

## **Use of percutaneous ventricular assist as a bridge to high risk combined heart valve surgery: a case report and review of the literature**

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**Title:** Use of percutaneous ventricular assist device as bridge to high risk cardiac surgery.

**Background:** Emergency surgery for acute mitral regurgitation carries a high risk of perioperative mortality, especially in the presence of ventricular systolic dysfunction and cardiogenic shock.

**Case report:** We report the preoperative use of Impella® CP, a percutaneous ventricular assistance system, as a bridge to urgent mitral valve surgery in a patient at high risk of postoperative complications. The patient was admitted for cardiac decompensation resulting in acute pulmonary edema, liver failure, and type I cardio-renal syndrome requiring inotropic support. A transoesophageal echo performed upon ICU admission revealed severe degenerative mitral regurgitation, biventricular systolic dysfunction and moderate tricuspid regurgitation. To optimize the patient's condition, an Impella® CP was first implanted before a surgical mitral valve replacement associated with tricuspid valve annuloplasty was performed after 48 hours. The Impella® CP was withdrawn into the descending aorta before cross clamping of the aorta and repositioned to help weaning the extracorporeal circulation. A low dose of dobutamine was also necessary to support the right ventricle during the first 72 postoperative hours. The postoperative course was otherwise uneventful.

**Discussion:** Impella® CP is a short-term percutaneous left ventricular assist device mainly used in cardiogenic shock associated with acute coronary syndrome and to facilitate difficult weaning from extracorporeal circulation after cardiac surgery. The Impella® CP improves several pathophysiological consequences of heart failure and was deemed particularly suitable in our patient. It facilitates the ejection of the left ventricle, improves cardiac output and thereby renal perfusion(1). It also decreases the left ventricular (LV) filling pressure, which reduces the afterload of the right ventricle (RV)(2). This may in turn reduce venous congestion and favor liver recovery. In addition, the reduction in LV filling pressure and improved LV ejection both contribute to reduce pulmonary edema. Finally, all the above improves myocardial oxygen balance(3). Thanks to these benefits, in our patient, the renal function and the liver function tests improved substantially before surgery. The inotropic support could also be discontinued. This possibly allowed resensitization of  $\beta$ -adrenergic receptors and may have facilitated the weaning from extracorporeal circulation.

**Conclusion:** We report the preoperative use of the Impella® CP as an adjunct to medical treatment 48 hours before combined urgent mitral and tricuspid surgery. Whether this preoperative use offers substantial benefits in comparison with postoperative or intraoperative implantation when required deserves further investigation.

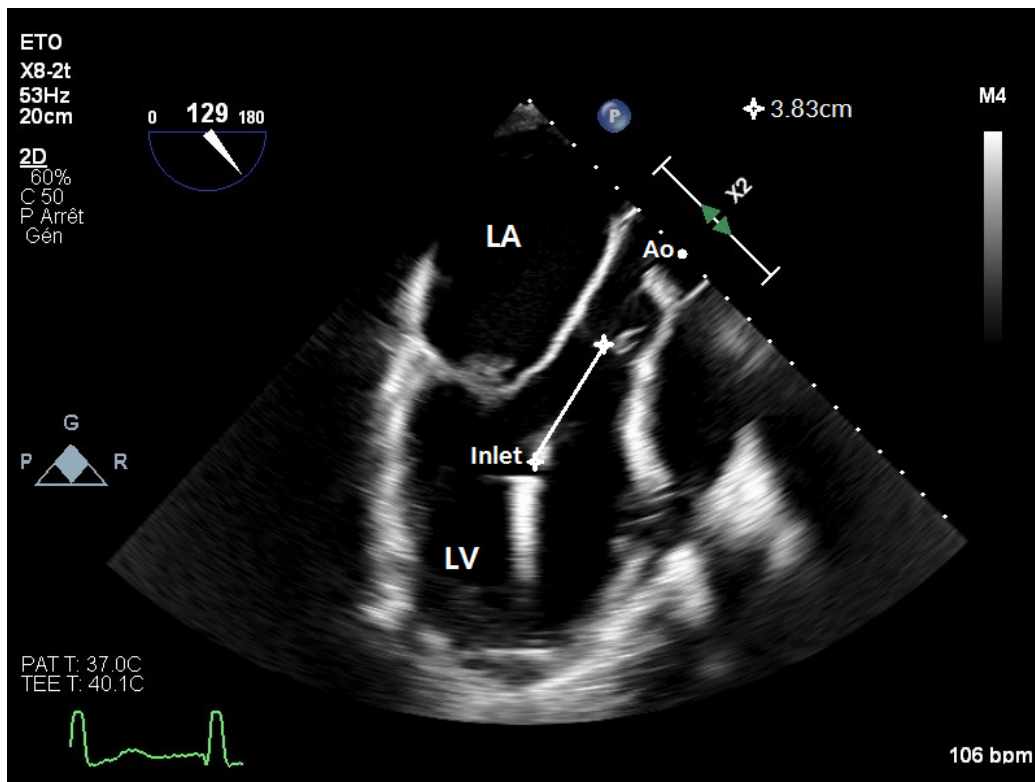


Figure 1: Percutaneous ventricular assist device by Impella® CP

## **Bibliography**

1. Markus B, Patsalis N, Chatzis G, Luesebrink U, Ahrens H, Schieffer B, et al. 2020. Impact of microaxillar mechanical left ventricular support on renal resistive index in patients with cardiogenic shock after myocardial infarction: a pilot trial to predict renal organ dysfunction in cardiogenic shock. *Eur Hear J Acute Cardiovasc Care*. 9:158–163.
2. Tedford RJ, Hassoun PM, Mathai SC, Girgis RE, Russell SD, Thiemann DR, et al. 2012. Pulmonary capillary wedge pressure augments right ventricular pulsatile loading. *Circulation*. 125:289–297.
3. Watanabe S, Fish K, Kovacic JC, Bikou O, Leonardson L, Nomoto K, et al. 2018. Left ventricular unloading using an impella CP improves coronary flow and infarct zone perfusion in ischemic heart failure. *J Am Heart Assoc*. 7:1–11.