

# First experience in simultaneous use of the extravascular implantable cardioverter-defibrillator and the leadless atrioventricular pacemaker

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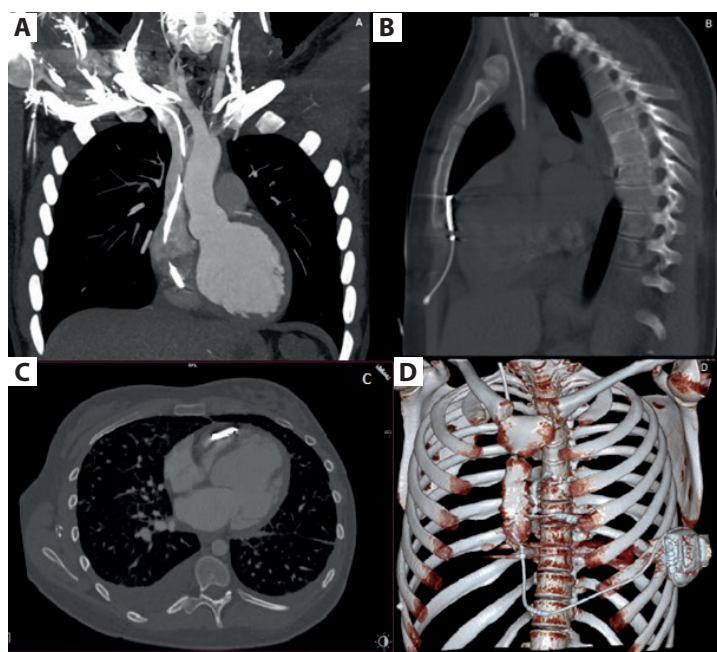
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The extravascular implantable cardioverter-defibrillator (EV-ICD) was introduced into clinical practice in 2023. EV-ICD uses a substernal lead location to provide both defibrillation and anti-tachycardia pacing therapy [1] for patients who do not present with chronic bradycardia, do not have indications for multichamber pacing, and have not undergone previous sternotomy. Currently, an implanted or added device is acceptable only when ventricular bipolar single-chamber pacing is used. Although various device combinations with leadless pacemakers have been described before [2, 3], the leadless Micra™ Transcatheter Pacing System is officially contraindicated with any other active cardiac device that may interfere with the sensing performance of the Micra device [4, 5]. Micra and an EV-ICD may benefit patients with limitations or contraindications to transvenous devices, but their simultaneous use has not been clinically tested before. This article presents a first report in the literature on the unprecedented simultaneous application of a leadless Micra AV pacemaker and an EV-ICD, which represents a novel and previously undocumented approach in clinical practice.

A Micra AV™ Transcatheter Pacing System and an Aurora EV-ICD™ SureScan MRI model DVEA3E4, were implanted in a 19-year-old female with fulminant postinfectious Ebstein-Barr virus cardiomyopathy. A detailed description of the patient's history of non-invasive treatment in the Heart Failure and

Transplant Unit, although very educational, is beyond the scope of this case presentation. After the first month of the onset of symptoms, the patient developed a complete atrioventricular block. Given the disseminated venous occlusion after intensive care (Figure 1A) and to avoid further vascular complications during a possible heart transplantation, it was decided to implant a leadless pacemaker instead of a transvenous device. A Micra AV was implanted in December 2023 (Figure 1B), and the patient was discharged home with left ventricular ejection fraction of 15%–20%, optimal pharmacotherapy, and a wearable cardioverter-defibrillator as a bridge to recovery or decision about heart transplantation. As no significant improvement in cardiac function was observed, an EV-ICD was implanted uneventfully in March 2024, following problems with the transvenous approach and vector test failures with the subcutaneous ICD (Figure 1C–D; Supplementary material, Figure S1–S2). Both devices were thoroughly tested and programmed after consulting the manufacturer's. The Micra pacing capture threshold was checked following intraprocedural EV-ICD defibrillation testing. EV-ICD sensitivity was programmed to 0.15 mV with post-shock pacing and pause prevention pacing algorithms OFF, and ATP turned OFF for all zones to avoid unintentional cross-talk pacing inhibition, while Wavelet was permanently OFF (parameters of both devices are presented in Supplementary material, Figure S3).



**Figure 1.** **A.** Angio-CT chest scan performed before electrotherapy procedures. Coronal plane. Diffuse white areas represent sub-occlusion of the subclavian veins and superior vena cava, which is a contraindication for transvenous system implantation. **B.** CT chest scan; axial plane, after Micra AV TPS implantation — the device is located in a septal/apical position in the right ventricle. **C.** CT chest scan; axial plane. Micra AV TPS is seen in the exact location as on Panel 1.B. Reflection of the substernal lead of the EV ICD implanted 3 months after the LP is marked with an arrow. **D.** 3D reconstruction based on a chest CT scan. LP and EV ICD systems topographic locations

The proper functioning of both devices was confirmed in subsequent interrogations performed during the 3-month follow-up. (Supplementary material, *Figure S4*) The programming applied resulted in continuous effective pacing in this pacemaker-dependent patient, and no tachyarrhythmia events were recorded, as might be due to ventricular pacing counting. Both systems were explanted on May 31, 2024, during sternotomy, when heart transplantation was performed due to rapid progression to end-stage heart failure.

The combination of devices described above became the only viable option in our thorough review and turned out to be safe and effective.

### Supplementary material

Supplementary material is available at [https://journals.viamedica.pl/polish\\_heart\\_journal](https://journals.viamedica.pl/polish_heart_journal).

### Article information

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