

What to do with an atrial thrombus?

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This case report is about an 84-year-old woman admitted with right atrial thrombus attached to a pacemaker lead, diagnosed by transesophageal echocardiography. Surgical treatment was rejected due to the high operative risk, and percutaneous stenting was performed with success; unfortunately, the outcome was fatal and the patient died. We review here the clinical features of right atrial thrombi, including the epidemiology, clinical manifestations, diagnosis, and treatment, which is sometimes controversial.

An 84-year-old woman presented with progressive dyspnoea and weakness over the last ten days. She had a history of hypertension, essential thrombocytosis treated with hydroxyurea, atrial fibrillation, and a transitory ischaemic accident the previous month. The patient had a pacemaker implanted due to auriculoventricular block, which had been replaced 7 months before. Despite her previous medical history, she was not on anticoagulant therapy.

On physical examination, her blood pressure was 110/70 mmHg, with an irregular pulse of 80 lpm. She was eupnoeic at rest with oxygen concentration mask of 7 l (O₂ saturation of 94%) and her neck veins were not distended. The cardiopulmonary auscultation revealed a systolic murmur with normal heart sounds suggestive of mitral regurgitation and abolition of vesicular murmur on the inferior half of the right hemithorax. The rest of the physical examination was unremarkable. The laboratory blood analysis revealed a creatinine of 1.53 mg/dL, thrombocytosis of 492.000, hemoglobin of 12.2 mg/dL, pO₂ 61 mmHg, and pCO₂ 35.6 mmHg. The chest X-ray showed a pleural effusion in the inferior half of the right hemithorax and two leads of pacemaker in the right ventricle, of which only one was connected to the pacemaker generator. The 12-lead ECG showed atrial fibrillation with normal voltages.

The patient was admitted to hospital and a thoracentesis was performed, obtaining a thick, white, pleural fluid with characteristics similar to lymph. A CT-scan (computerized tomography) was then performed and revealed a thrombosis of the azygos arch and the superior vena cava next to the leads of the pacemaker, with an image

suggestive of thrombus into the right atrium. The patient was therefore scheduled for transoesophageal echocardiography, which confirmed the presence of a free-floating thrombus attached to the pacing lead in the right atrium, and colour flow Doppler was absent in the superior vena cava (Figures 1 and 2; see Supplementary material online, Movies 1 and 2).

Once the diagnosis of superior vena cava thrombosis probably due to pacing leads was established, a venography was performed in order to better characterize this entity. It showed non-occlusive thrombosis of both right and left brachiocephalic trunk up to the origin of the right subclavian vein. The superior vena cava was occluded from the origin of the azygos vein.

A chest tube was inserted to drain the chylothorax. Surgical treatment of the thrombosis was rejected due to the high operative risk and comorbidity. The patient was then considered for a percutaneous approach and the insertion of a stent in the superior vena cava. The procedure was successfully performed without any complications.

Nevertheless, over the following days, the patient developed a respiratory infection with progressive clinical deterioration that led to sepsis, and despite intensive antibiotic therapy, she progressively deteriorated and finally died.

Discussion

The venous thrombosis associated with permanent pacemaker leads was first described a few years after the first endocardiac pacemakers were implanted.¹ Recent reports estimate that venous obstruction after implantation of transvenous pacing leads can occur in almost 20–40% of

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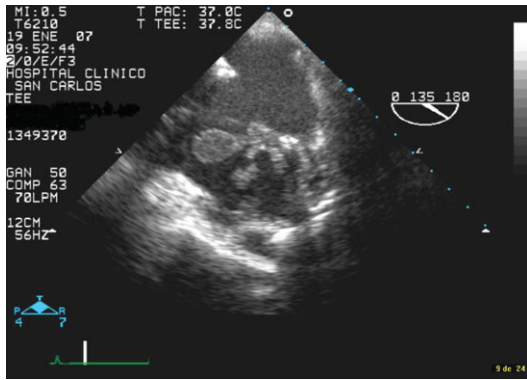


Figure 1 Transoesophageal echocardiography. Long-axis image plane of the right atrium (with transducer at 135°) showing a large, very mobile thrombus attached to the pacing lead, with total occlusion of the superior vena cava.

