

Catch the Important Beats: Unmasking Inadvertently Left Ventricular Pacing

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Abstract

A patient implanted with a two-chamber pacemaker developed an episode of transient-ischemic-attack. A six-lead-ECG during magnet positioning on the pacemaker revealed an S-wave in lead DI suggestive of a malpositioned pacemaker-lead in the left ventricle. This was confirmed by X-Ray and the lead was removed. We recommend recording an ECG with paced ventricular beats once in every pacemaker-patient.

Keywords

Pacemaker; Malposition; Lead; ECG

Abbreviations

ECG: Electrocardiogram; ILM: Inadvertent Lead Malposition; TIA: Transient Ischemic Attack

Introduction

Inadvertent lead malposition (ILM) in the left heart is a complication of heart rhythm device implantation. The incidence of ILM has recently been described as 0.34% and was associated with several risk factors (abnormal thoracic anatomy, underlying congenital heart disease, and inexperienced operator) [1].

Case Report

A 64-year old patient came to our attention with an episode of transient ischemic attack (TIA). In another hospital she was implanted with a dual-chamber pacemaker two years earlier due to a second degree AV-block. Part of the investigation of the TIA was a pacemaker interrogation with impedance, sensing and threshold values within normal ranges. A six-lead electrocardiogram (ECG) recorded during application of a magnet on the pacemaker is shown in Figure 1. It revealed atrio-ventricular sequential pacing with two ventricular paced beats followed by ventricular fusion beats. The S-wave in lead D1 of these first two ventricular paced beats aroused the suspicious of an inadvertently malpositioned pacemaker-lead in the left ventricle. This was confirmed by X-Ray (Figure 2) and echocardiography (Figure 3). The lead, as the most likely cause of the TIA, was removed and replaced by a correctly positioned pacing lead in the right ventricle.

Discussion

Inadvertently malpositioned pacemaker lead in the left ventricle is a rare complication of device implantation [1,2]. Although the expected QRS-morphology during left ventricular pacing is a right bundle branch block (RBBB), Okmen et al found a RBBB-pattern with “true left ventricular pacing” in only 12 of the analyzed 47 cases [3]. As an expression of the increasing dominance of the right oriented electrical forces during pacing from the left ventricle, all 12 cases revealed an S-wave in lead D1, whereas only 2 out of the remaining 35 cases with RBBB-pattern but proven right ventricular pacing showed an S-wave in lead D1 [3].

In our case the suspicion of a malpositioned pacemaker lead in the left ventricle could be entertained with a simple 6-lead ECG recorded during application of a magnet on the pacemaker.

The incidence of thromboembolic complications in patients without oral anticoagulation was 37% in a recently published review [3] and the thromboembolic event occurred from 6 months to 6.5 years after implantation of the lead. These findings make clear that an inadvertently malplaced left ventricular lead might not be detected despite regular pacemaker interrogations. We recommend critically analyzing once an ECG during ventricular pacing in every pacemaker patient.

