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STUDIUM PRZYPADKU / *CLINICAL VIGNETTE*

Three-dimensional transoesophageal echocardiography as the ultimate diagnostic tool in a case of unintentional left ventricular pacing

Trójwymiarowa echokardiografia przezprzełykowa, czyli „kropka nad i" implikacji diagnostycznych niezamierzonej stymulacji lewej komory

Piotr Scisło[1], Roman Steckiewicz[1], Przemysław Stolarz[1], Elżbieta Święton[2], Marcin Grabowski[1]

[1]Department of Cardiology, Medical University of Warsaw, Warsaw, Poland
[2]Department of Cardiology, Central University Hospital in Warsaw, Warsaw, Poland

Unintentional lead placement in the left ventricle (LV) is a rare complication of pacemaker implantation. Despite the fact that these procedures are routinely guided by electrocardiography and fluoroscopic imaging, these monitoring methods may occasionally prove to be insufficient. These are the cases when echocardiography, especially three-dimensional (3D) echocardiography, may be of help. An 83-year-old male was admitted to our clinic due to suspected ventricular lead dislocation into the LV, detected in a routine follow-up chest X-ray film. Five years earlier, the patient underwent implantation of a Victory DR (DDDR) cardiac pacing system (from St. Jude Medical) with screw-in leads (atrial Optisense 52 and ventricular Optisense 58) due to complete atrioventricular block. The pacing parameters were good both initially and at the interim follow-up outpatient interrogations. A 12-lead electrocardiogram (ECG) tracing showed normal cardiac pacing in the DDDR mode with pacemaker-generated ventricular complexes of right bundle branch block (RBBB) morphology (Fig. 1A). Lateral-view fluoroscopy revealed the electrode forming a backward-facing arch (Fig. 1C, arrow), which is consistent with the ventricular lead passing from the right atrium (RA) through the foramen ovale into the LV. A detailed, three-dimensional (3D) course of both leads was visualised via 3D echocardiography. During lead insertion the ventricular lead was deflected by an abnormally large muscle rim in the RA, which altered its course (Fig. 2A). The lead passed from the RA through the anterior edge of the foramen ovale, and into the left atrium (LA) (Fig. 2B). Finally, the lead passed through the mitral valve at the border of segments P2 and P3 into the LV (Fig. 3A), where its tip eventually rested in the basal part of the lateral apical segment of the LV (Fig. 3B). Right endocavitary pacing produces electrocardiographic evidence of left bundle branch block (LBBB). However, RBBB can also be seen in 8.3% of ECG tracings, a proportion that can be reduced to 4.3% by tracing modification with the Klein's manoeuvre (lowering precordial leads by one intercostal space). Radiographic anterior-posterior images do not always show lead placement accurately and may fail to visualise complications of permanent pacing. In the case presented here, the suspected complication was confirmed echocardiographically. The 3D mode allowed an accurate visualisation of lead placement in the LV and helped explain the likely cause of lead misdirection.

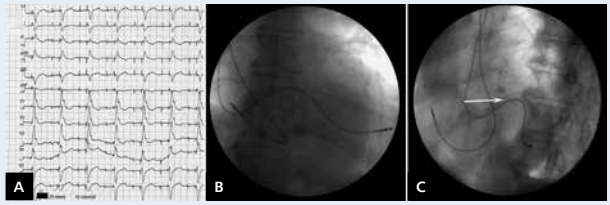

Figure 1. **A**. Atrioventricular (dual-chamber) cardiac pacing at 70 bpm; **B**, **C**. Fluoroscopy of the chest: anterior-posterior (A-P) view (**B**) and left lateral oblique view (ventricular lead — arrow) (**C**)

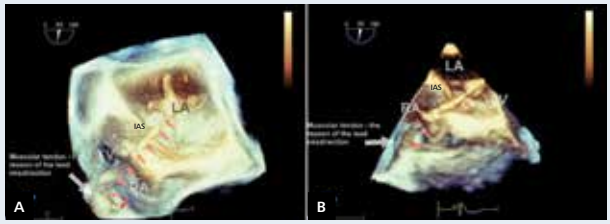

Figure 2. **A**, **B**. Three-dimensional transoesophageal echocardiography — two views from the middle oesophagus, modified. The lead passes through interatrial septum (IAS) in the anterior part of the foramen ovale; LA — left atrium; LV — left ventricle; RA — right atrium; TV — tricuspid valve

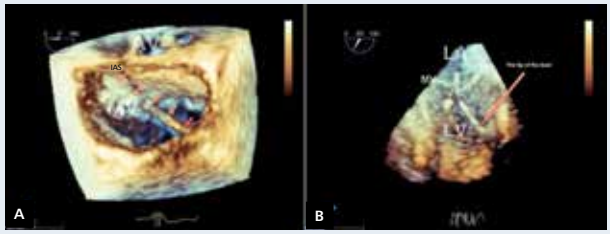

Figure 3. Three-dimensional transoesophageal echocardiography — the view from the middle oesophagus, modified; **A**. View from the left atrium (LA) roof towards the mitral valve (MV). Arrows mark the course of the lead toward segment P3 of the MV; **B**. View from the left ventricle (LV) apex towards the MV. The arrow marks the tip of the lead in the LV wall; IAS — interatrial septum; AV — aortic valve

Address for correspondence:
Roman Steckiewicz, MD, PhD, Department of Cardiology, Medical University of Warsaw, ul. Banacha 1A, 02–097 Warszawa, Poland, tel: +48 22 599 29 58, e-mail: r.steckiewicz@pro.onet.pl

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