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LETTER TO THE EDITOR

Primary cardiac lymphoma mimicking atrial thrombus in a patient who underwent permanent pacemaker implantation

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Dear Editor,

Primary cardiac lymphoma is a rare malignant lymphoma of the heart and pericardium [1, 2]. Delayed diagnosis is an ominous prognostic factor because of the non-specific initial presentation and rapid progression of this disease [3–7].

An 82-year-old woman with atrial fibrillation was prescribed amiodarone since early June 2009. In July 2009, she experienced dizziness, palpitation, and exertional dyspnea. Electrocardiography (ECG) revealed atrial fibrillation with slow ventricular rate (30–40/min). Amiodarone-induced arrhythmia was suspected initially, and then amiodarone was discontinued for more than 3 weeks. However, she continued experiencing dizziness occasionally and electrocardiography revealed junctional bradycardia.

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The patient was admitted to our cardiovascular ward. Holter ECG revealed a prolonged sinus pause (>3 s). Echocardiography showed left atrial dilatation (Fig. 1a). A permanent pacemaker was implanted via the left subclavian vein. Five days later, echocardiography (transthoracic and transesophageal) revealed a mass-like lesion, which was not observed 2 months earlier, in the right atrial appendage (Fig. 1b). The lesion was suggestive of a thrombus that was associated with pacemaker implantation.

The patient was prescribed anticoagulants and thrombolytic agents. However, a series of echocardiographies performed during the treatment period revealed poor response. After 4 weeks, computed tomography (Fig. 1c) revealed a filling defect in the heart and bilateral pleural effusion.

To investigate the cause of the intracardiac mass, we performed an operation in September 2009. Subtotal removal of the masses was performed because total resection was impossible. Pathologic examination revealed (Fig. 1d) large B cell lymphoma.

Bone marrow examination showed no invasion of the lymphoma cells. Positron emission tomography revealed a diffuse linear pattern of fluorodeoxyglucose (^{18}F-FDG) uptake in the cardiac recess; FDG uptake was not observed in any other region. Physical examination did not reveal palpable lymphadenopathy or other mass lesions.

The patient refused further treatment after the operation. However, she developed progressive orthopnea and exertional dyspnea in early October 2009. Follow-up echocardiography revealed enlargement of the heart mass. The patient received a series of systemic chemotherapy, including one cycle of COP (cyclophosphamide, vincristine, and prednisolone) followed by seven cycles of R-CHOP (rituximab, cyclophosphamide, anthracycline, vincristine, and prednisolone) until April 2010. The latest echocardi-

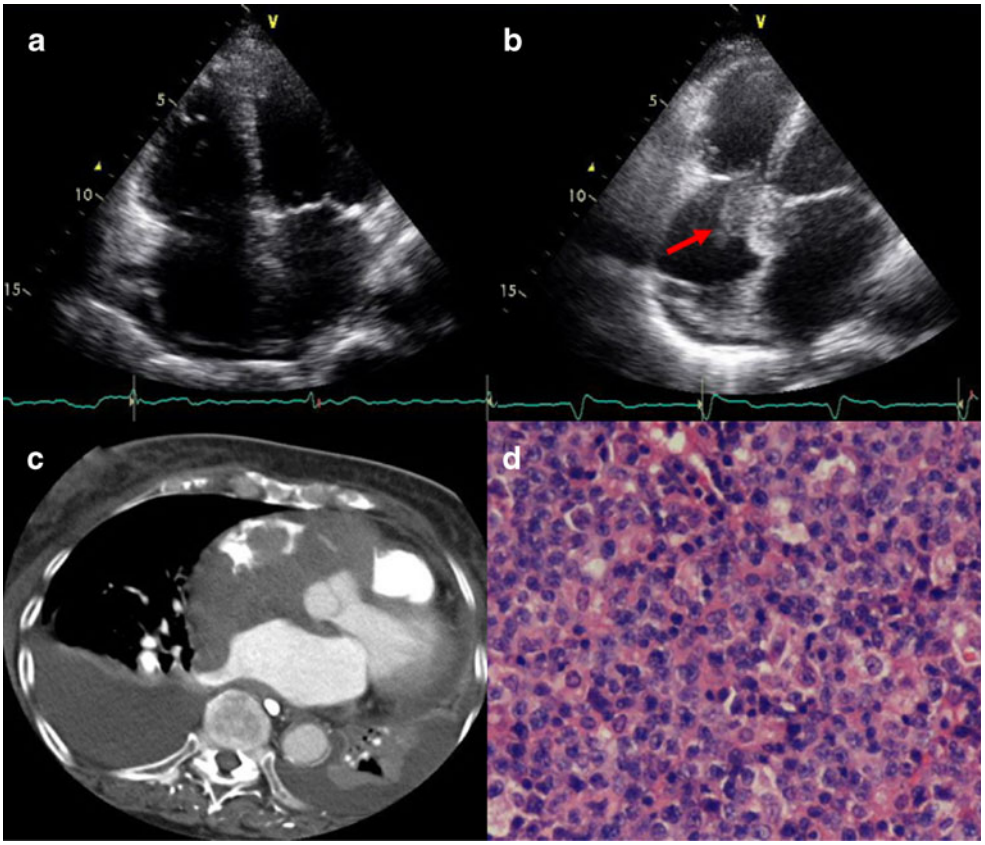

Fig. 1 **a** Echocardiography performed before permanent pacemaker implantation showed dilatation of the left atrium. **b** Echocardiography performed 5 days after permanent pacemaker implantation: A homogenous mass-like lesion in the right atrial appendage was revealed. **c** Contrasted computed tomography performed after 4 weeks of anticoagulation/thrombolytic therapy showed a obvious filling deficit in heart chamber. Thrombi in superior vena cava and right atrium were found. Bilateral pleural effusion was also noted. **d** Microscopically, the HE stain showed diffuse infiltration with a large number of intermediate-to-large pleomorphic neoplastic lymphoid cells, which were positive for CD20 and negative for CD3. *HE* hematoxylin and eosin stain

ography revealed no apparent tumor mass in the heart. Computed tomography revealed a marked regression of the intracardiac mass.

The cardiac mass, observed after the implantation of the pacemaker, is mostly caused by thrombosis that is associated with pacemaker insertion. The progressively enlarging mass, which was not responding to thrombolytic therapy or anticoagulants, in our case, however, arouses the concern of another etiology, such a neoplasm.

Echocardiography is the most common noninvasive diagnostic tool for detecting intracardiac masses. Generally, cardiac lymphoma appears as infiltrative, hypoechoic, heterogeneous, or lobulated masses in the heart [8]. However, not all echocardiographic findings are specific. To identify an intracardiac mass merely by echocardiography is difficult under certain clinical circumstances; a pathologic examination is mandatory for definite diagnosis.

In conclusion, the presentation of lymphoma as an intracardiac mass was quite unusual and could have been misdiagnosed as a thrombus. Lymphoma should be considered in the differential diagnosis when a mass of unknown cause develops in the heart.

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