Figures

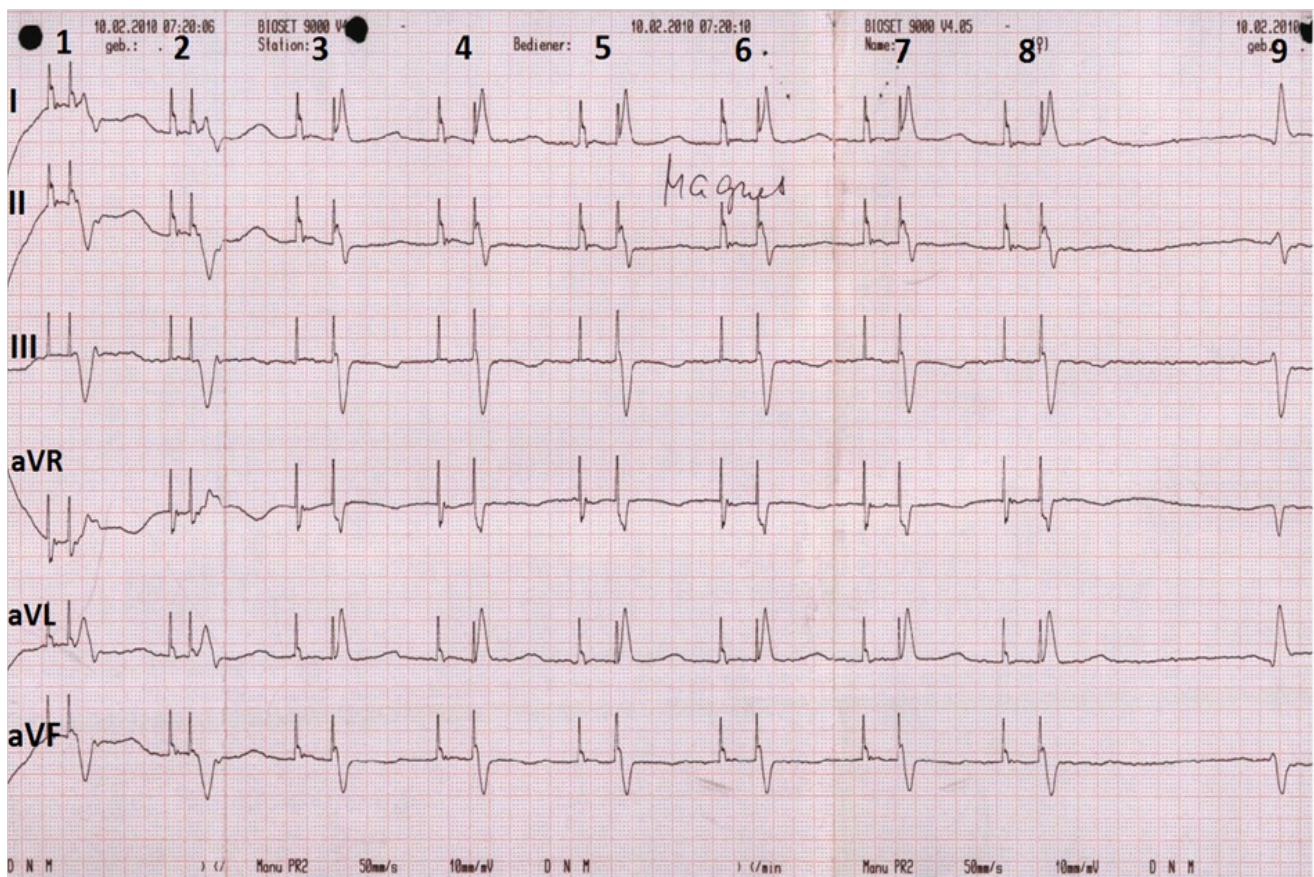


Figure 1: Six-lead electrocardiogram with a magnet applied to a dual chamber pacemaker. The electrocardiogram shows atrio-ventricular sequential pacing with true ventricular pacing during the first two beats followed by six ventricular fusion beats and one sinus beat. Note the S-wave in lead DI of the first two ventricular paced beats suggestive of an inadvertently malpositioned pacemaker-lead in the left ventricle.

