Cough, a rare and not well recognized symptom of lead perforation

Francesca Parisi, Elisabetta Demurtas, Marta Allegra, Lorenzo Pistelli, Giuseppe Dattilo, Pasquale Crea

Cardiology Unit, Department of Clinical and Experimental Medicine, University Hospital of Messina, Italy

ARTICLE INFO

Article history:
Submitted: 2. 9. 2021
Accepted: 18. 9. 2021
Available online: 10. 10. 2022

Klíčová slova:
Implantace kardiostimulátoru
Kašel
Perforace srdce elektrodou
Tamponáda

SOUHRN

Na naše oddělení byla přijata 64letá žena k implantaci dvoudutinového kardiostimulátoru. Samotný výkon se obešel bez jakékoli komplikace. Jedna komorová elektroda s aktivní fixací byla umístěna v hrotu pravé komory. Brzy po implantaci začal pacientku sužovat neproduktivní kašel, jednoznačně související s komorovou stimulací. Transtorakální echokardiografie prokázala malý perikardiální výpotek podél apikálních segmentů. U pacientky bylo provedeno urgentní CT vyšetření s kontrastní látkou, které potvrdilo perikardiální výpotek a přítomnost elektrody v myokardu hrotu pravé komory. Pro přetrvávání symptomů jsme se rozhodli přemístit pravokomorovou elektrodu do středu mezikomorového septa. Po výkonu kašel okamžitě vymizel.

Keywords:
Cough
Lead perforation
Pacemaker implantation
Tamponade

ABSTRACT

A 64-year-old woman was admitted to our department for dual-chamber pacemaker implantation. No complication apparently occurred during the procedure. An active fixation ventricular lead was positioned in right ventricular septal apex. Soon after implantation the patient started to suffer from non-productive cough, clearly related to ventricular stimulation. Transthoracic echocardiography revealed a small pericardial effusion along the apical segments. The patient underwent urgent contrast chest CT confirming pericardial effusion, and showing an intramyocardium placement of the right ventricular apical lead. Due to persistence of symptoms, we decided to perform right ventricular lead repositioning in right middle septum. Post-procedure, cough abruptly disappeared.

Introduction

Along with relevant progress in technology, pacemaker implantation is continuously improving its safety and efficacy in treating patients with bradyarrhythmias.[1] Despite this, this procedure has several complications, including hematoma, pneumothorax, lead dislodgement, infection, lead perforation and tamponade.[2] Atypical symptoms, like headache and palpitation, are also described and defined as pacemaker syndrome. In our report, we describe a case of a woman developing non-productive cough and palpitation soon after pacemaker implantation.

Case report

A 64-year-old woman, suffered from hypertension, was admitted to our emergency department for recurrent loss of consciousness. Vital parameters were normal (BP 115/85 mmHg, HR 80 b/m, SO_2 98%). Her ECG showed sinus rhythm, normal atrioventricular conduction, and right bundle branch block (RBBB). 24-hour 12-lead ECG recording, CT and MRI brain and electroencephalography resulted negative. The patient underwent loop recorder implantation (Medtronic Reveal LinQ), in order to assess arrhythmic causes of syncope, and was discharged. Two weeks later, an episode of paroxysmal complete AV block, conditioning a pause of 3 seconds, was recorded (Fig. 1). Thus, the patient was scheduled for urgent dual-chamber pacemaker implantation and loop recorder removal. No complication apparently occurred during the procedure. An active fixation ventricular lead was positioned in right ventricular septal apex while passive fixation atrium lead in the right appendage (Fig. 2A). Soon after implantation the patient started to suffer from non-productive cough, clearly re-

Address: Dr. Pasquale Crea, Cardiology Unit, Department of Clinical and Experimental Medicine, University Hospital of Messina, Via Consolare Valeria, 98124 Messina, Italy, e-mail: pasqualecrea@hotmail.it
DOI: 10.33678/cor.2021.111

Please cite this article as: Parisi F, Demurtas E, Allegra M, et al. Cough, a rare and not well recognized symptom of lead perforation. Cor Vasa 2022;64:554–556.

