Anatomical Assessment of Coronary Collaterals Predicts Procedural Success in Patients Undergoing Chronic Total Occlusion Percutaneous Coronary Intervention (CTO-PCI)

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Aims: The coronary collateral circulation has numerous benefits during CTO-PCI, including visualisation of the distal vessel, as a conduit to cross the distal cap and maintaining perfusion to the occluded vessel. The degree of collateralisation is not included in current predictive scoring tools. We sought to determine whether the degree of collateralisation was associated with CTO PCI outcomes.

Methods & Results: We reviewed patients undergoing CTO PCI at our centre from April 2010 to February 2019. After excluding patients with only bridging collaterals or a bypass graft as the major collateral vessel, 275 patients were assessed. 94 patients (34.2%) had an extensive collateral formation as defined as Rentrop grade 3, whilst 65.8% had less developed collaterals.

Those with well-developed collaterals were more likely to be females (26.6% vs 12.2%, p < 0.01) than those without, although there were similar ages in both cohorts (69.0 ± 10.3 vs 67.3 ± 10.5 years, p = 0.94). The presence of well-developed collaterals was associated with a higher rate of procedural success (92.5% vs 62.4%, p < 0.0001). When an antegrade approach was the only strategy attempted (n = 193), well developed collaterals remained predictive of success (95.5% vs 65.1%, p < 0.0001). When a retrograde approach was initially trialled (n = 43), well developed collaterals had a trend towards higher CTO PCI success rate (94.4% vs 77.8%, p = 0.10).

Conclusions: The degree of collateralisation is predictive of CTO PCI being successful, even in those undergoing an antegrade revascularisation strategy. Collateral circulation grading should be considered in the development of scoring tools aiming to predict CTO PCI outcomes.