Allergic reaction to an antibiotic-impregnated envelope masquerading as pocket infection

Aaron Vigdor, MD,* Jeffrey Luebbert, MD,† Jeffrey Arkles, MD, MA,† Robert D. Schaller, DO, MS, FHRS*

*From the *Electrophysiology Section, Division of Cardiology, Hospital of the University of Pennsylvania, Philadelphia, Pennsylvania, and †Electrophysiology Section, Cardiovascular Division, Perelman School of Medicine at the University of Pennsylvania, Philadelphia, Pennsylvania.*

Introduction

Absorbable antibacterial envelopes mitigate the risk of infection during repeat cardiac implantable electronic device (CIED) procedures.[1] Although infections may still occur, symptoms concerning for pocket infection with use of these envelopes, particularly in low-risk scenarios, should raise suspicion for noninfectious etiologies such as an allergic reaction. We present a case of recurrent wound dehiscence secondary to an inflammatory response to the antibacterial envelope.

KEY TEACHING POINTS

- Allergy to cardiac implantable electronic device components is likely an under-recognized phenomenon.
- Pocket disruption owing to allergy can mimic that of infection.
- Avoidance of potential allergens is an important aspect of pocket management.

Case report

A 52-year-old man with history of a mechanical aortic valve replacement 11 years prior complicated by complete heart block and implantation of a dual-chamber permanent pacemaker (DC PPM) presented for generator replacement (Azure XT DR; Medtronic, Minneapolis, MN). The procedure was performed in a routine fashion and included the use of a TYRX absorbable antibacterial envelope (Medtronic). Within a week, the wound was found to be partially dehisced at the edges with serosanguineous incisional drainage that persisted despite application of wound closure strips and a pressure dressing (Figure 1A). Owing to concern for pocket infection, the patient underwent percutaneous system extraction including debridement and closure of the pocket and placement of an externalized right ventricular lead as a bridging strategy. The pocket contained serosanguineous fluid with no purulence. Wound and blood cultures remained negative while he was maintained on antibiotics, and he ultimately underwent contralateral DC PPM implantation 3 days later with a TYRX envelope and was discharged on antibiotics for 2 weeks.

Within a week, he was found to have a similar wound dehiscence of the new pocket with serosanguineous incisional drainage concerning for recurrent pocket infection (Figure 1B). The patient was again admitted and underwent device removal followed by implantation of an externalized pacing lead. Pathologic specimen from the pocket demonstrated foreign body reaction with lymphoplasmacytic and focal neutrophilic inflammation most consistent with allergic reaction (Figure 2A). Three days later, the patient underwent implantation of a low-lateral left-sided DC PPM, distant from the prior site (Figure 2B), without the use of a TYRX envelope. All other surgical components were the same. The patient was discharged without antibiotics and without evidence of infection or allergy at the new surgical site over a follow-up period of 1 year.

Discussion

Pocket infection represents a dreaded complication of CIED generator replacement, with rates reported between 1.3% and 3.9%, introducing increased morbidity, mortality, and cost owing to the need for CIED system removal and replacement.[1] Multiple strategies have been explored to reduce the risk of infection, including pocket irrigation,[2] changing of gloves prior to handling of the device,[3] and avoidance of hematoma.[4] The use of the TYRX absorbable antibacterial envelope, which elutes minocycline and rifampin, has been

KEYWORDS Pacemaker; Allergic reaction; Lead extraction; Pocket infection; Inflammatory reaction
(Heart Rhythm Case Reports 2023;9:794–796)

Address reprint requests and correspondence: Dr Robert D. Schaller, Associate Professor of Clinical Medicine, Hospital of the University of Pennsylvania – Pavilion, Department of Cardiac Electrophysiology, One Convention Avenue, Level 2 – City Side, Philadelphia, PA 19104. E-mail address: robert.schaller@pennmedicine.upenn.edu.

