VIA MEDICA

CASE REPORT

Piotr Lackowski[1], Anna Bacza[1], Małgorzata Ostrowska[2], Tomasz Fabiszak[2], Wojciech Krupa[2], Jacek Kubica[2, 1]

[1]Student's Scientific Society, Department of Cardiology, Collegium Medicum, Nicolaus Copernicus University, Bydgoszcz, Poland
[2]Department of Cardiology and Internal Medicine, Collegium Medicum, Nicolaus Copernicus University, Bydgoszcz, Poland

75-year-old man with lung cancer obscured by an implantable cardioverter--defibrillator — case report

Corresponding author:
Piotr Lackowski, Student's Scientific Society, Department of Cardiology, Collegium Medicum, Nicolaus Copernicus University, Marii Skłodowskiej-Curie 9 St. 85-094 Bydgoszcz
E-mail: lackowski.piotr@gmail.com
Tel: 52/585 40 23,
Fax number: 52/585 4574

Medical Research Journal 2019; Volume 4, Number 1, 63–66
DOI: 10.5603/MRJ.a2019.0005

ISSN 2451–2591

ABSTRACT

We present a case of a 75-year-old man, who underwent a scheduled implantable cardioverter-defibrillator reoperation and has had a lung cancer found in a chest X-ray taken after the procedure, that was completely obscured by the previous device.

Key words: Lung cancer, ICD, chest X-ray

Med Res J 2019; 4 (1): 63–66

Introduction

Lung cancer is the most dominant form of cancer among men and the second one according to frequency among women in Poland [1]. In a group of implantable cardioverter-defibrillator (ICD) recipients, there are patients diagnosed with lung cancer but nationwide population-based cohort study in Denmark did not indicate a causal relationship between ICD implantation and cancer occurrence [2]. The aim of this case report was to point out not to forget about lung area hidden under the cardiac implantable electronic devices (CIEDs), as in the presented case the tumor was completely obscured by the previous device in prior chest X-ray.

Case report

A 75-year-old patient with coronary artery disease, hypertension, chronic left ventricular heart failure (New York Heart Association [NYHA] class II) and intermittent claudication was admitted to the Cardiology Department of University Hospital no 1 in Bydgoszcz for upgrade from ICD to cardiac resynchronization therapy defibrillator (CRT-D) with concomitant transvenous lead extraction (TLE).

The patient's medical history included an episode of ventricular fibrillation on 14th October 2009, coronary artery disease with a critical stenosis of right coronary artery on coronary angiography with subsequent unsuccessful, percutaneous coronary intervention. Echocardiographic examination at that time showed normal left ventricular ejection fraction (LVEF 55%). Patient was qualified for ICD implantation for secondary prevention of sudden cardiac death. On 28th October 2009 a single chamber ICD (Biotronik Lumax 300 VR-T) was implanted with a single coil Saint Jude Medical Durata lead. Defibrillation threshold test was successful at 18 J.

Between October 2009 and August 2015 the patient had multiple follow-up visits in the Outpatient Electrophysiology Clinic. In February 2012 the patient underwent electrical storm with multiple ICD discharges due to recurrent episodes of ventricular tachycardia and ventricular fibrillation. The only pathology identified as the cause was mild hypokalemia and the patient was started on amiodarone. Since September 2014 signs of electrode dysfunction were noted such as gradually growing ventricular pacing thresholds (from 1.2 V/1 ms in September 2014 up to 4.9 V/1 ms in July 2015) and increasing low-voltage circuit impedance (from 498 Ohm in September 2014 up to 2550 Ohm in July 2015), with normal and stable coil impedance and sensing

values. In July 2015 ICD battery elective replacement indication (ERI) status was reached. Due to ERI, signs of dysfunction of the high voltage lead and presence of clinical indications for cardiac resynchronization therapy (progression of heart failure — NYHA class II on admission, with concomitant left ventricular systolic dysfunction (left ventricular ejection fraction [LVEF] of 32%, and presence of left bundle branch block with QRS duration of 160 ms), the patient was qualified for replacement of the dysfunctional lead with concomitant upgrade from ICD to CRT-D.

The patient was admitted to the Cardiology Department on 27th August 2015. On admission he reported only moderate exertional dyspnoe with no other significant symptoms. Physical examination revealed enlarged axillary lymph nodes on the left side and lack of pulse on the popliteal and dorsal arteries on both sides (the patient had a history of intermittent claudication and was under supervision of vascular surgeon). Chest X-ray taken on hospital admission showed no abnormalities. The echocardiographic parameters were as follows: left ventricular ejection fraction: 32%, left ventricular end-diastolic diameter: 62 mm, left atrium diameter: 44 mm, interventricular septum diameter: 12mm. Low concentration of thyroid stimulating hormone (TSH) and slightly increased thyroid hormones prompted diagnosis of hyperthyroidism, probably secondary to amiodarone therapy and thiamazolum was added to the chronic treatment.

