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It's never too late for PCI: A case of a bail-out intentional percutaneous LIMA closure due to the CABG-induced coronary subclavian steal syndrome

Short title: A bail-out LIMA closure after CABG

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Cardiac surgery remains the optimal therapeutic strategy in severe valvular disease accompanied by multivessel coronary artery disease (MVD). However, in cases with extremely advanced atherosclerosis such treatment is contraindicated, as it may result in acute life-threatening complications. Hemodynamic support systems such as Impella or Extracorporeal Membrane Oxygenation (ECMO) are commonly used nowadays in emergency treatment of cardiogenic shock but limiting criterion is the presence of optimal vascular access [1].

A 73-year-old female with severe-aortic-stenosis (high-gradient-normal-flow with preserved left ventricular ejection fraction) and MVD including the left main (LM) (SYNTAX-Score = 49 pts; critical stenosis of LM with ostium left anterior descending (LAD) and

circumflex, then diagonal, and medial-RCA including bifurcation: LM/LAD/circumflex [Medina-1,1,1] and LAD/diagonal [Medina 1,0,1]) was expeditiously transferred from collaborating Cardiology Department to the Department of Cardiac Surgery for Surgical Aortic Valve Replacement and coronary artery bypass grafting, following previous local HeartTeam consultation. Due to general atherosclerosis including Lerich-syndrome and periprocedural diagnosed porcelain aorta resulting in an inability to connect the extracorporeal-circulation, the decision was made to perform only the left-internal-mammary artery → left-anterior-descending-coronary-artery (LIMA → LAD) bypass graft, with subsequent complete percutaneous coronary intervention (PCI) and the transcatheter aortic valve implantation. There was no data on atherosclerosis involving other vascular beds. At the end of surgical procedure, the patient's hemodynamic instability was observed, but the ECMO could not be applied due to occlusion of both femoral arteries (Figure 1A). As the clinical condition was rapidly deteriorating and the patient was developing cardiogenic shock, coronary angiography was performed. Initially, the left-radial access was used, and the occlusion of the subclavian artery (Figure 1B) with a massive steal syndrome in the LAD → LIMA → left upper limb vascular system had been identified (Figure 1C). Due to both, femoral and the right-radial-artery occlusion (following previous coronary angiography), the right-brachial access was used. First, a PK-PAPYRUS covered stent was implanted into the LAD at the LIMA suture site to stop the stealing from the LAD-supplied area through the LIMA to the upper limb (Figure 1D). The LIMA-LAD connection was successfully immediately closed. Afterwards, complete revascularization of remaining vessels was conducted (Figure 1E). Following the procedure, a gradual improvement in the patient's clinical condition was observed and remaining hemodynamically stable in a good clinical condition has been discharged home. After 12 weeks, scheduled transapical transcatheter aortic valve implantation was performed without acute complications (Figure 1F).

The knowledge regarding the advancement of atherosclerotic lesions in vascular beds is crucial for appropriate qualification for interventional treatment and avoiding potentially foreseeable complications. In the discussed case, the creation of the LIMA-LAD bypass (the primary goal of the operation) could have led to fatal complications, which were avoided by utilizing the last available vascular access for emergency PCI to close the LIMA with a covered stent, demonstrating its another application. Although intraoperatively, blood flow from the graft was unquestionable, any sudden destabilization of the patient post-coronary artery bypass grafting LIMA → LAD requires consideration of the steal syndrome as a potential cause within the urgently performed revision with the possibility of the rescue *ad hoc* intervention [2–4].

Article information

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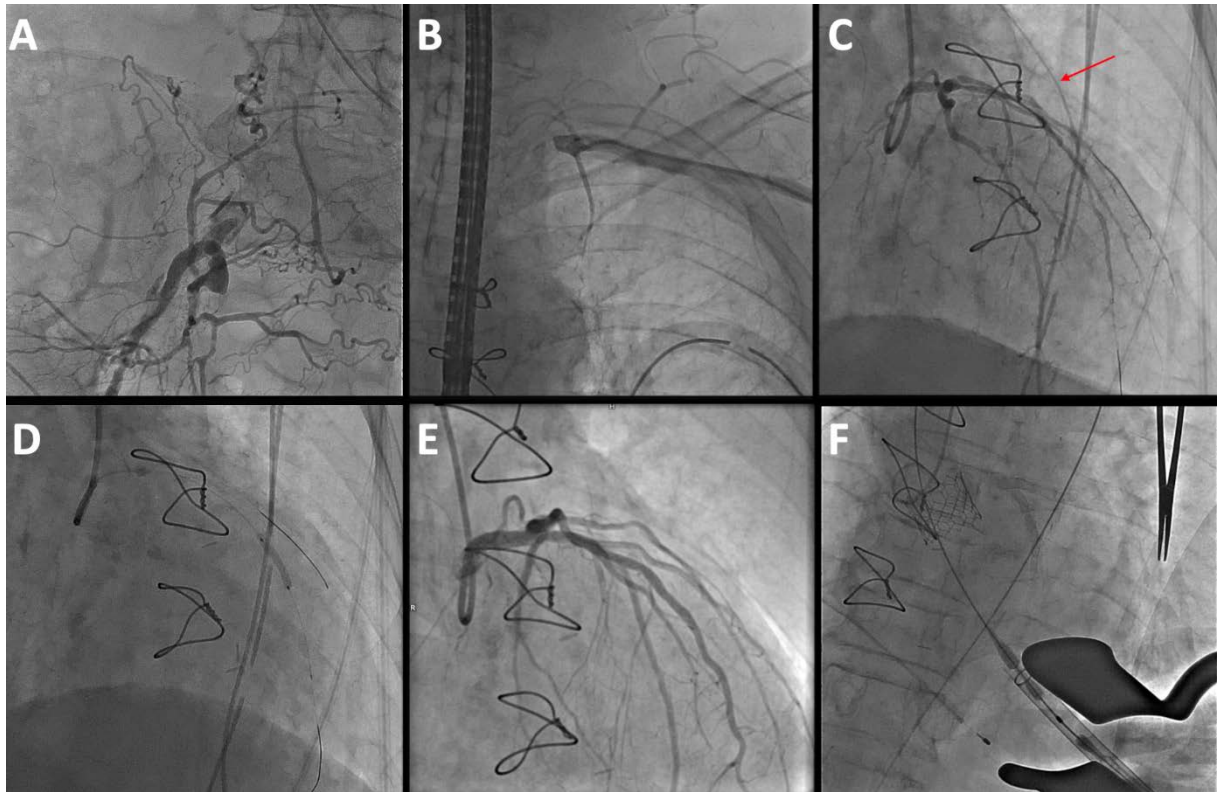


Figure 1. **A.** Iliac artery occlusion, **B.** Occlusion of the left subclavian artery, with the LIMA-LAD steal syndrome, **C.** Retrograde flow in the LIMA from LAD to left upper limb. **D.** Implantation of a covered stent in the LAD at the LIMA suture site. **E.** Coronary arteries after PCI (LM/LAD/Cx) in follow-up after 2 weeks (CRA projection). **F.** Transapical TAVI

Abbreviations: CRA, cranial; Cx, circumflex; Dg, diagonal; LAD, left anterior descending; LIMA, left-internal mammary artery; LM, left main; PCI, percutaneous coronary intervention; RCA, right coronary artery; TAVI, trans-catheter aortic valve implantation