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SPOTLIGHT

Extraction of stylet-driven pacing lead for left bundle branch area pacing

Paolo Bonfanti MD | **Antonio Mantovani MD** | **Taulant Refugjati MD** | **Luca Sormani MD** | **Giovanni Corrado MD**

Department of Cardiology, Valduce hospital, Como, Italy

Correspondence
Paolo Bonfanti, MD, Valduce hospital, Via Dante Alighieri, 11, 22100 Como CO, Italy.
Email: pbonfanti@valduce.it

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A 77-year-old man with a history of myocardial infarction was admitted to our department due to worsening heart failure (HF). Electrocardiography (ECG) revealed a 2:1 Mobitz atrioventricular block and a right ventricular bundle block. Echocardiography showed a left ventricle ejection fraction of 40%. Given the expected a high percentage of ventricular pacing, the first-line treatment strategy considered was left bundle branch area pacing (LBBAP). Consequently, the patient underwent dual chamber

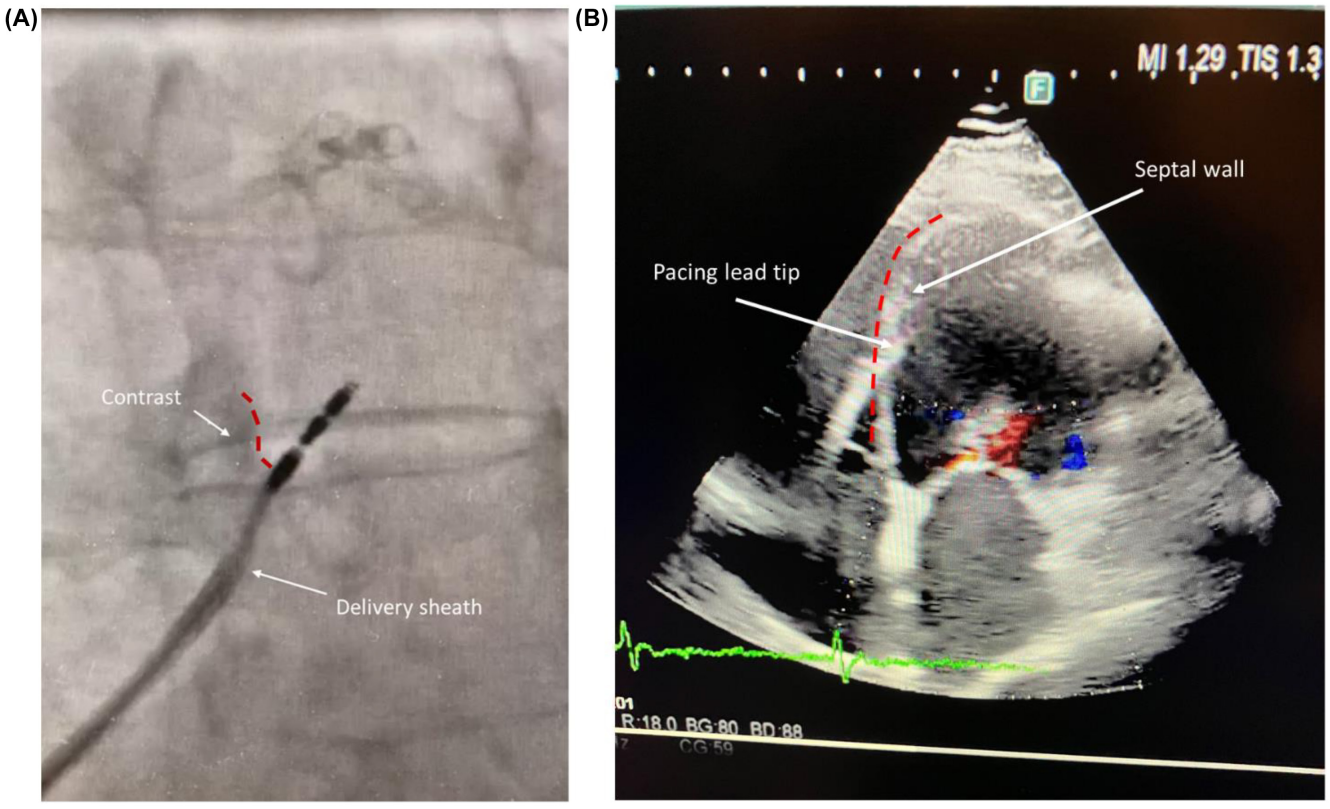

FIGURE 1 (A) X-ray image in the left anterior oblique 30° projection view, contrast medium is used to highlight the stylet-driven lead penetration into the septum. (B) Echocardiogram showing lead penetration in LBB area. The septal wall is indicated by a red dashed curve.

