

CASE REPORT

Successful implantation of leadless pacemaker in a patient with giant right atrium and tricuspid valve stenosis

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Abstract

With the steadily increasing amount of leadless pacemaker implantations performed worldwide, it has called attention to the delivery difficulty in patients with severe large right heart. Nevertheless, limited studies have reported leadless pacemaker implantation in patients with tricuspid stenosis. Here, we report the successful implantation of leadless pacemaker in a 60-year-old female patient with giant right atrium and tricuspid valve stenosis. It is highlighted that leadless pacemaker should not be discouraged even if there are tricuspid valve stenosis and giant right atrium.

KEYWORDS

leadless pacemaker, tricuspid valve stenosis, giant right atrium

1 | CASE

A 60-year-old female patient was admitted with recurrent dizziness and amaurosis for 1 month. She had a past medical history of multiple valve surgery (mitral valve replacement, aortic valve replacement, and tricuspid valvuloplasty) in 2007. The Holter ECG showed persistent atrial fibrillation with bradyarrhythmia, presenting with mean heart rate of 45 bpm throughout 24 h and a 6.85 s duration of cardiac arrest at 8 am (Figure 1A). Chest X-ray indicated an enlarged heart shadow with a cardiothoracic ratio of 0.8 (Figure 1B). Transthoracic echocardiography imaging (Figure 1C) demonstrated an extremely enlarged right atrium of 82 mm, moderate-to-severe tricuspid stenosis with estimated opening area of 0.99 cm², and the left ventricular ejection fraction (LVEF) was 70%.

Given the patients' condition, she had a class I indication for single-chamber pacing. The decision to implant a leadless pacemaker system (LPS) instead of a transvenous device was made after consultation between clinicians and the patients. After signing the informed consent, LPS was performed by doctors who have been well trained,

using the anatomical guidance of a two-dimensional angiogram of the right ventricle. Right femoral venous access was obtained without a hitch, and the introducer sheath was advanced easily to the level of the right atrium. Then, the delivery catheter was deflected across the tricuspid valve and advanced into the right ventricle. Finally, a Micra™ Transcatheter Pacing System (TPS) (Medtronic) was implanted successfully on the very first attempt, with a total procedure duration of 45 min. Electrical performances were within normal range, with stable threshold and R-wave amplitudes.

2 | DISCUSSION

With the steadily increasing amount of LPS implantations performed worldwide, it has called attention to the delivery difficulty in patients with severe large right heart. Previously published reports suggest that insufficient catheter reach during implantation can be owing to severe right heart dilation (Wan et al., 2018; Alyesh and Cunnane, 2019; Huang et al., 2021). Limited studies

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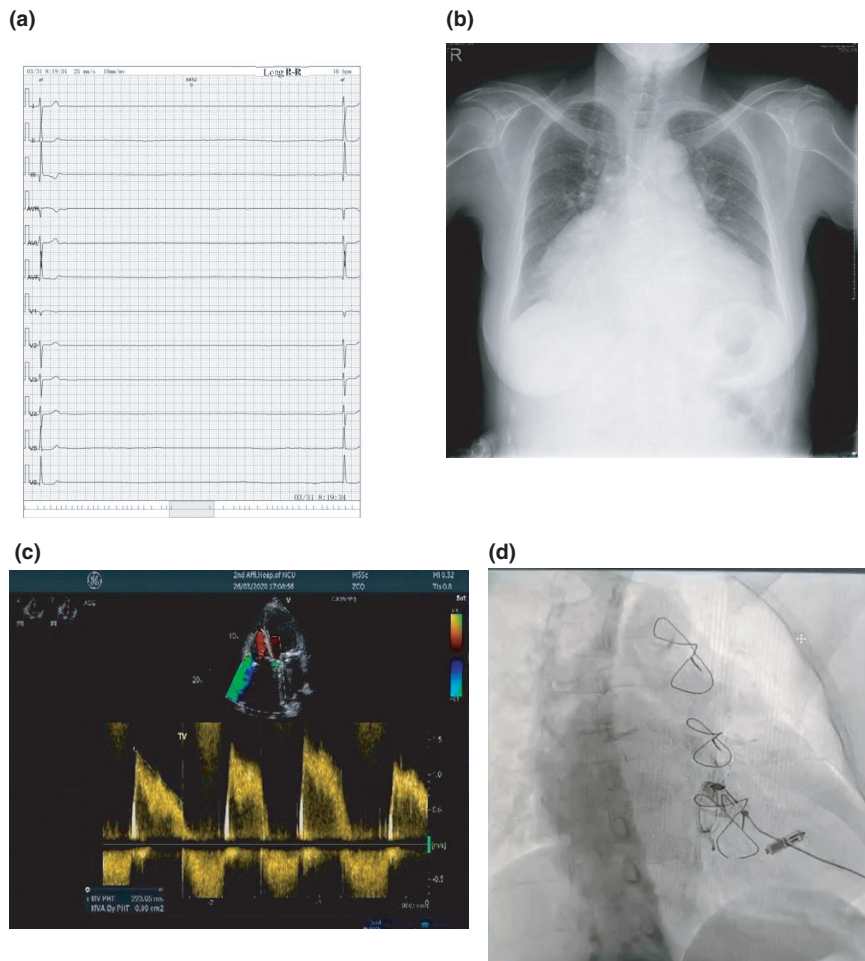


FIGURE 1 (a) A 6.85 s duration of cardiac arrest at 8 am shown in Holter ECG. (b) Chest X-ray presenting an enlarged heart shadow with a cardiothoracic ratio of 0.8. (c) Right atrium enlargement and tricuspid valve stenosis shown in transthoracic echocardiography imaging. (d) Fluoroscopic right anterior oblique images of the Micra location in the heart

have considered the potential impact of right ventricular anatomy on the implant procedure of LPS (Garweg et al., 2020). Also in most of these cases, the enlarged right heart is due to or accompanied by severe tricuspid annulus enlargement and regurgitation. We first report the successful LPS implantation in a patient with giant right atrium and tricuspid valve stenosis. It can be explained that tricuspid stenosis seems to provide a strong support for the LPS delivery catheter, when we make a “gooseneck sign” for the optimal deployment of Micra system. In view of this, the extremely enlarged right atrium is not considered to present a challenge to LPS implantation, while the difficulty of implantation actually depends on the anatomy of tricuspid valve or right ventricle but not the right atrium size.

Leadless pacemaker has been proven to be an effective pacing option in patients after valve intervention (Garweg et al., 2020). The aim of this case report was to show for the first time that LPS should not be discouraged even if there are tricuspid valve stenosis and giant right atrium.

CONFLICTS OF INTEREST

The authors have no conflicts of interest to disclose.

ETHICS STATEMENT

We identify that the ethics committee of Nanchang University second affiliated Hospital have approved the case, and that this case conforms to recognized standards, Declaration of Helsinki.

AUTHOR CONTRIBUTION

Qinmei Xiong contributed significantly to data collection and manuscript preparation. Qi Chen contributed to the conception of the study. Qiongqiong Zhou performed the patient management. Qinmei Xiong, Jinzhu Hu, Lin Huang and Qi Chen performed the leadless pacemaker implantation. Jinzhu Hu, Jianhua Yu, Juxiang Li and Kui Hong 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

Data sharing not applicable to this article as no datasets were generated or analysed during the current study.

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