

Poster presentation

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## Impact of successful and failed revascularization of chronic total occlusion on left ventricular function and infarct size

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### Introduction

Non-randomised studies have reported a prognostic advantage with percutaneous coronary intervention (PCI) in the treatment of chronic total occlusions (CTO). Failure to cross and successfully open a CTO confers a worse clinical outcome, however most trials have included occlusions of short duration (7-30 days). PCI success rates are inversely related to the age of vessel occlusion reflecting temporal, cellular changes within a CTO, namely progressive collagen deposition.

### Purpose

To assess the medium-term cardiac outcomes of PCI in the treatment of true CTO (endorsed by an expert consensus panel, requiring Thrombolysis In Myocardial Infarction [TIMI] flow grade 0 on angiography and  $\geq 12$  weeks duration) using quantitative cardiac magnetic resonance (CMR) imaging.

### Methods

23 patients (mean age  $60 \pm 11$ , 82% male) referred for PCI to a single vessel de novo CTO underwent CMR examination within one week prior to and 6 months after their procedure. PCI success was defined as recanalisation of the occluded vessel and stent implantation with a final residual diameter stenosis  $< 30\%$ . Left ventricular (LV) function and transmural extent of infarction (TEI) were assessed using standard SSFP and T1-weighted imaging on a 1.5 T MRI system. LV volumes and mass were quantified using a dedicated software package (QMass). Segmental

wall thickening (SWT) was calculated by (end systolic - end-diastolic wall thickness)/end-diastolic wall thickness  $\times 100\%$ . Myocardial segments were considered dysfunctional if SWT was  $\leq 45\%$ . Viable segments included dysfunctional myocardium with TEI  $< 25\%$ .

### Results

TIMI 3 flow was successfully achieved in 13 of the 23 patients (59%), all treated with drug eluting stents. Baseline demographics were well matched in each group (Table 1). Opening a CTO did not result in improvement in either regional or global systolic function however it was associated with a significant increase in SWT in dys-

**Table 1: Baseline demographics**

	PCI	
	Successful	Failed
No	13	9
Age/y	$61 \pm 11$	
Male (no/%)	9 (69)	9 (100)
CTO (no/%):		
• LAD	4 (31)	3 (33)
• LCx	3 (23)	0 (0)
• RCA	6 (46)	6 (67)
CTO duration/mo	$5.5 \pm 1.5$	$5.3 \pm 1.6$
Diabetes: (no/%)	4 (31)	4 (31)
Prior MI: (no/%)	6 (46)	5 (56%)
Prior CABG	1	0

**Table 2: Results**

	Success (S)			Failed (F)			S vs F	
	Pre	Post	P	Pre	Post	P	P	
EF/%	56 ± 8.9	57 ± 7.6	0.64	57.5 ± 8.8	57.0 ± 6.9	0.76	0.22	
LVEDI	62.8 ± 12.2	63.8 ± 14.4	0.61	59.9 ± 9.9	61.4 ± 10.7	0.59	0.89	
LVESI	28.4 ± 8.8	27.6 ± 8.8	0.52	25.6 ± 6.86	26.3 ± 6.4	0.68	0.46	
Infarct size/g	7.0 ± 5.3	8.7 ± 6.1	0.17	8.0 ± 6.2	10.9 ± 6.8	0.17	0.14	
Infarct size/%	9.0 ± 5.9	12.0 ± 7.6	0.19	10.0 ± 7.7	13.3 ± 8.2	0.14	0.86	
Segmental wall thickening (SWT)/%	62.6 ± 16.6	62.0 ± 17.9	0.93	56.7 ± 16.8	50.4 ± 19.5	0.32	0.54	
Mean change in SWT within dysfunctional but viable myocardium	31 ± 10.1	50.8 ± 23.1	0.02	26.3 ± 9.5	25.8 ± 10.9	0.71	0.047	
In hospital outcomes: Death/NQMI Stent thrombosis CK-MB > 3 upper limit		0			0			
		0			0		NS	
		0			1			

functional but viable segments (Table 2). Failed PCI was not associated with a worse cardiac outcome in terms of LV remodelling and infarct size as compared to patients with an open artery however one patient experienced a peri-procedural myocardial infarct (MI).

## Conclusion

In this single-centre pilot study failed revascularisation of true CTOs was not associated with worse cardiac outcomes compared to successful PCI. Despite a lack of improvement in global systolic function opening a CTO improved SWT within dysfunctional but viable segments. Larger, randomised studies are required to assess the long-term benefits and morbidity of PCI in the treatment of CTOs.

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