Photo Clinic

The Malposition of the Pacing Lead in the Left Ventricle through an Atrial Septal Defect

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A 54-year-old woman with a history of unknown childhood cardiac surgery underwent dual-chamber pacemaker implantation due to an advanced atrioventricular block in our center. One week later, we were asked to further evaluate tricuspid regurgitation via transthoracic echocardiography (TTE).

The postoperative TTE demonstrated a left ventricular ejection fraction of 45%, as well as moderate mitral regurgitation, a severely dilated right atrium, a moderately dilated right ventricle, a dilated main pulmonary artery (38 mm), a mildly stenotic pulmonary artery (peak gradient=30 mmHg), and moderate-to-severe tricuspid regurgitation, with a right ventricular systolic pressure of 40 mmHg. The right atrial pacemaker lead was in its proper place, the ventricular lead in the right ventricle was undetectable due to very poor TTE views. Electrocardiography (ECG) showed a pacing rhythm with no other abnormalities (Figure 1).

Therefore, transesophageal echocardiography was performed both to determine the cause of the unexplained dilation in the right ventricle and right atrium and to estimate the severity of the tricuspid regurgitation and the pulmonary insufficiency. The modality (2D and 3D) showed a severely aneurysmal interatrial septum with a sizeable secundum type atrial septal defect (ASD). Again, the right atrial pacemaker lead was visible in its place, while the ventricular lead had an abnormal course via the aneurysmal interatrial septum. The latter lead passed through the ASD to the left atrium and crossed the mitral valve to the left ventricle (Figures 2 & 3).

Fluoroscopy and chest X-ray were vague and imprecise; consequently, a cardiac computed tomographic scan was performed to confirm the pacing lead positions and reach a definite diagnosis (Figure 4).

Based on the imaging results and a final diagnosis of lead malposition, the patient underwent percutaneous correction of the lead position. Afterward, she was scheduled for ASD device closure, which was successfully performed a week later.

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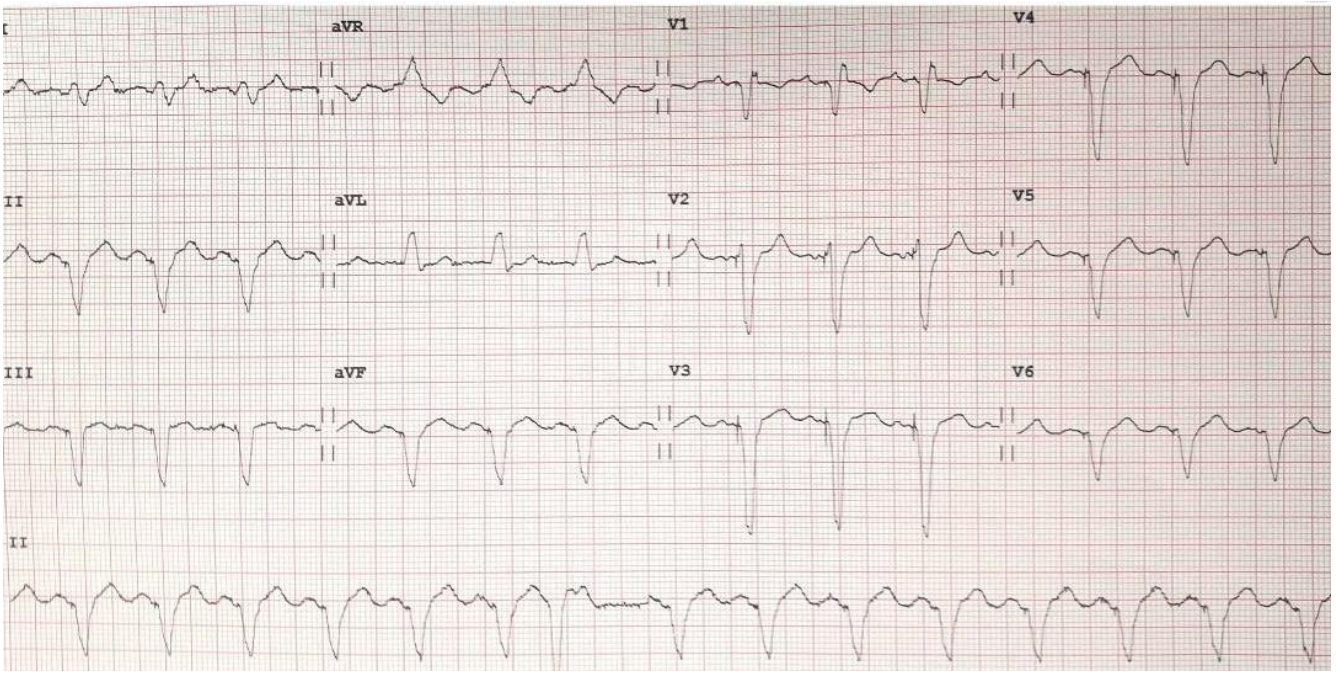

