

Viability and functional recovery after chronic total occlusion percutaneous coronary intervention

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Funding Acknowledgement: Type of funding source: None

Background: Current guidelines advocate viability assessment to guide percutaneous coronary intervention (PCI) of chronic coronary total occlusions (CTO).

Purpose: Aim of the present study was to evaluate viability as well as global and regional functional recovery after successful CTO PCI using quantitative cardiac magnetic resonance (CMR) imaging.

Methods: 132 patients with sequential CMR at baseline and 3-months after successful CTO PCI were prospectively recruited between 2013 and 2018. Segmental wall thickening (SWT) and percentage late gadolinium enhancement (LGE) were quantitatively measured per segment. Viability was defined as dysfunctional myocardium (<2.84mm SWT) with no or limited scar (≤50% LGE).

Results: Significant improvements in left ventricular (LV) ejection fraction (from 48.1±11.8 to 49.5±12.1%, p<0.01), LV end-diastolic volume (from 99.1±31.8 to 95.7±30.2ml, p<0.01), and LV end-systolic volume (from

54.4±30.5 to 51.2±29.3ml, p<0.01) were observed after CTO PCI. CTO segments with viability (N=216, (31%)) demonstrated a significantly higher increase in SWT (0.80±1.39mm) compared to CTO segments with pre-procedural preserved function (N=456 (65%), 0.07±1.43mm, p<0.01) or extensive scar (LGE >50%, N=26 (4%), -0.08±1.09mm, p<0.01). Improvement in SWT was comparable between segments with viability if further stratified to 0, >0–25, and >25–50% hyperenhancement (p=0.94). Patients with ≥2 CTO segments viability showed more SWT increase in the CTO territory compared to patients with 0–1 segment viability (0.49±0.93 vs. 0.12±0.98mm, p=0.03).

Conclusions: Improvements in LV function and volumes were significant but modest following CTO PCI. Detection of dysfunctional myocardial segments without extensive scar (≤50% LGE) as a marker for viability may aid in identifying subjects with significant regional functional recovery after CTO PCI.