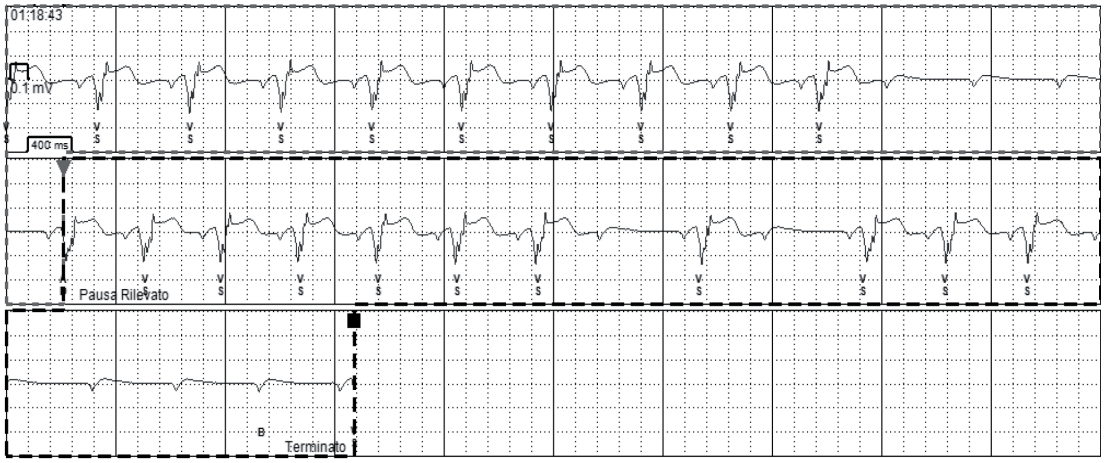

Fig. 1 – ECG strip recording of loop recorder showing III degree paroxysmal AV block.

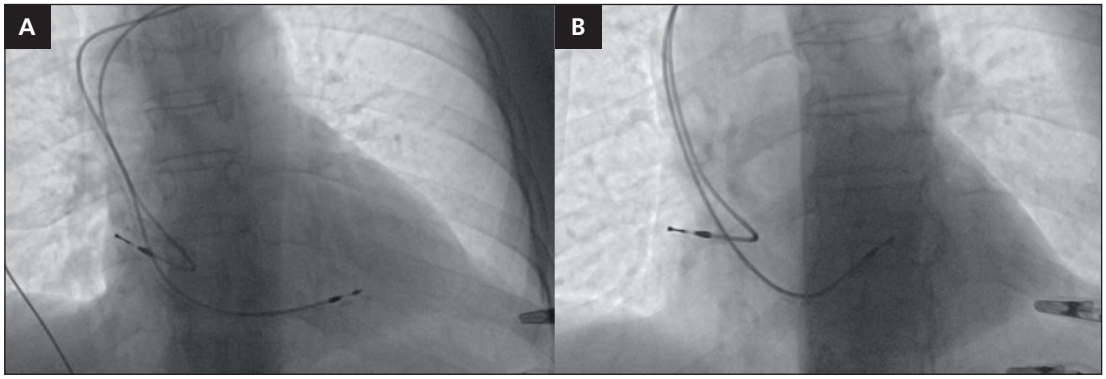

Fig. 2 – Fluoroscopy showing leads position in AP view after first implantation (A) and in LAO 30° view after revision (B).

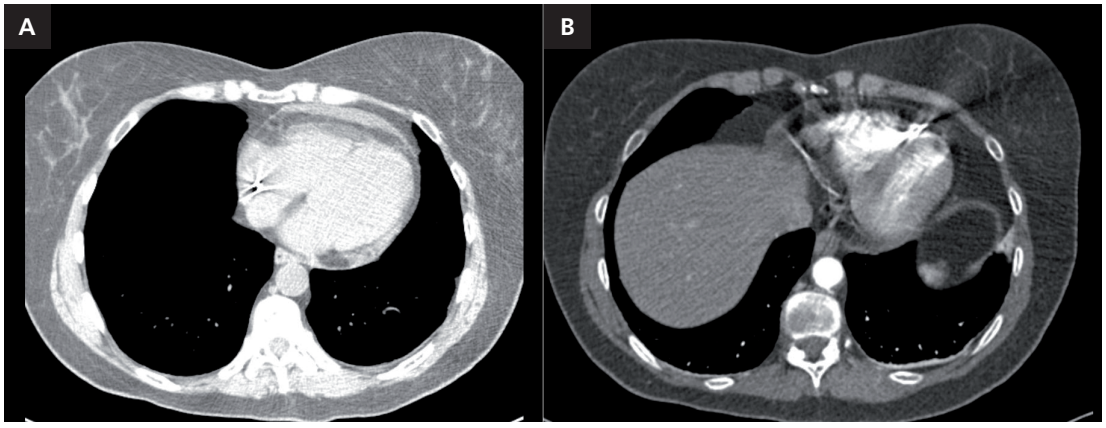

Fig. 3 – Contrast CT scan: (A) pericardial effusion; (B) intramyocardium placement of the right ventricular apical lead.

lated to ventricular stimulation, either in DDD or in VVI pacing modality. Vital parameters were always normal (BP 120/75 mmHg, HR 85 b/m, SO_2 99%). During spontaneous ventricular activation (RBBB) no symptoms occurred. Transthoracic echocardiography, performed the day after implantation, revealed a small pericardial effusion (diastolic diameter < 10 mm) along the apical segments, near the tip of the right ventricular lead. Suspicion of right ventricular lead perforation arised. The patient underwent urgent contrast chest CT confirming pericardial effusion, and showing an intramyocardium placement of the right ventricular apical lead (Fig. 3). No active bleeding in pericardium was observed. Due to persistence of symptoms, we decided to perform right ventricular lead repositioning in right middle septum (Fig. 2B), with pericardiocentesis back-up promptly available. However, pericardial effusion remained stable during and after the procedure. Post-procedure, palpitation and cough abruptly disappeared. Two days later the patient was discharged. After three months of follow-up, no significant symptoms were reported and pericardial effusion gradually disappeared.

