

Cardiac magnetic resonance in patients with antiarrhythmic devices .Image quality and diagnostic utility study.

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Background:Recent studies suggest that cardiovascular magnetic resonance (CMR) could be carried out in those patients with implanted antiarrhythmic devices (AAD), such as pacemakers (PM) or implantable cardioverter-defibrillators (ICD), with minimum risk both for the patient and for the AAD. CMR in this setting can be technically demanding and the signal loss and magnetic field inhomogeneity induced by the AAD may limit the diagnostic yield of this imaging technique. The aim of this study was 1) to assess the safety and diagnostic usefulness of CMR in patients with AAD, 2) to analyse which factors may affect image quality in these scans.

Methods: 42 patients with AAD referred for a CMR scan were included. They all were informed about specific risks, gave a written consent and were clinically assessed before and after the scan. During the scan, pacing mode was programmed to asynchronous for PM-dependent patients whereas ICDs were programmed to a monitor-only mode. The following parameters were analysed: 1). type of AAD (ICD, PM) 2).Weight and volume of AAD 3). Reason for CMR referral (myocardial perfusion/viability study-MPV, right ventricular function quantification study - RVF), 4). Area of signal loss around the AAD (SLA) analysed placing a ROI with center in the center of AAD including any SLA, in basal slice of cardiac short axis steady-state free-precession sequences. 5). The need to change the usual CMR acquisition protocol. (Steady-state free precession sequences change to turbo fast low angle shot sequences.). 6) Presence of phase-off artefacts. CMR was considered nonconclusive when it failed to solve the clinical questions raised for each individual patient.

Results: Seven patients had an ICD implanted and another 35 a PM, being 11 of them PM dependant. Neither clinical events nor patients complaint were reported. No significant changes were seen in AAD function after the scan with respect to thresholds, battery charge, sensing signal amplitude and impedance. In 24 cases (56%) a change in CMR acquisition protocol was required. SLA was correlated with AAD weight ($r=0,7$ $p<0,01$) and volume ($r=0.7$ $p<0,01$). CMR was non conclusive in only 8 patients (19%), and this happened mainly in patients with ICD (57% vs. 12% with PM, ($p=0,02$), in MPV (43% vs. 5% in RVF, $p=0,05$) and in AAD of high volume ($23\pm13\text{mL}$ vs. $14\pm7\text{mL}$, $p=0,04$).Phase-off artefacts are presents in 8 patients (19%) six of them have non conclusive tests.

Conclusions: 1) CMR can be safely done in AAD patients with good diagnostic yield. 2) SLA correlates with AAD weight and volume. 3) MPV CMR scans in patients with high volume AAD should not be advised, due to the high incidence of nonconclusive tests.

