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CASE REPORT

WILEY

Inadvertent malposition of a permanent ventricular lead into the middle cardiac vein was misdiagnosed as lead perforation

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Abstract

A 54-year-old man had a dual-chamber pacemaker implantation 9 years ago because of sick sinus syndrome at a different facility. The patient did not undergo any evaluation of his pacemaker for a long time with cardiologist. The patient was admitted to another hospital manifesting dyspnea and palpitation with atrial fibrillation for 1 month, and he was diagnosed with ventricular lead perforation. For further treatment, he was referred to our hospital, and an elective replacement indicator (ERI) of the battery state and a malpositioned ventricular lead into the middle cardiac vein were found. Finally, the pacing lead was left in the primary place and the pacemaker was replaced.

KEYWORDS
malposition, middle cardiac vein, pacemaker, pacing lead

1 | INTRODUCTION

Malposition of a right ventricular lead into the coronary vein is an uncommon complication. Although its actual incidence still remains unclear, an increased proportion has been reported because of the rising number of pacemaker implantation (Wynn et al., 2013). During the procedure, the inadvertent implantation of the right ventricular lead into the middle cardiac vein (MCV) may be easily ignored due to the MCV anatomic course resembling an RV apical position under fluoroscopic guidance, and then, it could be easily misdiagnosed as ventricular lead perforation. Herein, we report a case who was misdiagnosed with ventricular lead perforation at a local hospital, but it was found that the lead was inadvertently implanted into middle cardiac vein. To avoid this complication, we discuss several noninvasive methods used to place the lead in correct position during pacemaker implantation (Villanueva et al., 1987).

2 | CASE PRESENTATION

A 54-year-old male patient was admitted to another center with palpitation and dyspnea because of the onset of atrial fibrillation 1 month ago. The patient had a history of dual-chamber pacemaker implantation for sick sinus syndrome 9 years ago. It was learned that the patient did not undergo any evaluation of his pacemaker for a long time. On admission to the cardiovascular department, it was found that the ventricular lead was located at left ventricular side on chest X-ray. The 12-lead ECG presented atrial fibrillation with heart rate of 81 bpm and normal ventricular pacing spikes followed by QRS pattern of complete right bundle branch block (Figure 1). According to the ECG and chest radiograph, the patient was diagnosed as chronic perforation of ventricular pacing lead. Two-dimensional echocardiograms confirmed that the ventricular pacing lead was imaged in the right atrium but not in right ventricular chamber or across the tricuspid valve. Magnet response was evaluated to check for

