First Polish experience with permanent direct pacing of the left bundle branch

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Permanent pacing of the His bundle is gaining popularity as a promising new therapeutic modality.[1] This method of ventricular pacing preserves the physiological sequence of ventricular depolarization. His bundle pacing most likely prevents pacing-induced cardiomyopathy, which affects approximately 10% to 20% of all pacemaker patients. However, higher pacing thresholds, sensing issues, and frequent failure to overcome distal conduction defects are perceived as major limitations of direct His bundle pacing.

Very recently, a novel method of His–Purkinje system pacing has been proposed, namely, deep septal pacing with direct left bundle branch (LBB) capture.[2] This can be achieved with an active helix pacing lead that is screwed in deep into the interventricular septum (FIGURE 1). Left bundle branch pacing offers an entirely physiological depolarization of the left ventricle, using the native conduction system. At the same time, it is free of the above limitations of His bundle pacing. Left bundle branch capture thresholds are usually very low and sensing amplitudes are good.[3] Moreover, direct pacing of the LBB bypasses lesions in the conduction system that are responsible for distal atrioventricular conduction blocks. Furthermore, direct LBB pacing may potentially be applied in patients with heart failure who are candidates for cardiac resynchronization therapy. This is because most LBB blocks result from lesions that are located proximally (still within the His bundle or in the proximal part of the LBB) and can be "bypassed" with LBB pacing.

We present a case of a 78-year-old woman with syncope due to an advanced distal atrioventricular block (second to third degree) and broad QRS complexes, which illustrates typical acute procedural outcomes of direct LBB pacing (FIGURE 1). During pacemaker implantation, despite obtaining a nonselective His bundle capture (QRS, 128 ms), attempts to stabilize the pacing lead at the His bundle region were unsuccessful. Therefore, the lead was positioned in the mid-septal region (approximately 2 cm apically from the His bundle region) and deployed deep within the interventricular septum with 10 lead rotations. During progressively deeper lead deployment, typical paced QRS morphology transition (FIGURE 1A) and discrete LBB potential were observed (FIGURE 1D), suggesting the achievement of LBB capture. At mid-term follow-up (5 months), the patient is symptom free, and both LBB pacing threshold (0.75 V @0.5 ms) and ventricular sensing (>15 mV) remain excellent.

ARTICLE INFORMATION

CONFLICT OF INTEREST None declared.

HOW TO CITE Jastrzębski M, Moskal P, Bednarek A, et al. First Polish experience with permanent direct pacing of the left bundle branch. Kardiol Pol. 2019; 77: 580-581. doi:10.33963/KP.14850

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Received: February 1, 2019.
Revision accepted: March 21, 2019.
Published online: May 24, 2019.
Kardiol Pol. 2019; 77 (5): 580-581
doi:10.33963/KP.14850

