KARDIOLOGIA POLSKA

Polish Heart Journal
The Official Peer-reviewed Journal of the Polish Cardiac Society since 1957

Online first
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ISSN 0022–9032 e-ISSN 1897–4279

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Article type: Clinical vignette

Received: July 5, 2022

Accepted: August 1, 2022

Early publication date: September 10, 2022

Impella-supported high-risk percutaneous coronary intervention complicated by a stuck pump and somersault in the aorta

Short title: High-risk PCI with Impella support complicated by a stuck pump in the aorta

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Conflict of interest: None declared

A 65-year-old man with non-ST-segment elevation myocardial infarction and three-vessel disease was admitted for further invasive treatment. His concomitant diseases included chronic heart failure, hypertension, hypercholesterolemia, and type 2 diabetes mellitus. Echocardiography revealed hypokinesis of the inferior and anterior walls with a reduced left ventricular ejection fraction of 35%. Coronary angiography revealed chronically occluded right coronary artery and critical stenosis of the left main (LM) bifurcation (Medina 0,1,1) (Supplementary material, *Videos S1–S3*). The local Heart Team considered the therapeutic approach. Due to high operative risk (SYNTAX score, 47.0 points; EuroSCORE II, 2.65%) and incompatibilities of coronary arteries with grafting, the patient was disqualified from the coronary artery bypass grafting and qualified for high-risk rescue percutaneous coronary intervention (PCI) with the use of Impella CP (Abiomed, Denver, CO, US) support.

Impella CP was successfully introduced into the left ventricle (LV) *via* the right femoral approach. The catheter needed to be repositioned twice before being placed in the optimal position (Figure 1A). When removing the guide wire, the operator noticed that the wire was trapped inside the lumen of the catheter. Following the applied traction, the Impella and the trapped guidewire moved back to the aortic arch and the descending aorta, with simultaneous flexion just distal to the pump motor and further down the catheter (Figure 1B). To straighten the kinked Impella catheter, we used a 6 F 12–20 mm Atrieve Vascular Snare™ through the right radial approach. After several attempts, the distal part of the pump was captured by the vascular snare (Figure 1C). The kinks were straightened by gently pulling both snare and the Impella catheter, and the pump was retrieved (Supplementary material, *Video S4*). Due to concerns about the efficiency of Impella, we decided to continue the procedure without protection, allowing the use of the new device as a bailout.

PCI was performed using the 14F Impella CP sheath with the EBU 3.5 Guide Catheter (7 F). Because of severe calcifications, we performed the rotablation of LM along with the proximal and middle segment of the left descending artery (LAD). Two drug-eluting stents (DESs), 3.0 × 12 mm and 2.5 × 28 mm, were successfully implanted in the LAD. LM bifurcation was treated with 3.5 × 34 mm DES implantation by provisional technique. The procedure was completed with the proximal optimization technique (POT) with a 5.0 mm NC-balloon. The optimal final angiographic result was obtained and confirmed in the IVUS (Figure 1D–E). The patient remained hemodynamically stable throughout the procedure.

Complex PCI in a patient with poor LV function is one of the indications for the use of Impella CP [1, 2]. In the presented case, the procedure was successfully performed without hemodynamic support, mainly due to the operators' experience and only moderate LV disfunction.

A possible cause of problems with retrieving the guidewire may be its distal kink and damage that occurred during Impella's reposition, hence we suggest using a new guidewire in such cases. The presented case shows also that snaring can be effectively and safely used to capture and reposition or remove kinked Impella catheter [3].

Supplementary material

Supplementary material is available at https://journals.viamedica.pl/kardiologia_polska.

