Sky is the limit: Multivessel PCI with mechanical left ventricular support and simultaneous 10-stent deployment

Luiza Bulak[1], Michał Furdal[1], Artur Telichowski[1], Natalia Świątoniowska-Lonc[1], Adrian Doroszko[1,2], Waldemar Banasiak[1,2], Krzysztof Ściborski[1]

[1]Department of Cardiology, Center for Heart Diseases, 4th Military Hospital, Wrocław, Poland
[2]Clinical Department of Cardiology, Faculty of Medicine, Wroclaw University of Science and Technology, Wrocław, Poland

Correspondence to:
Luiza Bulak, MD,
Department of Cardiology,
Center for Heart Diseases,
4th Military Hospital,
R. Weigla 5, 50–981 Wroclaw,
Poland,
phone: + 48 609 985 201,
e-mail: bulak.luiza@gmail.com

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Percutaneous coronary intervention (PCI) as opposed to coronary artery bypass grafting (CABG) in complex coronary artery lesions seems to be safer when performed in a fewer-stage procedural setting. However, in patients with diffuse coronary artery disease (CAD), unsuitable for surgical revascularization but qualified for palliative PCI, the precise planning of a complex multistep procedure is virtually impossible, as periprocedural dissection or occlusion may occur, resulting in the urgent need for a further complex procedure.

In order to limit the risk for cardiogenic shock, complex PCI procedures, especially those associated with a high risk of severe left ventricular systolic dysfunction, are performed with percutaneous mechanical circulatory support.

A 75-year-old man with a history of heart failure with mildly reduced ejection fraction (HFmrEF 40%, NYHA III), with previously diagnosed multivessel coronary artery disease (MVCAD, SYNTAX Score 85, Figure 1A, 1B) was transferred to our clinical department. Comorbidities included hypertension and type 2 diabetes. The Heart Team consultation performed at our center disqualified him from CABG due to diffuse CAD with distal segments affected.

Due to high-risk PCI (HR-PCI) related to complexity of lesions, a percutaneous mechanical circulatory support-protected procedure was planned with the Impella CP. Though only mildly reduced ejection fraction, we believed that other left ventricular support measures thought (i.e., pharmacological such as levosimendan, or mechanical such as intra-aortic balloon pump) could be insufficient during numerous stents deployment with the possibility of iatrogenic, periprocedural ischemia. After the Impella was placed using femoral access, an intravascular ultrasound (IVUS)-guided PCI of the left coronary artery (LCA) was performed. Three of the two-stent techniques were used: DK crush (double kissing crush) for LM/LAD/Cx and Culotte LAD/Dg; TAP (T and protrusion; and Cx/IB, including CTO of IB) (Figure 1C–F). As a result, 10 stents with a total length of 280 mm were implanted. The periprocedural clinical course was uncomplicated, the patient did not experience recovery of angina symptoms, and in a control transthoracic echocardiogram (TTE) the left ventricular ejection fraction (LVEF) recovered up to 53% within the 6-month follow up period.

Numerous studies have focused on elevated risks of both thrombosis and restenosis following a long-stenting procedure [1], as the number and the length of the stents increase the risk of various post-intervention target lesion failures [2, 3]. In addition, the long-stenting procedure is not only a technical challenge, but also increases the risk for periprocedural ischemia due to e.g., small-branches occlusion or peripheral embolization. In numerous cases of diffuse CAD, the initially planned number and length of stents must be changed, since severe lesions occur including bifurcation lesions. Ignoring some of these lesions can result in procedural failure. Even though the Impella provides us with an incontestable benefit during HR-PCI

