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CASE REPORT

Management of a patient with multiple device replacements and extractions: When the leadless pacemaker is a viable solution

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Abstract

Leadless pacemaker (LPs) is a safe device and the implantation rates of this device is increasing. The device extraction and replacement are today a challenging procedures especially in case of infections, fragile and older patients or in unfavorable venous anatomy; LPs can be a valid alternative strategy in these cases. We report a case of management of a patient with multiple previous device replacements and extractions, with malfunction of transvenous pacemaker and with a fibrous membrane between the walls of the ventricular lead and the superior vena cava (SVC), who underwent a successful LP implantation.

KEYWORDS
avblock, leadless, micra, pacemaker, pacing

1 | INTRODUCTION

Leadless pacemakers (LPs) have shown a high profile of safety and efficacy.[1–3] They may offer new opportunities for patients with previous infections, device extraction and more generally, for fragile and older patients.[4–6]

This case report describes a management strategy of a patient with a history of multiple previous device replacements, extractions, and malfunction of conventional transvenous systems, who underwent a successful LP implantation.

1.1 | Case report

A 45-year-old woman with a history of congenital atrioventricular (AV) block, who had a dual chamber pacemaker (PM) implanted at the age of 16 with 3 PM replacements for battery depletion and a previous atrial lead previously abandoned due to capture/sensing defects, was admitted to our emergency care unit because of symptomatic bradycardia. The PM follow-up revealed high values of ventricular pacing threshold, with an increase of right ventricle lead impedance and sporadic capture defects, so the patient was admitted to our operative unit for leads extractions, device extraction and reimplantation, procedure recommended especially in young patients (Figure 1A)[7]; at that time patient was in junctional rhythm on ECG, the atrial lead showed very high thresholds of pacing, normal impedance and very low P wave sensitivity probably suitable for atrial silence/paralysis. The echo examination showed a mild reduction of ejection fraction (EF = 50%), mild mitralic insufficiency (MI), mild dilation of the right ventricle with preserved systolic longitudinal function and severe tricuspid insufficiency (PISA 9.5 mm, EROA 0.56 cm, VR 55 ml) with flap coaptation deficiency due to dilatation of the valvular ring, the patient refused surgical evaluation. There were three leads, two atrial, and one ventricular. After

Abbrevaitions: AV, atrioventricular; LPs, leadless pacemakers; MI, mitralic insufficiency; PM, pacemaker; SVC, superior vena cava; TV, tricuspid valve TV.

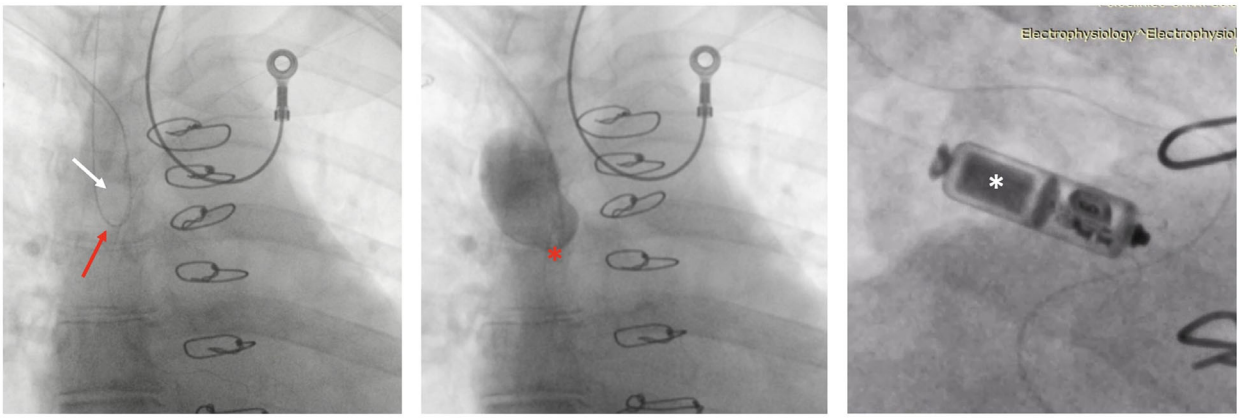

FIGURE 1 (A–C) Pacemaker implantation. (A) Obstruction to the passage of the guide into the superior vena cava (white arrow) with folded guide (red arrow). (B) Fibrous sleeve at the level of the atrio-caval junction (red asterisk). (C) Leadless pacemaker (white asterisk) released in septal position [Color figure can be viewed at wileyonlinelibrary.com]

