

Transcatheter edge-to-edge repair in Carpentier type IIIa mitral regurgitation: challenging conventional contraindications

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Mitral regurgitation (MR) is a highly prevalent valvular heart disease globally, with untreated severe cases demonstrating associations with elevated morbidity, mortality, and adverse cardiovascular outcomes.^[1,2] While transcatheter edge-to-edge repair (TEER) has emerged as an alternative option for high surgical risk patients with severe MR,^[3,4] severe MR of Carpentier class IIIa (characterized by restricted leaflet motion during both systole and diastole) has been considered a relative contraindication for TEER interventions due to stenosis risk and procedural complexity.^[5,6]

A 70-year-old male was readmitted for heart failure despite optimal guideline-directed medical therapy. Echocardiography demonstrated severe MR (4⁺) with restricted leaflet mobility in both diastole and systole, and posterior leaflet tethering (combined Carpentier type IIIa & IIIb). Echocardiography also showed thickened mitral and aortic leaflets, and mild aortic regurgitation (Figure 1A–1C). Hemodynamic assessment revealed elevated transmitral velocity (2.1 m/s) with borderline mitral valve area (3.46 cm²), and mean gradient (5 mmHg) (Figure 1D & 1E), alongside severely reduced left ventricular ejection fraction (27%).

While conventional anatomical criteria favored surgery over TEER for type IIIa pathology, the multidisciplinary team pursued TEER given high surgical risk (STS score: 8.6%) and potentially feasible anatomy (posterior leaflet tethering contribution, borderline mitral valve area). A single MitraClip™ G4-XT was successfully deployed at A2-P2 extending toward A3-P3 (Figure 1F & 1G), resulting in mild MR (1⁺) without significant stenosis (mean gradient: 4 mmHg, Figure 1H & 1I), resolution of pulmonary venous flow reversal. The patient experienced significant symptomatic improvement paralleled by N-terminal pro-B-type

natriuretic peptide decline (6089 to 1867 ng/L).

A recent case showed the feasibility of TEER after balloon mitral commissurotomy in such entity,^[7] our case highlights the feasibility of TEER without preceding balloon mitral commissurotomy. Notably, it's of paramount importance to precisely quantify coexisting mitral stenosis and elucidate the underlying MR mechanisms using multimodality imaging.^[8] Further studies are required to define selection criteria and validate clinical efficacy of TEER in type IIIa MR.

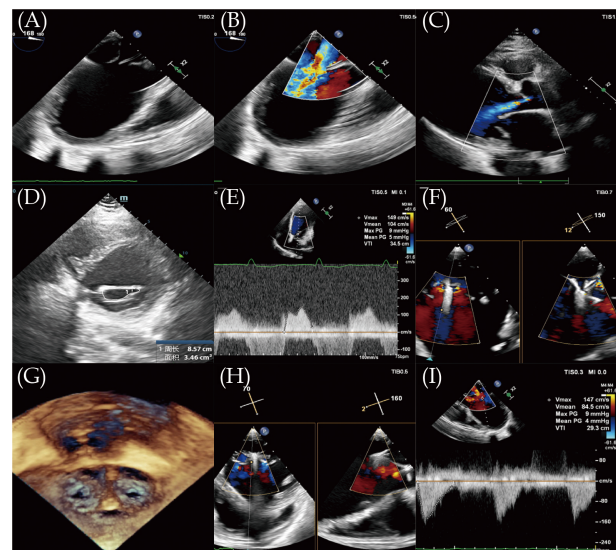


Figure 1 Echocardiographic images. Perioperative (A–E), intraoperative (F) and postoperative (G–I) echocardiographic images. (A): Thickened mitral valve leaflets with posterior leaflet tethering during systole; (B): severe mitral regurgitation; (C): dome shaped mitral valve in diastole, and thickened aortic valve leaflets with mild aortic regurgitation; (D): mitral valve area; (E): mean transmitral gradient; (F): TEER device positioning; (G): post-TEER 3D *en face* view; (H): post-TEER X-plane view showing mild mitral regurgitation; and (I): post-TEER mean transmitral gradient. TEER: transcatheter edge-to-edge repair.

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