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Case Report

Cardiac device infection with *Salmonella* Blockley

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ABSTRACT

Human infections with *Salmonella* Blockley are uncommon, and cases described in the literature are usually gastrointestinal in origin. We report a case of an implantable cardioverter-defibrillator (ICD) infection in a 76-year-old Chinese man who presented with pain, redness, and warmth from the ICD pocket site, which later developed a sinus draining purulent material. *S.* Blockley was isolated from the wound and the patient underwent device removal and treatment with intravenous ceftriaxone. *S.* Blockley was cultured from the generator and the leads. The patient did not develop fever or bacteremia. This is, to the best of our knowledge, the first reported case of *S.* Blockley cardiac device infection.

Introduction

Infections of permanent pacemakers (PPMs) and implantable cardioverter-defibrillators (ICDs) with Gram-negative organisms are uncommon. In one study of 123 patients with PPM/ICDs, 17% had an infection with enteric Gram-negative bacilli [1]. Infection of a pacemaker with *Salmonella* species specifically is exceedingly rare, and documented with a few case reports and as part of a cohort of patients with both Gram-negative bacteremia and PPM/ICDs [2,3]. We report a case of ICD pocket infection with *Salmonella enterica* serotype Blockley (*Salmonella* Blockley). To the best of our knowledge, there have been no previously reported cases of such an infection in the literature.

Case report

A 76-year-old Chinese man with systolic heart failure and type 2 diabetes mellitus who had undergone an ICD placement in 2012 presented at the cardiology clinic for evaluation of the gradual onset of pain, redness and warmth from the ICD pocket site for one month, more than a year after the surgery for implantation. He was recently prescribed an unrecalled oral antibiotic by his primary care provider without improvement, and there was note of insidious onset of erosion of skin over the pocket site. His cardiologist obtained cultures and cleaned the wound. Three weeks later, the wound developed purulent discharge and he was advised inpatient admission for treatment. At no point in the presenting illness did the patient develop fever, chills, or gastrointestinal symptoms.

On physical examination, the left pectoral ICD pocket site was tender, erythematous, and fluctuant, with a sinus draining purulent material. No cardiac murmurs were audible on auscultation. Initial wound cultures obtained yielded *Salmonella* Blockley that was susceptible to ampicillin (MIC, $\leq$2 mg/L), trimethoprim-sulfamethoxazole (MIC, $\leq$20 mg/L), levofloxacin (MIC, $\leq$0.12 mg/L), and intermediate to ciprofloxacin (by Kirby–Bauer disk diffusion assay). Identification of the isolate and susceptibility testing was done by the New York City Department of Health and Mental Hygiene. Several blood cultures obtained on admission yielded no growth. The serum creatinine level was 0.81 mg/dL and the peripheral white blood cell count was 5.8×10^3 cells/mm^3 (neutrophil percentage, 61.8%). Treatment was started with ceftriaxone and the patient underwent removal of the ICD. The device was sent to the laboratory for cultures, which yielded *S.* Blockley in both the generator and the leads. Tissue cultures from the pectoral wound also yielded *S.* Blockley. A peripherally inserted central catheter (PICC) was placed and the patient was discharged with home care, to complete a 21-day course of ceftriaxone dosed at 2 g daily. He was readmitted briefly during this period to evacuate a hematoma that had developed over the former pocket site, but otherwise had an unremarkable convalescence. On 21-day follow-up at the outpatient infectious disease clinic, the wound was well-healed and intravenous antibiotics were discontinued. He was prescribed a 7-day course of amoxicillin–clavulanate and continued to have no further complications on subsequent follow-up visits.

Discussion

It is estimated that between 1 and 7% of cardiac implantable electronic devices (CIED) become infected, with the risk increased in patients with diabetes mellitus, previous glucocorticoid therapy,

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underlying malignancy, operator inexperience, multiple lead placement, advanced patient age, oral anticoagulant use, frequent generator replacement, heart failure, fever before implantation, use of temporary pacing catheters, nonpectoral implantations, and renal dysfunction. If the infection occurs within 2 weeks of implantation, *Staphylococcus aureus* is most frequently implicated, but beyond this period, other organisms are more frequently seen, usually skin flora (coagulase-negative staphylococci), *S. aureus*, other Gram-positive cocci (enterococcus and streptococcus) and, less frequently, Gram-negative bacilli [1,4]. The route of infection in our patient can be most likely attributed to secondary seeding from an enteric source, since *Salmonella* species are not usually contaminants encountered at implantation, and clinical signs of infection appeared more than a year after surgery. During the patient's clinical course, no organism was ever recovered in blood cultures, which indicates that there was probably transient bacteremia which led to seeding.

The organism isolated from culture, *Salmonella* Blockley, is rarely encountered in human infections, and most of the literature describes gastrointestinal infections. One of the earliest reports of *S.* Blockley infections was of an institutional outbreak due to contaminated ice cream with unpasteurized egg yolks. Approximately 40% of 167 infected people manifested symptoms of moderate fever, diarrhea, nausea, and abdominal cramping [5]. In 1998, 35 cases of *S.* Blockley gastroenteritis were reported throughout Greece; however, inquiries about various risk factors did not elucidate a common exposure among the cases [6]. An outbreak of *S.* Blockley gastroenteritis was also described in Germany in June 1998. In this study, antibiotic resistance patterns and molecular typing suggested that the source of the outbreak could be traced from fish farms in Veneto, Italy [7]. Isolates of *S.* Blockley have been studied from contaminated pigs and poultry products in the Far East, South Africa, Ethiopia, and Italy [8–11]. Our patient emigrated from China in 2009 and went on a tour of several European countries in 2011, about a year prior to surgery. However, he did not report developing fever or gastrointestinal symptoms during or immediately after the trip. Stool cultures were not obtained. It cannot be ascertained at which point our patient acquired an enteric *S.* Blockley infection that may have led to subsequent infection of the ICD.

Given the infection of the leads, superficial erosion of the pocket site, and formation of an abscess, removal of the ICD was indicated for our patient. In cases of superficial or incisional infections, removal may not be necessary [4]. The isolate in our case was susceptible to beta-lactams and had intermediate susceptibility to ciprofloxacin. Effective treatment was achieved with removal of the device and prolonged administration of ceftriaxone, though in future cases, care must be taken to determine the susceptibility of the isolate, as multidrug resistance has been described [12].

Human infections with *Salmonella* Blockley are rare and most cases described are gastrointestinal in origin. Our patient appears to be the first case of *S.* Blockley infection of a pacemaker, though other *Salmonella* species have been known to cause PPM/ICD infections as well. Device infections with *Salmonella* must not be overlooked in patients who present late after surgery, especially with known residence or travel to endemic areas.

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