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The safety of cardiac magnetic resonance imaging in patients with implantable cardiac devices compatible and non-compatible with MRI

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Background: Lately there has been a growing number of patients with implanted electronic cardiac devices and at the same time an increase in the use of MRI. It is estimated that in the coming 10 years as many as 63% of such patients will need MRI diagnosis. Resonance imaging is however avoided in most patients with implanted cardiac devices because of the overall poorer quality of MRI and safety concerns contrary to the ESC guidelines on MRI which support use of this modality regardless of the ICD type (compatible or non-compatible with the MRI) as long as the safety protocol is observed.

Objective: To estimate the safety of cardiac magnetic resonance imaging in patients with implantable cardioverter-defibrillators (ICCD) compatible and non-compatible with MRI.

Patients and methods: 92 patients with ICD, aged 60.7 +/- 10.6 years (90% with coronary artery disease) underwent CMR examination. ICD was implanted for primary prevention in 64 patients, and in 28 patients for secondary prevention. The MRI-compatible and non-compatible devices were implanted in 50 and 42 patients, respectively.

CMR was performed on 1.5 T scanner (Magnetom Avanto, Siemens). ICD was re-programmed for the duration of MRI examination according to the 2013 ESC guidelines. The baseline settings were restored after CMR. ICD parameters were checked three times: before, immediately after and 30 days after CMR. Patients’ safety was monitored by pacing impedance, defibrillation impedance, pacing threshold and sensitivity of the detection of R wave (sensing amplitude).

Results: No device-related adverse events were documented during CMR. There were no significant differences for both MRI-compatible and MRI-non-compatible devices in terms of parameters measured before, immediately after and 30 days after CMR. The pacing impedance measured at all three timepoints showed no significant differences for both MRI-compatible (521.02? ± 113.02? vs 524.52? ± 112.06? vs 521.02? ± 111.89?; p=ns) and MRI-non-compatible devices (445.45? ± 106.95? vs 438.00? ± 104.56? vs 454.05? ± 106.18?; p=ns). Similarly, no differences in defibrillation impedance were observed for both types of devices, MRI-compatible (79.52? ± 8.35? vs 80.52? ± 8.11? vs 80.58? ± 8.07?; p=ns) and MRI-non-compatible ones (65.70? ± 6.62? vs 67.60? ± 6.83? vs 65.93? ± 6.77?; p = ns). Pacing threshold and sensitivity of R wave detection (sensing amplitude) were also within normal limits.

Conclusions: With appropriate precautions, CMR may be performed safely in patients with either compatible or non-compatible devices. All device parameters measured after the CMR scan for both, MRI-compatible and MRI-non-compatible devices, confirmed normal device performance.