Impact of Cardiac Magnetic Resonance Imaging – Cardiac Contusion With Intramural Hemorrhage –

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Figure. (A,B) Cine steady-state free-precession images acquired early after contrast showing focal myocardial hemorrhage in the basal anterior wall (arrow). (C,D) Late gadolinium enhancement (arrow). (E) T2-weighted image with an attenuated core, confirmed on (F) T2 mapping.

We report the case of an 18-year-old man who presented following severe blunt chest trauma. This is one of the first cases demonstrating intramyocardial hemorrhage complicating myocardial contusion diag-

nosed antemortem on cardiac magnetic resonance imaging (CMR), and highlights the potential role of CMR in myocardial trauma.

The man presented, following a high-speed motorbike ac-

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cident, with dyspnea, abdominal pain and sternal bruising. Electrocardiogram (ECG) showed transient hyperacute T waves in V1–V2; and troponin-I was 6,222 ng/L (normal, <26). Computed tomography (CT) showed a right-sided pneumothorax, normal mediastinum and a ruptured spleen. Transthoracic echocardiography was normal. CMR (Signa HD 1.5T; GE Healthcare, Waukesha, WI, USA) day 5 showed evidence of focal hypokinesia in the basal anterior wall (**Figures A,B; Movie S1**) in a non-coronary territory. Late gadolinium enhanced imaging showed this to be of high signal intensity but with an attenuated core (**Figures C,D**). Conventional T2-weighted imaging was performed using a short inversion time inversion recovery sequence (slice thickness, 8 mm; repetition time, 2×R–R interval; echo time, 82 ms; inversion time, 150 ms). This showed marked regional increase in signal intensity with a central area of attenuation (**Figure E**), which was confirmed quantitatively on T2 mapping (multi-echo double-IR fast spin echo technique; GE Healthcare), demonstrating a regional segmental T2 time of 43 ms with a central area of attenuation of 37 ms vs. remote myocardial T2 35 ms (**Figure F**). These findings are diagnostic of intramural hemorrhage. There were no significant cardiac sequelae observed, and the patient was discharged on day 11.

Cardiac contusion causing death occurs in up to 21% of patients who undergo autopsy following severe trauma.¹ The diagnosis of the condition in patients who survive to hospital, however, has been challenging owing to the lack of a gold standard diagnostic test.² Patients who are diagnosed with cardiac contusion can have symptoms that range from subclinical, through to malignant arrhythmias, heart failure and myocardial infarction (MI).³ Intramyocardial hemorrhage represents more extensive myocardial damage, and is associated with cardiac disruption, free rupture and death.^{4,5}

There is growing interest in the use of CMR for the diagnosis of cardiac injuries in chest trauma.⁶ Compared to ECG, echocardiography and CT, CMR provides greater tissue characterization, and lack of distortion from adjacent rib or pulmonary trauma, making it ideal in severe chest trauma. It is, for example, capable of distinguishing cardiac contusion from acute MI, which may present similarly.⁷ In the current case, the focal midwall nature of the injury and the lack of a subendocardial pattern of necrosis within a coronary distribution made the differential diagnosis of MI very unlikely. In the present report, CMR allowed us not only to rule out MI,⁸ but also to

diagnose the presence of myocardial hemorrhage antemortum, and when other modalities did not. CMR adds additional diagnostic information to currently used diagnostic modalities used in chest trauma, and it appears to have a promising but as yet undefined role in chest trauma.

Disclosures

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Supplementary Files

Supplementary File 1

Movie S1. Magnetic resonance imaging cine showing focal myocardial hemorrhage in the basal anterior wall of the left ventricle, with evidence of focal hypokinesia.

Please find supplementary file(s);
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