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Percutaneous coronary intervention of chronically occluded coronary arteries using a mechanical circulatory support system: expanding the indications of chronic total occlusion percutaneous coronary intervention

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Short title: Percutaneous coronary intervention of chronic total occlusion with Impella support

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A 57-year-old man with stable angina, severely reduced left ventricular ejection fraction (LVEF 20%) and decompensation of heart failure was diagnosed with a chronic total occlusion (CTO) of the proximal portion of the right coronary artery (RCA) (Figure 1A, arrows) with supplying collaterals from the left anterior descending coronary artery (LAD) (Figure 1B, arrows). Percutaneous recanalisation of the RCA was electively planned, under mechanical circulatory support (MCS) with the Impella 2.5 (Abiomed, Inc. Danvers, MA, USA) micro-axial percutaneous left ventricular assist device (LVAD), that was implanted in the beginning of the index procedure (Figure 1C, arrows). Due to the presence of Impella and the necessity for contralateral injections, triple arterial access was warranted. Coronary vessel recanalisation was achieved using a primarily retrograde approach with reverse controlled antegrade and retrograde tracking (rCART) technique (Figure 1D), followed by implantation of two drug-eluting stents (Figure 1E). The patient remained haemodynamically stable during the whole intervention and the Impella device was removed at the end of the procedure with puncture place closing using an Angio Seal (8F) and a Proglide. Echocardiography before discharge documented an improvement of LVEF up to 45% (Figure 1F).

Mechanical circulatory support enhances intraprocedural haemodynamic stability, particularly in patients with high procedural risk [1], multiple comorbidities, and anatomical complexity. Accordingly, the use of low-profile percutaneous LVADs may expand the feasibility of percutaneous complete revascularization [2,3]. The most commonly used elective MCS device is Impella 2.5 or CP [2]. The use of MCS is particularly important in complex retrograde procedures, which remain sometimes very challenging [4].
Figure 1 Panel A: CTO at proximal RCA (white arrows); Panel B: Collaterals from LAD to RCA (white arrows); Panel C: Impella 2.5 position – aortic valve line (arrow); Panel D: Reverse controlled antegrade and retrograde tracking (rCART) technique; Panel E: Final angiographic result. Panel F: Pre-discharge echocardiography showing an improvement of LVEF up to 45%.
References:


