

## Imaging in Cardiology – Lead Constriction

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### Case Report

A 69-year-old man presented with episodes of syncope due to bradyarrhythmias. His previous medical history revealed no major abnormalities. He was admitted to the hospital. Myocardial infarction or other temporary causes of total AV block were ruled out, and a DDD pacemaker was implanted. The ventricular and the atrial lead, both tined leads Synox SX60-BP and JSX53-BP (Biotronik, Germany) were implanted and positioned easily with normal thresholds and good sensing properties. The routine procedure is to fixate the silicone sleeves on silicone-insulated leads to the adjacent tissue using non-absorbable sutures. This prevents the lead from being pulled back, and thus helps avoid dislocation of the lead tip.

The patient was readmitted to the hospital after 6 weeks due to recurrent symptoms of syncope, which was caused by the failure of ventricular pacing, as shown by the first recorded ECG. It was also obvious after further evaluation that there was also complete failure of sensing. The lead impedances (atrial and ventricular) can be measured via pacemaker telemetry.

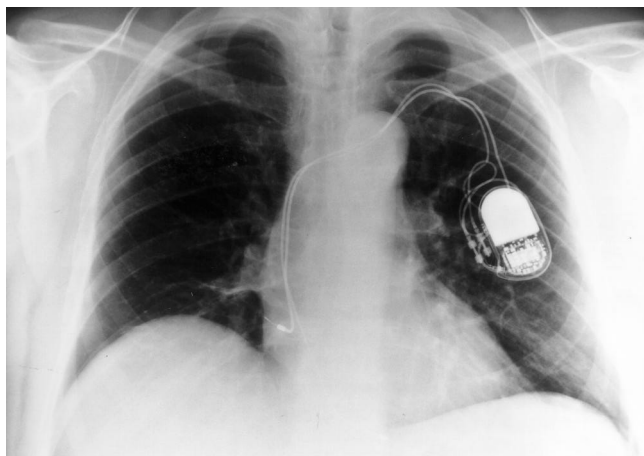


Figure 1. Overview of the chest X-ray of the patient immediately following re-admission to the hospital. The leads are in the implanted position, and a lead fracture is not obvious.

The last follow-up of this patient at discharge (two days after implantation) showed a ventricular pacing impedance of 567  $\Omega$ . After readmission, the ventricular pacing impedance was increased beyond the upper level, which will be displayed by the pacemaker: 3200  $\Omega$ . Lead fracture was suspected, but routine X-rays of the chest in two directions showed no clear signs of dislocation or distortion of the leads (see Figures 1 and 2).

However, a close study of the X-ray image may have led to a solution to the problem, as a very small con-

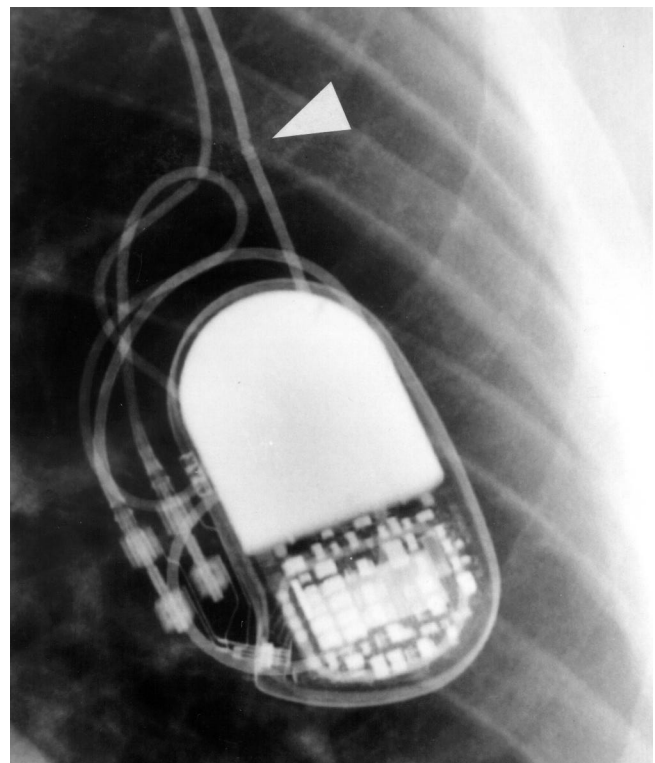


Figure 2. A more detailed X-ray photo shows a pseudofracture in the (atrial) body of the lead (a few centimeters above the pacemaker can - right lead, see arrow). The leads are projected over each other and the pacemaker. At one of the crossings (just left of the pseudofracture in the atrial lead) a tight constriction is visible.



*Figure 3. Two lead bodies and the sleeves with the suture remnants are represented in detail. At the lower part, the atrial lead is presented with the torn sleeve. The insulation of the body was slightly constricted (not visible). At the upper part of the figure, the ventricular lead body and the cut sleeve can be seen. Not only the outer insulation and the outer (proximal) coil are disconnected, but also the insulation around the inner (distal) coil, which explains the total loss of sensing and pacing.*

striction can be seen or suspected at the point where the leads cross. Therefore, a more detailed observation was planned. Fluoroscopy in the left oblique view ( $37^\circ$ ) with craniocaudal adjustments ( $13^\circ$ ) showed a severe constriction of the ventricular lead. The atrial

lead also showed a small constriction on fluoroscopy, which was described as a pseudofracture. A revision of the pacemaker system was performed. The damaged ventricular lead was explanted successfully and the atrial lead was inspected electrically and visually (Figure 3). In addition, the sleeve around the atrial lead had been cut completely through, and the body of the lead was not in ideal condition. The atrial lead was also removed and two new leads were implanted.

This lead fracture resulted from a thin suture (around the sleeve) that was fastened too tight. The sleeve itself was cut into two parts, and the outer insulation and outer coil were completely cut through.

### Recommendations

The sutures used to fixate the sleeves around the body of the lead should not be too thin. We recommend non-absorbable basting thread like Mersilene 2/0 or the equivalent, and the use of suture sleeves when fixation of the lead body is required or preferred. The sutures should fixate the lead and sleeve but should not strangle the lead and indirectly harm the patient [1-3].

### References

- [1] Castle LW, Cook S. Pacemaker Radiography. In: Ellenbogen KA, Kay NG, Wilkoff BL (eds). *Clinical Cardiac Pacing*. Philadelphia; WB Saunders Company. 1995: 553-558.
- [2] Dunbar RD. Radiologic appearance of compromised thoracic catheters, tubes, and wires. *Radiol Clin North Am*. 1984; 22(3): 699-722.
- [3] Hayes DL. Pacemaker Radiography. IX Lead integrity. In: Furman S, Hayes DL, Holmes DR Jr (eds). *A Practice of Cardiac Pacing*, Third Edition. Armonk, NY; Futura Publishing Company. 1993: 392-397.

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