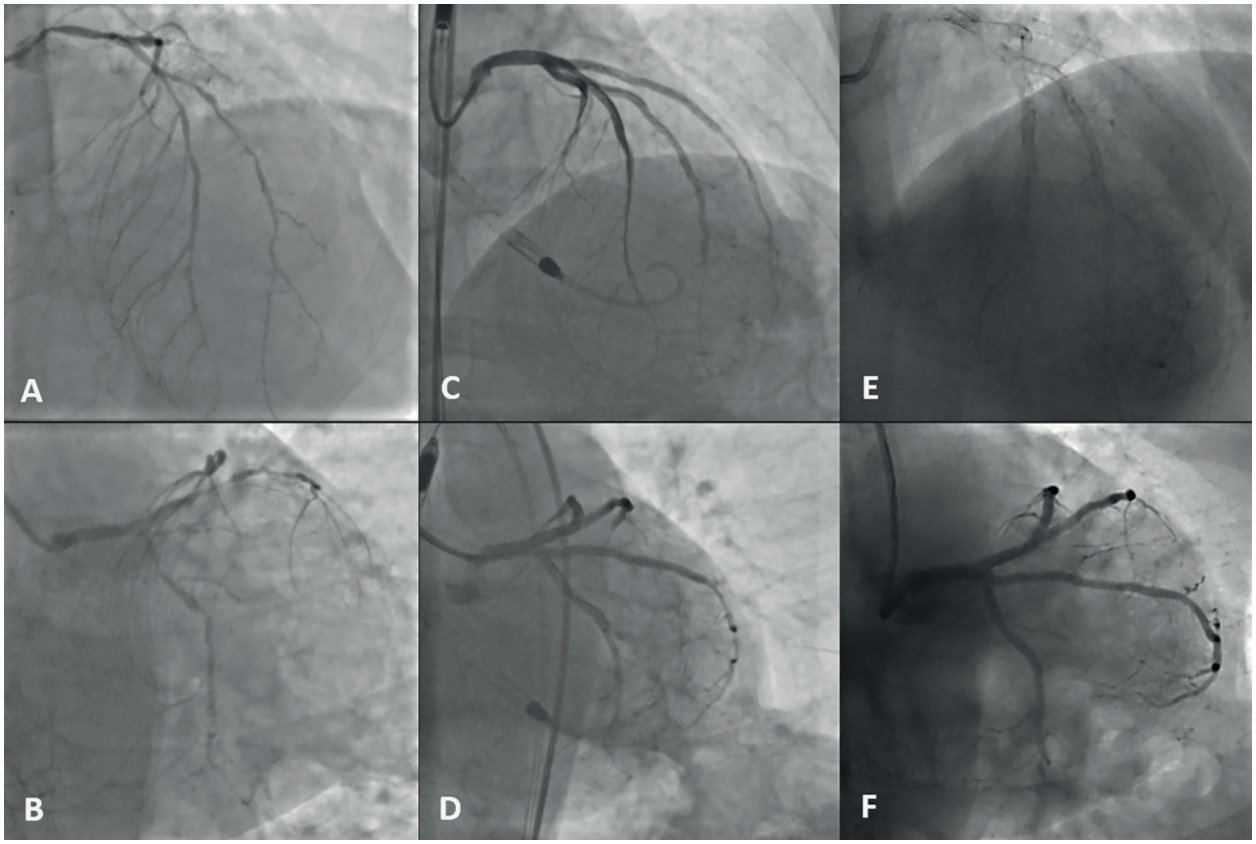

Figure 1. A. Baseline angiogram showing diffuse coronary artery disease (cranial). **B.** Baseline angiogram showing diffuse coronary artery disease (caudal). **C**. Final result after stent placement (cranial). **D**. Final result after stent placement (caudal). **E**. Stent tree. **F**. Coronary angiogram after 6 months

[4, 5], data regarding the impact of such a procedure on long-stenting safety is scarce.

In our opinion, Impella-supported long-stenting procedures seem to be safe for a very select subset of patients following appropriate risk/benefit stratification. Nevertheless, EBM-based data from clinical trials which could address the currently unmet clinical need for an appropriate patient triage, and the risk stratification, is still missing. Hence, there is a need for future trials regarding this issue, because for long-stenting procedures the sky is the limit!

Article information

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