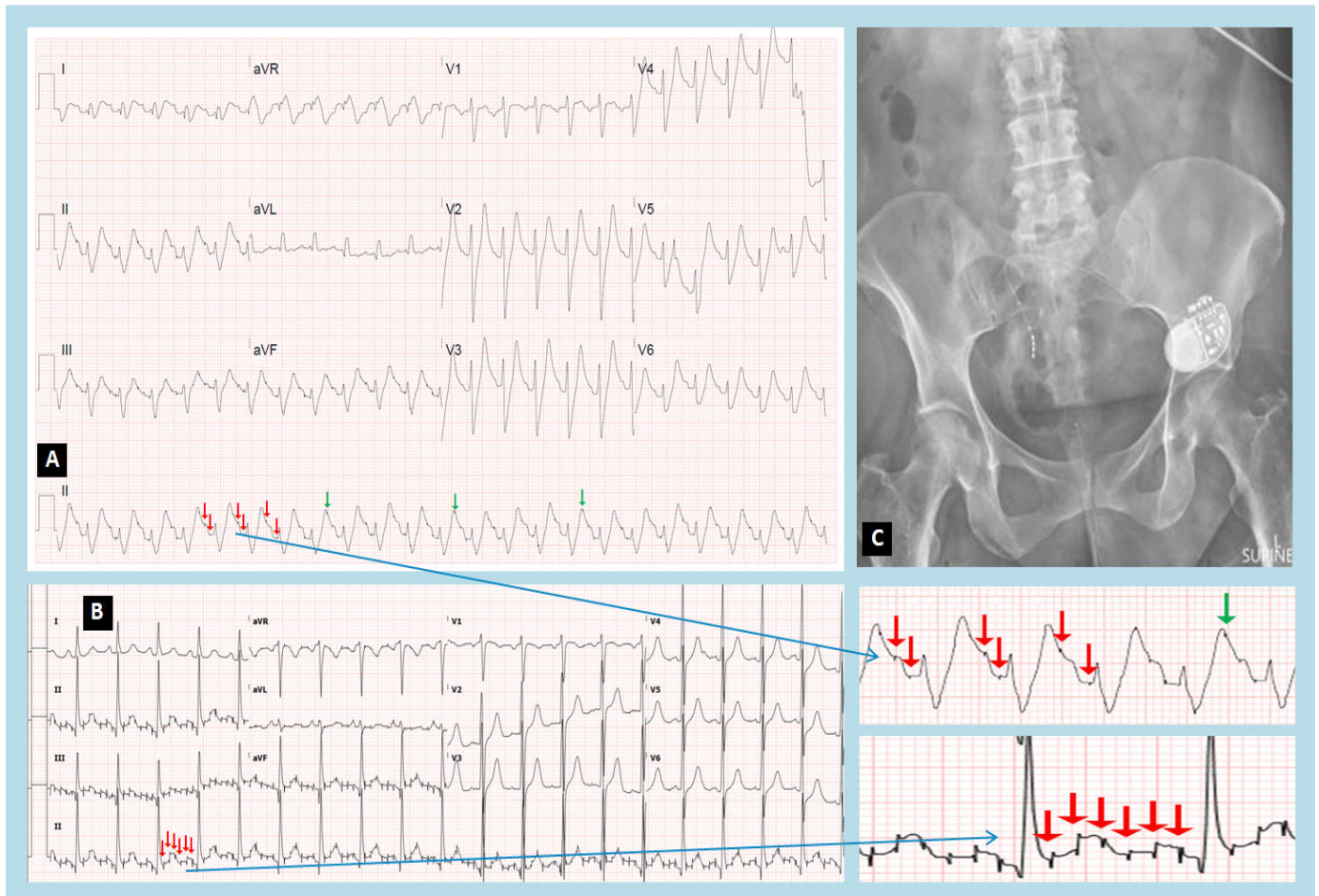


## Bladder Pacemaker: *Electrocardiographic Interference!*

Rajasekhar Mulyala, M.D.<sup>a</sup>, Nupur Shah, M.D.<sup>a</sup>, Mariam Riad, M.D.<sup>a</sup>, Nikky Bardia, M.D.<sup>a</sup>, Usman Sarwar, M.D.<sup>a</sup>, Maulikkumar Patel, M.D.<sup>a</sup>, Mustafeez Ur Rahman, M.D.<sup>a</sup>, Christopher Malozzi, D.O.<sup>a</sup>, Bassam Omar, M.D., Ph.D.<sup>a,b</sup>



