

LEFT MAIN CORONARY BIFURCATION TREATMENT WITH IMPELLA SUPPORT IN COMPLEX AND HIGH RISK PATIENT (CHIP)

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ARTICLE INFO

Article history:

Received 17 Dec 2023

Accepted 31 May 2024

Published 15 Aug 2024

Keywords:

cardiogenic shock, bifurcation lesion, coronary artery disease, Left main coronary, left ventricular support

ABSTRACT

Bifurcation lesions, especially around the left main coronary (LMC), are occasionally encountered. More frequent LMC lesion are present in Complex and High risk Patients (CHIP) and this case represent a real challenge for interventional cardiologists. Bifurcation lesions PCI reported to have high overall major adverse cardiovascular events, and require the use of various complex interventional techniques. Here, we report a case of successful percutaneous coronary intervention supported by Impella on an LMC bifurcation treatment with culotte stenting in patient with cardiogenic shock.

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1. Introduction

Complex and High-Risk Patient (CHIP) revascularization is characterized by three element featuring high risk PCI: patient risk factor and comorbid condition, location and complexity of coronary anatomy and hemodynamics, ventricular function and concomitants valvular disease [1-4]. During these high-risk procedures, prolonged ischemia from balloon inflations, no-reflow or dissection may have major hemodynamic consequences. The culotte technique as one of the most used two stent technique in specific situations that two stents needed for coronary artery bifurcation lesion has several major advantages [5-7]. We describe a patient with left main coronary artery (LMCA) bifurcation stenosis with cardiogenic shock treated with culotte stent technique.

2. Case report

A 67 year-old man from South East Asia with ischemic cardiomyopathy was admitted with worsening heart failure. He had a history of diabetes 2 type, arterial hypertension, past smoking history, myocardial infarction on 2015 and PCI with DES on proximal LAD and left circumflex (LCx) a which was medically managed with ASA and prasugrel. Echocardiography revealed a severely dilated left ventricle (LV) with ejection fraction of 22 %, moderate mitral regurgitation, aortic sclerosis without stenosis, and moderate tricuspid regurgitation. At the time of hospital admission, arterial pressure was 80/60 mmHg, oxygen saturation was 98% with no oxygen supply, heart rate was 73 bpm. On physical examination, the patient presented signs of pulmonary congestions and mild bilateral peripheral oedema. Renal function was normal, troponin was normal, but NTproBNP was 2200 pg/ml (reference range 215 pg/ml). Electrocardiogram showed sinus rhythm with incomplete left bundle branch block.

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DOI: 10.3269/1970-5492.2024.19.5

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Cardiac catheterization demonstrated a moderate diffusion stenosis of right coronary artery and subocclusive calcific stenosis of mid left anterior descending (LAD) and distal LM, involving LAD and LCx ostia. The Syntax Score was 36. Given reduced ejection fraction, active heart failure, and severe lung disease, the institutional heart team decision was to perform LM-LAD-LCx angioplasty with Impella CP support. Given the absence of viability on the inferior wall, PCI of the right coronary artery chronic total occlusion was not performed. After obtaining right common femoral artery access, the left common femoral artery was punctured under fluoroscopic guidance. After appropriate positioning of the Impella CP in the LV. During the prolonged ostial LAD inflations, required for IVL erogation, we observed non pulsatile pressure with a mean arterial pressure (MAP) of 65 mmHg, maintained by means of Impella CP output (3,5 L/min). The bifurcation was treated with a Culotte technique; after performing pre-dilatation with semi-compliant balloons, we implanted three drug eluting stents (Coroflex 3,5 x 18 mm to mid LCx, Alex Plus 3.5 x 12 mm to proximal LCx and Coroflex 4 x 24 mm), followed by kissing balloon postdilatation with semi compliant balloons 3.5 x 12 mm to LCx and 4.0 x 12 mm to LAD.

After weaning in the cardiac catheterization laboratory, the Impella was removed. The patient was transferred to ICU, blood pressure persisted low (80/60 mm Hg) despite escalating inotropic treatment, diuresis recovered (>70 mL/h) and lactate levels decreasing (1,5 μ mol/L). Left ventricle contractile function gradually improved (LVEF \approx 30%) due to reduced afterload.

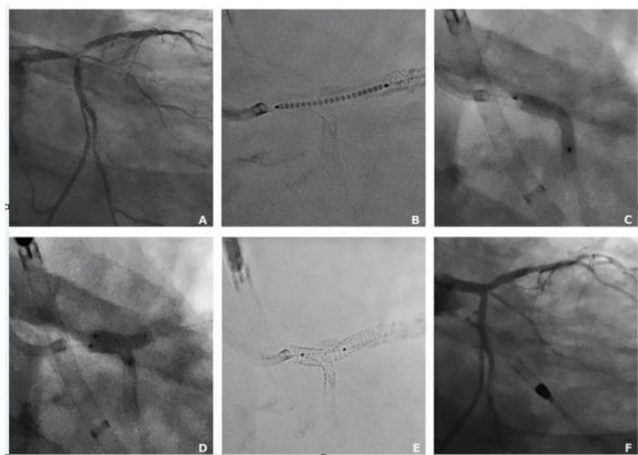


Figure 1. A: Coronary angiography pre stenting B: DES on LM – proximal LAD C: DES on LM – LCX D: Kissing baloon E: Clear-stent after kissing baloon F: final result

3. Discussion

The use of left ventricular circulatory support devices for CHIP is a current topic of interest, aimed at the reduction of LV filling pressures and increase of cardiac output [5]. Among the different available devices, the percutaneous insertion of the Impella pump in high risk PCI. The mechanism provides both hemodynamic support of myocardial ischemic protection: cardiac output and mean arterial pressure. Furthermore, the Impella system improves the perfusion of the coronary microcirculation [6-7]. In the present case, we demonstrate an example where occlusion of the left main coronary artery during PCI balloon inflation results in rapid loss of arterial pressure. In the presence of an Impella pMCS device, aortic pressure pulsatility also declines and eventually is completely lost, despite maintenance of a nearly normal mean arterial pressure value and almost no change in PAPs [8].

The new IMPELLA - CP guarantees a maximal flow up to 4.0 L/ min. This axial pump is inserted through a 14F introducer in the femoral artery and actively aspirates blood from an in let cage in the left ventricle, expelling it in the ascending aorta. The main advantage of IMPELLA - CP is the ability to unload the left ventricle reducing end - diastolic pressure and myocardial oxygen demand, increasing cardiac output, coronary flow, and systemic perfusion.

The culotte technique has several advantages because provides good protection and stent coverage of a significantly diseased side branch in a large territory at risk when primary two-stent technique were performed. Finally, the culotte technique has only two stent layers in the proximal part of the bifurcation lesion, potentially leading to a lower risk of incomplete stent apposition less stent distortion in comparison with other techniques [9,10].

4. Conclusions

We report the hemodynamic changes during the prolonged ostial LAD inflations in a patient with subocclusion of distal LM, ostial LAD and LCX cardiogenic shock. Intra - aortic balloon pump (IABP) did not prove effective in this scenario as more solid mechanical circulation support (MCS) devices are probably needed to revert the hemodynamic instability of coronary syndrome. The new IMPELLA - CP provided superior hemodynamic support as compared to IABP and may represent a good tool in the early management of CS. However, the clinical benefit of MCS devices to reduce mortality during CS has yet to be demonstrated.

Funding: This research received no external funding.

Institutional Review Board Statement: Not necessary

Informed Consent Statement: Not necessary

Data Availability Statement: Not necessary

Conflicts of Interest: The authors declare no conflict of interest.

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