https://doi.org/10.1016/j.hrcr.2023.08.006

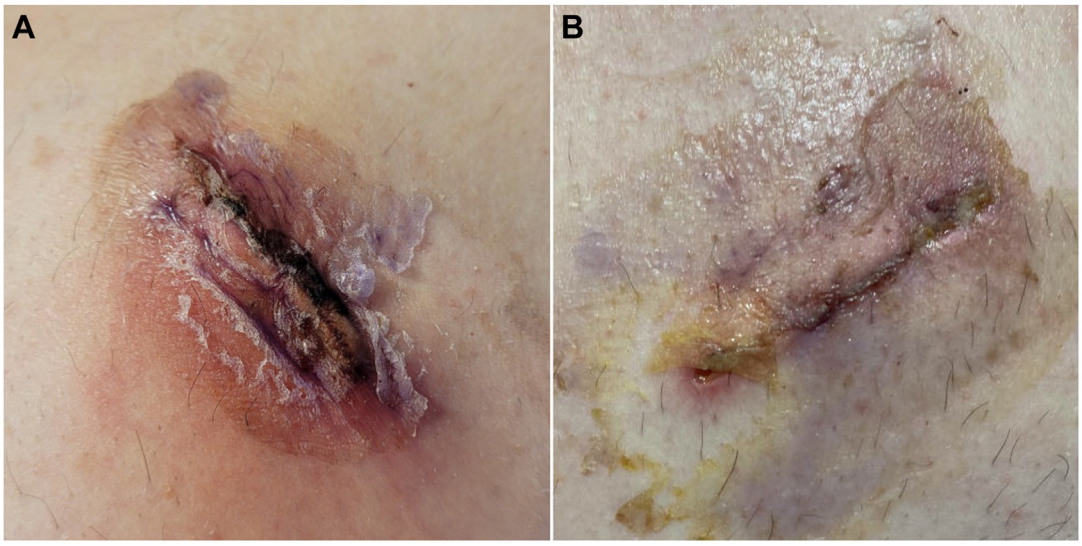

Figure 1 **A:** Left sided deltopectoral incision with tissue breakdown and serosanguineous drainage. **B:** Right-sided incision with similar drainage. Note that there is no clear infection in either image.

shown to reduce the risk of infection by 40% during repeat procedures and is now used commonly.[5]

Acute pocket infections typically present with erythema, warmth, and fluctuance owing to gram-positive organisms such as *Staphylococcus aureus*[6] but may also present with wound dehiscence and discharge. Allergic reaction to various CIED components and/or suture material is a rare phenomenon but can present similarly to infection. Allergic reaction to CIED components is rare and mostly associated with titanium, nickel, or epoxy resin associated with the device and leads.[7,8] Although our patient was able to tolerate previous devices implanted with similar hardware and surgical tools, it is unlikely that those represent the allergen in question. The TYRX envelope is composed of absorbable filaments of glycolide, caprolactone, and trimethylene carbonate and coated with a bioabsorbable polyarylate polymer with a resorption time of 9 weeks. Although it is unclear which of these compounds may have been the specific irritant, the totality of the evidence, including the temporal relationship to device implantation, the atypical presentation of the pocket, negative pocket cultures, corroborative pathologic results, and subsequent successful implantation without the envelope, suggest it to be the culprit.

Although conservative management consisting of administration of steroids has been previously described in a similar patient with a localized superficial reaction,[9] the continuous drainage of serosanguineous fluid in our patient was enough to warrant complete system removal to avoid a superimposed infection in a patient with a mechanical valve. CIED location of the new device after bilateral pocket disruption also represents a unique challenge. One option is the use of a leadless PPM, which has a lower rate of infection[10] but does not currently provide sufficient dual-chamber functionality. We chose a low lateral implantation, which has been described in this setting and was sufficiently distant from the other pockets.[11]

Allergy to the TYRX envelope was not reported in 3495 patients in the WRAP-IT trial,[5] and to our knowledge this is the first reported case of a histologically proven allergic reaction requiring removal. Given the rarity of this inflammatory response, and its proven benefit to reduce pocket infection, routine empiric allergy testing is likely not