temporary pacing electrode insertion and two atrial lead extraction, the attempt of ventricular lead extraction, laser-guided, was difficult and the procedure was stopped. After a couple of hours, the patient developed hemodynamic instability and a promptly echocardiogram showed the presence of pericardial effusion. An urgent pericardial drainage was performed and an epicardial lead for temporary pacing was placed in by sternotomy. After 8 days, an attempt to implant a PM via the right transvenous subclavian vein failed; the venography showed the presence of a fibrous membrane (Figure 1B), probably a massive adhesion between the walls of the ventricular lead implanted 28 years earlier and the superior vena cava (SVC), at the level of the atrio-caval junction with very slow outflow of the contrast medium. So, we decided to implant a single-chamber LPs (Micra TPS, Medtronic Inc.). A 23F Medtronic Micra delivery catheter was inserted through the right femoral vein and advanced across the tricuspid valve (TV) to the right ventricular apical-septum (Figure 1C). The pacing threshold and R wave sensing (1.1 V at 0.24 ms) were considered adequate and the PM was released. The day after procedure, a device interrogation showed stable electrical parameters. The postoperative period was uncomplicated.

2 | DISCUSSION

The Micra Pacing Study[1] excluded the patients with an existing pacemaker or implantable cardioverter–defibrillator. Nevertheless, Zucchelli et al., showed that a Micra implant is feasible and safe, even in patients who previously underwent device extraction, and there are no significant differences in implanting a Micra after extraction or as first line pacing therapy.[8] In our case, awaiting permanent PM, to avoid symptomatic junctional bradycardia we placed an epicardial lead, but previous studies showed the feasibility of a LPs even with an intracardiac temporary pacing lead.[6,9–12] The presence of a lead screwed in the right ventricle may affect the maneuverability of the delivery system. However, the safety and the acute success rate seemed not to be compromised.[6,12] Moreover, data from the Micra post-approval registry have shown the feasibility and safety of leadless PM implantation in patients with prior device infections. More than 35% (39/105 patients with prior extraction) of the studied patients received the Micra PM on the same day as the extraction procedure.[6] The small size, the reduced exposure to bacteria because of intracardiac positioning, and the possible partial or complete Micra fibrous encapsulation may explain the limited infection risk in cases of leadless PM.[6] The obstruction of the access veins after PM is widely spread in the scientific literature. The presence of multiple pacing leads is related with a higher risk of venous obstruction. In our patient, the fibrous membrane was a massive adhesion formed between the walls of the SVC and the leads implanted 28 years earlier. A site where fibrotic adherence is frequently described is the SVC (66%).[13] In these cases, implantation of a Micra PM via femoral access can avoid SVC obstruction. Our patient presented a tricuspid valve insufficiency. An intracardiac device such as leadless PM may theoretically avoid interaction with the tricuspid valve. Beurskens et al.,[14–16] reported a study of the impact of LPs on cardiac and valvular structure and function, showing LP therapy was unexpectedly associated with an increase in TV dysfunction, comparable to changes seen in patients with DDD transvenous pacemaker systems.

3 | CONCLUSION

Leadless pacing is an available alternative to epicardial pacemaker leads in patients with unfavorable venous anatomy or more generally, following a device extraction.

To date, the mechanism of interference with the tricuspid valve and the role of the LPs in the patients with mitral regurgitation is not clear. Further study is needed to address this topic.

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