Takotsubo Cardiomyopathy after Permanent Pacemaker Implantation

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A 78-year-old woman presented to our emergency room because of complete atrioventricular block. The patient experienced significant psychophysical stress during pacemaker implantation due to fear of operation. Acute lung edema occurred four hours after permanent pacemaker implantation. Coronary angiography showed no significant coronary artery stenosis and left ventriculography revealed typical abnormal wall motion of takotsubo cardiomyopathy. Three weeks later, follow-up echocardiography showed recovery of left ventricular wall motion abnormality. This case demonstrates that cardiologists should include takotsubo cardiomyopathy in the list of potential complications of permanent pacemaker implantation, especially in postmenopausal women.

Key Words: Pacemaker • Taiwan • Takotsubo cardiomyopathy

INTRODUCTION

Takotsubo cardiomyopathy (TCM) is a recently described and often underdiagnosed entity in Taiwan. The clinical presentation mimics acute myocardial infarction, but these patients have no significant stenosis of the coronary artery. Typically, the transient left ventricular (LV) dysfunction may present with akinesis or hypokinesis of the mid-to-distal portion of the LV chamber with hyperkinesis of the basal segments. The prognosis is favorable, because left ventricular function usually recovers relatively quickly after supportive care. Here we describe a case of TCM that occurred after permanent pacemaker implantation.

CASE REPORT

A 78-year-old Taiwanese woman presented to our emergency room because of dizziness and general weakness for 1 week. She had a longstanding history of hypertension. Her antihypertensive medications consisted of amlodipine 5 mg, doxazosin 4 mg, furosemide 20 mg and telmisartan 80 mg per day. On physical examination, her blood pressure was 185/71 mmHg, heart rate 34 beats per minute, and temperature 36.6 °C. There was a soft II/IV systolic murmur over the left sternal border and apex. There were no other noteworthy findings.

Blood tests yielded the following: a white blood cell count of 5,750/uL (normal range: 3,500-9,900); hemoglobin level of 11.9 g/dL (normal range: 14-18); platelet count of 250,000/uL (normal range: 130,000-340,000); creatine kinase (CK) level of 127 IU/L (normal range: 26-174); CK myocardial band (CK-MB) level of 3.6 IU/L (normal range: 0.1-6.3); and troponin I level of 0.07 ng/ml (normal < 0.5). Chest x-ray demonstrated mild cardiomegaly and no pulmonary congestion. Electrocardiogram (ECG) revealed complete atrioventricular block with a heart rate of 34 beats per minute and diffuse non-specific ST-T changes (Figure 1). Initially, the pa-
Patient refused temporary and permanent pacemaker implantation because she was afraid of having this type of operation. After informed consent was obtained, the patient received a dual-chamber pacemaker under local anesthesia on the day after admission. No apparent complications occurred, but the patient did experience significant psychophysical stress during implantation.

Four hours after pacemaker implantation, the patient developed dyspnea and orthopnea. Follow-up chest x-ray showed acute pulmonary edema. Repeat ECG showed atrial synchronous ventricular pacing and mild ST-segment elevation over V2-V5 (Figure 1). Follow-up CK and CK-MB levels were 161 and 11.0 IU/L, respectively, and troponin I 1.37 ng/ml. Echocardiography revealed akinesis of the apical and midventricular segments, hyperkinesis of the basal segments of the LV, and an overall LV ejection fraction estimated to be 13%. Intravenous furosemide and nitrate were prescribed for congestive heart failure. We administered intravenous amiodarone for episodes of non-sustained ventricular tachycardia. Twelve hours after pacemaker implantation, coronary angiography was performed, revealing no significant coronary artery stenosis. Left ventriculography showed apical akinesis and ballooning, and an ejection fraction of 30% (Figure 2). Intra-aortic balloon pump support was used for the acute decompensated heart failure with unstable hemodynamics. The cardiac enzymes peaked 24 hours later, with CK and CK-MB levels of 515 and 47.7 IU/L, respectively, and troponin I 10.55 ng/ml. Despite receiving intensive medical therapy, the patient developed respiratory failure that required in-
tubation and mechanical ventilation 3 days after pacemaker implantation. The patient developed ventilator-associated pneumonia and acute respiratory distress syndrome, which led to prolonged hospital stay. Follow-up ECG showed evolution of T-wave inversion (Figure 1). A transthoracic echocardiogram obtained three weeks later demonstrated complete resolution of the LV wall abnormalities with estimated LV ejection fraction of 62%. The ventilator was successfully weaned, and the patient was discharged 52 days later and maintained on a regimen of captopril, and furosemide. After 10 months’ follow-up, the patient was in good condition and relatively healthy.

DISCUSSION

In 1991 Dote et al. first named this transient LV systolic dysfunction takotsubo cardiomyopathy, after the instrument with a round bottom and narrow neck used for trapping octopus in Japan.5 Those patients presenting with the syndrome are most commonly postmenopausal women.6 The syndrome is often triggered by emotional or physical stress, and perioperative stress has been suggested as the trigger in some of these cases. Although the precise mechanism of TCM remains unknown, exaggerated sympathetic stimulation may play a central pathogenic role.7

Considerable evolution in technique and hardware has taken place over the past three decades, and this has greatly simplified the implantation procedure of pacemakers. However, permanent pacemaker implantation can be associated with a list of complications related to the implantation procedure. To the best of our knowledge, only five previous cases of TCM following pacemaker implantation have been reported in the literature.8-11 All the previous cases and our case involve postmenopausal women. Because pacemaker implantation represents psychophysical stress that may trigger TCM, we think that TCM is a potential complication of pacemaker implantation, especially in postmenopausal women.

Although, we did not perform an echocardiography examination before the operation, we believe that TCM developed after pacemaker implantation. The patient did not have signs of congestive heart failure before pacemaker implantation and developed acute lung edema 4 hours after pacemaker implantation. Moreover, her levels of cardiac enzymes on admission were within normal limit. Follow-up cardiac enzymes elevated and peaked 24 hours after pacemaker implantation. Her LV angiography showed the typical pattern of TCM. Series echocardiography of this patient showed resolution of wall motion abnormality and normalization of LV systolic function. Our case had no other causes of acute reversible heart failure, and the diagnosis of TCM was made and confirmed by applying the modified Mayo Clinic diagnostic criteria.12

TCM is often characterized by ECG changes (ST-segment elevation and/or T-wave inversion) mimicking acute coronary syndrome.7 Pacing may mask ECG changes, however, our patient’s ECG changes were consistent with the typical findings of TCM. Kurisu et al. reported two cases of TCM associated with pacemaker implantation that presented with persistent LV dysfunction even during the convalescent stage. Serial ECG of their cases showed resolution of ST-segment elevation, but deep T-wave inversion under ventricular pacing did not occur. They proposed that lack of deep T-wave inversion may be a marker of an adverse outcome in TCM.10 ST-T changes of the pacing ECG could be a clue to early diagnosis, and a prognostic factor.

In conclusion, cardiologists should include TCM in the list of potential complications of permanent pacemaker implantation, especially in postmenopausal women. Minimizing perioperative stress may help to prevent the occurrence of TCM.

REFERENCES

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