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Original Article

Pacemaker pocket infection due to environmental mycobacteria: Successful management of an outbreak and steps for prevention in future

Vijaya Bharat [a,*], Vivek Hittinahalli [b], Meenakshi Mishra [c], Sridhar Pradhan [d]

[a] Head of the Department of Cardiology and in-charge ICU, Tata Main Hospital, Jamshedpur, India
[b] Microbiologist, Panacea Hospital, Bangalore, India
[c] Pathologist, Tata Main Hospital, Jamshedpur, India
[d] Senior Surgeon, Tata Main Hospital, Jamshedpur, India

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ABSTRACT

Background: An outbreak of surgical site infection (SSI) due to environmental mycobacteria (EMB) occurred in a hospital in Eastern India.
Method: A quality improvement project (QIP) was undertaken to analyze the causes and prevent further outbreak. Step (1) Proof of the need: Four patients who had undergone pacemaker implantation consecutively during a 10-day period developed SSI. Step (2) Diagnostic journey: Since all patients developed SSI within 2 months of implantation, a common source of infection was likely. Atypical mycobacteria (AMB) were grown from surgical sites as well as from the surface of operation table, image intensifier, and lead aprons. It was a rapid growing variety that lacked pigment, a characteristic of EMB with pathogenic potential. The EMB was finally traced to its source, the overhead water tank. Step (3) Remedial journey: By thorough cleaning of the water tank and enriching its chlorine content, the EMB was eliminated from its source. Step (4) Holding the gains: Protocol for cleaning the water tank once in 3 months was made. A checklist was prepared to ensure compliance to asepsis protocol in the operation theater. In the ensuing 5 years, the infection did not recur.
Result: The bacteria that caused SSI were identified as EMB that grew in the water tank and contaminated the operation room. It could be eliminated by appropriate measures.
Interpretation: Water is a potential reservoir for EMB. Use of the term 'environmental mycobacteria' instead of 'atypical mycobacteria' will generate awareness about contamination as the cause of SSI.

* *Corresponding author.*
E-mail address: bharatjsr@gmail.com (V. Bharat).
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1. Introduction

Surgical site infection (SSI) after permanent pacemaker implantation is very low (less than 2% of the annual implantations in most centers) and *Staphylococcus epidermidis* is the commonest pathogen.[1] We report an outbreak of pacemaker pocket infection due to environmental mycobacteria (EMB) and the corrective measures that were implemented.

2. Material

In our pacemaker implantation unit, the incidence of re-do surgery for deep SSI was 0.83% and occurred in 13 of the 1380 pacemakers implanted from 1982 to 2008.[2] They were sporadic and *S. epidermidis* was the culprit organism. But in the year 2009, of the 146 pacemaker implantation procedures, five procedures in four patients were complicated by SSI (3.42% of the annual implantations). Initial swabs from the infected sites neither showed any microorganism in Gram stain nor any bacterial growth on culture. Purulent discharge persisted despite antibiotics and microbiology tests were repeated. Acid fast bacilli were found on Ziehl-Nielson staining, which grew rapidly in Lowenstein-Jensen medium and were reported as 'atypical mycobacteria (AMB)'. The outbreak occurred in all four patients who underwent pacemaker implantation consecutively over a 10-day period from 21st March to 1st April 2009. The clinical presentation was that of SSI within 6 weeks of surgery with redness, purulent discharge, and non-healing operation site without any systemic feature like fever (Table 1). Only the 4th patient responded to antibiotics and wound dressing, while the rest required removal of the pacemakers, debridement, and reimplantation on the contralateral side after sterilization with ethylene oxide. The 2nd patient underwent reimplantation in the same operation theater (OT), before the bacteria were eliminated from their environmental source, which led to recurrent infection in the 2nd site as well. Thus, in four patients, there were five instances of SSI.

3. Method and results

The OT was closed in mid-June 2009 and a quality improvement project (QIP) was initiated. QIP is a tool to solve a problem through measures in cross-functional areas and is conducted in four steps.[3]

Table 1 – Profile of SSI due to EMB in four patients (AMB – atypical mycobacteria; EMB – environmental mycobacteria; QIP – quality improvement project; ATT – anti-tuberculous treatment).

#	Name Age & Sex	h/o DM Blood sugar < Sx	Date of primary Sx, Type of pacemaker, Peri-op antibiotics, Early course	Course of SSI, treatment and outcome
1	DC 52 years F	Non-DM 86 mg/dl	21st March 2009 Relia RESR01. Cefaperazone, Kloxacillin.	Abscess noted on 14th April 2009, 3 weeks after Sx. AMB in aspirated pus. ATT for 2 months – no response. Explanation and debridement on 26th June 2009. Wound healed well. A new Relia RESR01 was implanted in contra lateral side on 2nd August 2009 in the same OT. Healed well. Ok till March 2014
2	MMS 60 years M	DM 122 mg/dl	25th March 2009 Sigma SEDR01. Gentamycin, Kloxacilin. Healthy wound on Stitch removal.	Redness and discharge from 20th post-op day leading to sinus. Vancomycin > linezolid. Pus swab – no bacteria initially, then AMB isolated. ATT > Ofloxacin > Ciproflaxacin. Explantation and debridement on 1st June 2009. Re-implanted on the opposite site on 4th June 2009 in the same OT. Developed early SSI with persistent discharge, despite ATT, Ofloxacin > Trimethoprim/sulphamethoxazole. EMB suspected. QIP undertaken. Explantation and debridement on 7th August 2009. A new pacemaker, Adapta ADSR03 & lead were implanted on the first side on 14th August 2009 in the same OT. Healthy wound on stitch removal. Ok till March 2014
3	TA 53 years F	DM 211 mg/dl	27th March 2009 Adapta ADVDD01 Gentamycin, Kloxacillin.	Persistent slight ooze up to 29th April 2009. Pus swab sent – AMB isolated. Treated with linezolid, ciprofloxacin; alternate day cleaning and dressing. Satisfactory wound healing by end May 2009, followed for 2 months post-op. Ok till March 2014
4	RPB 75 years M	Non-DM 150 mg/dl	1st April 2009 Regency 2406L Cefaperazone, Kloxacillin. Healthy wound on Stitch removal.	Swelling at op site after 6 weeks > discharging sinus. AMB isolated from pus. ATT for 4 months-sinus persisted. Explanation and debridement on 14th November 2009. A new Regency 2406L was implanted on 25th November 2009. Healthy wound on stitch removal. Ok on follow-up till March 2014