

Lead insulation breach manifested by pectoral activation – Seeing is believing



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Introduction

There are a variety of manners in which pacemaker lead compromise may present, depending on multiple factors. Consequently, careful ongoing monitoring of the device and associated lead(s) with office-based and remote surveillance remains standard for early detection and intervention. While other reports of lead insulation breach causing extracardiac muscle activation are well-known, the video display presented in this case report permits a unique view of such an event alongside stable conventional lead metrics otherwise.

Case report

An 89-year-old man with remote history of coronary artery bypass graft surgery received a dual-chamber pacemaker 10 years ago for complete heart block, requiring pulse generator change 2 years ago. He reported intermittent palpitations (“chest jumping”) while lying on his left side, but this could not be reproduced in the office. Device interrogation revealed long episodes of nonsustained ventricular tachycardia, which did not correlate with reported symptoms. Invasive programmed stimulation was inducible for sustained ventricular tachycardia, prompting upgrade to a dual-chamber implantable cardioverter-defibrillator. Upon opening the pocket, gross activation of the pectoral muscle was seen in alignment with each atrially paced event while the device was fully externalized, excluding unipolar pacing as an etiology for pectoral capture. This observation was accentuated with manual pressure in the pocket, likely explaining the postural variation in symptoms. Removal of the atrial lead from the header demonstrated reproducible cessation of pectoral activation (Supplemental Video) and cinefluoroscopy was devoid of any obvious radiographic infractions on the lead.

KEYWORDS Extracardiac muscle capture; Lead insulation breach; Pacemaker malfunction; Pacing impedance trends; Pectoral activation; Palpitations (Heart Rhythm Case Reports 2021;7:743–744)

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KEY TEACHING POINTS

- Lead insulation breaches are most frequently manifested by falling impedances, rising stimulation thresholds, reduced sensing, and nonphysiologic (“noise”) signals visualized on the associated channel.
- Extracardiac muscle stimulation, including pectoral and intercostal, are far less common presentations of an insulation defect, usually occurring simultaneously with 1 or more of the above-outlined features.
- Careful attention to symptom reports of “twitching” or even palpitations outside of the context of arrhythmias or obvious pacing lead disturbances should prompt the provider to fully examine the ipsilateral chest wall during a pacing cycle for assessment of extracardiac muscle stimulation.
- Maneuvers, including upper extremity isometrics, repositioning, gentle pocket massage, and varied pacing outputs may be useful in elucidating findings consistent with subtle lead compromise.

Preoperative atrial lead characteristics were normal, exhibiting stable trends in sensed amplitudes, capture thresholds, and impedances (Figure).

Discussion

Following implantation of a new atrial lead, no further pectoral stimulation was elicited, even with maximal output pacing. In aggregate, this scenario could only be explained by a lead insulation breach resulting in a current leak and consequent pectoral stimulation, which completely resolved with lead replacement. Lead insulation breaches generally result in changes in impedance trends, but these can be subtle and transient.¹ Other unique written and video-documented

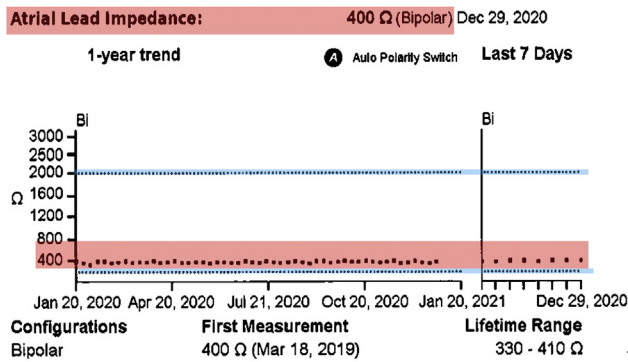


Figure Atrial lead impedance trend over the year prior to presentation, reflecting normal/stable measures (*pink*) plotted between standardly expressed upper and lower limits of acceptable (*blue*).

accounts of extracardiac muscle activation from device/lead defects have been reported.^{2,3} However, these were further characterized by corresponding maladies in lead integrity

metrics or grossly visible hardware flaws, which were not identified in our case. Pectoral capture as a cause of debilitating postural “palpitations” can occur owing to lead integrity failures despite stable lead parameters on interrogation.

Appendix Supplementary data

Supplementary data associated with this article can be found in the online version at <https://doi.org/10.1016/j.hrcr.2021.08.004>.

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