Percutaneous coronary intervention with evolving stent technology for treating totally occluded native coronary arteries

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Chapter 10

Recovery of Absolute Coronary Flow and Resistance one Week After Percutaneous Coronary Intervention of a Chronic Total Occluded Coronary Artery, using the novel Rayflow© infusion catheter.

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A 59-year-old male was admitted to the Catharina Hospital with unstable angina. Coronary angiography showed a chronic total occlusion (CTO) of the right coronary artery (RCA) (A), a proximal subtotal stenosis of the ramus circumflex (RCx) and septal collaterals (RENTROP grade 1) from the left anterior descending (LAD) to the RCA (D). After discussion in the ‘heart team’ we decided to not perform PCI of the LAD due to diffuse disease, discovered during the hyperemic pullback and he was scheduled for percutaneous coronary intervention (PCI) of the chronic occluded RCA. Using the new technique of thermodilution with low rate of saline (Rayflow© infusion catheter (Hexacath Inc., Paris, France) and Coroventis software), we measured absolute flow and resistance in the donor vessel (LAD) before and after PCI of the CTO (D)\(^1,2\). Absolute flow in the LAD before PCI of the RCA was 256ml/min, with a microvascular resistance of 231 Wood Units (WU). Additionally we measured flow and resistance in the RCA after successful treatment, being 161ml/min and 370WU respectively (B,G). Staged PCI of the RCx was performed after one week and all measurements in the RCA and LAD were repeated (C,F,H). The absolute flow in the RCA had increased now with 86% to 300ml/min compared to 1 week ago, with a decrease of microvascular resistance of 33% to 243WU. Blood flow in the LAD area had decreased to 215ml/min, due to the decrease of perfusion territory (F). This case elegantly demonstrates how this method can be used in the cath lab, to study recovery of flow after PCI of a CTO. It illustrates that the microvasculature distal to a CTO, needs a number of days to recover and normalize.
Figure 1 - A: CTO of the RCA pre-PCI. B&G: Complete physiological assessment of the RCA directly post-PCI of the RCA including absolute flow and resistance measurements. C&H: Physiological assessment of the RCA 1 week post-PCI showing recovery of absolute flow with an increase of 86%. D–F: Complete physiological assessment of the LAD pre-PCI, directly post-PCI, and 1 week post-PCI.
References