Figure 1. The image depicts the 12-lead electrocardiogram during ventricular pacing after the first implantation.

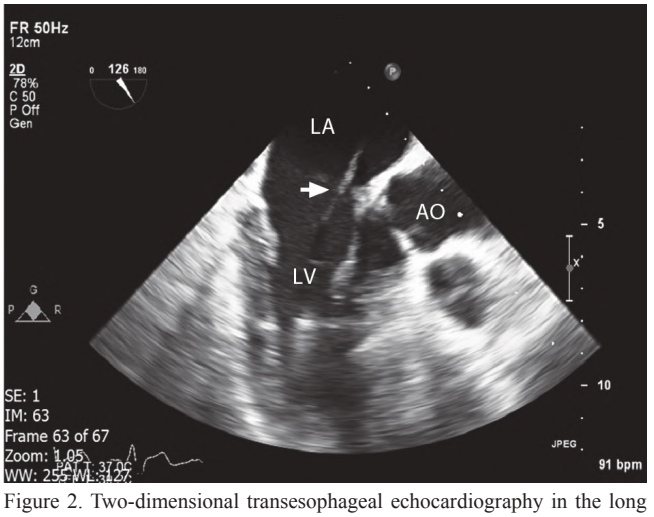

Figure 2. Two-dimensional transesophageal echocardiography in the long axis-view shows the pacing lead (arrow) in the left atrium. The lead passes across the mitral valve to the left ventricle.
LA, Left atrium; LV, Left ventricle; AO, aorta

The malposition of the ventricular pacing lead to the left ventricle is a rare complication of pacemaker implantation, and it usually occurs through a patent foramen ovale. The pacemaker lead in the left ventricle increases the risk of thromboembolic events, injury to the mitral valve leaflets and the left ventricular wall, and infectious endocarditis.[1]

This complication can be avoided through precise echocardiography before pacemaker implantation for a comprehensive assessment of the heart structure and possibly some accompanying undiagnosed congenital heart diseases such as ASD. After implantation, a 12-lead ECG, chest X-ray, and echocardiography can help ascertain the proper placement of the leads.[2]