pacemaker implantation (Evity 8 DR-T, BIOTRONIK SE & Co. KG, Berlin, Germany) with a conventional atrial pacing lead (Solia 53, BIOTRONIK SE & Co. KG) positioned in the right auricula. The Selectra 3D 55–42 delivery sheath (BIOTRONIK SE & Co. KG) was used to implant a stylet-driven (SD) pacing lead (Solia 60, BIOTRONIK SE & Co. KG) into the interventricular septum in LBBAP. Conduction system capture was tested using 12-lead ECG, and lead penetration in the septum was halted when r' in V1 lead appeared. The final sensing of the LBBAP lead was 9 mV, pacing impedance was 930 Ohm, and pacing threshold was 0.4 V@0.4 ms. Contrast injection was also used to test the position of the lead tip, and fluoroscopy imaging showed a lead penetration in the septum of approximately 11 mm (Figure 1).

After 10 months, the patient was referred to our hospital due to worsening HF. A significant reduction in the left ventricular fraction below 35% was observed, indicating the need for a cardiac resynchronization therapy defibrillator (CRT-D). Considering the suboptimal QRS duration achieved with LBBAP (Figure 2A) and the need for

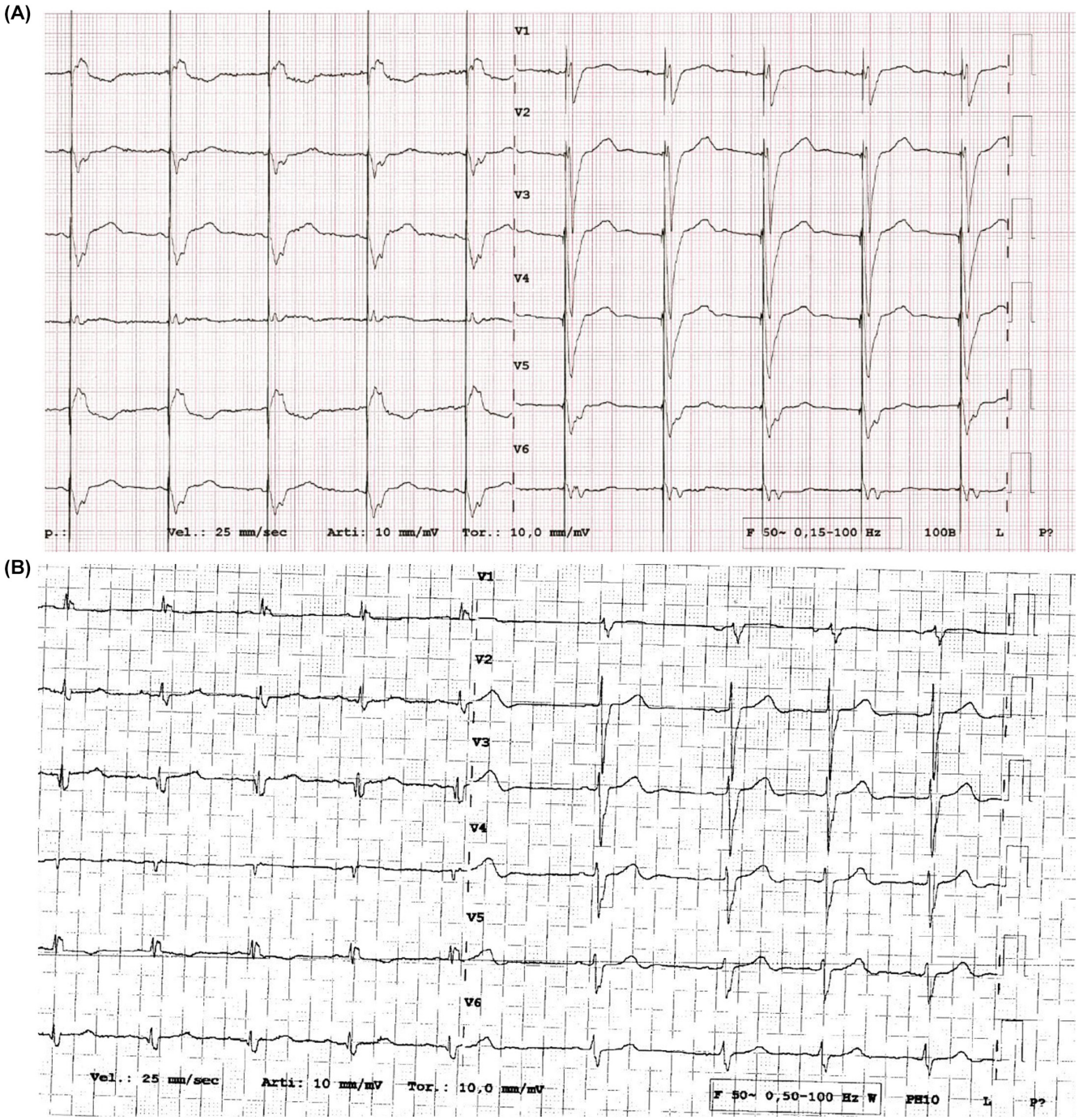

FIGURE 2 Twelve-lead ECGs showing (A) suboptimal result of the left bundle branch area pacing at follow-up in terms of QRS duration and presence of qRS pattern in V1 lead and (B) biventricular pacing obtained after CRT-D device implantation.

VIDEO 1 Effortless extraction of the stylet-driven LBBAP lead placed into the septum.

a defibrillator lead, we decided to attempt the complete transvenous extraction of the implanted system to proceed with a de novo conventional CRT-D device. After removing the suture sleeve, the lead extraction was attempted arming the LBBAP lead with a stiff stylet. Due to the deep septal penetration, no active screw retraction was attempted to avoid screw entanglement. As a second step, the lead body was directly subjected to 5–6 counterclockwise rotations. This maneuver allowed for the immediate and effortless extraction of the lead, as demonstrated in the Video provided. No screw fracture or elongation was observed after extraction (Video 1).

