

Real-time 3D Transesophageal Echocardiography is Superior to 2D Transesophageal Echocardiography in Localizing Mitral Valve Pathology: Comparison with Surgical Findings

Sagit Ben zekry¹, Stephen H Little¹, Sherif F Nague¹, Elizabeth L Herrera², Karanbir Singh², William A Zoghbi¹

¹ Cardiology Department, ² Anesthesiology Department, Cardiovascular Imaging Institute, The Methodist Hospital DeBakey Heart and Vascular Center, Houston, TX, USA

Background: The incremental value of transesophageal (TEE) real time 3-Dimensional (3D) echocardiography over 2D TEE in diagnosing mitral valve pathology is unknown. The aim of the study was therefore to assess the comparative accuracy of 3D TEE and 2D TEE in identifying the mechanism of mitral regurgitation (MR) and mitral valve pathology.

Methods: Patients with significant MR referred for mitral valve repair were consecutively enrolled. In the operating room, a standard 2D TEE of the mitral valve was performed. A 3D TEE was also obtained with a zoomed (live image) view of the mitral valve and a full volume acquisition. 2D and 3D images were stored separately and reviewed by 2 independent observers, blinded to the surgical findings and all other data. The valve was assessed for the MR mechanism: functional or organic. In patients with organic MR, the presence and location of leaflet prolapse and/or flail were noted. The surgical findings served as the gold standard.

Results: Nineteen patients (60.4±9.1 years, 6 females) were studied. Fourteen patients with organic MR were correctly diagnosed by 2D and 3D TEE (100% accuracy and agreement). Twelve patients had prolapse, and there was a good agreement between 2D and 3DE in identifying the prolapsed valve (accuracy: 89.5% for 2D and 84.2% for 3D, k=0.87, p<0.001). There were 11 patients with flail leaflets; all flail segments were located in the posterior leaflet (all in P2). A good agreement between 2D TEE and 3D TEE was seen in diagnosing flail leaflets (accuracy: 84.2% for 2D, 89.4% for 3D, k=0.784, p=0.001). However, 3D TEE was more accurate in identifying the flail posterior leaflet scallop (accuracy: 97.4% for 3D and 85.9% for 2D, p=0.004).

Conclusions: Both 2D and 3D TEE reliably identify the mechanism of MR. However, 3D TEE has the incremental value of more accurately identifying the leaflet scallop with the flail segment, most likely because 3D TEE allows a full geometric view of the valve. These results have potential significant implications in guiding surgical repair.