

Supplemental Material

Supplemental Methods

CMR

CMR examinations were performed on a 3 Tesla MR scanner (Trio, Siemens Healthcare, Erlangen, Germany). After piloting, steady-state free precession (SSFP) cine images using retrospective gating (TE / TR = 1.4 / 3.2 ms; flip angle = 50°; pixel size: 1.6 x 1.6 mm; slice thickness: 8 mm) were acquired. The short axis stack was acquired parallel to the atrio-ventricular groove in 1 cm increments (slice thickness 8 mm, inter-slice gap 2 mm). Identical short axis images at matching slice position with cine images were acquired using T2W and LGE imaging.

Edema imaging was performed using a T2 prep-SSFP single shot sequence¹ (TE / TR = 1 / 4.1 ms; effective TE = 60 ms; flip angle = 90°; pixel size: 2.1 x 2.8 mm; slice thickness: 8 mm).

LGE-CMR was performed with a T1-weighted segmented inversion-recovery gradient echo-phase sensitive-inversion recovery (GRE_PSIR) sequence (echo time 2.5 ms, voxel size 1.8 x 1.4 x 8 mm, flip angle 20°) 5 to 10 minutes after the administration of 0.1 mmol / kg contrast agent (Gadodiamide, OmniscanTM, GE Healthcare, Amersham, UK).

Image co-registration and post-processing analysis

Cine, edema and LGE images were acquired parallel to the AV groove and were radially aligned to the position of the papillary muscles. CMR image sets acquired at different time points were analyzed in random order by observers blinded to the origin of the image.

Quantification of LV volumes and damaged myocardium

Left ventricular volumes and ejection fractions were calculated from the short axis images as previously described.² Injured fractions (injured myocardium volume / slice volume) in each short axis slice both for LGE and T2W images were quantified using computer assisted planimetry in MATLAB version 7.3.0.267 (Natick, USA) by a single experienced operator (ED).

Apical slices were not included in LGE and T2W analysis due to partial volume effects.

For objective quantification of edema or LGE, a reference region of interest (ROI) was placed in remote myocardium. The signal intensity threshold indicating edema/LGE was imposed 2 standard deviations above the mean intensity of the reference ROI, as previously described.³

Microvascular obstruction (MVO) / hemorrhage was defined as the low intensity core within an area of LGE or edema. Both MVO and haemorrhage were included in the measurement of the areas of infarction or edema.

A second reader blinded to the results of the first and to the results of PCI and CMR imaging, analysed edema images to assess interobserver variability on 20 randomly selected patients.

The index of myocardial salvage was calculated as difference in area between edema and late gadolinium divided by the area of edema. Our standardised methods for analysing and calculating LGE, along with reproducibility, have been reported previously.^{4,5}

Semi-quantitative assessment of regional function, edema and late gadolinium

Myocardial anatomical segmentation was according to the American Heart Association 17 segment model (excluding segment 17, true apex).⁶ Semi-quantitative assessments of wall motion abnormalities, myocardial edema and LGE were undertaken by an experienced observer (E.D.) using Argus software (Version 2002B, Siemens Medical Solutions). For regional function, segments were graded: 1 = normal; 2 = hypokinetic; 3 = akinetic or 4 = dyskinetic. Change in regional contraction was defined as a difference of ≥ 1 functional grade between time points. Wall motion score index (WMSI) was defined as the sum of segmental scores divided by the number of segments scored, as previously published.⁷

The extent of LGE within each segment was estimated visually and categorized according to the percentage hyperenhanced area of each segment:⁸ 0 = no LGE; 1 = 1 - 25% LGE; 2 = 26 - 50% LGE; 3 = 51 - 75% LGE and 4 = > 75%. Similarly, the extent of edema per segment was also assessed visually and categorized for each segment according to an equivalent scoring system. A second blinded reader scored the images for LGE / edema and wall motion in 20 patients. The infarct size score (% LVscore) was also calculated based on the scoring system as previously shown⁹ (sum of all the scores throughout the LV (range 0 to 4) / total number of segments x 4).

Supplemental Table

	Segments edema + n (%)	Segments LGE + n (%)	Segments WMA + n (%)	Total segments analyzed per each modality
Time point 1	151 (35%)	133 (31%)	139 (32%)	428
Time point 2	157 (37%)	N/A	107 (25%)	428
Time point 3	152 (36%)	N/A	95 (22%)	428
Time point 4	25 (6%)	100 (29%)	94 (23%)	336

Supplemental Figure Legend

Figure. Patient flow.

Disposition of patients with STEMI recruited to this study, indicating numbers at each follow-up CMR examination up to six months and reasons for loss from study.

References

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