Abstract 18 Figure 1 (a) Recovery in dysfunctional segments at follow-up CMR by SEE. (b) ROC curve of single and combined predictors of segmental improvement in dysfunctional segments. (c) ROC curve of single and combined predictors of segmental normalisation in dysfunctional segments.

IMH, Ecc or MSI did not improve predictive accuracy versus SEE alone (Figure 1b–1c).

Conclusions This is the largest study assessing CMR predictors of segmental recovery in acute STEMI. Baseline SEE was the strongest predictor. Ecc, MSI, MVO and IMH provided no incremental predictive value to SEE. Functional improvement can occur where SEE >75%.

| 19 | THE RANDOMISED COMPLETE VS. LESION ONLY PRIMARY PCI TRIAL – CARDIOVASCULAR MRI SUBSTUDY (CvLPRIT-CMR) |

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Background Multivessel disease (MVD) occurs in ~40% of STEMI. Management is controversial. PRAMI and CVLPRIT showed improved clinical outcomes with complete versus infarct-related artery (IRA)-only revascularisation at primary percutaneous coronary intervention (PPCI). However, non-IRA PCI may cause additional infarcts. We aimed to determine whether in-hospital complete revascularisation was associated with increased myocardial injury versus an IRA-only strategy.

Methods Multicentre, prospective, randomised, blinded end-point trial. STEMI patients with MVD and <12 hr symptoms were randomised to IRA-only or complete in-hospital PCI. 1.5T CMR was performed acutely (median 3 days post-PPCI) and with adenosine stress at 9 months. The primary CMR endpoint was acute infarct size on late gadolinium imaging. Myocardial salvage index (MSI) was the proportion of non-infarcted area-at-risk. n = 100 per group gave 80% power to detect ±4% infarct size. The primary clinical outcome was 12 month combined MACE (death, repeat revascularisation, heart failure, MI).

Validation studies optimised infarct, area-at-risk and strain quantification. Full-width half-maximum infarct quantification was more accurate, reproducible and correlated strongest with ejection fraction (LVEF) and infarct characteristics. Otsu's Automated Thresholding most accurately and reproducibly assessed area-at-risk. Compared with tagging, Feature Tracking strain measurement was more robust, quicker, had better interobserver variability and correlated stronger with infarct, area-at-risk and MSI.

Results (summarised in Table 1) 203 patients (98 complete revascularisation, 105 IRA-only) completed acute CMR. The groups were well matched. There was no difference in infarct size, MSI, LVEF, circumferential strain or ischaemic burden between groups. Complete revascularisation patients had increased non-IRA MI at acute CMR (Figure 1). 12 month MACE was reduced in complete revascularisation patients (8.2% vs. 17.1%, p = 0.055, hazard ratio 0.43).

Conclusions Complete revascularisation in STEMI with MVD leads to a small increase in CMR-detected non-IRA MI, but total infarct size and 12 month MACE are not increased. This

provides further reassurance that complete revascularisation can be considered at PPCI.

Abstract 19 Table 1 Baseline, angiographic and CMR characteristics

| Variable	IRA-only revascularisation (n = 105)	Complete revascularisation (n = 98)	p
Baseline characteristics			
Age (y)	64.1 ± 10.8	63.1 ± 11.3	0.53
Male sex (n,%)	83/105 (79.0)	87/98 (88.8)	0.06
Anterior infarct (n,%)	37/105 (37.2)	35/98 (35.7)	0.94
Diabetes Mellitus (n,%)	13/105 (12.4)	15/98 (15.3)	0.55
Angiographic markers			
TIMI pre PCI grade 0–2 (n,%)	97/105 (92.4)	89/98 (90.8)	0.69
SYNTAX score (total)	18 (14–22)	17.3 (13–23.5)	0.81
Symptom-PCI time (TTR, min)	171 (127–268)	192 (131–302)	0.20
TIMI post PCI grade 3 (n,%)	100/105 (95.2)	89/98 (90.8)	0.21
Acute CMR			
Time to acute CMR (d)	2.8 (1.8–3.4)	3.0 (2.0–4.3)	0.13
LV ejection fraction (%)	45.1 ± 9.5	45.9 ± 9.9	0.60
Peak LV circumferential strain (Ecc,%)	−18.1 ± 6.0	-18.6 ± 6.1	0.86
Total infarct size (% LV mass)	**13.5 (6.2–21.9)**	**12.6 (7.2–22.6)**	**0.57**
Patients with >1 infarct	11/105 (10.5)	22/98 (22.4)	0.02
Patients >1 acute infarct	5/105 (4.8)	17/98 (17.1)	0.004
Myocardial salvage index (%)	60.5 (40.6–81.9)	58.5 (32.8–74.9)	0.14
Follow-up CMR			
Time to follow-up CMR (CMR2, mth)	9.3 (8.9–9.9)	9.4 (9.0–10)	0.20
LV ejection fraction (%)	50.8 ± 8.7	49.7 ± 9.4	0.42
Peak LV circumferential strain (Ecc,%)	−23.6 ± 6.3	−22.5 ± 6.3	0.28
Total infarct size (% LV mass)	7.6 (3.2–15.1)	7.3 (3.0–14.4)	0.41
Patients with >1 infarct (%)	9/80 (11.2)	20/84 (23.8)	0.035
Presence of ischaemia (n,%) in all pats	16/77 (20.8)	17/82 (20.7)	0.99
Global ischaemic burden (%) all pats	4.3 ± 11.3	3.4 ± 8.9	0.81