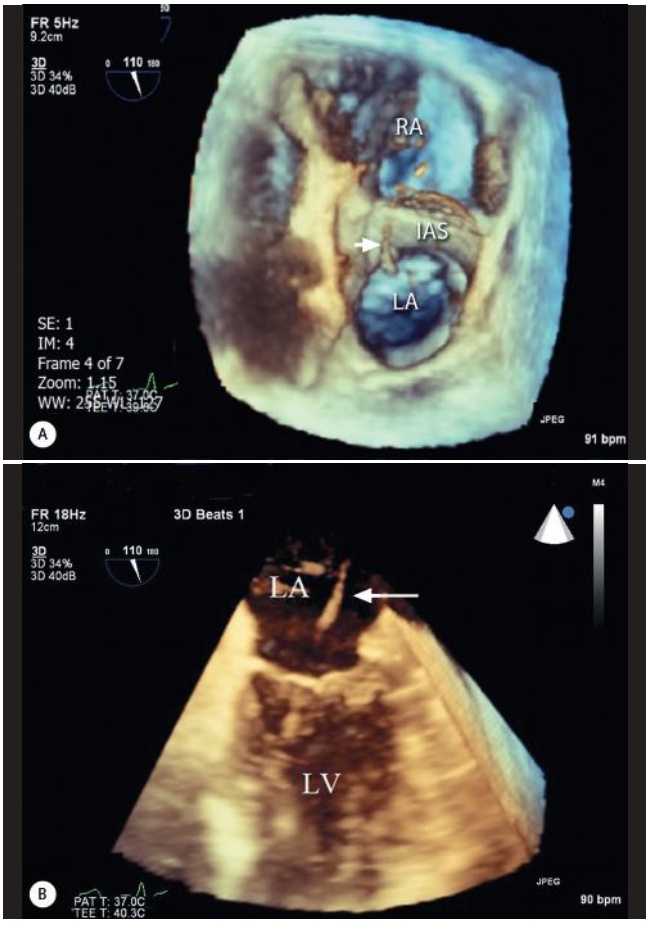

Figure 3. Three-dimensional transesophageal echocardiography

demonstrates A) the passage of the pacing lead (arrow) from the right atrium to the left atrium through the interatrial septum and B) the passage of the pacing lead (arrow) across the mitral valve to the left ventricle.
IAS, Interatrial septum; LA, Left atrium; LV, Left ventricle; RA, Right atrium

In cases of lead malposition in the left ventricle, the right bundle branch block pattern occurs in ECG.[1-3] Nevertheless, in our case, ECG did not demonstrate the pattern (Figure 1) despite the presence of the lead in the left ventricle, which may have been due to the placement of the lead next to the interventricular septum (Figure 4B).

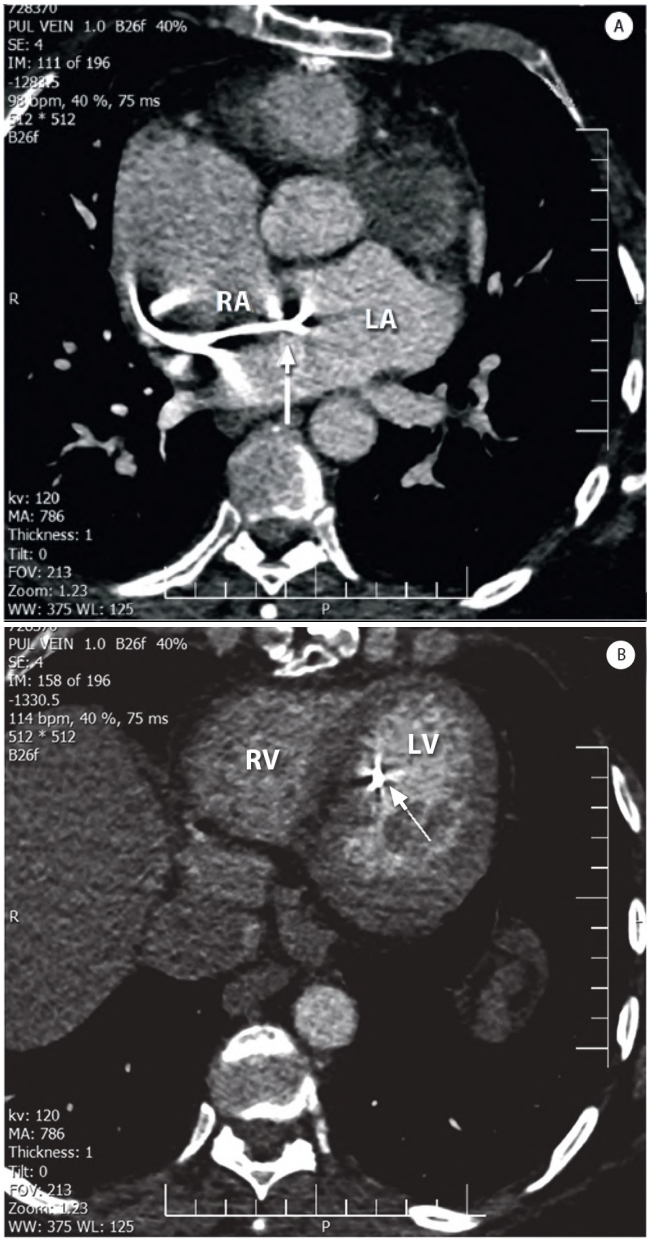

Figure 4. Cardiac computed tomography shows A) the passage of the pacing wire (arrow) through the interatrial septum into the left atrium and then B) into the left ventricle near the septum (arrow).
LA, Left atrium; LV, Left ventricle; RA, Right atrium

References

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