On 28th July 2015 the dysfunctional lead and the ICD can were successfully extracted and replaced with a Boston Scientific Origen CRT-D device with a Medtronic CapsureFix atrial lead, single coil Saint Jude Medical Durata high voltage lead and bipolar Saint Jude Medical Quickflex left ventricular lead. The surgery was uneventful.

As a routine post-procedural follow-up investigation, the standard posterior-anterior (PA) and lateral chest X-rays were taken (Figure 2. and 3.), which unexpectedly showed a round shape shadow in the upper pole of the left lung (area completely obscured by the previous device in pre-procedural X-ray — Figure 1.). Subsequent chest computed tomography revealed a pathological mass in the upper lobe of the left lung, sized 47x45x41 mm, with irregular, polycyclic borders, with contrast enhancement — suggestive for lung tumor. Abdominal ultrasound performed in search for possible metastatic foci showed no abnormalities. The patient was discharged from hospital and referred to a pulmonology department.

Subsequent telephone follow-up with the patient's family member revealed that the patient was qualified only for palliative therapy and eventually patient died in September 2016 due to respiratory failure.

Timeline of events

2009.10 — ICD implantation for secondary prevention of sudden cardiac death.
2012.02 — Electrical storm only with mild hypokalemia identified as the only reversible cause. Amiodaron added to therapy.
2014.09 — First signs of high voltage lead dysfunction.