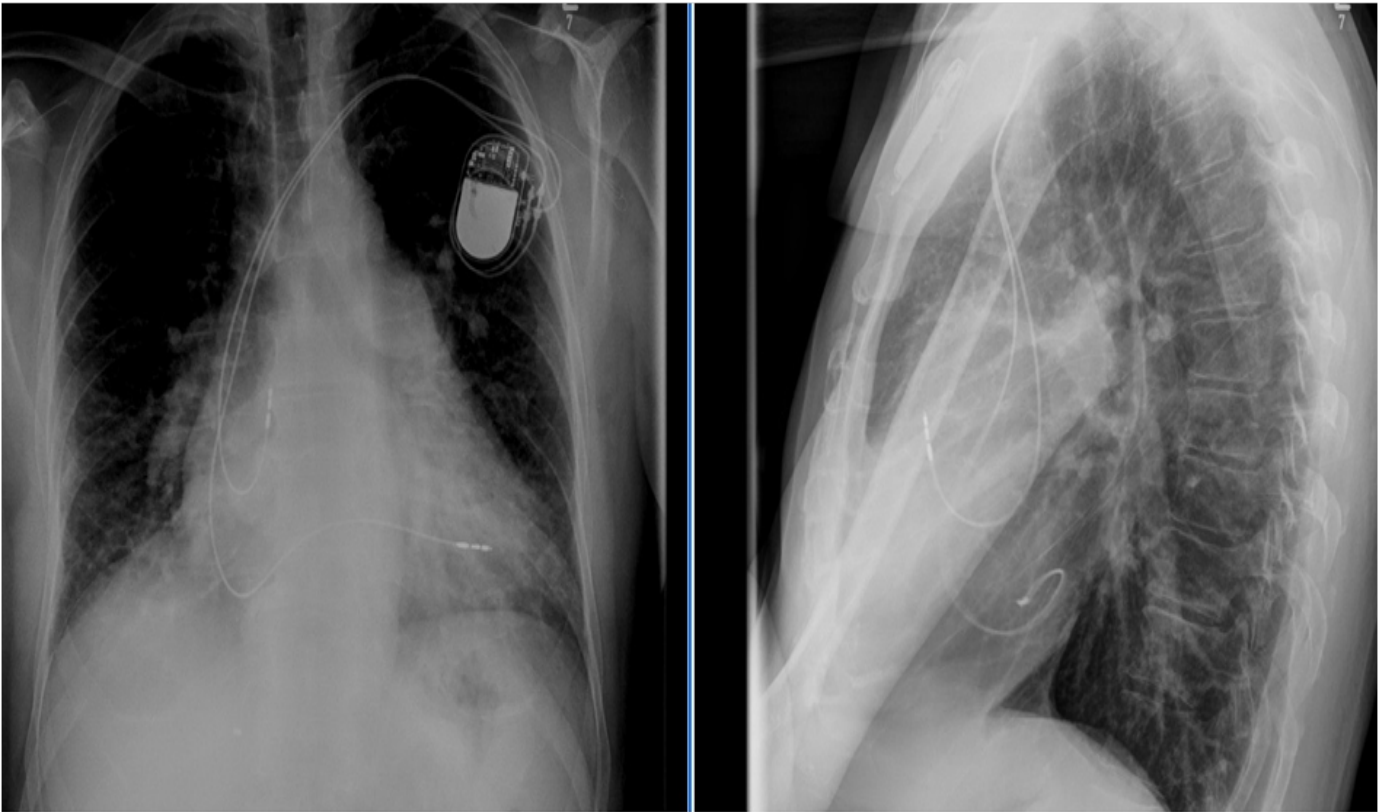


Figure 2: Posterior-anterior (left) and lateral (right) chest x-Ray showing the passage of the right ventricular lead through the intra-atrial septum

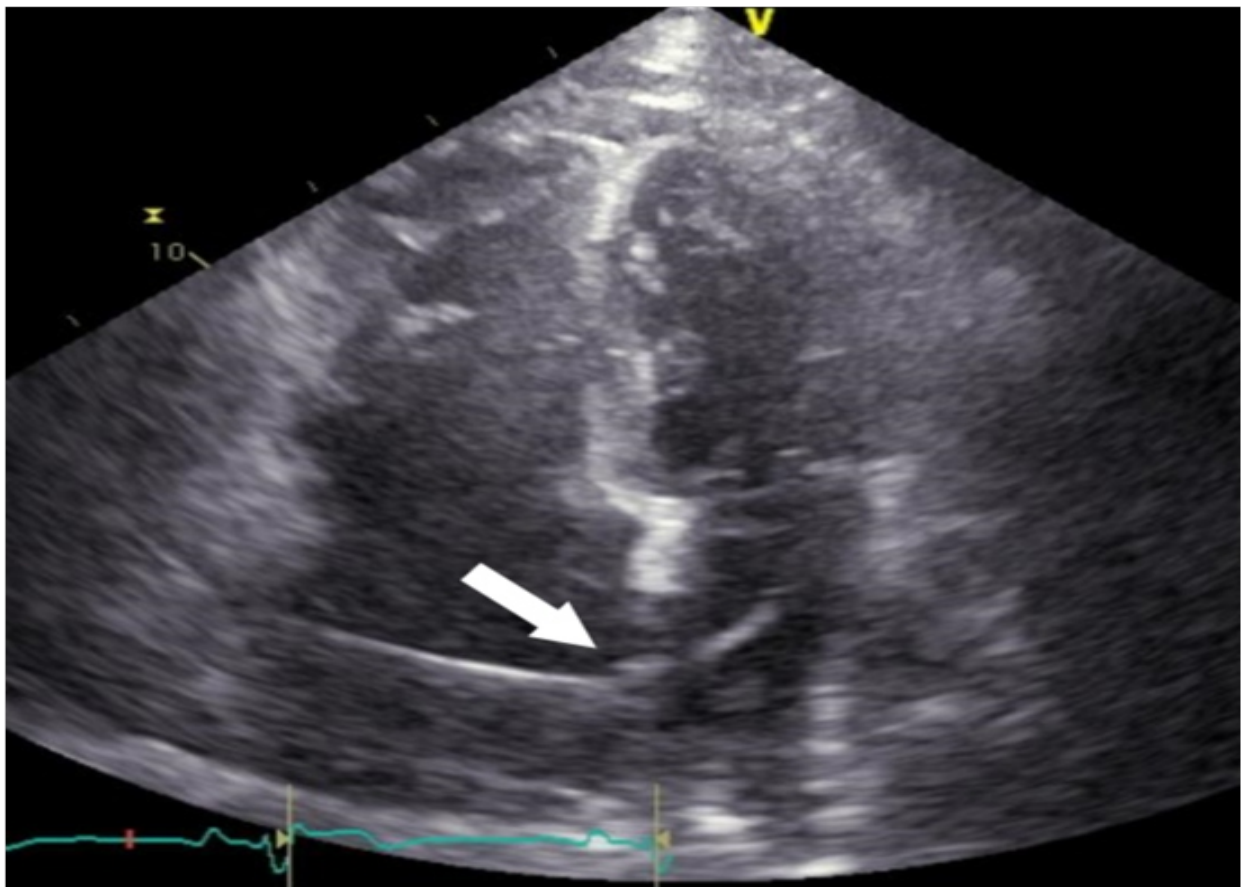


Figure 3: Echocardiographic apical four-chamber view showing the passage of the right ventricular lead through the intra-atrial septum (arrow)

References

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