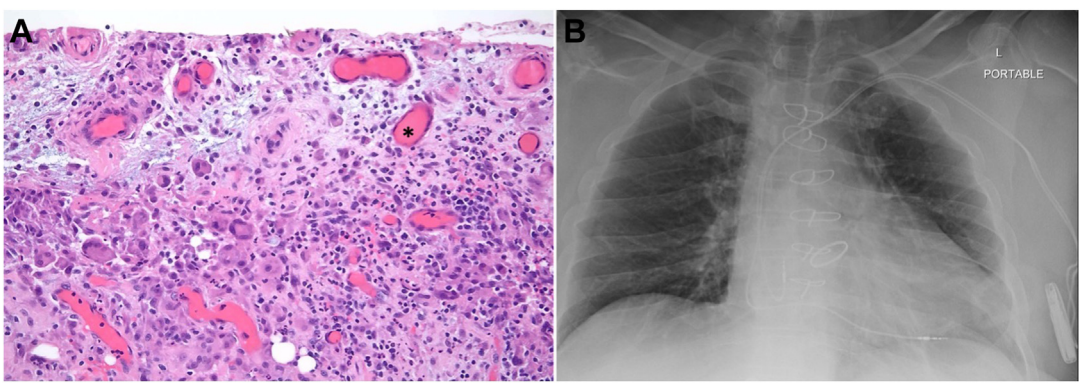

Figure 2 **A:** Pathologic specimen from the right-sided pocket demonstrating a foreign body giant cell reaction (*asterisk*) with histiocytes, lymphocytes, and neutrophils. **B:** Radiograph showing a low lateral location of a dual-chamber pacemaker generator.

warranted. However, the diagnosis of an allergic reaction should be considered in the setting of wound dehiscence with an atypical presentation, as this may impact use during subsequent procedures.

Funding Sources: This study was funded in part by the Ansary Foundation Fund in Cardiac Electrophysiology.

Disclosures: None.

References

1. Clementy N, Carion PL, Leotoing L, et al. Infections and associated costs following cardiovascular implantable electronic device implantations: a nationwide cohort study. Europace 2018;20:1974–1980.
2. Kang FG, Liu PJ, Liang LY, et al. Effect of pocket irrigation with antimicrobial on prevention of pacemaker pocket infection: a meta-analysis. BMC Cardiovasc Disord 2017;17:256.
3. Kozon I, Riahi S, Lundbye-Christensen S, et al. Risk factors of cardiac device infection: glove contamination during device procedures. Am J Infect Control 2017;45:866–871.
4. Tarakji KG, Korantzopoulos P, Philippon F, et al. Infectious consequences of hematoma from cardiac implantable electronic device procedures and the role of the antibiotic envelope: a WRAP-IT trial analysis. Heart Rhythm 2021;18:2080–2086.
5. Tarakji KG, Mittal S, Kennergren C, et al. Antibacterial envelope to prevent cardiac implantable device infection. N Engl J Med 2019;380:1895–1905.
6. Tarakji KG, Chan EJ, Cantillon DJ, et al. Cardiac implantable electronic device infections: presentation, management, and patient outcomes. Heart Rhythm 2010;7:1043–1047.
7. Robledo-Nolasco R, Gonzalez-Barrera LG, Diaz-Davalos J, De Leon-Larios G, Morales-Cruz M, Ramirez-Cedillo D. Allergic reaction to pacemaker compounds: case reports. HeartRhythm Case Rep 2022;8:410–414.
8. Tschabrunn CM, Rosenbach M, Lavi N, Cooper JM. Allergic reaction to suture material after an ICD procedure: device infection mimicry. J Cardiovasc Electrophysiol 2012;23:330–332.
9. Tomaiko E, Sridhar M, Lockhart C, et al. Indication and management of allergy to TYRX absorbable antibacterial envelope. Circulation 2019;140:A14011.
10. El-Chami MF, Bonner M, Holbrook R, et al. Leadless pacemakers reduce risk of device-related infection: review of the potential mechanisms. Heart Rhythm 2020;17:1393–1397.
11. Liang JJ, Schaller RD, Modi DS, Enriquez A, Supple GE, Cooper JM. Low lateral thoracic site for cardiac implantable electronic device implantation: a viable alternative in patients with limited access options after infected device extraction. Heart Rhythm 2017;14:1506–1514.