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Authors: Rafał Młynarski, Michał Sosna, Maciej Honkowicz, Michał Gibiński, Karolina Simionescu, Michał Rozmus, Krzysztof S Golba

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Usefulness of metal artifact reduction algorithms from pacemaker lead in diagnostic of late perforation: The right choice makes it easier to make a decision

Short title: IMAR and lead perforation

Rafał Młynarski^{1, 2*}, Michał Sosna^{1, 3*}, Maciej Honkowicz^{1, 3}, Michał Gibiński^{2, 4}, Karolina Simionescu^{2, 4}, Michał Rozmus⁵, Krzysztof S Golba^{2, 4}

¹Department of Electroradiology, School of Health Sciences, Medical University of Silesia, Katowice, Poland

²Electrocardiology Department, Upper Silesian Medical Center, Katowice, Poland

³Department of Radiology, Upper Silesian Medical Center, Katowice, Poland

⁴Department of Electrocardiology and Heart Failure, School of Health Sciences, Medical University of Silesia, Katowice, Poland

⁵Department of Radiodiagnostics and Interventional Radiology, University Clinical Center prof. K Gibinski of the Medical University of Silesia, Katowice, Poland

*These authors contributed equally to this work

Correspondence to:

Rafał Młynarski, MD,
Department of Electroradiology,
School of Health Sciences,
Medical University of Silesia,
Ziołowa 45, 40–635 Katowice, Poland,
phone : +48 323 598 900,
e-mail: rmlynarski@sum.edu.pl

Dislocations of lead(s) of cardiac implantable electronic devices (CIED) often result in cardiac tamponade [1, 2]. Risk of lead dislocation is higher in very elderly patients (≥ 80 years).

Additionally risk of complication increase in the latest methods of cardiac pacing including left bundle branch area pacing, where overall incidence of lead dislodgments is about 1% [3]. The combination of various imaging techniques allows for a proper diagnosis and treatment. The biggest problem are artifacts from the exposed metal parts of the lead(s).

We present a case of massive asymptomatic lead dislocation, after implantation of the DDD pacemaker in 2007, due to the sinus node dysfunction. Patient (women) was admitted to the Hospital due to asymptomatic dislocation of the ventricular lead with perforation of the left ventricular wall and displacement to the pleural cavity, which was found in a routine lung X-ray examination. The patient denies fainting. Implanted device has been programmed in AAIR mode (base rate 50/min; atrial pacing rate 12%).

The chest X-ray shows abnormal location of right ventricular lead with its tip projected below the contour of left diaphragm, at the level of gastric air bubble in left upper abdominal quadrant, (possibly in the intraabdominal adipose tissue).

To support decision about lead extraction, we performed a computed tomography scan using Siemens Somatom Force. Obtained images show the course of ventricular lead along the interventricular septum and perforation the wall of the right ventricle near the apex of the left ventricle. Then the lead runs subpleural in the pericardial fat tissue, its tip locates in the supradiaphragmatic fat tissue of left costophrenic angle, at the level of costochondral junction of the left VII rib.

Due to numerous lead artifacts, iterative metal artefact reduction (IMAR) techniques was superimposed on the image in various subroutines, as shown in the [Figure 1](#) [4, 5]. In our opinion IMAR gives promising results, but not with pacemaker preset. Dental presets seems to be the best in this rare case.

In the Holter electrocardiography, no atrioventricular conduction disturbances were recorded. After the Heart Team decision, the patient was qualified for further conservative treatment. The patient was in good general condition and was discharged home.

