Early detection of myocardial stunning using low-dose dobutamine magnetic resonance imaging

Détection précoce de la sidération myocardique grâce à l’IRM cardiaque dobutamine faible dose

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Received 4 March 2010; received in revised form 18 March 2010; accepted 18 March 2010
Available online 26 August 2010

KEYWORDS
Myocardial stunning; Magnetic resonance imaging

MOTS CLÉS
Sidération myocardique ; Imagerie par résonance magnétique nucléaire

A 55-year-old man was referred to our department with antero-septo-apical ST-elevation myocardial infarction (Fig. 1Panel A). No history (personal or family) was reported, except a smoking habit. The patient received thrombolytic therapy 1 h after symptom onset. Twenty minutes later, early signs of reperfusion were sudden relief of chest pain and accelerated idioventricular rhythm followed by ST-segment normalization (Fig. 1Panels B and C). The patient underwent angioplasty of the proximal left descending coronary artery with a bare-metal stent (Fig. 2Panel D). Left ventriculography showed severe antero-apical hypokinesia (Fig. 2Panel E; Video 1). Troponin T concentration was raised to 0.8 ng/mL ($N \leq 0.01$ ng/mL).

Magnetic resonance imaging (MRI) was performed four days later and confirmed severe antero-apical hypokinesia at rest (Fig. 3Panel F; Video 2). Intermediate-dose dobutamine (10 $\mu$/kg/min) MRI displayed adequate increase of antero-apical endocardial inward movement and wall thickening compared with rest (Fig. 3Panel G; Video 3). No abnormality was found either on first-pass perfusion (Videos 4 and 5) or delayed enhancement MRI (Fig. 3Panel I). MRI control was normal at 2 months (Fig. 3Panel H; Video 6).

Abbreviations: ECG, electrocardiogram; MRI, magnetic resonance imaging.
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doi:10.1016/j.acvd.2010.03.013
Figure 1. Panel A. Initial electrocardiogram (ECG) showing antero-septo-apical ST-segment elevation with ST-segment depression in the inferior leads. Panel B. Twenty minutes after the start of thrombolytic therapy, ECG showed accelerated idioventricular rhythm. Panel C. Forty minutes later, ECG showed complete resolution of ST-segment elevation after thrombolysis.

Figure 2. Coronary angiography and left ventriculography. Panel D. The patient underwent angioplasty of the proximal left descending coronary artery. Panel E. Left ventriculography showed severe antero-apical hypokinesia.
Figure 3. Four chamber Magnetic resonance imaging (MRI) (steady-state free precession) at rest (Panel F), at intermediate-dose dobutamine (10 \( \mu \)g/kg/min) (Panel G) and at control (Panel H), showing both end-diastolic (left column) and end-systolic (right column) phases. Intermediate-dose dobutamine MRI displayed adequate increase of antero-apical endocardial inward movement and wall thickening compared with rest. MRI control was normal at 2 months. Delayed-enhancement three-dimensional T1-weighted turboFLASH inversion-recovery MRI sequence in four-chamber and long-axis views (Panel I) did not detect infarcted tissue.
Myocardial stunning is defined by a transient contractile dysfunction secondary to an episode of coronary hypoperfusion. Early detection of myocardial stunning is often difficult. This case highlights that the possible combination of several MRI modalities improves early detection of myocardial stunning. Low-dose dobutamine cine MRI is usually not mandatory in such a case but confirmed the fact that the tissue was highly viable and had great potential for recovery, as predicted by the absence of myocardial damage on late enhancement images.

Conflict of interest

None.

Appendix A. Supplementary data

Supplementary data associated with this article can be found, in the online version, at doi:10.1016/j.acvd.2010.03.013.