Artefact mimicking tachycardia during magnetic resonance imaging in a patient with an implantable loop recorder

J R Gimbel, B L Wilkoff

CASE REPORT

A 45 year old man presented with recurrent episodes of syncope, several of which were injurious. After the history and physical examination, ECG, multiple external loop recordings, tilt table testing, electrophysiological testing, cranial MRI, and electroencephalography failed to disclose the cause of the patient’s recurrent syncope, an ILR (Reveal Plus) was implanted in his left parasternal region.

Four months later, the patient fell off the roof of his single story home while attempting to “rescue his cat”. The patient lost consciousness and injured his right shoulder. The ILR was interrogated in the emergency room after the fall and nothing had been recorded in the memory of the ILR. During a cranial MRI, one of the authors (JRG) attended to the patient, clearing the ILR before MRI and interrogating and downloading its contents after the MRI. Nothing had been recorded by the ILR during the cranial scan.

The following day, an orthopaedic consultant obtained an MRI of the patient’s right shoulder. A 1.5 T MRI was used (T2 fast-spin echo, echo time 34–85 ms, repetition time 2500–4000 ms, 5 mm slice thickness, 15 slices). The ILR was verified to be functioning properly immediately before the patient’s MRI and its memory was cleared. The contents of the ILR were downloaded immediately after the MRI. While not monitored with ECG or pulse oximetry, the patient did not experience any cardiopulmonary or neurological symptoms during the scan. Figure 1 shows what appears to be a wide complex tachycardia followed by sinus rhythm and then a narrow complex tachycardia. The time–date stamp feature of the ILR confirmed that both episodes of “tachycardia” were recorded by the ILR while the patient was undergoing MRI of the right shoulder.

DISCUSSION

The one to one correlation of the presence of an arrhythmia and associated symptoms provides the intellectual underpinnings justifying the choice of treatment. It is well known that “electrocardiographic artifact can simulate ventricular tachycardia” leading to inappropriate diagnostic testing and treatment. “Artefactual atrioventricular block” has also been reported to lead to inappropriate drug treatment in the intensive care unit setting. As reported by others, during artefact mimicking tachycardia the patient’s native QRS complex is visible within the “tachycardia” sequence. Thus, in our patient no specific treatment was directed towards treating the patient’s “arrhythmia”.

It is well known that electromagnetic interference can degrade the performance of electronic medical devices. Time varying magnetic forces and radiofrequency waves are two types of electromagnetic energy. The powerful gradient magnetic fields and the radiofrequency energies required for MRI applied across the body of the ILR undoubtedly produced the artefact that was observed during shoulder MRI. Because the cranial MRI was done with a “head coil”, thereby focusing the radiofrequency and gradient magnetic energy on the region of interest, it is likely that the strength of the applied radiofrequency and magnetic gradients were insufficient to create the artefact seen only during the shoulder scan.

This case adds to the body of previously recognised ECG artefacts. Because patients with injurious syncope who have ILRs may undergo MRI, care should be taken to exclude artefact when interpreting the ECG recordings of the ILR after MRI.

Abbreviations: ILR, implantable loop recorder, MRI, magnetic resonance imaging
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