

# Improving Cardiac Rehabilitation Outcomes: Subclavian Artery Approach with Impella 5.0 Support in Severe Heart Failure

Andrew Berra\*

Department of Cardiology, University of Miami Hospital and Clinics, Miami, FL 33136, USA

## Introduction

Severe heart failure poses significant challenges to both patients and healthcare providers, impacting quality of life and increasing mortality rates. Left Ventricular Assist Devices (LVADs) have emerged as a viable treatment option for patients with advanced heart failure, providing mechanical circulatory support. However, the success of LVAD implantation greatly depends on the patient's preoperative condition and their ability to undergo effective cardiac rehabilitation. Prior to LVAD implantation, the subclavian artery approach with Impella 5.0 support has gained popularity as a method for improving cardiac rehabilitation outcomes in severe heart failure patients. The Impella 5.0, a percutaneous mechanical circulatory support device, is temporarily inserted through the subclavian artery in this method. The Impella device improves cardiac output, improves hemodynamic stability, and makes cardiac rehabilitation more efficient [1].

In patients who have undergone LVAD implantation, Cardiac Rehabilitation (CR) in the acute and chronic postoperative phases improves physical function and independent daily living. A recent meta-analysis demonstrated that exercise-based CR improves functional capacity in patients with HF who have undergone LVAD implantation. Another recent study examined the benefits of CR in patients with HF with LVADs versus those of patients who underwent heart transplantation. The study demonstrated similar benefits between the two groups of patients. Specifically, a 6 Min Walking Distance (6-MWD) resulted in the same functional recovery in the two groups, suggesting that CR programs improve the functional capacity of HF patients, regardless of whether or not the patients have undergone heart transplantation or LVAD implantation [2].

## Description

The subclavian artery approach with Impella 5.0 support involves the temporary insertion of an Impella 5.0 device, a percutaneous mechanical circulatory support device, via the subclavian artery. This approach provides hemodynamic stability, improves cardiac output, and allows for more effective cardiac rehabilitation. By utilizing this technique, patients with severe heart failure can undergo structured exercise programs, physical therapy, and other interventions aimed at improving their overall cardiovascular health and functional capacity. Several studies have demonstrated the feasibility and potential benefits of the subclavian artery approach with Impella 5.0 support in enhancing cardiac rehabilitation outcomes. The temporary mechanical support provided by the Impella device allows patients to engage in exercise programs with reduced risk of hemodynamic instability and complications. This approach not only improves cardiovascular fitness but also strengthens the patient's overall physical and mental well-being, enabling them to better tolerate the subsequent LVAD implantation procedure [3].

\*Address for Correspondence: Andrew Berra, Department of Cardiology, University of Miami Hospital and Clinics, Miami, FL 33136, USA, E-mail: [bandrew@gmail.com](mailto:bandrew@gmail.com)

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In order to carry out CR in a secure manner with the assistance of Impella, risk management was carried out before, during, and after the intervention by collaborating with other disciplines and sharing roles. There was just a single unfriendly occasion during CR, which was a reduction in Impella stream, prompting loss of cognizance. The discontinuation of inotropic medications and a change in the volume of the blood that circulates as a result of the elastic bandage's removal are potential causes. No serious episodes, for example, Impella malposition or huge dying, happened during CR. When performing CR with Impella support, it is essential to understand the characteristics of the Impella device and to share goals among multiple disciplines [4]. Due to the small number of patients, it was difficult to evaluate changes in physical function between post-Impella 5.0 and pre-LVAD.

However, the median grip strength (percent body weight) pre-LVAD was 47.1%, which is significantly higher than the 25% grip strength suggested as a criterion for frailty in LVAD-implantation patients. Five metabolic equivalents are predicted by KEIS pre-LVAD, which was higher than 0.46 kgf/kg in three of the patients. Patients' muscle strength and skeletal muscle mass before LVAD implantation have been linked to postoperative recovery and long-term prognosis in a number of studies. Before LVAD implantation, HF patients may benefit from CR, including mobilization, with Impella 5.0 support to prevent physical function decline. This study's findings are supported by a case report in which an Impella-supported patient's limb strength was improved through NMES and mobilization. However, the patient did not require LVAD implantation and was able to wean off of Impella in the previous study. Because it demonstrates the physical functioning of HF patients who receive Impella 5.0 support with CR prior to LVAD implantation, this study is influential [5].

## Conclusion

Enhancing cardiac rehabilitation outcomes in severe heart failure patients is crucial for optimizing the success of LVAD implantation and improving long-term prognosis. The subclavian artery approach with Impella 5.0 support offers a promising strategy to achieve these goals. By providing temporary mechanical circulatory support, this approach allows patients to participate in comprehensive cardiac rehabilitation programs, leading to improved cardiovascular fitness, functional capacity, and overall well-being. CR may be a reasonably safe method that may be undertaken prior to LVAD installation in patients with HF who have Impella 5.0 implantation via the SA, allowing ambulation and other types of mobilisation. Further research and clinical studies are needed to validate the effectiveness and safety of this approach, ultimately guiding healthcare professionals in providing optimal care for severe heart failure patients undergoing cardiac rehabilitation prior to LVAD implantation.

## Acknowledgement

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## Conflict of Interest

There are no conflicts of interest by author.

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