The CRT-D implant was then completed with a quadripolar pacing lead in a posterior branch of the coronary sinus resulting in a greater narrowing of QRS duration compared with previous LBBAP (Figure 2B).

Recent reports have shown that LBBAP improved clinical outcomes compared with biventricular pacing in patients with CRT indications.[1] Despite LBBAP, our patient had a decline in heart failure function, possibly attributed to specific characteristics of his conduction system, such as diffuse distal conduction or intramyocardial disease, or alternatively by the progression of the underlying disease. It is noteworthy to highlight that our case underscores the feasibility of LBBAP lead extraction, which consequently enables a transition to CRT therapy. Some previous cases have reported successful extraction of leads implanted in LBBAP, but these reports are limited to the removal of the lumenless (LL) 3830 lead (Medtronic Inc., Minneapolis, MN, USA), which has specific features that differ from conventional bipolar pacing leads.[2,3] However, there is a growing use of SD leads for LABBP, associated with specifically designed delivery sheaths.[4] Compared with LL leads, SD leads may benefit from better support and stability during LBBAP implantation, but concerns may arise about long-term extractability. There is only one case report that showed successful percutaneous extraction of a SD lead from the left septum 4 months after implantation using a snare via a femoral approach, due to a distal fracture of the electrode occurring during the procedure.[5] Our case showed the feasibility and ease of extraction of a LBBAP lead after 10 months from implantation without complications. Our methodology involved employing a standard stylet, along with delicately applied counterclockwise rotations of the lead body. Importantly, we refrained from retracting the active fixation screw, a precaution taken to prevent lead fracture.

CONFLICT OF INTEREST STATEMENT

The authors have no conflicts of interest to declare.

ETHICS APPROVAL STATEMENT

N/A.

PATIENT CONSENT STATEMENT

Patient gave consent to publish this case report.

CLINICAL TRIAL REGISTRATION

N/A.

ORCID

Paolo Bonfanti https://orcid.org/0009-0008-9625-7594

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