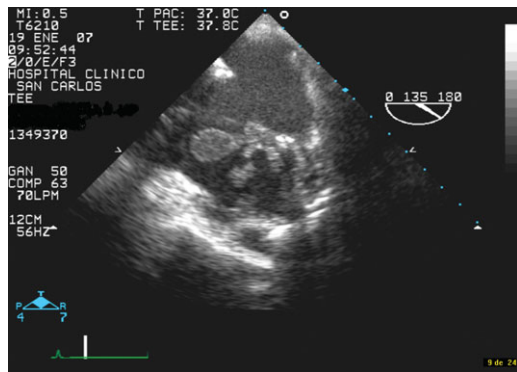


Figure 2 Transoesophageal echocardiography. Long-axis image plane of the right atrium (with transducer at 135°) showing a large, very mobile thrombus attached to the pacing lead, with total occlusion of the superior vena cava.

patients.^{2,3} Fortunately, clinically silent thrombosis is the rule as a result of the development of venous collateral circulation, and symptomatic vein thrombosis occurs only in 1–3% of the cases.^{2,4,5} However, when total occlusion is clinically manifest, it can lead to significant morbidity and mortality. The most frequent symptoms and signs are facial and arm swelling or pain, discoloration, visible collateral circulation, and occasionally, it can reproduce a superior vena cava syndrome.^{3,5} The finding of floating right atrial thrombi attached to a pacing lead is much more uncommon; however, it can be more life-threatening due to the high risk of pulmonary embolism. Moreover, it has been described that the presence of right heart thrombi in acute pulmonary embolism is associated with haemodynamic compromise, right ventricular hypokinesia, congestive heart failure, worse prognosis, and higher mortality rate.⁶ It is evident that massive pulmonary embolism or paradoxical embolism is more frequent if the thrombus is mobile or free-floating, as in this case (see *Figures 1 and 2*), but these severe consequences were not reported and, therefore, were not the cause of the fatal outcome of our patient. There are several useful imaging techniques for the diagnosis of pacing lead thrombosis in the right heart chambers. Transthoracic echocardiography is possibly the

first option due to its availability, but it provides poor sensitivity, especially in the presence of small thrombi that can easily be overlooked.⁷ Transoesophageal echocardiography can reveal cardiac structures and the great vessels without any anatomical interference, and that is the reason why some authors suggest that it should be the best initial image technique for the diagnosis and the subsequent management of these patients.⁷ Nevertheless, our opinion is that transthoracic echocardiography is a very useful technique, a simple and available tool to evaluate pulmonary artery pressure and other signs of right ventricular overload.^{8,9} The new image techniques as cardio-MR (magnetic resonance) and cardio-CT-scan have not been validated yet for the study of right atrial thrombi. They are probably a useful technique in some cases; however, they are less available and reliable than echocardiography.¹⁰ Moreover, MR is contraindicated in patients with magnetic devices, as the pacemakers. Percutaneous venography is the gold standard test to diagnose venous thrombosis, although it is not routinely used due to its risks for the patient.

The treatment of right atrial thrombosis of pacemaker leads is controversial.^{8,11} The size and site of the thrombosis and the duration and kind of symptoms are the main determinants of the treatment strategy. The options are medical therapy (antiplatelet, anticoagulation, and/or thrombolysis), surgical extraction, and percutaneous intervention. It has not been proved that the choice of the therapy has any effect on mortality, especially if the presentation is chronic. In our case, surgery was rejected due to the age and comorbidity of the patient, which determined a high risk for the intervention. Therefore, a percutaneous approach was considered the best option and was performed successfully, even if the final outcome was fatal.

Conflict of interest: none declared.

Supplementary material

Supplementary material is available in the online version.

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