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Implementation of Impella in Primary PCI: Who, When and How

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Background: After the occurrence of Myocardial Infarction (MI), patients might either develop or be at high risk of Cardiogenic Shock (CS) due to lower Left Ventricle (LV) contractibility. Impella 2.5[®] and CP[®] devices are micro-axial blood pumps that support the cardiovascular system and unload the LV. This overview examines the pivotal topic of the use of Impella in protected Primary Percutaneous Coronary Intervention (PPCI).

Teaching Points: Patient selection: All the patients with established CS after MI, or at great risk based on certain parameters (with infarct size being the dominant factor) are suitable for protected PPCI.

Time of implementation: Studies have shown that when the implantation preceded the PPCI, patients showed significantly lower morbidity and mortality rates.

Implantation and Function Principles: Impella is inserted percutaneously through the femoral or axillary artery in the LV, delivering blood to the ascending aorta, with a mean flow of 2.5L/min (Impella 2.5) or 3.7 L/min (Impella CP), thus supporting the circulation and unloading the LV.

Interference with cardiac physiology: Impella decreases the end diastolic volume, pressure and oxygen demand, increases the aortic flow, pressure, coronary circulation and oxygen delivery and consequently protects the myocardium. Concomitant administration of inotropes and/or vasopressors might be necessary. Ideal Activated Clotting Time on each stage is achieved by Unfractionated Heparin (preferably), bivalirudin, or argatroban (in case of Heparin Induced Thrombocytopenia). Administration of anticoagulants is guided by anti-Xa levels, along with Activated Partial Thromboplastin Time measurements. Additional antiplatelet therapy with ticagrelor and aspirin is needed.

Weaning protocol: Impella can be safely removed when Pulmonary Artery Wedge Pressure is <20mmHg and Cardiac Power Output is >0.6 Watts. In any other case, additional clinical, echocardiographic and invasive parameters should be examined. Use should not exceed 5 days. Nevertheless, weaning could be reasonably delayed until haemodynamic independence is established, or another form of LV support is implemented.

Final Message: The technological advancements have enriched Interventional Cardiology's armamentarium with a plethora of devices and circuits that offer cardiovascular support. Impella device is unequivocally an asset for short-term myocardial protection. However, its sophisticated design and mechanism of function requires a certain degree of dexterity, as well as comprehensive knowledge of cardiovascular pathophysiology. This presentation aims to shed light on these crucial topics, in the truly marvelous era of modern Cardiology.

Biography

Stavroula Siopi completed her studies in medicine in Aristotle University of Thessaloniki, Greece (10/2015-07/2021) and shortly afterwards begun her master studies in Cardiovascular Support and Perfusion Techniques (12/2021-to date). Her thesis emphasizes on Acute Heart Failure and Mechanical Circulatory Support. She is an active physician, with comprehensive knowledge and experience both in medicine and surgery. She has worked in the surgical department of General Hospital of Kilkis, Greece and has participated in a plethora of general surgery operations (09/2021-11/2022). She was attendant and assistant surgeon in numerous adult cardiac surgery operations in AHEPA University Hospital and Papanikolaou General Hospital of Thessaloniki, Greece (12/2022-04/2023). Currently, she is an internal medicine resident in General Hospital of Chalkidiki, Polygyros, Greece (04/2023-to date). Her love and passion to fight for the human heart is highlighted by her enrollment as an ALS/ILS/BLS volunteer Instructor Candidate (after distinction in examinations, provided by the European Resuscitation Council). She aspires to become a cardiologist and has a particular interest in coronary, structural and valvular interventional cardiology, as well as in acute heart failure. She speaks English, Greek and German and is in love with classical music and the German landscape. On her free time, she enjoys playing the piano, working out or takes pleasure in her family's and friends' company.