Article information

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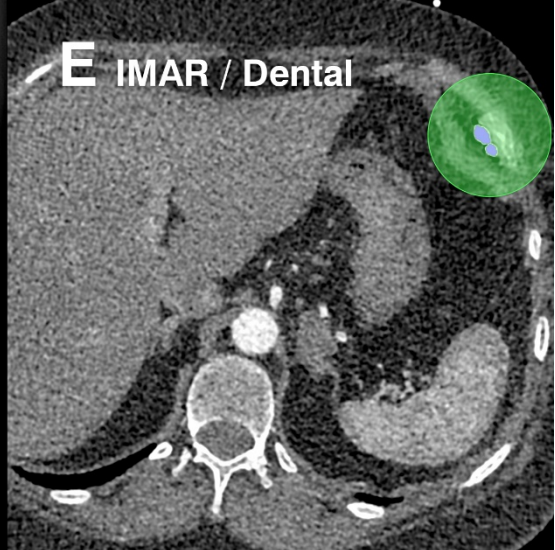
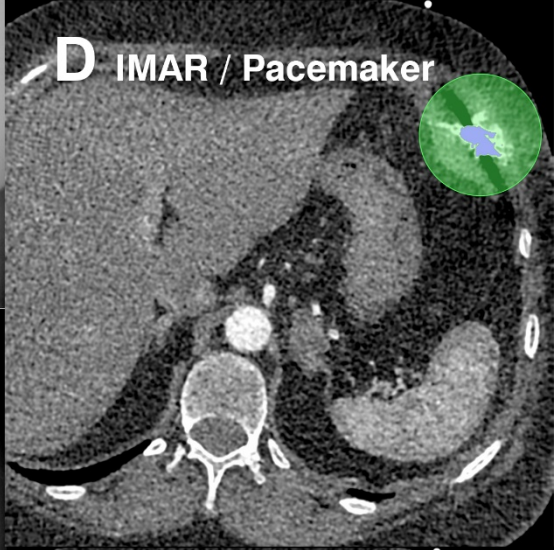
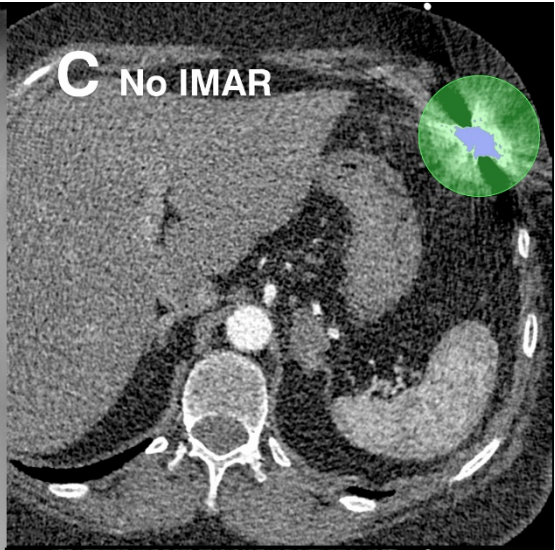
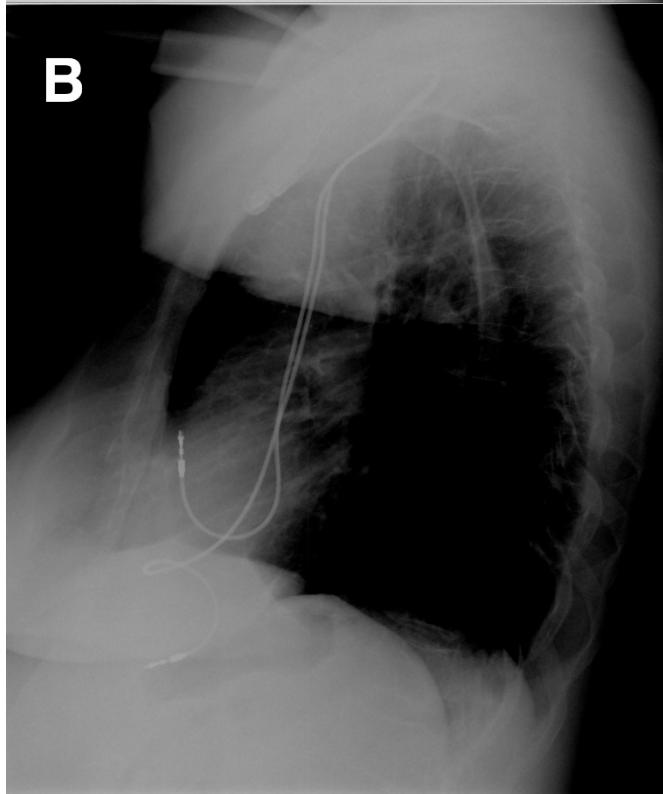
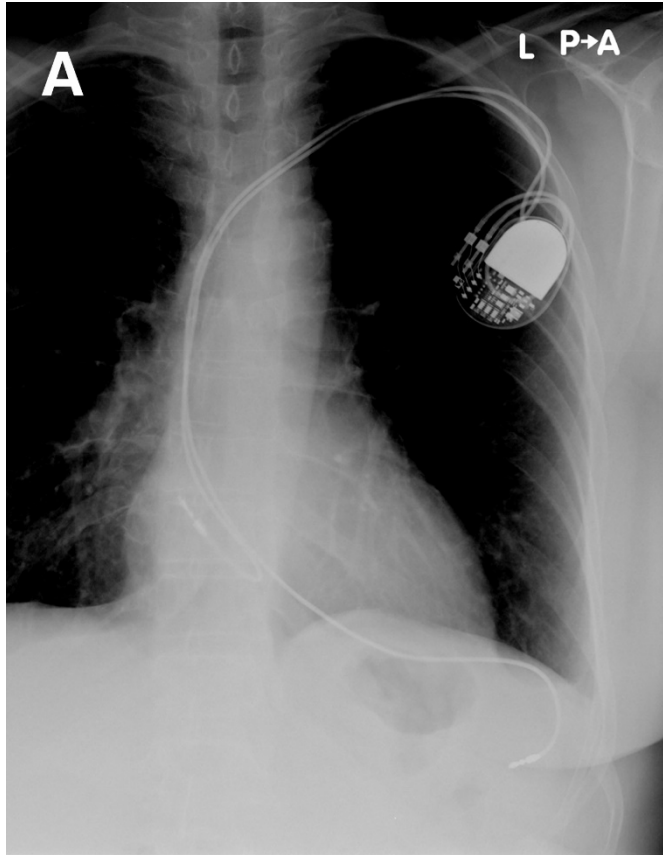


Figure 1. Posteroanterior (**A**) and lateral (**B**) chest X-ray shows right ventricular lead projected under the left diaphragm. Native (**C**) and IMAR-filtered (**D**, **E**) computed tomography images showing reduction of the area of metallic artifacts around the lead tip, with best results on dental preset (**E**)