

## Osteomyelitis of the clavicle following to a pacemaker implantation

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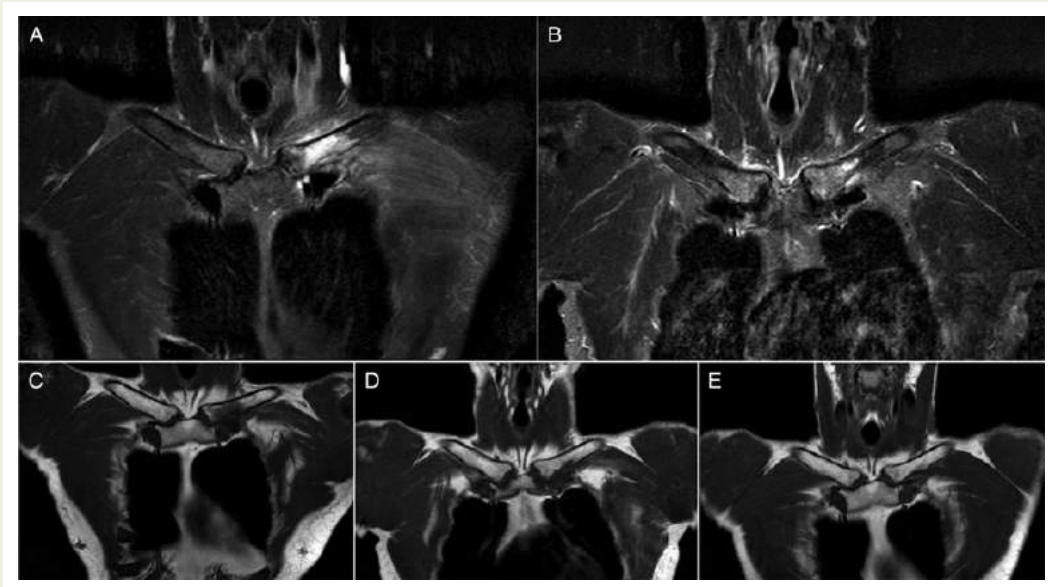
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Two weeks after dual-chamber pacemaker implantation, a 51-year-old man presented typical signs of pacemaker pocket infection. Device and leads were explanted. As the local pain persisted and even extended to the left clavicle, a magnetic resonance was performed and acute osteomyelitis of the left clavicle was diagnosed. Nine months later, a nearly complete resolution of the osteomyelitic focus was observed.

A 51-year-old man was referred to our Cardiology Department for presumed pacemaker pocket infection. Two weeks before, he underwent a dual-chamber pacemaker implantation elsewhere for recurrent episodes of cardioinhibitory neurally mediated syncope; the index procedure was described as uncomplicated and furthermore the patient did not have any risk factors for pacemaker infection. He was a carpenter, so he needed to use both arms for his work. After 13 days from implantation, he presented to our emergency service with typical signs of pacemaker infection and sharp pain on the left shoulder with functional impotence of the limb.

Device and leads were explanted on Day 6. *Pseudomonas aeruginosa* was isolated in culture samples obtained from the pocket tissue and both lead tips; blood cultures remained sterile. Specific antibiotic therapy with intravenous ciprofloxacin and cefepime was started. Transoesophageal echocardiography ruled out intracardiac vegetations. Chest magnetic resonance showed acute osteomyelitis of 5 cm on the medial third of the left clavicle extending into the sternoclavicular joint (Figure 1A–C). After prolonged hospitalization, a control 24 h Holter monitoring did not show any significant arrhythmias or pauses and the patient was then discharged without contralateral implantation under oral ciprofloxacin for 6 weeks. Three months later, a decrease of the osteomyelitic focus with small residual oedema of the soft tissue was observed (Figure 1B–D). Nine months later, a nearly complete resolution of the osteomyelitic focus was observed and the



**Figure 1** (A, B) STIR sequence T2-weighted magnetic resonance imaging (MRI) showing acute osteomyelitis of 5 cm of the medial third of the left clavicle extending into the sternoclavicular joint, at the time of diagnosis (A) and 3 months later (B). (A) STIR sequence T2-weighted (MRI) shows areas of high signal intensity in the bone marrow of the clavicle, consistent with bone infection and trabecular bone oedema. A marked reduction of cortical thickness in the inferior portion of the left clavicle was observed consistent with involvement of the cortical bone and adjacent soft tissues. (B) STIR sequence T2-weighted MRI shows a decrease of the osteomyelitic focus with small residual oedema of the soft tissue and the persistence of decreased cortical thickness of the left clavicle. (C–E) T1-weighted coronal MRI at the time of diagnosis, 3 months later, and 9 months later. (C) At the time of diagnosis, MRI shows impaired signal intensity in the medial third of the left clavicle, consistent with inflammatory reaction. (D) Three months later, a marked decrease of the infection was observed. (E) Nine months later, MRI shows nearly complete resolution of the osteomyelitic focus.

patient regained a full functionality (Figure 1E). Further evaluations are planned to rule out absolute indications for contralateral pacemaker reimplantation.

Osteomyelitis is a rare disease that mostly affects the long bones. According to Waldvogel classification system, it can be divided into three categories—haematogenous, contiguous, and chronic.<sup>1</sup> In children, osteomyelitis involve the clavicle most commonly as a primary infection of haematogenous source; in adults, clavicular osteomyelitis more often come from a secondary infection originating in a contiguous focus and it is generally associated with pre-disposing factors. *Pseudomonas aeruginosa* is a Gram-negative, aerobic, opportunistic, and primarily a nosocomial pathogen that cause infections especially in immunocompromised patients; it accounts for around 20% of all Gram-negative osteomyelitis cases.<sup>2</sup> Magnetic resonance imaging has a very high sensitivity, specificity, and accuracy to detect osteomyelitis and to delineate the anatomical extension of the infection focus. A precise analysis of microbial aetiology and susceptibilities should address antibiotic therapy; in non-responsive cases, surgical treatment may be required.<sup>1</sup>

To our knowledge, this is the first report of a clavicle osteomyelitis secondary to pacemaker infection. In this case, we hypothesized that generator pocket became infected during the pacemaker implantation or within few days. Thereafter, *Pseudomonas* colonization probably developed and extended in the soft tissue around device pocket involving the left clavicle. According to recent scientific statement about cardiovascular implantable electronic device infections, device and lead explantation is necessary to eradicate infection and to prevent future relapses.<sup>3</sup> The prompt beginning of specific antibiotic therapy along with a good susceptibility profile of the microorganism and the absence of comorbid conditions probably contributed to the complete resolution of infection.

**Conflict of interest:** none declared.

## References

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