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CASE REPORT

The role of Impella in high-risk percutaneous coronary intervention

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KEYWORDS
Left ventricular assist device;
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Abstract Percutaneous coronary intervention (PCI) has been increasingly performed in patients with severely depressed left ventricular function and complex coronary lesions, including multivessel disease.

Mechanical ventricular assist devices play an increasingly important role in high-risk PCI. Impella CP® (Abiomed, Inc.) is a new percutaneous left ventricular assist device, designed for short-term circulatory support. It is a promising option for hemodynamic support in high-risk procedures and can potentially reduce PCI-related complications.

The authors present two case reports of high-risk PCI using the Impella CP® device.

In the setting of low coronary flow reserve, severely depressed left ventricular function and potential hemodynamic instability, the Impella CP® device has made it possible to maintain hemodynamic stability during procedures, without being associated with vascular complications.

PALAVRAS-CHAVE
Dispositivo de assistência ventricular esquerda;
Bomba microaxial;
Intervenção coronária percutânea de elevado risco

O papel do Impella na intervenção coronária percutânea de alto risco

Resumo As intervenções coronárias percutâneas (ICP) têm sido feitas com maior frequência em doentes com depressão severa da função ventricular esquerda e com lesões coronárias complexas, inclusive doença coronária multivaso.

Os dispositivos de assistência ventricular mecânica desempenham um papel cada vez mais importante nas ICP de elevado risco. O Impella CP® (Abiomed, Inc.) é um novo dispositivo percutâneo de assistência ventricular mecânica esquerda, desenvolvido para apoio circulatório

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de curta duração. Constitui uma opção prometedora de apoio hemodinâmico em procedimentos de elevado risco, com o potencial de reduzir as complicações relacionadas com as ICP.

Os autores apresentam dois casos clínicos de ICP de alto risco que usam o dispositivo Impella CP®.

No contexto de baixa reserva coronária, depressão severa da função do ventrículo esquerdo e de potencial instabilidade hemodinâmica, o Impella CP® permitiu manter a estabilidade hemodinâmica dos doentes durante os procedimentos, sem se associar a complicações vasculares.

List of abbreviations

CABG	coronary artery bypass grafting
CMRI	cardiac magnetic resonance imaging
LAD	left anterior descending
LCX	left circumflex
LMCA	left main coronary artery
LV	left ventricle
LVEF	left ventricular ejection fraction
MCS	mechanical circulatory support
OM1	first obtuse marginal
PCI	percutaneous coronary intervention
RCA	right coronary artery
SVG	saphenous vein graft
TTE	transthoracic echocardiogram
UFH	unfractionated heparin

Case 1

A 70-year-old diabetic male with a history of chronic kidney disease (creatinine clearance 43 ml/min) was admitted to our cardiac intensive care unit with non-ST-elevation myocardial infarction, Killip class III. Thirty years previously, he had undergone 3-vessel coronary artery bypass grafting (CABG) with saphenous vein grafts (SVGs) and had subsequently undergone PCI of the SVGs to the first obtuse marginal (OM1) in 2002 and 2009, with implantation of a 4.5×13-mm Bx Velocity™ stent (Johnson &) and a 4.0×2.8-mm Xience stent (Abbott Vascular),tively.

On admission, a transthoracic echocardiogram (TTE) showed severely depressed left ventricular ejection fraction (LVEF) (estimated 29%); akinesis of the apex, inferior wall, middle and distal segments of the anterior wall; and hypokinesis of the other walls. There was no evidence of intracavitary thrombi. Invasive coronary angiography revealed severe native coronary artery disease consisting of an occluded left anterior descending (LAD) artery at the origin and occluded left circumflex (LCX) and right coronary artery (RCA) in their middle segments. The SVG to LAD was occluded, the SVG to the OM1 had 90% stenosis proximally (pre-stent) and the SVG to the right posterior descending artery had 70% stenosis distally. The patient underwent cardiac magnetic resonance imaging (CMRI), which showed extensive myocardial scarring involving the apex, the inferior wall and the middle and distal segments of the anterior wall. Finally, an adenosine stress perfusion CMRI revealed ischemia of the basal segment of the inferolateral wall. Based on this evidence, and in an attempt to improve the patient's status, it was decided to perform a PCI of the SVG to the OM1. A 4-l/min Impella CP® assist device was selected for support due to the low physiologic reserve of the patient and the relevance of the aforementioned graft in the perfusion of the remaining viable myocardium.t

Following local anesthesia, a 6-Fr sheath was inserted into the right femoral artery. After performing a contrast study of the aorta and both iliac arteries, the patient was considered a candidate for using the assist device. A 14-Fr sheath was then placed in the left femoral artery. After administration of 5000 units of unfractionated heparin (UFH), an angiographic pigtail diagnostic catheter (Cardinal Health) was used to deliver a specific 0.14-inch guidewire to the LV. The diagnostic catheter was then removed, and the Impella CP® pump was advanced over the wire across the aortic valve under angiographic guidance (Figure 1A). The pump was started, with a maximum of 3.5 l per minute of circulatory support necessary to maintain the patient hemodynamically stable during the procedure.

The SVG to the OM1 was intubated with a 6-Fr Amplatz Left 1 catheter (Cardinal Health). A distal embolic protection device, the 6-Fr Emboshield NAV (Abbott Vascular), was gently passed into the SVG across the target lesion and was deployed at the distal portion of the graft (Figure 1B). After pre-dilation of the target lesion with a 3.5×20-mm TREK balloon (Abbott Vascular), a 4.0×28-mm Xience stent was successfully deployed in the SVG. Next, the stent was post-dilated with a 4.5×15-mm Quantum™ Maverick™ balloon (Boston Scientific) at 18 atm. The Emboshield NAV basket was then carefully withdrawn. Aspiration was performed to clear the guide catheter of any debris and thrombi and ensure that none of the contents of the basket remained in the guiding catheter (Figure 1C).

The intervention was uneventful and the patient remained hemodynamically stable throughout the procedure. The Impella CP® assist device was withdrawn at the end of the procedure and the left femoral artery access site was transcutaneously closed with two ProGlide (Abbott

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