

CASE REPORT

INTERMEDIATE

CLINICAL CASE

# Collaborative Cardiac Care



## A Comprehensive Heart Team Approach to Multiple Severe Vascular Conditions

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### ABSTRACT

Left main artery coronary disease represents the highest risk lesion of ischemic heart disease. Revascularization can be accomplished by surgery or percutaneous interventions. This study highlights the case of a patient with severe multiple peripheral vascular conditions and complex coronary anatomy treated with percutaneous coronary intervention using mechanical circulatory support. (**Level of Difficulty: Intermediate.**) (J Am Coll Cardiol Case Rep 2019;1:873-5)  
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### CASE

**PRESENTATION.** A 73-year-old male patient presented with an episode of syncope and dyspnea on exertion, which was ongoing for several weeks. Syncope occurred approximately 2 months previously without any prodromal symptoms, and the

patient failed to seek medical care at the time. Physical examination revealed elevated jugular venous distention, lower extremity edema, and bibasilar lung crackles.

**MEDICAL HISTORY.** The patient's medical history included hypertension, hyperlipidemia, stage 4 chronic kidney disease, peripheral arterial disease, and abdominal aortic aneurysm (AAA). He was also an active tobacco user for the past 40 years.

**DIFFERENTIAL DIAGNOSIS.** Based on physical examination and history findings, differential diagnoses of congestive heart failure, chronic obstructive pulmonary disease, pneumonia were considered.

**INVESTIGATIONS.** Electrocardiography showed sinus rhythm with Type I Mobitz heart block and echocardiography showed mildly reduced ejection fraction with left ventricular hypertrophy. The patient was admitted for heart failure exacerbation and further cardiac evaluation. Cardiac catheterization following an abnormal stress evaluation showed an ostial 90% left main stenosis with severe diffuse disease in the remaining vessel extending to

### LEARNING OBJECTIVES

- To understand the increased risk of mortality with left main coronary disease without revascularization;
- To establish the importance of the heart team approach in dealing with complex cardiovascular disease;
- To establish the means of revascularization and new percutaneous techniques to revascularize left main coronary artery disease;
- To focus efforts on precision medicine, tailoring decision making to individual patients, incorporating clinical and anatomic factors, optimizing procedural outcomes, and improving post-procedural medical management.

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Informed consent was obtained for this case.

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**ABBREVIATIONS  
AND ACRONYMS**

**AAA** = abdominal aortic aneurysm

**CABG** = coronary artery bypass graft

**IVUS** = intravascular ultrasonography

**LAD** = left anterior descending artery

**PCI** = percutaneous coronary intervention

the proximal left anterior descending artery (LAD) (Figure 1). The right coronary artery was found to have a chronic total occlusion at the ostium, with collaterals from the left system. SYNTAX score was >35 for this complex anatomy. It was noted that catheter engagement of the diseased left main resulted in ischemic ST-segment changes and aortic pressure ventricularization, which compromised his hemodynamic status. Intravascular ultrasonography (IVUS) was used to map the minimal lumen area of

the vessel, which was found to be hemodynamically significant. In addition to his severe coronary disease, the patient was found to have severe bilateral carotid stenosis as well as AAA measuring 5.5 cm, all meeting criteria for surgical intervention. His significantly elevated Society of Thoracic Surgeons score, in addition to the peripheral vascular disease signaled caution for coronary artery bypass referral.

