Totally endoscopic robotic mitral valve replacement after intra-operative failure of mitral valve repair

Objective:
Surgical treatment of Carpentier Type III mitral regurgitation is a nuanced and evolving topic. This video demonstrates the adaptability of the totally endoscopic robotic approach, which facilitated efficient conversion to mitral valve replacement after an initial attempt at repair via annuloplasty and posterior leaflet augmentation.

Case Video Summary:
A 42-year-old female presented with significant symptoms related to severe Carpentier Type III mitral regurgitation with restricted posterior leaflet motion identified on transesophageal echocardiogram (TEE). Preoperative imaging demonstrated right and left common femoral artery diameters of 6 and 7 millimeters, which precluded the use of an arterial cannula with an endoballoon side port. While mitral valve replacement was considered, the patient was deemed to be a candidate for totally endoscopic robotic mitral valve repair via annuloplasty and posterior leaflet augmentation with bilateral percutaneous cannulation for cardiopulmonary bypass (CPB).

Five 8-millimeter robotic ports were placed in the right lateral chest wall. Percutaneous CPB was established using a 28 French right femoral venous cannula with the tip in the superior vena cava, a 16 French right femoral arterial sheath for endoballoon placement into the ascending aorta, a 19 French left femoral arterial perfusion cannula, and superior vena cava cannulation via the right internal jugular vein with a 19 French drainage catheter connected to the venous side of the bypass circuit.

After right T3-T9 intercostal nerve cryoablation, the mitral valve was repaired using a 30-millimeter semi-rigid ring. After weaning from CPB, TEE showed moderate-to-severe mitral regurgitation. The decision was made to replace the valve by enlarging the eight-millimeter working port to 30 millimeters. A 31-millimeter porcine valve was introduced into the body through the working port and secured with interrupted sutures. Completion TEE showed a properly functioning bioprosthetic valve.

Conclusions:
The totally endoscopic robotic approach allows for easy intraoperative transition from mitral valve repair to replacement. Additionally, bilateral percutaneous cannulation is a useful strategy to establish CPB in patients with contraindications to the use of an arterial cannula with an endoballoon side port. The robotic platform is a versatile minimally invasive tool in the surgical armamentarium to treat Type III mitral regurgitation.

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