EP CASE REPORT

End-of-service management of leadless cardiac pacemakers: a case report

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Introduction

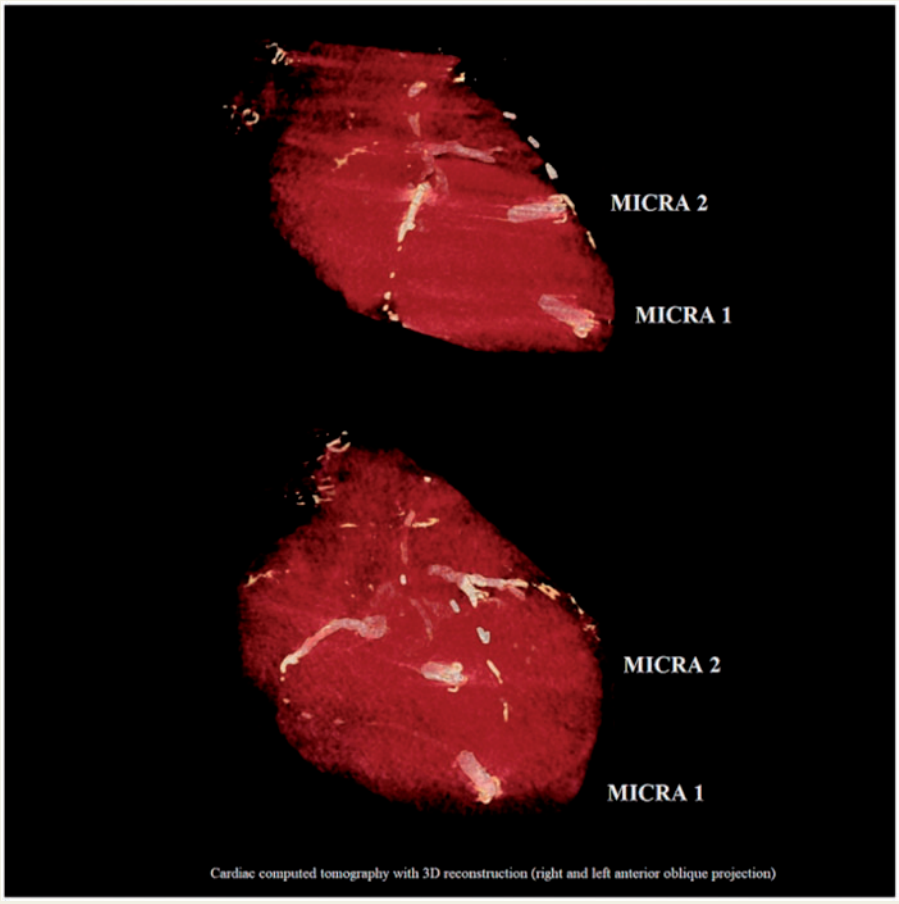
Leadless pacemakers are designed to avoid lead-associated complications in patients indicated with a pacemaker. End-of-service management with leadless devices remains unclear. We report the very first human case of a second leadless device implantation indicated for 'box change'.

Case report

A 90-year-old man had been implanted with a leadless pacemaker (Micra MC1VR01 transcatheter pacing system, Medtronic, Minneapolis, MN, USA) for a complete atrioventricular block in 2016.

He had severe comorbidities with a history of myocardial infarction with coronary artery bypass graft surgery, permanent atrial fibrillation, severe chronic kidney disease, and thrombocytopenia necessitating hydroxyurea chemotherapy.

Baseline transthoracic echocardiography showed a preserved left ventricular systolic function with moderate aortic stenosis, mild mitral regurgitation, and severe tricuspid regurgitation.



Cardiac computed tomography with 3D reconstruction (right and left anterior oblique projection)

At implantation, ventricular pacing threshold was 0.63 V at a 0.24 ms pulse width, with an expected battery longevity >10 years.

At 3-month follow-up, device interrogation showed an elevated pacing threshold >3 V, with normal R-wave sensing and impedance measurement. Chest radiography showed no significant dislodgement. Considering patient's comorbidities, it was decided not to extract nor reposition the device. The pacing threshold remained >3 V during follow-up with an end-of-service expected to occur in 2018.

In July 2018, a second leadless pacemaker implantation procedure under local anaesthesia was then decided. The second leadless device (Micra MC1VR01 transcatheter pacing system, Medtronic, Minneapolis, MN, USA) was easily placed higher on the septum, displaying excellent electrical parameters at the first positioning (pacing threshold 0.63 V, ventricular sensing 8 mV, and impedance 630 Ω). Procedure total

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duration (skin-to-skin) was 28 min, fluoroscopy time 5 min 42 s. The first leadless device was turned off. At 3 months, pacing threshold was even lower (0.38 V), with an expected longevity >10 years.

Cardiac computed tomography with 3D reconstruction was performed (*Figure*), showing relative position of both leadless devices. Spatial separation was 39.2 for proximal sides and of 56.7 mm for distal sides.

Discussion

End-of-service management of leadless pacemakers remains absent of current guidelines. Traditional box change procedure is not feasible, and extraction procedures of these devices are at higher risk than simple lead repositioning in conventional pacemakers. We show that an additional device can be easily implanted in the right ventricle, adjacent to the initial turned-off leadless device. Previous studies examined the feasibility of implanting multiple intra-cardiac devices in the right ventricle. Chen *et al.*[1] already showed that the implantation of two adjacent leadless pacing devices in a swine heart does not lead to dimensional or functional cardiac abnormalities. Omdahl *et al.*[2] implanted three leadless pacemakers in a human cadaver heart (right ventricular apex, mid-septum, and outflow tract). Finally, Boldt *et al.*[3] published the first case of two different leadless models implanted in a same patient due to the initial device failure. However, how many devices can be implanted during a long lifetime remains an unsolved question.

Conflict of interest: none declared.

References

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