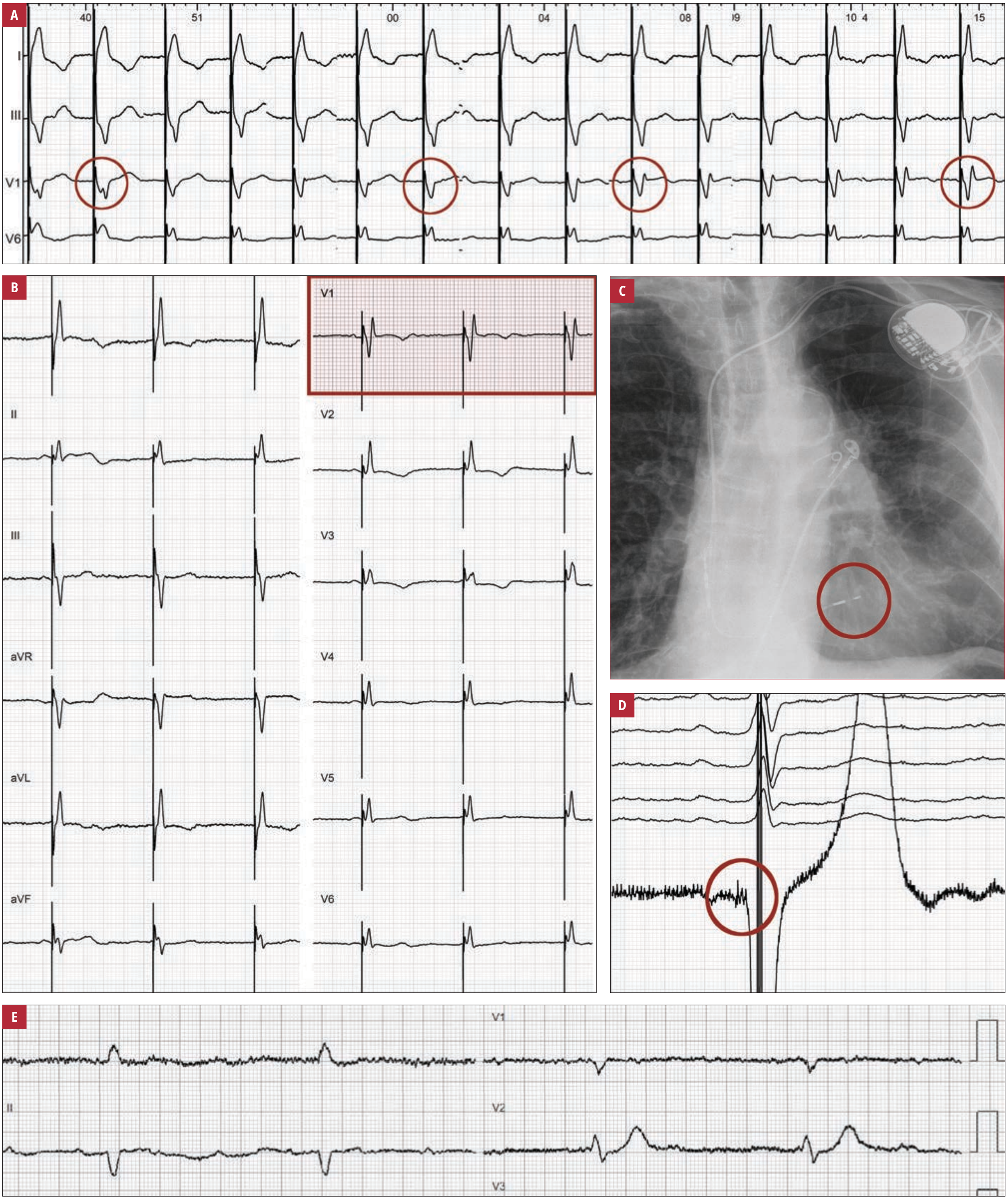

FIGURE 1 **A** – a collage of QRS morphologies obtained during 25 seconds of pacing, using the method developed in our laboratory of "pacemapping while screwing in," which consists in constant unipolar pacing from the lead as it is more and more deeply deployed. It enables to observe a continuous change of the QRS morphology and prompt termination of screwing when left bundle branch (LBB) capture is achieved. Please note the continuous change of QRS morphology (circles) in lead V_1 from broad "W" through a narrower "V" to a very narrow QRS with a sharp r'—a hallmark of direct LBB capture. **B** – the final paced QRS complex is very narrow, with a duration of 132 ms reflecting nonselective LBB capture with only a small delay in the right ventricular activation. **C** – chest X-ray illustrating typical pacing lead tip position (circle)—much deeper within the right ventricular cavity than normally seen during His bundle pacing. **D** – endocardial electrogram recorded from the pacing lead, documenting discrete LBB potential (circle) that precedes surface QRS by 20 ms; sweep speed, 100 mm/s. **E** – electrocardiogram before pacemaker implantation, demonstrating 3:1 atrioventricular block and QRS of 170 ms with LBB block morphology; paper speed, 25 mm/s