Eight years of left ventricle pacing due to inadvertent malposition of a transvenous pacemaker lead in the left ventricle

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The inadvertent malposition of a pacemaker lead in the left ventricle is a rare and underdiagnosed pacemaker complication. A 78-year-old woman was admitted to our Emergency Department for progressive dyspnea, 8 years after transvenous pacemaker implantation. Routine 12-lead electrocardiography revealed a right bundle branch block on the paced beats, and lateral chest X-ray showed posterior deflection of the pacemaker lead, suggesting a pacemaker electrode in the left ventricle. Echocardiography confirmed that the pacing lead had migrated through the foramen ovale into the left ventricle. After review of the literature and taking into account the age and emboligenic-free history of the patient under platelet therapy, we decided to postpone the surgical removal of the malpositioned lead in the left ventricle until the need arose for cardiac surgery for additional reasons, such as valve and/or coronary illness. The general therapeutic strategy remained unchanged due to the risk of bleeding complications with anticoagulation in the patient. This case illustrates the prominent role of echocardiography in the diagnosis of unusual cardiac events.

KEYWORDS
Left ventricle; Pacemaker; Malpositioned pacemaker lead

Introduction
Malposition of pacemaker leads in several locations is described in the literature, but rarely in the left ventricle. The incidence and clinical history of this type of pacemaker complication is under-reported and not well known.

We report the clinical, electrographical, chest X-ray, and echocardiographic findings of a 78-year-old female patient in whom the intravenous lead inadvertently migrated through the foramen ovale at the time of implantation, becoming fixed in the lateral part of the left ventricle after passage through the mitral valve. Malposition of the lead was diagnosed 8 years after the implantation procedure. The patient was on antiplatelet therapy for atrial fibrillation and had no signs of emboligenic history; echocardiography found no evidence of thrombus on the pacemaker electrode. Pacing thresholds were normal at the time of implantation and were documented as being normal during follow-up.

Case report
A 78-year-old female patient was admitted to our Emergency Department for progressive dyspnea of 3 weeks duration. She had a past history of brady–tachy syndrome with VVI pacemaker implantation in 1999, a long-term history of atrial fibrillation treated with beta-blockers and digoxin, and a known hypothyroidism treated with levothyroxine. Blood pressure was 148/82 mmHg.

Electrocardiogram (Figure 1) showed a right bundle branch block pattern during VVI pacing, and chest X-ray (Figure 2) showed cardiomegaly with a posterior deflection of the VVI pacemaker electrode on the lateral view. Transthoracic echocardiogram (Figure 3) with colour flow mapping and Doppler analysis in the normal parasternal and apical windows showed a slightly enlarged left atrium and normal diameter of the left ventricle, with an ejection fraction of 52% and a moderate leak of the mitral and tricuspid valves. Because the trace of the pacemaker lead could not be followed, alternative echo windows were used on the lower intercostals, revealing an abnormal route of the migrated pacemaker lead: from the right atrium, the lead passed through the foramen ovale, left atrium, and mitral valve, with fixation of the pacemaker electrode in the midlateral part of the left ventricle. There were no signs of
thrombus formation on the pacemaker lead. The mitral valve appeared to have good function, with no damage to the valve leaflets.

After reviewing the literature, we decided to postpone surgical removal of the malpositioned lead in the left ventricle until cardiac surgery became necessary for additional reasons, such as valve and/or coronary illness, because of the age and the non-emboligenic history of the patient and because she was receiving antiplatelet therapy. The general therapeutic strategy remained unchanged due to the risk of bleeding complications with anticoagulation in the patient.

Discussion

Despite improving knowledge and growing expertise in pacemaker implantation procedures, complications remain a problem that should not be underestimated.\textsuperscript{1,2} Large follow-up studies show a mean overall complication rate in pacemaker implantation of 3.4–5.7%.\textsuperscript{3}

The expected morphology of right ventricular pacing is a left bundle branch block; however, right bundle branch block can be seen during permanent right ventricular pacing. In a cohort of 300 consecutive patients, O'Kmen et al.\textsuperscript{4} found that 8.3% exhibited right bundle branch block in 'true right ventricular pacing', which fell to 4.3% after modifying the electrocardiogram locations to one interspace lower than the standard locations (Klein manoeuvre).\textsuperscript{4}

If right bundle branch block of paced beats is present, chest X-ray including a lateral view should be obtained to assess the position of the pacemaker lead. X-ray may clarify that the pacemaker electrode is not positioned in the right ventricular apex, but is sometimes insufficient because left ventricular position can easily be mistaken for coronary vein position.\textsuperscript{5} Therefore, echocardiography is necessary to remove any doubt.

Anticoagulation should be considered when this problem comes to attention for the first time during follow-up. Lifetime anticoagulation therapy or surgical retraction should be considered because patients with left ventricular lead

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\includegraphics[width=\textwidth]{figure1.png}
\caption{Figure 1 Twelve-lead electrocardiogram. Note the right bundle branch block on the paced beats.}
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\begin{figure}
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\includegraphics[width=\textwidth]{figure2.png}
\caption{Figure 2 Chest radiographs suggest left-sided positioning of the pacemaker lead. Left: anterior–posterior chest radiograph. Right: lateral chest radiograph.}
\end{figure}
positioning have significant risk of embolization from thrombus formation on the lead.6

Conclusion

Diagnosis of left ventricular lead malposition is not difficult, but requires a high index of suspicion. Care should be taken to recognize this potentially serious complication that may occur even in the most trained and experienced hands.

References


