3-Dimensional Transesophageal Echocardiography Provides Real-Time Guidance During Percutaneous Interventions: Initial Experience

Sagit Ben Zekry [1], Sasidhar Guthikonda [2], Neal S Kleiman [2], William A Zoghbi [1], Stephen H Little [1]

[1] Cardiovascular Imaging Institute, [2] Division of Interventional Cardiology, The Methodist DeBakey Heart and Vascular Center, Houston, TX, USA

Objective: To describe our initial experience using a matrix array real-time transesophageal (3D TEE) for catheter based interventions, including atrial septal defect (ASD) closure and antegrade percutaneous paravalular repair (PPR). Our hypothesis was that 3D TEE would overcome the limitations of 2D TEE and allow precise visualization of intra-cardiac pathomorphology in real-time and enable accurate visualization of catheters and devices within surrounding environments.

Methods: For each interventional procedure, image guidance by 2D TEE and 3D TEE was qualitatively compared for; 1) assessment of the structural defect location and geometry, 2) continuous catheter visualization, 3) evaluation of closure device position and function.

Results: During 3 cases of secundum ASD closure, 2 mitral and one aortic PPR procedures, the supplemental imaging afforded by 3D TEE was of immediate value. A unique en-face view of the atrial septal defect (from a left atrial perspective) clearly delineated the ASD geometry and simplified closure device sizing and position. 3D TEE, with real-time 3D color Doppler was used to clearly identify the size, location and crescent-like geometry of significant paravalvular regurgitation of a mechanical mitral prosthesis as well as the aortic PPR. For all cases 3D TEE provided continuous catheter and transeptal puncture imaging (Figure A). En-face views of ASD closure device from right and left atria (Figure B) and of the paravalvular occluder (from atrial and ventricular perspectives) provided instantaneous evaluation of device position. Real-time 3D color Doppler provided immediate evaluation of closure device function.

Conclusion: In our experience, real-time 3D TEE during percutaneous intervention provides important additive value regarding structural defect geometry, device delivery guidance and immediate assessment of procedural success.