Allergic contact dermatitis to pacemaker resulting in extrusion and mimicking infection

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Background

- Pacemaker infection is a serious complication that bears great morbidity and mortality.
  - 300,000 pacemaker implants inserted in US annually → 12,000 projected infections of pacemaker implants annually
    - Estimated cost of combined medical/surgical treatment of a pacemaker infection: $35,000

- However, when erythema over the pacemaker site fails to resolve with antibiotics, non-infectious processes must be considered.

*We present a case of early pacemaker extrusion secondary to pacemaker-mediated allergic contact dermatitis.*
77-year-old man was transferred to our hospital for pacemaker explantation due to infection.

- **Pacemaker placed for sick sinus syndrome**
  - 6 years prior to presentation

- **Painless chest erythema**
  - 1 month prior to presentation

- **OSH infectious workup**
  - Transthoracic echogram: no vegetations
  - EKG: normal PR interval
  - Blood cultures: negative
  - Wound cultures: negative or skin flora

- **No response to IV ertapenem/vancomycin**
  - TRANSFER
Patient was evaluated by inpatient dermatology consult service on hospital day three

- No recorded fevers. Denied pain at pacemaker site.

No tenderness to palpation noted. 3 cm well demarcated erythematous to violaceous plaque with central shallow erosion and 2 vesicles

Ddx: Suspect non-inflammatory etiology with associated lymphatic drainage. Impending pacemaker extrusion 2/2 pressure necrosis vs. 2/2 allergic contact dermatology.
Two foci of thinned skin and underlying induration with metallic base, small erosion inferiorly draining thin, transparent, yellow fluid. No purulence or malodor noted.

Wound culture: rare coagulase negative staphylococcus
The pacemaker was surgically removed due to the presence of surface communication.

- In the operating room:
  - **Appearance**: Cutaneous erosion was noted to communicate with pacer. A small collection of thin fluid was noted in the pacemaker pocket but no frank pus.
  - **Intraoperative trans thoracic echogram**: No vegetations noted
  - **Intraoperative wound biopsy** performed and sent for STAT read…
Intraoperative Biopsy Report

- Ulceration with underlying dermal necrosis and a mixed inflammatory infiltrate involving the dermis and superficial subcutaneous fat
- Lymphohistiocytic infiltrate with abundant plasma cells, particularly in a perivascular distribution and scattered eosinophils.
- Brown-Hopps, Periodic Acid-Schiff, Grocott’s methenamine silver, and Fite stains negative for microorganisms.

Altogether the features were suggestive of a hypersensitivity reaction resulting in pacemaker extrusion.

Given the confirmation of non-infection, fibrosed pacer wires were left in place, greatly diminishing the procedural risk to the patient. A new pacemaker device was implanted deeper in the contralateral chest wall.
Erythema overlying pacemaker: Differential DX

1. Pacemaker infection
2. Impending pacemaker extrusion
3. Pacemaker-mediated contact dermatitis
4. Reticular telangiectatic pacemaker erythema.
Pacemaker ACD vs. Extrusion

- Pacemaker mediated contact dermatitis classically presents as **erythema**
  - Reported allergens: titanium (MOST COMMON), nickel, mercury, epoxy resin, polyurethane, cadmium, chromate, cobalt, silicone
  - Patch testing to titanium may demonstrate false negatives
  - Can treat with topical corticosteroids but pacemaker replacement only permanent option → coat with non-allogenic materials like gold

- The two main etiological processes classically identified in the pathogenesis of pacemaker extrusion are **infection** of the site and **pressure necrosis** of the overlying tissue and skin.
However, **hypersensitivity** has been shown to manifest in extrusion of other implanted devices:

- Cochlear implants: 3 cases of delayed extrusion. 2 with silicone hypersensitivity on patch testing, one with silicone hypersensitivity diagnosed clinically.\(^5\)

**This case demonstrates that hypersensitivity to the pacemaker may also contribute to this phenomenon**


