Successful antegrade revascularization by the innovation of composite core dual coil in a three-vessel total occlusive disease for cardiac arrest patient using extracorporeal membrane oxygenation

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We report a successful antegrade recanalization of a 67-year-old male who survived cardiopulmonary resuscitation after a non-ST elevation acute myocardial infarction. The patient experienced cardiac arrest due to ventricular fibrillation after admission in hospital and he was stabilized after 25 min of cardiopulmonary resuscitation. After resuscitation no neurological symptoms were detected. Coronary angiography revealed in chronic total occlusions (CTO) three-vessels with severe coronary calcifications (Panels D and E); the patient was not considered to be a surgical candidate due to his poor clinical condition [very low ejection fraction (EF) <20% and acute coronary syndrome (ACS) at presentation] and for his angiographic characteristics (very small coronary arteries without visualization of distal coronary segments). Extracorporeal membrane oxygenation (ECMO) (Panel A – C show ECMO for circulatory failing heart system in real clinical patient setting after epidural anesthesiology and femoral vein and artery surgical cannulation; the pump maintain a minimum flow of 2.0 L/min) and percutaneous coronary intervention (PCI) by the use of new composite dual coil guidewire Fielder XTR (Asahi Intecc Co, Japan) 48-hours after AMI, was used to fully recanalized left anterior descending artery (LAD), circumflex artery (CX) and right coronary artery (RCA). Excellent angiographic results were obtained by the use of three, two and four drug eluting stent (DES) in the LAD, CX, and RCA respectively (Panels F and G), and ECMO was terminated at the end of the procedure.

In the search for technical solutions to improve results of PCI in CTO intracoronary guide wires represent, probably, the most advanced class of devices. The recent set-up of so-called ‘composite core, dual coil’ guide wires can be considered an absolute turning point, especially when the complexity of CTO, patient clinical conditions, and the use of an antegrade technique might limit procedural success.

To the best of our knowledge, this is the first case presentation of a three PCI of CTOs executed in a single procedure with haemodynamic support by ECMO in a patient in a critical clinical condition. Percutaneous coronary intervention was considered as the last remaining option to promote an improvement of patient prognosis and ECMO was used to guarantee circulatory assistance during the procedure. Indeed, CTO lesions and critical haemodynamic patient conditions due to ACS are considered the worst revascularization scenario, considering that these patients are not suitable for cardiac surgery; nevertheless, based on excellent results of CTO revascularization already demonstrated in less complex clinical conditions, we believe that, by minimizing the risk of intra-procedural adverse events by the use of ECMO, revascularization of CTOs is possible also in case of severe clinical conditions for improving survival, affording to the patient an opportunity of revascularization therapy. Notably, the patient did not have any peri-procedural adverse events, the EF was improved up to 32% at the 1-week follow-up, and he was discharged 9 days after the procedure.

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