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Safety and image quality of cardiac magnetic resonance imaging in patients with retained epicardial pacing wires after heart transplantation

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Introduction

Temporary epicardial pacing wires, implemented in patients during heart transplantation, are routinely removed before discharge. However, in some cases, these wires may remain in situ and are often considered as a contraindication for magnetic resonance imaging in the future. Therefore, we aimed to provide data about safety and image quality of cardiac magnetic resonance (CMR) in those patients.

Methods

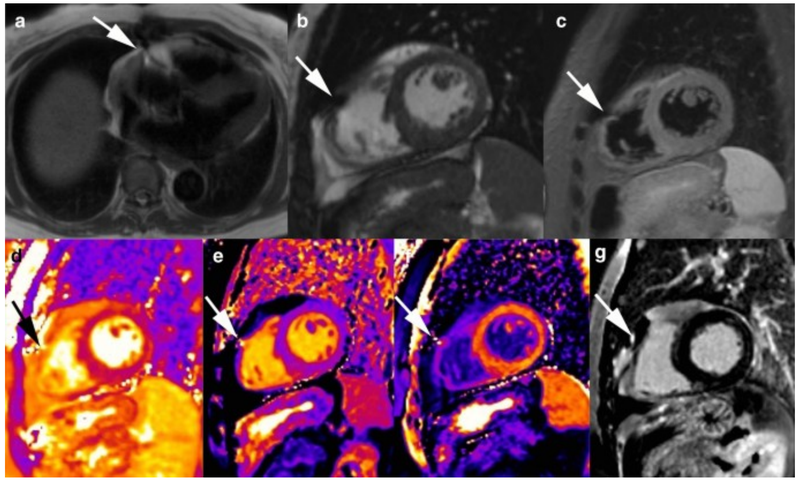
This is a report on a subpopulation out of eighty-eight patients after heart transplantation that were included in a prospective cohort study and underwent multiple CMR in their post-transplant course. During CMR, patients were monitored by ECG and all examinations were observed by a physician to document potential adverse events. Additionally, image quality was assessed by two independent imaging specialists.

Table 1 Patient characteristics

	N = 19
Retained temporary PM leads	19/88* (22)
Age (years)	54 ± 15
Male patients	11 (58)
CMR Studies	51 (91)
Form	
Loop	9 (47)
C-shaped	6 (32)
Straight	4 (21)
Adverse reactions	
Severe	0 (0)
Mild	1 (5)
Event rate	
CMR	1/51 (2)

Numbers are given as mean ± standard deviation or count and (%) *Total heart transplantation CMR study cohort; PM, pacemaker

Figure 1 Preserved image quality of CMR in a patient with retained wires (white arrows). None of the sequences are obscured by artifacts (a–g)



Results

Nineteen of 88 patients included had temporary pacing wires in situ. These patients underwent a total of 51 CMR. No major adverse event and only one single, mild sensory event could be documented. One patient, with a C-shaped temporary pacing wire in situ, described a sensory event near the subcutaneous end of the retained lead during the second CMR, 12 months after heart transplantation. This event occurred during the HASTE sequence. The effect was reproducible, as it immediately disappeared once the sequence was discontinued, but returned as soon as it was restarted. No arrhythmic event or signs of skin irritation were observed. The CMR scan was stopped and the patient was transferred out of the CMR unit. The further course was uneventful; however, the patient was excluded from the study. All other CMR studies were completed uneventfully. All CMR studies showed preserved diagnostic image quality. Temporary pacing wires were visible in 100% of HASTE and CINE sequences. In less than 50 percent of the examinations, temporary pacing wires were also visible in T1 and T2 Mapping, STIR, and LGE sequences, without any impairment of image quality.

Table 2 Visibility and image quality of temporary Pacemaker leads in CMR

Grading of image quality	n = 51(%) HASTE	n = 51(%) Cine	n = 51(%) T1/T2 Mapping	n = 50(%) STIR	n = 48(%) LGE
Not visible	0 (0)	11 (22)	23 (45)	18 (36)	14 (29)
Visible, no image quality impairment	51 (100)	40 (78)	23 (45)	23 (46)	19 (40)
Visible, impaired image quality	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Not in field of view	0 (0)	0 (0)	5 (10)	9 (18)	15 (31)

Numbers are given as count and (%). HASTE, half-Fourier single shot turbo spin echo, LGE, late gadolinium enhancement; STIR, short tau inversion recovery

Conclusions

With a low event rate of only one mild adverse event during 51 CMR examinations (1.96%), CMR appears to be safe in patients with retained temporary epicardial pacing wires after heart transplantation. Moreover, image quality was not impaired by the presence of pacing wires.