### Description

The above electrocardiogram (EKG) in Figure A reveals pacemaker spikes preceding a wide QRS complex rhythm initially suggestive of dual chamber (AV sequential) pacing. Closer scrutiny (insert) reveals additional pacemaker spikes on the T waves which are inappropriate and do not support a pacing role for the detected spikes. Review of a prior EKG in Figure B revealed very fast pacing spikes with a cycle length of approximately 77 ms, and a rate of about 780/minute, thought to be AC interference (insert). The Chest X ray did not reveal

evidence of any cardiac pacemaker. A Kidney, Ureter and Bladder (KUB) X ray, however, revealed a bladder pacemaker historically placed for atonic bladder as the cause for this interference artifact, likely set at 13 Hz, as seen in Figure C. The EKG changes in Figure A were in retrospect related to significant hyperkalemia with tachycardia, which coincided with the bladder pacemaker spikes causing the elusive appearance of dual chamber pacing with wide QRS rhythm and peaked T waves preceded by pacemaker spikes.

## **Discussion**

EKG recording errors have been reported in approximately 6.5% of EKGs performed in a hospital setting [1]. Interference on an EKG from adjacent electrical devices has been reported previously not only in the setting of a bladder stimulation device [2], but also from a variety of extracardiac stimulators [3].

Many types of EKG artifacts have been reported [4] which include a several types of lead reversals or misplacements and tremor artifacts related to patient motion such as in Parkinson's disease. Of greater than 1000 EKGs performed in a hospital setting, 5.9% were reported to have artifact, about 17% of which was AC noise (interference) artifact [5]. It is important to be vigilant of such artifacts [6] to avoid misinterpretation of these EKGs as cardiac arrhythmia or cardiac pacing (as in our case) and find ways to reduce such errors which can impact patient care [7].

---

Manuscript submitted Nov 14, 2022 accepted Nov 22, 2022

a Division of Cardiology, University of South Alabama, Mobile, AL 36617

b Corresponding Author: Bassam Omar, Division of Cardiology, University of South Alabama, 2451 USA Medical Center Dr., Mobile, AL 36617, USA.

Email: bomar@health.southalabama.edu

<http://cardiofellows.com/newsletter-november-2022.html>

## **References**

1. Moses A, Malozzi C, Omar B. Prevalence of ECG Recording Errors in a University Hospital ECG Database. *Circ Cardiovasc Qual Outcomes*. 2016 February;9:A236.
2. Madias JE. Electrocardiographic artifact induced by an electrical stimulator implanted for management of neurogenic bladder. *J Electrocardiol*. 2008 Sep-Oct;41(5):401-3.
3. Guinand A, Noble S, Frei A, Renard J, Tramer MR, Burri H. Extra-cardiac stimulators: what do cardiologists need to know? *Europace*. 2016 Sep;18(9):1299-307.
4. Pérez-Riera AR, Barbosa-Barros R, Daminello-Raimundo R, de Abreu LC. Main artifacts in electrocardiography. *Ann Noninvasive Electrocardiol*. 2018 Mar;23(2):e12494.
5. Awan MU, Omar M, Omar B, Malozzi C, Awan MU. ECG Recording Errors Prevalence in a Hospital Setting. *Circ Cardiovasc Qual Outcomes*. 2018 April; 2018;11:A244.
6. Drew BJ. Pitfalls and artifacts in electrocardiography. *Cardiol Clin*. 2006 Aug;24(3):309-15, vii.
7. Davies A. Recognizing and reducing interference on 12-lead electrocardiograms. *Br J Nurs*. 2007 Jul 12-25;16(13):800-4.

---

**KEYWORDS:** Bladder Pacemaker; Atonic Bladder; Electrocardiography; Interference Artifact.

### Reference this article as:

Mulyala A, Shah N, Riad M, Bardia N, Sarwar U, Patel M, Rahman MU, Malozzi C, Omar B. Bladder Pacemaker: *Electrocardiographic Interference!* Cardiofel Newslet 2022. Nov; 5(11):34 – 35.