Discussion

We describe a singular case of cough, as atypical symptom immediately after pacemaker implantation. Although a clear time-correlation between cough and pacemaker implantation, we excluded other common causes of non-productive cough: bronchial or pulmonary inflammation/infections or ACE inhibitor use. The cough could be an atypical but recognized feature of the pacemaker syndrome defined as "the symptoms and signs present in the pacemaker patient which are caused by inadequate timing of atrial and ventricular contractions".[3] This happens because the pacing produces adverse hemodynamic changes and, in some instances, the atrial contraction occurs against closed atrioventricular valves, producing reverse blood flow and non-physiologic pressure waves.[4] This event causes the development of symptoms including pulsation in the neck and in the abdomen, headache, cough, and jaw pain. Moreover, the findings suggest a possible role for afferent vagal receptors from the airways. In our case, the patient started to suffer from non-productive cough, clearly related to ventricular stimulation either in DDD or in VVI pacing modality. Cough in DDD modality, with preserved atrioventricular synchrony, makes unlikely the hypothesis of pacemaker syndrome. Pericardial effusion and contrast-CT showing intramyocardial position of the tip guided our suspicion to a possible right ventricular lead microperforation. Although right ventricular lead parameters were completely normal (namely RV threshold < 1 V and RV impedance near 650 ohm either in unipolar or bipolar configuration), this findings didn't exclude RV perforation.[5,6] The lead perforation is known as a rare complication of device implantation; previous studies have reported a lead perforation rates after pacemaker placement of 0.1–0.8%, and 0.6–5.2% after ICD placement.[7] Typical symptoms of RV lead perforation are chest pain and hypotension. The patient described in our case showed a hemodynamically stable pericardial effusion accompanied by non-productive cough, clearly time-related to RV stimulation. In literature, there is only one similar case report. Steiner et al. described cough as a rare symptom of right ventricular lead perforation.[8] Since pacemaker implantation, the patient suffered from chronic cough and he was symptomatic for several weeks before he underwent a lead replacement. The authors suspected lead perforation after chest CT showing the intracardiac lead placement. Pericardial effusion, contrast-CT showing intramyocardial position of the tip and, in the end, disappearance of symptoms just after RV repositioning justifying the hypothesis of RV lead microperforation.

Conclusions

The cough is a rare and not well recognized symptom of lead perforation. Early diagnosis of RV perforation allows performing urgently and safely (pericardiocentesis back-up) lead replacement/repositioning. Echocardiography and contrast-CT could be useful in order to assess a possible pericardial effusion or intramyocardial/pericardial position of RV lead tip.

Conflict of interest
None declared.

Funding body
None.

Ethical statement
Authors state that the research was conducted according to ethical standards.

Informed consent
The patient was asked to consider allowing Dr. Pasquale Crea to use his medical records to write a case report. The case report has been fully explained to the patient and all questions have been answered. We explained to the patient the objective of this manuscript, share information experienced by one patient during his clinical care that may be useful for other physicians and members of a healthcare team, and may be published in JECG for others to read. The patient authorized access to his personal health information and she has agreed to participate in this case report.

References

1. Clémenty N, Fernandes J, Carion PL, et al. Pacemaker complications and costs: a nationwide economic study. J Med Econ 2019;22:1171–1178.
2. Udo EO, Zuithoff NP, van Hemel NM, et al. Incidence and predictors of short- and long-term complications in pacemaker therapy: the FOLLOWPACE study. Heart Rhythm 2012;9:728–735.
3. Schüller H, Brandt J. The pacemaker syndrome: old and new causes. Clin Cardiol 1991;14:336–340.
4. Naito M, Dreifus LS, David D, et al. Reevaluation of the role of atrial systole to cardiac hemodynamics: evidence for pulmonary venous regurgitation during abnormal atrioventricular sequencing. Am Heart J 1983;105:295–302.
5. Hirschl DA, Jain VR, Spindola-Franco H, et al. Prevalence and characterization of asymptomatic pacemaker and ICD lead perforation on CT. Pacing Clin Electrophysiol 2007;30:28–32.
6. Ahmed A, Shokr M, Lieberman R. Subacute Right Ventricular Perforation by Pacemaker Lead Causing Left-Sided Hemothorax and Epicardial Hematoma. Case Rep Cardiol 2017;2017:1264734.
7. Mahapatra S, Bybee KA, Bunch TJ, et al. Incidence and predictors of cardiac perforation after permanent pacemaker placement. Heart Rhythm 2005;2:907–911.
8. Steiner S, Schueller PO, Blondin D, Winter J. Cough as a rare symptom of a pacemaker lead perforation. Pneumologie 2015;69:86–88.