 mg/L was initiated. The clindamycin therapy was also initially continued at the time of admission. Due to anticipated ICD removal, warfarin therapy was discontinued.

Initial complete blood count (CBC) showed values within normal limits, and basic metabolic panel (BMP) was significant only for a serum creatinine of 1.52 mg/dL; throughout admission, serial CBCs remained within normal limits, and BMPs showed serum creatinine levels ranging from 1.12 mg/dL to 1.65 mg/dL, but no other aberrant values. Transesophageal echocardiography showed no signs of cardiac or ICD lead vegetation. Serial blood culture sets for the first three days of admission showed no growth, and meropenem was discontinued. A swab obtained from the pocket drainage on the day of presentation was cultured and returned only light growth of mixed skin flora at approximately 72 hours. A subsequent pocket culture obtained after removal of the device showed light growth of *S. maltophilia*—susceptibility results given in Table 1—and *Candida albicans* (believed to be a colonizer as it did not grow in the ICD lead culture). Multiple cultures (including anaerobic cultures) taken from the ICD leads also showed moderate growth of *S. maltophilia*. Follow-up urine culture was negative. Levofloxacin was not used to treat the patient due to the risk of significant QTc-interval prolongation (via interaction with amiodarone) as well as supratherapeutic INR (via interaction with warfarin, after new ICD placement); SMZ-TMP use was also precluded due to the risk of supratherapeutic INR (via

Table 1: Susceptibility results of cultures positive for *Stenotrophomonas maltophilia*

Antibacterial	MIC*	Interpretation
Ceftazidime	4	Susceptible
Levofloxacin	2	Susceptible
Trimethoprim-sulfamethoxazole	≤ 2	Susceptible

*MIC = minimum inhibitory concentration

MIC determined by ARIS (Thermo Fisher Scientific, Inc., Waltham, MA, USA)

interaction with warfarin), potential QTc-prolongation (via interaction with amiodarone), and the patient's unknown allergic reaction. Therefore, antibiotic therapy was switched to ceftazidime 1 g every 12 hours for a total of 14 days due to lack of bacteremia with no other evidence of endocarditis. The patient tolerated implantation of a new ICD in the right chest and antibiotic therapy well and was discharged on hospital day 18 to a smaller medical center to complete antibiotic therapy and physical therapy before returning home.

DISCUSSION

To our knowledge, this is the first reported case of an ICD pocket infection caused by *S. maltophilia*. No evidence of endocarditis was found in this patient. Using Medline we found only two cases of pacemaker pocket infection and endocarditis caused by this organism, highlighting the rarity of cardiovascular infection with *S. maltophilia* [5, 6]. *S. maltophilia* is a multidrug-resistant pathogen which has become an increasingly prevalent and serious issue in immunocompromised patients over the past two decades [7]. *S. maltophilia* is generally regarded as an organism of low virulence and therefore an opportunistic pathogen, especially in immunocompromised hosts [8]. It is a known respiratory pathogen in cystic fibrosis patients. However, even in immunocompetent patients it has been implicated in various serious infections, including pneumonia and bacteremia, particularly in the critically ill [6]. There are limited antimicrobial options for infections due to *S. maltophilia* because of its extensive resistance to most antibiotics, including β -lactam antibiotics, macrolides, aminoglycosides, and carbapenems. Traditionally, the drug of choice has for *S. maltophilia* infections is trimethoprim/sulfamethoxazole (TMP/SMX), although ciprofloxacin, ceftazidime, and ticarcillin/clavulanate have been used successfully as well [9]. Although our patient's clinical presentation was not severe, concern for secondary bacteremia or endocarditis supported ICD removal and antimicrobial therapy. Given *S. maltophilia*-positive cultures obtained from the pocket site as well as multiple ICD leads, we are confident that the organism was not misidentified in this case; additionally, given

the lack of *C. albicans* growth in any device-derived cultures, we are also confident that *S. maltophilia* was the causative organism in this infection. ICD pocket infections are rare. The overall incidence of infections ranged from 0.5–2.2% of patients in a review [10]. Several risk factors for ICD infection have been reports among them, male sex, lack of antimicrobial prophylaxis during the implantation procedure, the number of prior cardiac implantation procedures, and type of device [11]. ICD pocket infection has been associated with increased hospital length-of-stay and mortality. Thus patients with signs and symptoms suggesting such an infection should be promptly seen and treated.

CONCLUSION

In conclusion, we present a case of ICD pocket infection caused by *S. maltophilia*. Considering the emerging role of *S. maltophilia* as a significant cause of multidrug-resistant infection and the serious risks and costs associated with ICD pocket infection, clinicians caring for patients with these infections should be aware that rare organisms such as *S. maltophilia* may be causative.

Author Contributions

Michael Buege – Substantial contributions to conception and design, Acquisition of data, Analysis and interpretation of data, Drafting the article, Revising it critically for important intellectual content, Final approval of the version to be published

Amanda Bushman – Substantial contributions to conception and design, Acquisition of data, Drafting the article, Revising it critically for important intellectual content, Final approval of the version to be published

Leyla Best – substantial contributions to conception and design, Acquisition of data, Drafting the article, Revising it critically for important intellectual content, Final approval of the version to be published

Geoffrey C. Wall – substantial contributions to conception and design, Acquisition of data, Drafting the article, Revising it critically for important intellectual content, Final approval of the version to be published

Guarantor

The corresponding author is the guarantor of submission.

Conflict of Interest

Authors declare no conflict of interest.

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