

The Diagnostic Value and Safety of Cardiovascular Magnetic Resonance Imaging in Patients with Cardiac Rhythm Devices

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Background

Cardiovascular magnetic resonance (CMR) examinations in patients with cardiac rhythm devices are increasingly required in daily clinical practice. Conventional pacemakers and implantable cardioverter-defibrillators (ICD) have always been regarded as a contraindication to magnetic resonance (MR) imaging. However the introduction of MR-conditional systems have significantly improved access to MR examinations. Despite solution of this problem device related artefact remains a significant issue in CMR studies.

Aims

The aim of this study was to investigate diagnostic accuracy and safety of CMR imaging in patients with MR-conditional pacemakers and implantable loop recorders (ILR).

Methods

Between June 2012 to January 2014 we identified 28 consecutive patients with cardiac rhythm devices who were referred for a CMR examination in our tertiary cardiothoracic centre. All devices were interrogated and reprogrammed pre-CMR and post-CMR to minimize interference with the electromagnetic fields. All scans were performed on 1.5 Tesla scanner.

Results

Among the 28 patients with cardiac devices undergoing a CMR, 11(39%) had pacemakers and 17(61%) ILR. All devices scanned were left sided implants. All pacemakers scanned were MR conditional. In the post-CMR interrogation, there were no significant changes of pacing capture threshold, lead impedance and battery life noted immediately or 3 months after the CMR. 12(43%) patients had stress perfusion study, 16 (57%) was a cardiomyopathy scan. Artefacts were then categorized in minor artefacts (n=15) and major artefacts (n=2), the latter group providing major limitation to the diagnostic accuracy of the CMR scan. Among the 15 devices providing minor artefacts, n=2 were pacemakers vs n=13 ILR (p<0.001). Of those 2 providing major artefact 1 was a pacemaker and 1 was a ILR. Overall most common image sequence affected by artefact were cine thereby causing inaccurate volume assessment.

Conclusions

CMR can be performed safely in patients with ILR and MR conditional pacemakers with strictly defined cardiologic and radiologic protocols and monitoring. Most of the devices can cause artefacts but causing minor interference with the diagnostic accuracy of the CMR scan.

Acknowledgement

The work is funded by Bristol NIHR Cardiovascular Biomedical Research Unit (BRU).

Figure1: showing results summary
Total number of implants (n=28)

