Three-Dimensional Transesophageal Echocardiogram Provides Real-Time Guidance During Percutaneous Paravalvular Mitral Repair

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A 65-year-old woman with severe paravalvular mitral regurgitation and chronic hemolytic anemia was referred for surgical consultation. Her medical history included rheumatic heart disease with mitral valve replacement in 1977, aortic valve replacement in 1988, and repeat mechanical mitral valve replacement in 2002. Predominant symptoms were New York Heart Association function class III dyspnea and fatigue. The patient was considered at high risk for surgical complication because of the 3 previous valve surgeries and significant pulmonary hypertension (systolic pulmonary pressure, 70 mm Hg).

The Figure demonstrates repair of the significant paravalvular regurgitation using antegrade transcutaneous catheter-based deployment of a patent ductal occluder device (Amplatz, AGA Medical Corp, Plymouth, Minn) into the paravalvular mitral annular defect.

Two-dimensional transesophageal echocardiographic (TEE) color Doppler (panel A) demonstrates a significant paravalvular defect (white arrow). Real-time 3D color Doppler TEE (“surgeon’s view” from the left atrium) demonstrates a crescent of systolic paravalvular flow along the anterolateral region of the prosthetic annulus (panel B; Movie I). This en-face view suggests more severe regurgitation than appreciated by 2D 2-chamber images (compare with panel A). Catheter placement through the paravalvular defect was confirmed by fluoroscopy (panel C). Live 3D TEE confirmed the occluder (blue triangle) and catheter position immediately before occluder deployment (panel D; Movie II). Fluoroscopy confirmed complete deployment of the paravalvular occluder device (inset, panel E). Live 3D TEE demonstrated en-face “surgeon’s view” of the deployed occluder and mechanical leaflets during diastole (panel F). Both live 3D TEE and

Figure. Real-time 3D transesophageal echocardiogram guidance during percutaneous paravalvular mitral repair. White arrows indicate 2D or 3D color Doppler flow; red arrows, transeptal catheters; blue triangles, occluder device. Left atrium (LA) and left ventricle (LV) are identified.

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fluoroscopy were used to confirm unrestricted mechanical leaflet motion. This 3D image (panel G; Movie III) is cropped to create a unique lateral 2-chamber perspective and demonstrates the mushroom shape of the deployed occluder against the circular contour of the prosthetic valve annulus. Significant reduction in paravalvular systolic flow is demonstrated by 2D color Doppler (panel H; compare with panel A).

Procedural success was confirmed by Doppler hemodynamic parameters before and 5 days after paravalvular repair. Postprocedure study demonstrated a reduction of mitral inflow mean pressure gradient (from 5.7 to 3.8 mm Hg, both studies at 70 bpm). In addition, a dramatic decrease in the degree of hemolysis was observed. Before closure, hemoglobin was 8.7 gm/dL, total bilirubin was 3.8 mg/dL, ferritin was 598 ng/mL and LDH was 2935 U/L. Four days after closure, hemoglobin remained stable, total bilirubin decreased to 0.8 mg/dL, and LDH decreased to 1066 U/L. Acutely, the patient’s symptoms also improved from New York Heart Association class III to class II dyspnea.

Disclosures

None.
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