CASE REPORT

Right giant atrial thrombosis and pulmonary embolism complicating pacemaker leads

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SUMMARY

We describe a case of a patient with bilateral pulmonary embolism because of a giant intracardiac thrombus anchored on a right atrial pacemaker lead treated with unfractionated heparin and the consecutively complete thrombus resolution after 5–6 days.

placed and there were no signs of pulmonary congestion or pulmonary infarction.

INVESTIGATIONS

The patient underwent transthoracic echocardiography (TTE) which showed mild hypertrophy of the interventricular septum with normal left ventricular size and function. The right ventricle was dilated (end-diastolic diameter of 42 mm), associated with systolic ventricular dysfunction (tricuspid annular planar systolic excursion of 11 mm and systolic tissue velocity Doppler imaging TVI of the lateral tricuspid annulus of 8 cm/s) with a positive McConnell's sign. Pulmonary arterial pressure was increased (60 and 34 mm Hg, both systolic and mean pulmonary arterial pressure, respectively).

A large oval mass (suspicious for thrombus) was detected. It was mobile, anchored to the right atrial lead surface, with irregular profile measuring 50×40 mm and passing through the tricuspid valve to the right ventricle (figures 2 and 3). The patient was immediately admitted to our department and underwent a chest CT. It documented submassive bilateral pulmonary embolism and confirmed a thrombus at the level of the main pulmonary branches and the presence of the floating thrombus in the right atrium implanted at the pacemaker lead (figures 4 and 5). A Doppler study of the upper and lower extremity veins and pelvic regions did not show any signs of peripheral thrombi. An abdominal and pelvic echo tomographic study did not reveal any abnormalities. The study of thrombophilia was negative.

BACKGROUND

Intracardiac thrombus complicating pacemaker leads is a potential, although uncommon, complication of intracardiac pacemaker leads. The proper diagnosis requires a high index of suspicion. The pathogenesis of thrombosis related to these implanted devices remains controversial.

CASE PRESENTATION

An 84-year-old man was referred to our department for recent acute dyspnoea arising at rest. In 1999, he was subjected to a dual-chamber pacemaker implantation because of episodes of syncope and bradycardia. He was treated with ramipril (10 mg/daily) for hypertension and acetylsalicylic acid 100 mg daily. On visit, he was symptomatic for dyspnoea with 20 breaths/min and diaphoresis; his heart rate was regular at 75 bpm. His heart sounds were normal, lungs were clear and no other physical signs of left heart failure were present. Blood pressure was 110/75 mm Hg. The patient had no clinical history or laboratory test indicative of infection or cancer. An electrocardiogram showed sinus rhythm at a rate of 80 bpm (figure 1). On chest X-ray, pacemaker leads were correctly

Figure 1 The ECG performed at the visit showed sinus rhythm induced by a dual-chambers pacemaker.

To cite: D'Aloia A, Bonadei I, Vizzardi E, et al. *BMJ Case Rep* Published online: [please include Day Month Year] doi:10.1136/bcr-2012-008017

Figure 2 The ECG showing the oval large thrombus detected and anchored to the right atrial lead and passing through the tricuspid valve to the right ventricle.

TREATMENT

Considering the relatively stable haemodynamic profile (blood pressure of 110/75 mm Hg) and the age, the patient was initially treated with intravenous unfractionated heparin, including a bolus of 5000 UI followed by infusion to obtain a coagulation time two to three times the control.

OUTCOME AND FOLLOW-UP

TTEs performed daily showed that the intracardiac thrombus reduced in size and that the systolic pulmonary artery pressure decreased to 40 mm Hg with the confirmation of complete resolution of the lead thrombus after 5–6 days (figure 6). A CT scan checked after 10 days confirmed pulmonary embolism and atrial right lead mass resolution. The patient was discharged with oral anticoagulation and ramipril and he remained asymptomatic and healthy for several months.

DISCUSSION

Permanent intravascular devices, such as pacemakers and defibrillators, have been associated with the development of local vascular vein stenosis and thrombosis, which may be attributed to the presence of multiple pacemaker leads and/or a temporary wire before implantation or the use of dual-coil leads.^{1–4}

In contrast with indwelling catheter-induced subclavian venous thrombosis, an intracardiac thrombus complicating a pacemaker lead is uncommon and tends to have an asymptomatic course.^{5–7}

Figure 3 The ECG showing the oval large thrombus detected and anchored to the right atrial lead and passing through the tricuspid valve to the right ventricle.

Figure 4 CT scan showing the presence of thrombus in the main pulmonary branches.

Seeger and Scherer observed a 15% incidence of asymptomatic pulmonary embolism among patients undergoing pacemaker implantation who were not receiving heparin therapy.⁸ A more recent autopsy series of patients with implantable cardiac devices identified pulmonary emboli in 21% of patients.⁹ Coleman *et al*¹⁰ have also reported intracardiac thrombosis associated with trans-venous pacemaker leads in 24 patients; 62.5% of them presented acutely with congestive heart failure, shock, shortness of breath or chest pain, 20.8% presented subacutely with malaise, cyanosis, oedema or fever and 16.7% presented without symptoms. Despite this relative frequency, the aetiology and potential long-term implications of subclinical pulmonary embolism remain poorly understood. The aforementioned studies have used a variety of imaging modalities to evaluate thrombosis in the upper extremity and great veins and the potential downstream emboli to the lungs but have not evaluated the presence of thrombi on the intracardiac segment of the leads. Intracardiac thrombi have sometimes been detected by TTE, but considering the limited resolution of this technique, the presence of intracardiac lead thrombi may be under-recognised.² Recently Supple *et al*¹¹ observed the presence of mobile thrombi on cardiac implantable electronic device leads, identified by intracardiac echocardiography in 30% of the population of patients undergoing ablation; detection was underestimated using on TTE (3.8%).

In our patient, thrombosis lead detection was casually found by TTE; so this technique resulted to be a valuable diagnostic tool in this setting. Pacing lead-related thrombosis is a poor and

Figure 5 CT scan showing the presence of the floating thrombus in the right atrium adhered to the pacemaker lead.

Figure 6 The ECG showing the complete resolution of the thrombus located on the right atrial lead. Note the disappearance of the mass after anticoagulation therapy.

scarcely recognised phenomenon and the therapeutic management options may include anticoagulation or surgical extraction.

If a not-large-size thrombus is detected in a patient who is asymptomatic or at low risk of embolisation, anticoagulation may be considered as a reasonable option.

If the thrombosis is evidenced in a patient who is symptomatic or at high risk of embolisation, the therapeutic options may include:

- ▶ Intravenous administration of heparin followed by chronic warfarin therapy;
- ▶ Thrombolytic therapy (either as an initial approach in case of haemodynamic instability or in patients in whom anticoagulation fails);
- ▶ Surgical removal of a pacemaker lead followed by anticoagulation.

Our patient was treated efficaciously (with rapid thrombus disappearance) using unfractionated heparin followed by administration of oral vitamin K antagonist considering the age and the absence of cardiogenic shock and/or persistent arterial hypotension.

Learning points

- ▶ The number of patients undergoing permanent intravascular device implantations with more leads is constantly increasing.
- ▶ Device lead thrombosis could be an underestimated phenomenon.
- ▶ It may have tragic consequences such as pulmonary embolism.

Contributors AD has contributed to the recovery of the images and critical revision of article. EV and IB have contributed in drafting the article and AC approved it.

Competing interests None.

Patient consent Obtained.

Provenance and peer review Not commissioned; externally peer reviewed.

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