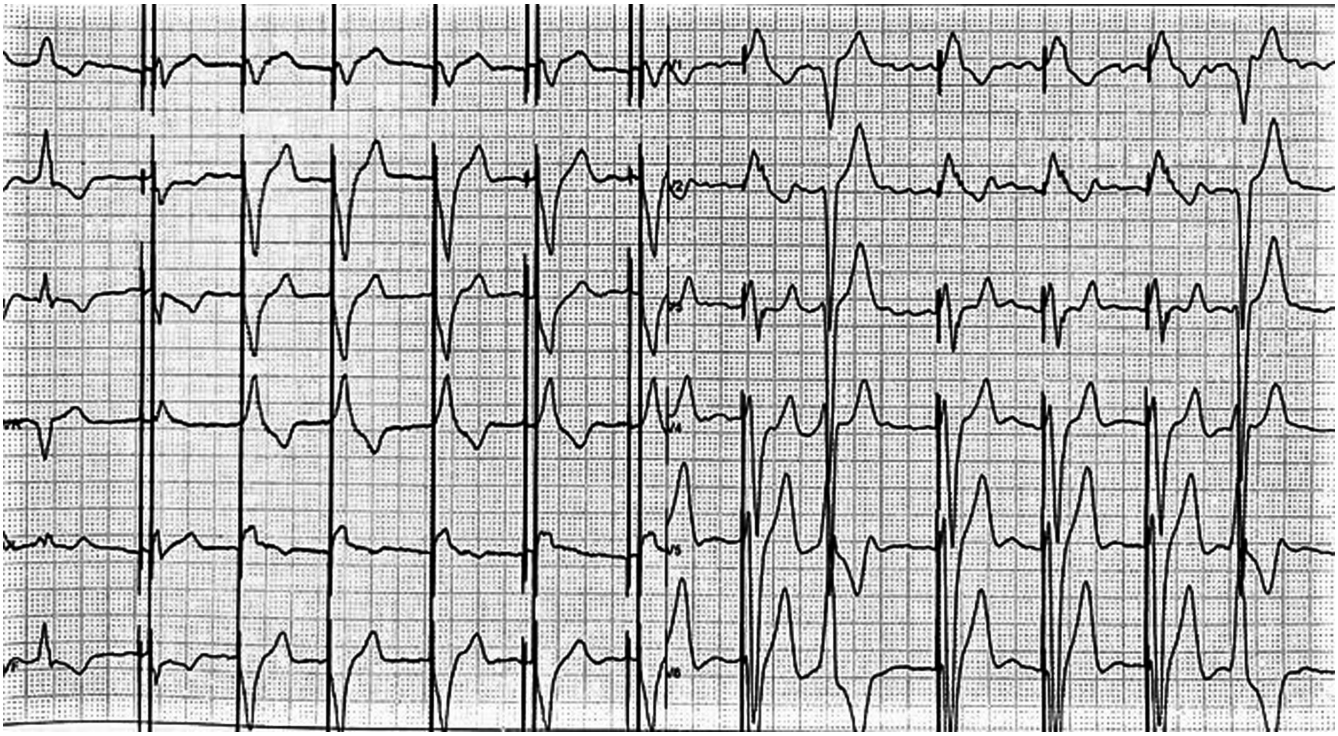

FIGURE 1 A 12-lead ECG presents atrial fibrillation with a heart rate of 81 bpm and several premature ventricular contractions. Normal ventricular chamber pacing with pacemaker spikes. ECG recorded at 25 mm/sec

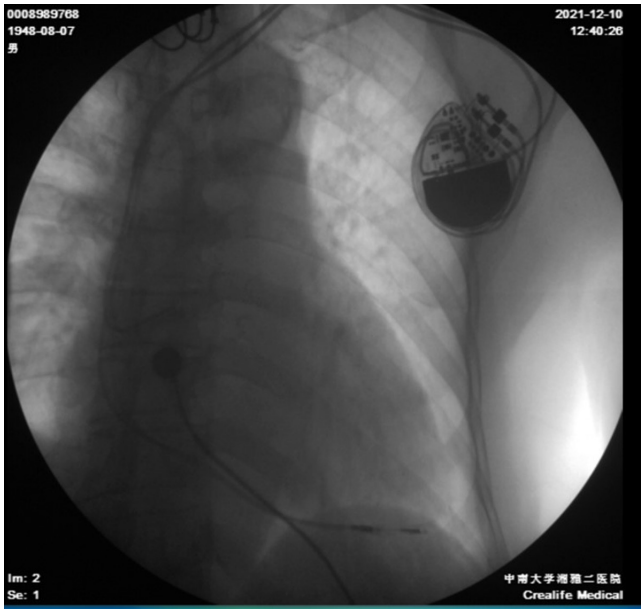

FIGURE 2 Chest roentgenogram of this patient showing contour of electrode leads in posteroanterior. The tip of ventricular lead looks like locating at apex

possible battery depletion. SSS was observed by placing the magnet, whereas wide QRS recurred when the magnet was removed from over the pacemaker. The dual-chamber pacemaker was recorded with normal pacing and sensing parameters of right atrium and ventricle lead. Fluoroscopy was used to monitor the lead position at posteroanterior and left/right anterior oblique view (Figures 2–4), which showed that the tip of ventricular lead looked like locating inside the pericardial cavity. After clinical evaluation, it was considered that the ventricular pacing lead was located in middle cardiac vein. Because of the normal parameters of the ventricular lead, we decided to replace the pacemaker and retain the pacing lead. Then, the patient was taken to the catheter laboratory for pacemaker replacement. The patient was discharged on the next day and did not have any problem during the follow-up.

3 | DISCUSSION

The coronary sinus is a wide venous channel situated in the posterior part of the atrioventricular groove. It has five major tributaries. The middle cardiac vein runs along the posterior interventricular groove receiving blood from both ventricles. It usually opens into the coronary sinus close to the ostium (Shettigar et al., 1989). During the procedure, it may be easily ignored the inadvertent implantation of the right ventricular lead into the MCV due to the MCV anatomic course resembling an RV apical position under fluoroscopic guidance. There are several noninvasive methods provided for avoiding malposition. During the implantation, firstly, the ventricular lead was delivered into the right ventricular outflow tract, and subsequently, premature ventricular contractions were observed in V_1 with a QS/rS pattern. Additionally, if the ECG monitoring presents a pattern of right bundle branch block during ventricular pacing on lead V1, an echocardiographic assessment