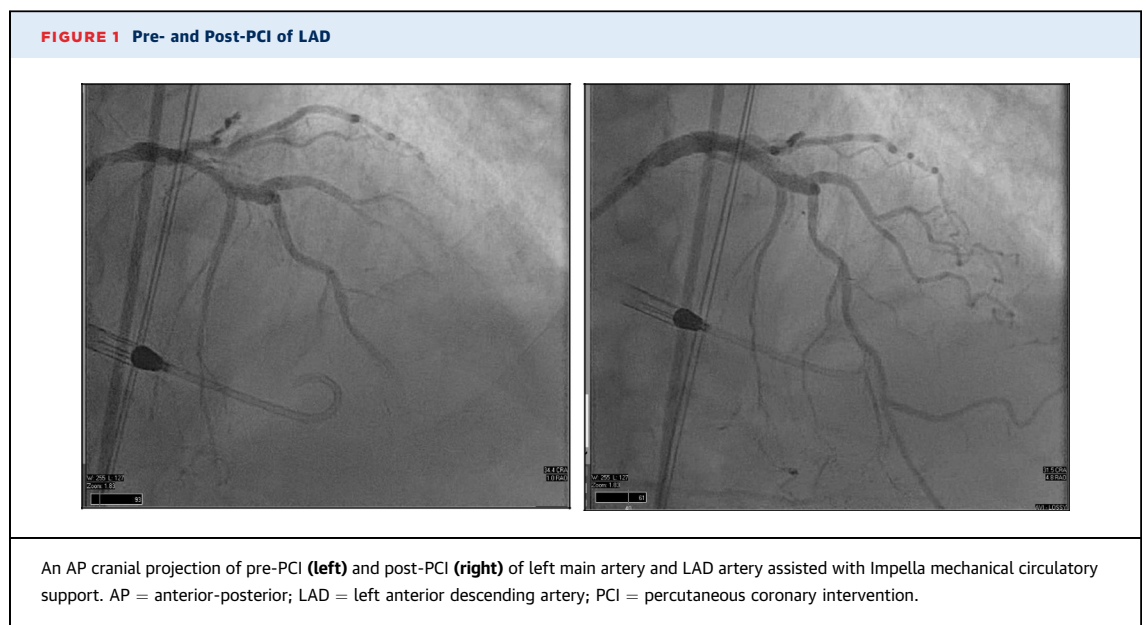
**MANAGEMENT.** A collaborative heart team decision was made to percutaneously revascularize the coronary anatomy with mechanical circulatory support, followed by vascular surgical intervention in the carotids and then to address AAA repair. Using a 14-F sheath, an Impella (AbioMed, Danvers, Massachusetts) left ventricular assist device was introduced into the LV cavity to supplement cardiac output during this high-risk intervention. Due to the severe ostial left main artery lesion, initial wire position in the LAD had to be obtained without guide catheter

engagement. After pre-dilations, 2 subsequent drug-eluting stents were successfully deployed in the LAD artery extending back into the left main artery. A third drug-eluting stent was deployed at the ostium of the left main artery covering the most severe lesion. IVUS was used to verify, successful placement, deployment, and apposition of the stents. The patient tolerated the procedure, and the Impella device was safely discontinued without any major complications.

**FOLLOW-UP.** The patient tolerated the coronary intervention well and was discharged home within 48 h after completion of the procedure. He then underwent subsequent carotid endarterectomies a few weeks later, followed by an elective endovascular AAA repair to be scheduled at a later date.

**DISCUSSION**

A heart team approach to left main coronary artery disease (CAD) and complex anatomy revascularization is a Class I recommendation by American Heart Association/American College of Cardiology guidelines (1). The authors' heart team consisted of a cardiothoracic surgeon, a vascular surgeon, and noninvasive and interventional cardiologists. Patient preference was a key component of the shared decision-making process. Revascularization of the left main CAD has been shown to reduce mortality. With the advent of contemporary drug eluting stents and adjunctive technology such as mechanical circulatory support and IVUS, percutaneous coronary intervention (PCI) on the left main artery lesions have



become more common. IVUS in left main revascularization is associated with lower long-term risk of cardiac death and adverse cardiac events compared with angiography-guided PCI (2). There has been long-standing debate as to the mode of revascularization of left main CAD by using PCI versus coronary artery bypass graft (CABG). Left main CAD subset analysis of SYNTAX trial did not show significant differences in overall major cardiovascular events between PCI and CABG groups, although patients with high SYNTAX scores did better with surgery (3). In Europe, a trial comparing a cohort of left main CAD patients' outcomes favored CABG over PCI, primarily driven by repeated revascularization and post-procedural myocardial infarction at 5 years (4). The EXCEL (Everolimus-eluting stents or bypass surgery for left main coronary artery disease) trial showed noninferior outcomes of patients with left main disease revascularized by CABG or PCI at 3 years. In patients with left main CAD and chronic kidney disease, acute renal failure occurred less frequently with PCI than with CABG (5). Impella support during

complex PCI has been shown to improve cardiac index, stroke volume, and mean blood pressure, providing a stable basal hemodynamic condition during prolonged coronary occlusion (6). Accounting for all the clinical and anatomical factors, research-based evidence and patient preference, the authors tailored efforts to provide the most optimum outcome for the patient.

## CONCLUSIONS

An extensive heart team discussion is important prior to staging multiple procedures and/or surgeries. PCI of left main artery can be achieved in highly complex coronary anatomy in unique cases when CABG is not a viable option.

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**KEY WORDS** cardiac assist devices, cardiovascular disease, coronary angiography