Intramyocardial haemorrhage and microvascular obstruction after primary percutaneous coronary intervention

Hémorragie intramyocardique et atteinte microvasculaire après angioplastie primaire

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A 49-year-old woman, an ex-smoker with a history of hypertension, presented to the emergency room 5 hours after the onset of acute chest pain. Electrocardiography showed ST-segment elevation in leads DI, DII and aVL. She was treated with aspirin, clopidogrel and eptifibatide in addition to low-molecular-weight heparin and beta-blockers, and was referred for immediate coronary angiography, which demonstrated proximal occlusion of the first diagonal (Fig. 1A, white arrow). Primary percutaneous coronary intervention was performed after thromboaspiration. Stenting was successfully performed in the diagonal with TIMI 3 flow at the end of the procedure (Fig. 1B). Chest pain and ST-segment elevation immediately improved. The patient underwent cardiovascular magnetic resonance (CMR) imaging on day 3. A T2-weighted sequence showed a large, well-demarcated area (Fig. 1C, white asterisks) of high signal intensity (bright signal), consistent with myocardial oedema of the anterior and lateral walls. An attenuated T2W signal was seen (Fig. 1C, white arrow), corresponding to blood in the infarct core and suggesting intramyocardial haemorrhage (IMH). Rest first-pass perfusion (Fig. 1D) showed a midventricular anterolateral perfusion defect corresponding to microvascular obstruction (MVO). MVO was confirmed by a 2-minute post-gadolinium steady-state free precession cine short-axis view (Fig. 1E, white arrow). On the T1 inversion recovery post-contrast sequence, microvascular damage appeared dark (Fig. 1F, white arrow) in the middle of transmural late gadolinium enhancement (Fig. 1F, white asterisks), representing the non-viable myocardial necrosis. Note that late gadolinium enhancement was less extended than the previous areas involving myocardial oedema, representing the myocardial area at risk.

Abbreviations: CMR, Cardiovascular magnetic resonance; IMH, Intramyocardial haemorrhage; MVO, Microvascular obstruction.
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Figure 1. Coronary angiogram before (A) and after percutaneous coronary intervention (B). Short-axis, T2-weighted sequence with myocardial oedema and blood in the infarct core (C). Rest first-pass perfusion and post-gadolinium steady-state free precession cine short-axis view showing microvascular obstruction (D, E). T1 inversion recovery post-contrast sequence showing microvascular damage in dark and non-viable myocardial necrosis in white (F).
Reperfusion may cause IMH by extravasation of erythrocytes through severely damaged endothelial walls. IMH is frequently observed in reperfused myocardial infarction with MVO. IMH is closely related to markers of infarct size, MVO and function but prognostic significance remains unclear. CMR is the only non-invasive, reliable and reproducible imaging technique that may detect the presence of IMH after reperfusion.

**Disclosure of interest**

The authors declare that they have no conflicts of interest concerning this article.

**Appendix A. Supplementary data**