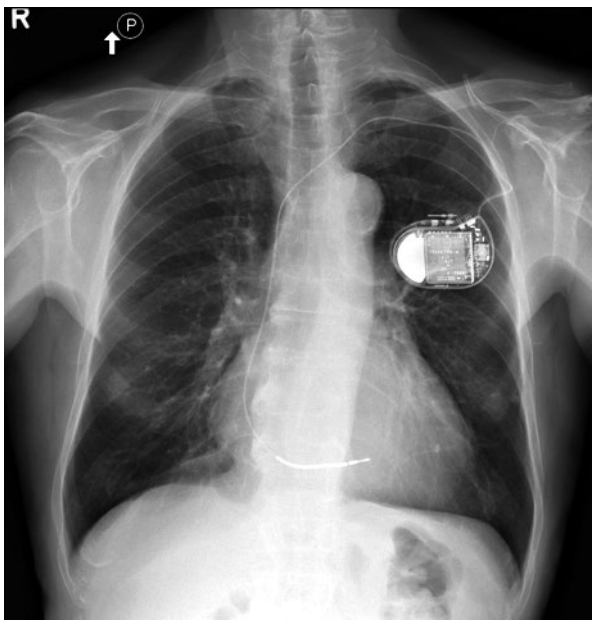

Figure 1. The posteroanterior chest X-ray taken before TLE procedure

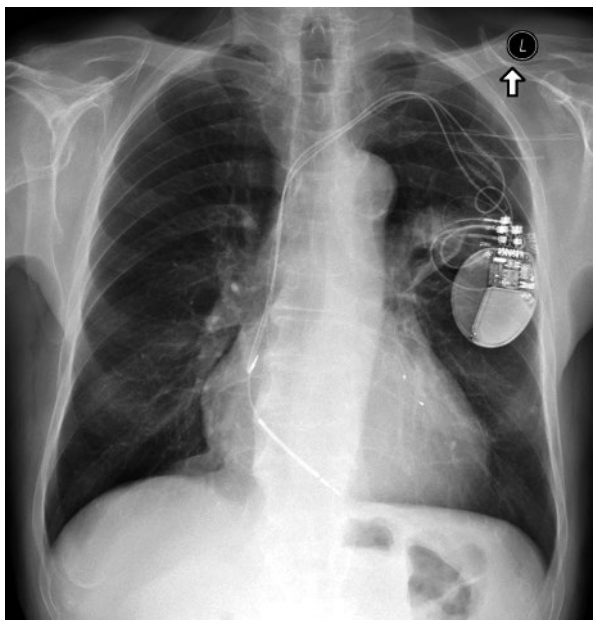

Figure 2. The posteroanterior chest X-ray taken after TLE procedure

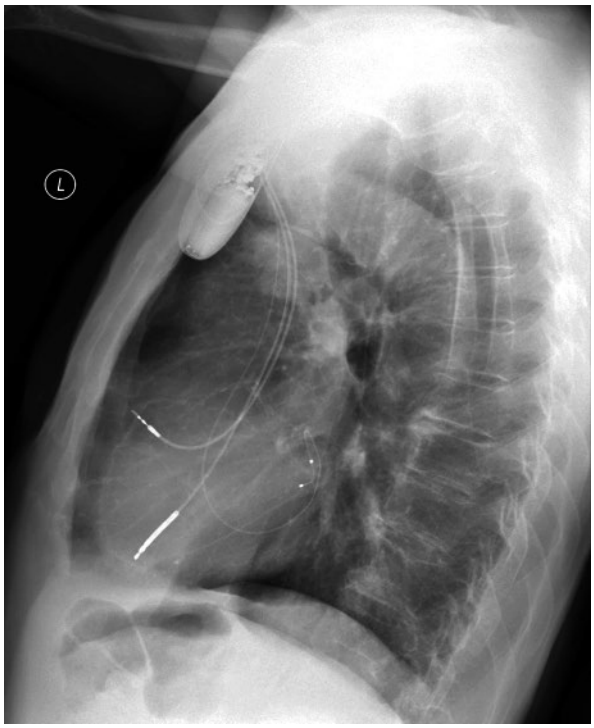

Figure 3. The lateral chest X-ray taken after TLE procedure

2015.04 — Follow-up visit in the Outpatient Electrophysiology Clinic: right ventricular (RV) pacing threshold: 2.8V/1.0 ms, an RV lead impedance: 1092 ohm.
2015.07 — Elective replacement indication status reached (low battery voltage).
2015.08.27 — Admission to the Cardiology Department. Normal admission chest X-ray.
2015.08.28 — Extraction of dysfunctional lead and ICD. Implantation of CRT-D.
2015.08.29 — Postoperative Chest X-ray displaying a round shadow (44x43x42 mm) in the upper lobe of the left lung cavity.
2015.09.03 — Abdominal ultrasound exam: no metastatic foci were found.
2015.09.04 — Chest CT scan: a pathological mass in the upper lobe of left lung- 47x45x41 mm, with irregular polycyclic and spicular outlines suggestive of lung tumor.
2015.09.04 — Discharge from hospital and referral to the Pulmonology Department.
2015.11 and 2016.06 — Follow-up visit in the Outpatient Electrophysiology Clinic: no arrhythmias.
2016.09 — Patient's death.

Discussion

The nationwide Danish population-based cohort study performed by Pedersen et al. did not indicate a causal relationship between ICD implantation and cancer, but the authors concluded that extended follow-up data are needed to elucidate risks for individual cancer types [2]. According to the literature, there have been cases of patients with CIEDs and lung cancer showing successful treatment of those patients with radiotherapy [3–4]. If radiotherapy is indicated or additional diagnostics is needed (i.e. lung biopsy) and it's not possible due to localization of CIED, there is always a possibility to relocate or remove the device. However, the radiotherapy is not the only possible treatment for lung cancer in the CIED recipients. In case of the interventional pulmonology procedures consultation with a physician involved in the CIED implantation is always required. It is usually necessary to change the parameters of the device for the time of surgery in order to prevent adverse events and more frequent follow-up visits in the Outpatient Electrophysiology Clinic in the course of radiotherapy are warranted.

The distinguishing feature of this case is an incidental diagnosis of lung cancer after relocation of the device during the exchange procedure. The pathological finding that was present prior to the surgery and could suggest a neoplasmatic process were the enlarged axillary lymph nodes. It was only the accidental change of the position of the device that allowed to visualize the previously invisible pulmonary field. In a case report presented by Bowers et al. two patients were also diagnosed with lung cancer directly posterior to a previously implanted ICD device, but in both cases, the new opacities were not completely overshadowed by the device [5]. One should be remembered that the field under the CIED may be not visible in the standard PA chest X-ray. This is important as the number of CIEDs recipient's is increasing and lung cancer is one of the most frequent cancers.

Learning points

The area under the CIED cannot be seen in the standard PA chest X-ray and this should be kept in mind. In order to visualize this lung area, there is a need for an additional side chest X-ray or a computed tomography (CT) scan.

In patients with CIEDs and symptoms suggestive of lung cancer, but normal results of the standard PA chest X-ray, extensive imaging methods should be applied.

Disclosure of interest: The authors declare that they have no conflict of interest

References

1. Didkowska J, Wojciechowska U, Olasek P. CANCER IN POLAND IN 2015, Polish National Cancer Registry Department of Epidemiology and Cancer Prevention, Warsaw . 2017; 11: 11.

2. Pedersen SB, Nielsen JC, Bøtker HE, et al. Implantable cardioverter-defibrillators and subsequent cancer risk: a nationwide population-based cohort study. Europace. 2015; 17(6): 902–908, doi: 10.1093/europace/euv076, indexed in Pubmed: 25840286.
3. Ahmed I, Zou W, Jabbour SK. High dose radiotherapy to automated implantable cardioverter-defibrillator: a case report and review of the literature. Case Rep Oncol Med. 2014; 2014: 989857, doi: 10.1155/2014/989857, indexed in Pubmed: 25276450.
4. Wadasadawala T, Pandey A, Agarwal JP, et al. Radiation therapy with implanted cardiac pacemaker devices: a clinical and dosimetric analysis of patients and proposed precautions. Clin Oncol (R Coll Radiol). 2011; 23(2): 79–85, doi: 10.1016/j.clon.2010.08.031, indexed in Pubmed: 21041071.
5. Bowers RW, Scott PA, Roberts PR. Use of external defibrillator jacket to facilitate safe delivery of radiotherapy for lung cancer - a report of two cases. Indian Heart J. 2014; 66(1): 111–114, doi: 10.1016/j.ihj.2013.12.004, indexed in Pubmed: 24581107.