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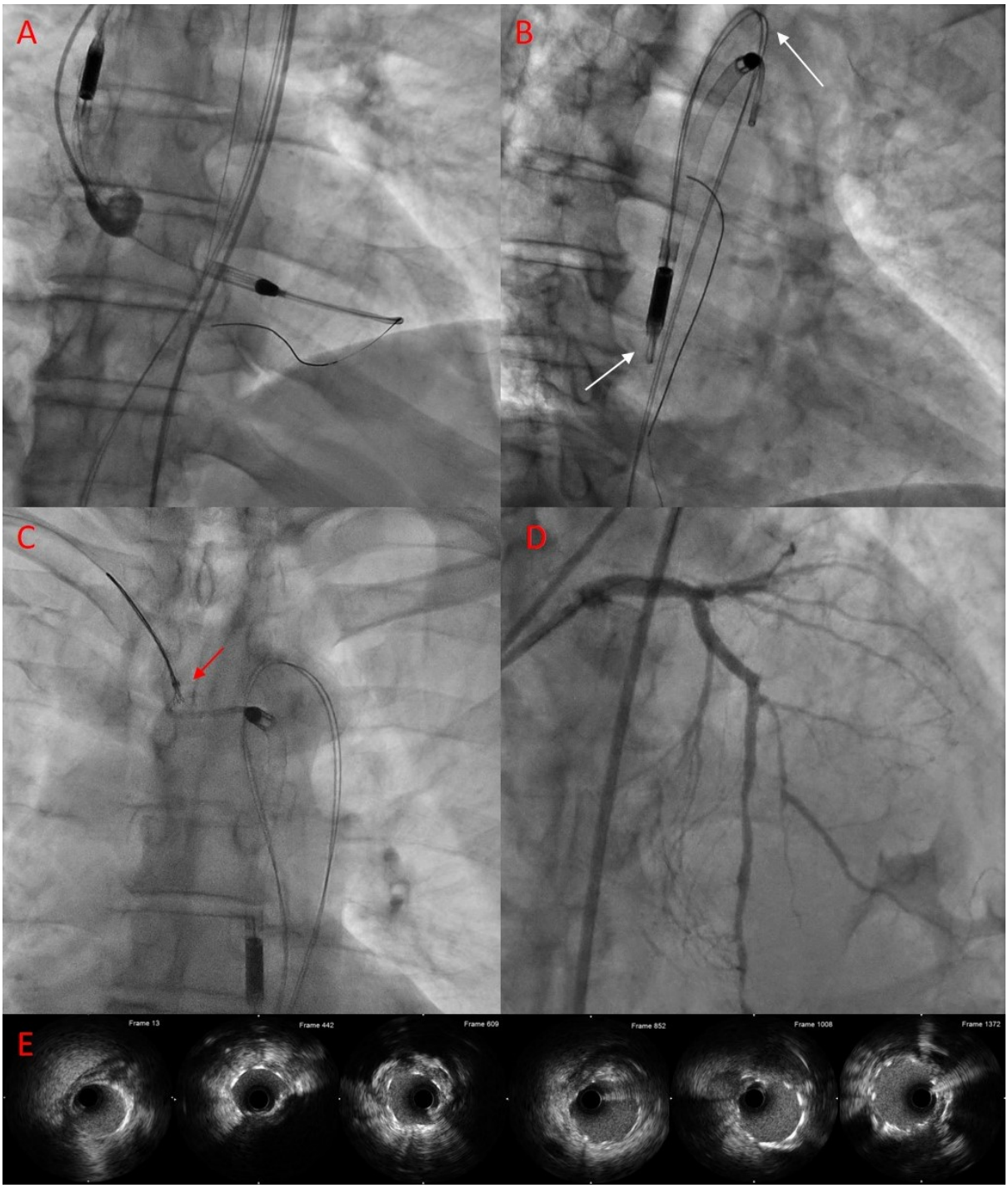

Figure 1. A. Angiographic view of Impella CP placed in the left ventricle. **B.** Angiographic view of Impella and guidewire displaced into descending aorta, with flexion just behind the pump and further down the catheter (white arrows). **C.** Angiographic view of the distal part of the pump captured by the vascular snare (red arrow). **D** The final angiographic result. **E.** Final IVUS cross-sections of the left main (LM) and the anterior descending artery (LAD) with well-expanded stent