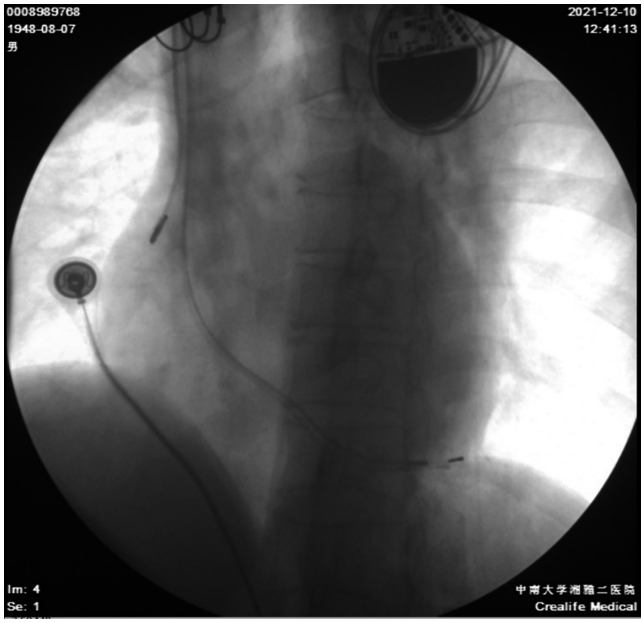

FIGURE 3 Chest roentgenogram of this patient showing contour of electrode leads in left anterior oblique view. The tip of ventricular lead looks like locating inside the pericardial cavity

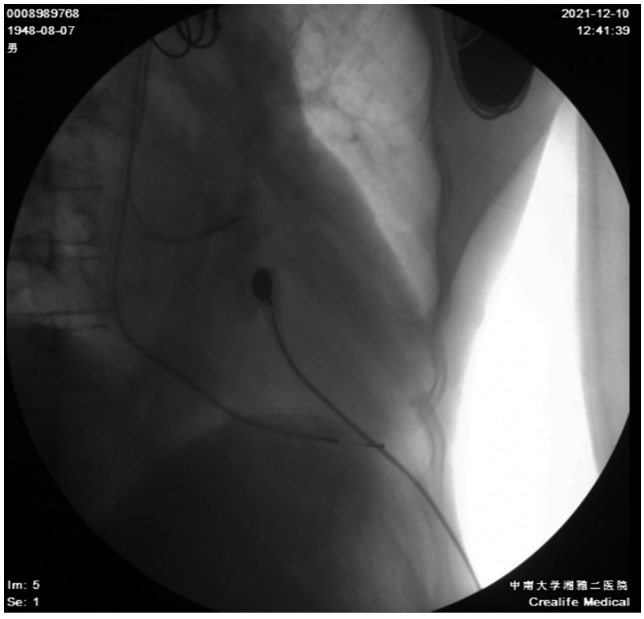

FIGURE 4 Chest roentgenogram of this patient showing contour of electrode leads in right anterior oblique view. The tip of ventricular lead looks like locating inside the pericardial cavity

should be performed to evaluate the lead placement. In normal position of right ventricular pacing lead according to two-dimensional echocardiograms, the pacing lead passes through the right atrium and can be traced across the tricuspid valve and into the right ventricular. However, if the right ventricular pacing lead is in a malposition, it was not imaged across the tricuspid valve and ventricular chamber (Topaloglu et al., 2015; Zaher et al., 2011). Furthermore, the proper position of the right ventricular pacing lead is at right ventricular median septum. On the left oblique view, the tip of the ventricular lead should be located toward the left of spine (Paravolidakis et al., 2004).

4 | CONCLUSION

Although inadvertent malposition of right ventricular pacing lead into middle cardiac vein may be rarely observed, it should be avoided according to several noninvasive methods.

CONFLICT OF INTEREST

We declare that we have no financial and personal relationships with other people or organizations that can inappropriately influence our work.

INFORMED CONSENT

Written informed consent was obtained from this patient.

ETHICAL APPROVAL

We identify that the ethics committee of The Second Xiangya Hospital of Central South University have approved the case, and that this case conforms to recognized standards, Declaration of Helsinki.

AUTHORS CONTRIBUTIONS

Mingxian Chen contributed significantly to data collection and manuscript preparation. Xuping Li contributed to the conception of the study. Zhenjiang Liu and Lin Hu performed the patient management. Zhihong Wu and Qiming Liu performed the pacemaker implantation. Shenghua Zhou and Zhihong Wu performed the analysis with constructive discussions. All authors agree on the order in which their names will be listed in the manuscript.

DATA AVAILABILITY STATEMENT

It is a case report. No data.

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