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Micra leadless pacemaker extraction using Aveir retrieval catheter-initial experience in Poland

Short title: Micra extraction with Aveir retrieval catheter

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The number of implanted leadless pacemakers (LPM) grows worldwide, and as more LPMs reach their end of life, choosing an optimal strategy for their further management, becomes essential [1]. The current European Heart Rhythm Association consensus does not prioritize between LPM extraction, or its abandonment, followed by the implantation of a new device [2]. However, extraction can be performed when feasible, as it potentially limits long-term complications associated with multiple devices remaining in the right ventricle.

We present a case of an 83-year-old female with a history of permanent atrial fibrillation, who had undergone bilateral nephrectomy for renal cell carcinoma, required chronic dialyses, and was admitted for elective replacement of her LPM. In October 2021, she received a Micra VR (Medtronic, Minneapolis, MN, US) device due to a second-degree atrioventricular block in atrial fibrillation and was totally pacemaker dependent. The decision was made to extract the device in the electrophysiologic lab, under local anesthesia, using the dedicated LPM retrieval tool, and then implant the Aveir VR LPM (Abbott, Sylmar, CA, US). The cardiac surgery team was available in the facility.

Having secured backup pacing from a temporary electrode from the left femoral vein, the Aveir Retrieval LSCR111 (Abbott, Sylmar, CA, US) tool was introduced via the right femoral vein into the proximity of the device (Figure 1A), and Micra was caught in its middle part using the tool-equipped loop (Figure 1B). The protective sleeve was inserted on the LPM (Figure 1C). After few traction attempts, with countertraction provided by the protective sleeve, having secured the most optimal alignment, we eventually managed to extract the Micra and tug the system into the protective sleeve and sheath (Figure 1D–E, Supplementary material, *Video S1*). Then, a new Abbott Aveir VR pacemaker was successfully implanted with the same sheath used for Micra extraction, with optimal parameters (Figure 1F). The temporary pacemaker was withdrawn, and the patient discharged home the next day.

Extraction of leadless pacemakers, especially after a prolonged dwelling time, with the risk of encapsulation by the adherent tissue, may be challenging [3]. The Micra LPM system received the CE Mark in April 2015. With the estimated and observed battery longevity of approximately 10 years, the number of Micra devices approaching end of life will soon see a major increase, and thus, its management strategies are needed. The reduced time to elective replacement in the presented case was associated with a higher yet stable pacing threshold of 2.5 V/1.0 ms. In our case, we decided to attempt an extraction of the Micra and implantation of a new device due to concerns about pacing threshold seen with the Micra device. Moreover, a relatively broad distance from the tricuspid valve, limited the risk of tricuspid valve complication during the procedure.

The Aveir retrieval system has been designed with a triple-loop mechanism and a flexible protective sleeve, to allow mostly for extraction of Nanostim and Aveir pacemakers, and high efficacy in extraction of those pacemakers was recently demonstrated [4]. To date, there have been few cases of successful Micra extraction with the use of Aveir Retrieval tool, although none reported periprocedural insights in a pacing-dependent patient, in whom additional caveats must be considered [5]. In our patient, complete pacing dependence required temporary pacing throughout the whole procedure, and the decision was made to begin the procedure with Micra extraction, without risking the dislodgment of the newly implanted device, by maneuvering with the old LPM, as could occur in the opposite sequence.

Supplementary material

Supplementary material is available at https://journals.viamedica.pl/polish_heart_journal.

