

Percutaneous mitral valve repair with the new MitraClip XTR system in cardiogenic shock with concomitant Impella 5.0 mechanical circulatory support

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Transcatheter percutaneous mitral valve repair (PMVR) with the MitraClip system is an effective alternative to surgery for treatment of acute mitral regurgitation (MR) complicating myocardial infarction (MI). There is limited experience with PMVR in cardiogenic shock and concomitant mechanical circulatory support (MCS) with percutaneous left ventricular assist devices (pVAD). The MitraClip XTR system could reduce procedural time and improve device performance in complex cases.

Case report

A 42 year-old man was referred to our Institution for profound cardiogenic shock secondary to acute ST-segment elevation anterior MI, necessitating prolonged MCS with VA-ECMO and Impella CP despite successful percutaneous myocardial revascularization. The patient was shifted to Impella 5.0 surgically implanted via right axillary artery and VA-ECMO was removed to facilitate myocardial recovery and early patient mobilization. Despite active left ventricular unloading (Impella flow >4.5 l/min), pulmonary wedge pressure remained persistently elevated (PCWP 28 mmHg) and the patient failed weaning from invasive mechanical ventilation due to refractory pulmonary edema. Transesophageal echocardiography revealed moderate-to-severe functional MR. Following Heart Team discussion, considering the clinical impact of MR despite loading conditions, transcatheter PMVR with the new MitraClip XTR system was attempted. Patient's hemodynamics was highly dependent on MCS, thus the Impella 5.0 catheter was left in place during the procedure. A single central XTR clip was successfully implanted with reduction of MR to trace and mean post-procedural gradient 3 mmHg (Figures 2A to 2C). Pulmonary wedge pressure dropped (PCWP 12 mmHg) and pulmonary edema resolved in 24 hours. The patient was extubated and weaned from Impella 5.0 support 4 days after the procedure.

Discussion

Active left ventricular unloading from pVAD could result in underestimation of the hemodynamic relevance of acute functional MR related to papillary muscle dysfunction. This complication of MI requires intervention in order to achieve weaning from MCS and patient recovery. As compared to the MitraClip NT clip, the new XTR system has longer clip arms and longer grippers, improving grasping and mitral leaflet coaptation, potentially facilitating PMVR. This could result especially useful in unstable patients who are highly dependent on MCS, owing to reduction in procedural time. However, properly positioned, the 21-F version of the Impella axial-flow pump results extremely close to the anterior mitral leaflet, potentially reducing MitraClip maneuverability owing to its dimension and flow turbulence created by blood inlet area proximity. This case highlights the importance of a proper assessment and treatment of acute functional MR even in the setting of MCS, demonstrating for the first time the feasibility of PMVR with the new MitraClip XTR system in cardiogenic shock with concomitant Impella 5.0.