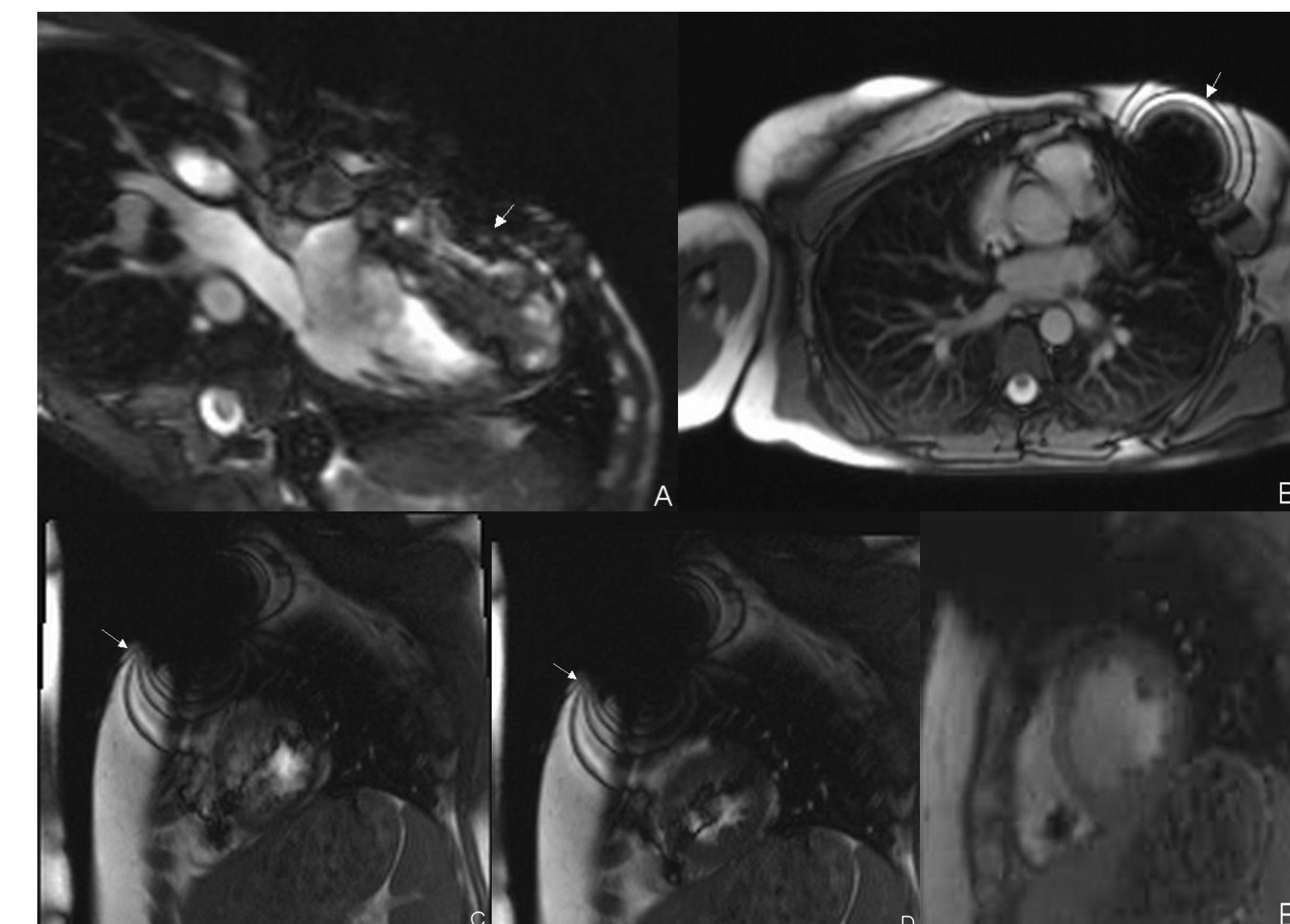
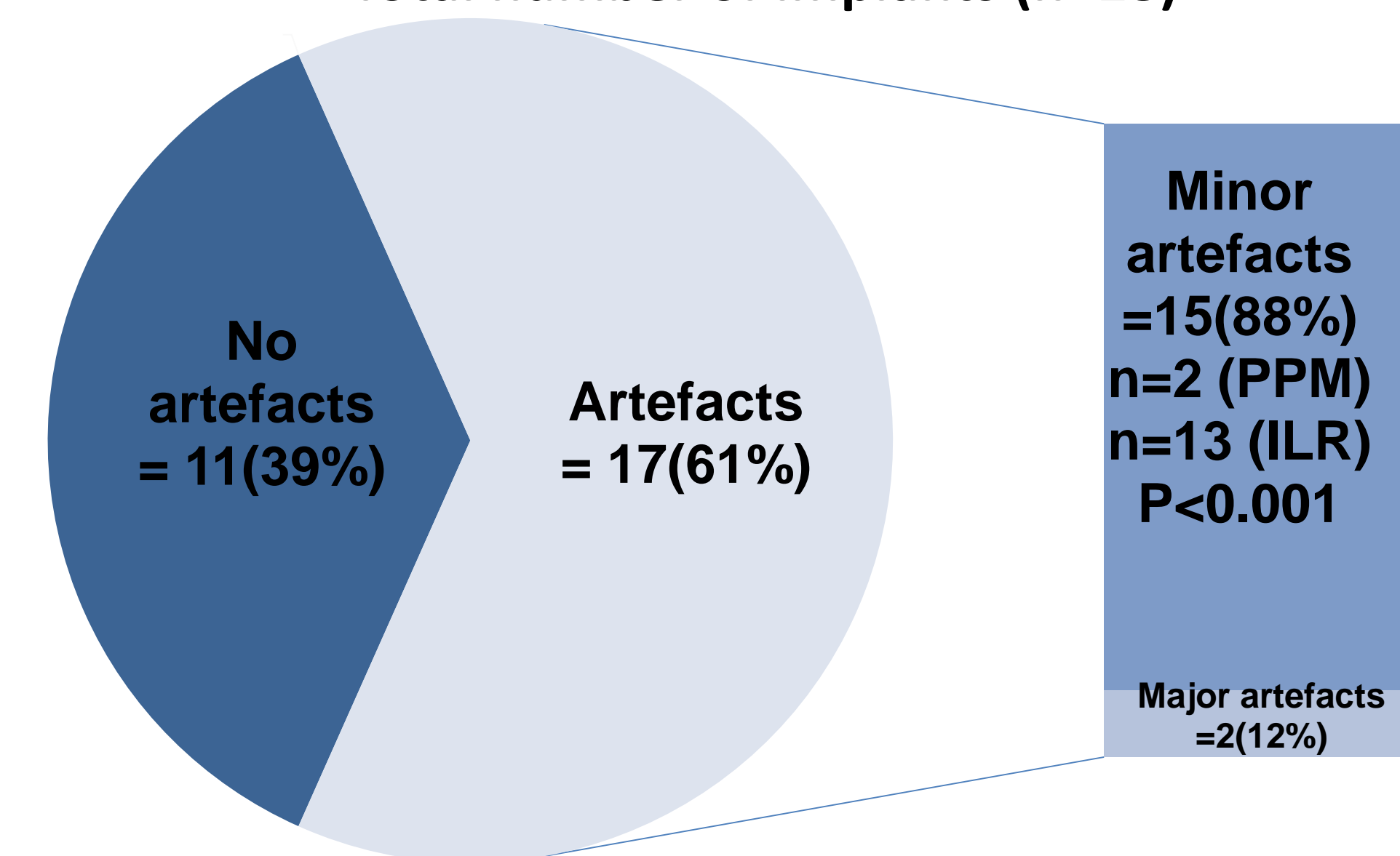


Figure 1:(panel A) showing artefact (see arrow)caused by ILR distorting 3 chamber cine view. (Panel B) showing artefact caused by pacemaker. Gross susceptibility artefact caused by ILR, panel C (early diastole) and panel D (systole) affecting the diagnostic accuracy. In same patient FLASH cine sequence (panel E) significantly improve the image quality.