Article information

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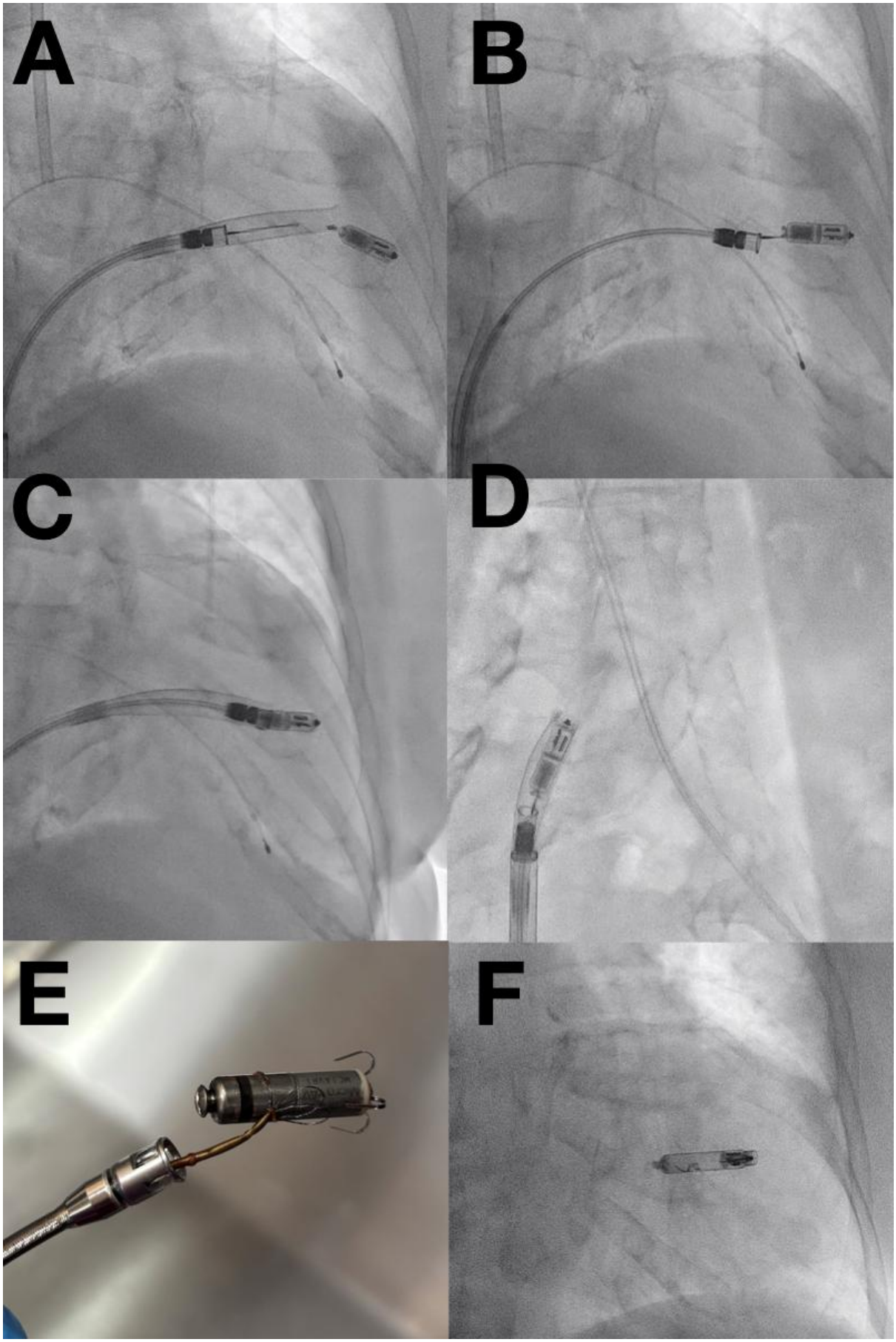

Figure 1: Procedure and device images. **A.** The Abbott Aveir Retrieval LSCR111 tool

introduced via the right femoral vein and placed in the right ventricle, with the protective sleeve in the close proximity to the device. **B.** Micra caught in its middle part using the tool-equipped loop. **C.** The protective sleeve being inserted on the leadless pacemaker. **D.** The device extracted from the myocardium pulled into the protective sleeve and sheath. **E.** The system seen after explantation, with the snare catching the device in its middle part. **F.** A new Abbott Aveir VR pacemaker implanted in the typical ventricular position