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The transmural extent of late gadolinium enhancement (LGE) CMR predicts functional recovery in acute myocardial infarction (AMI). Automated methods are recommended[1] to define infarct extent on LGE imaging, such as 'n-standard deviations' (SD) and 'full width at half maximum' (FWHM). These define infarcted myocardium by signal intensity as compared to remote myocardium, which in turn depends on signal-to-noise and contrast. Individual variability in these parameters makes a single thresholding technique unlikely to be universally suitable. Extracellular volume (ECV) estimation by T1-mapping CMR is theoretically less affected by sequence and contrast variations. We compared infarct ECV with threshold-based measures of LGE transmural extent to predict contractile recovery in reperfused AMI.

Consecutive patients with reperfused first ST-elevation AMI underwent acute (day 2) and convalescent (3 months) CMR. Cine imaging, modified Look-Locker inversion T1 mapping natively and 15 min post gadolinium-contrast administration and LGE imaging were performed. Five LGE thresholding techniques were compared: 2, 5 and 6 SD, FWHM and a histogram-based technique (Otsu).[2] The ability of acute infarct ECV to predict improvement in segmental wall motion was compared with these thresholding techniques.

n = 35 (28(80%) male, age 57 ± 11 years). Infarct characteristics are shown in Table 1. ECV showed modest correlation with all threshold measures of LGE (r^2 = 0.16–0.31, p < 0.01).
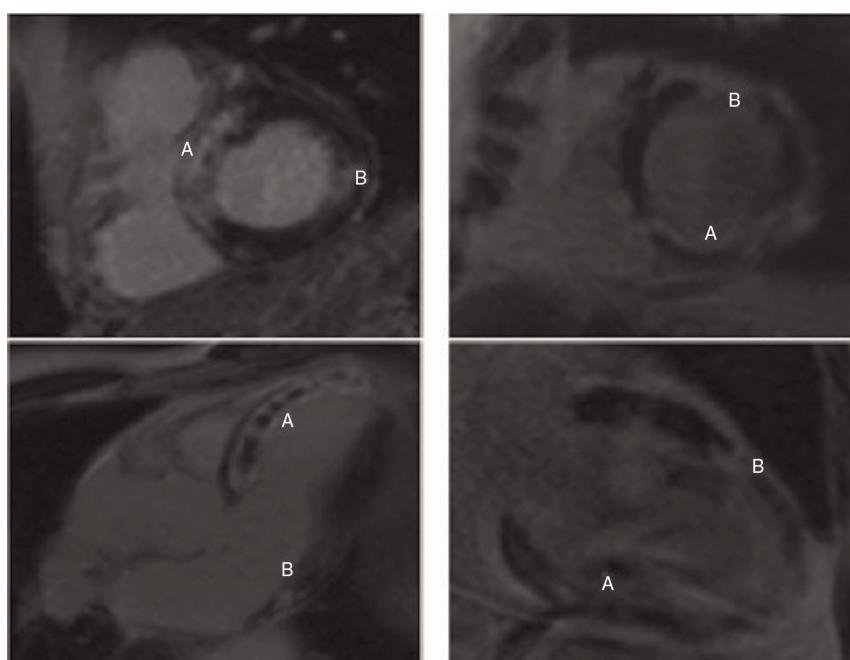
Abstract 19 Figure 1 Multiple infarcts on late gadolinium imaging in complete revascularisation patients
The 2 images on left and 2 images on right are 2 different patients.
A = main infarct-related artery territory infarct
B = infarct in non-infarct related artery territory