Conclusions: RT3D provides a highly accurate assessment of all types of MR mechanisms similar to TEE and has incremental diagnostic value over TEE particularly in the type II mechanism.

Clinical use of real time 3D-echocardiography after percutaneous mitral commissurotomy (commissural assessment and valve area measurements)

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Background: Two-dimensional echocardiography (2DE) is the method of choice for the assessment of percutaneous mitral commissurotomy (PMC) results: mitral valve area (MVA) and commissural splitting. However, assessment of commissural opening by 2DE is hindered by the complex 3D-shape of the mitral valve and it has been recently suggested that Real-Time-3D-Echocardiography (RT-3DE), allowing appropriate plane orientation, may provide more accurate MVA measurements (MVA-3D). Nevertheless, since only 3D-guided 2D MVA measurements are possible, the superiority of quantitative RT-3DE for experienced operators can be questioned. We sought to compare 2DE and RT-3DE assessment of MVA and commissural opening after PMC.

Methods: MVA and commissural opening were assessed 24 to 48 hours after PMC in 71 patients (mean age 48±14 years, 76% female, and 23% atria fibrillation). 3D measurements were performed blinded to 2D results. For both modalities, commissural opening was semi-quantitatively scored as 0=None, 1= mild, 2=partial, and 3=complete.

Results: After PMC, MVA-2D increased (1.06±0.21 vs. 1.84±0.29 cm², p<0.0001) and mean transmural gradient decreased (0.14±0.7 vs. 5.2±2.4 mm Hg, p<0.0001). All except 85% had a good valve opening (final valve area ≥ 1.5 cm²). Mean MVA-3D was 1.87±0.35 cm². Compared to MVA-2D, correlation was excellent (r=0.77, p<0.0001), mean difference small (0.16±0.15 mm) and no significant difference observed (p=0.04). Commisural opening assessment by 2DE and RT-3DE was performed in the Table. Agreement between the 2 methods was weak (kappa=0.40) and 2DE underestimated the degree of commissural opening (p<0.0001).

Conclusion: After PMC: 1) for MVA measurement quantitative RT-3DE is not superior to 2DE for experienced operators. In contrast, 2) it seems to provide a more accurate qualitative assessment of commissural opening. The prognostic value of the new modality of commissural assessment deserves additional studies.

Three-dimensional echocardiography: an improved technique for the assessment of mitral valve postendocarditis lesions


Background: Three-dimensional (3D) echocardiography is a new and rapid evolving technique offering far more information than conventional two-dimensional (2D) echocardiography. Moreover 2D echocardiography requires mental integration of imaging planes. 3D echocardiographic reconstruction facilitates the judgment of the mechanism and a better understanding of the lesions, helping the surgeon to plan the surgical procedure. One of such circumstances is the evaluation of mitral valvular lesions that appear in the evolution of infective endocarditis.

Aim: To evaluate the feasibility of 3D transesophageal echocardiography (TEE) for reconstruction of mitral valve in patients with infective endocarditis

Material and method: 29 adult patients (p) with infective endocarditis and involvement of mitral valve apparatus were studied. The 3D-echocardiographic study was performed using an ultrasound imaging system Sonos 5500, Agilent Technologies, USA, equipped with a multiplane TEE probe. The echocardiographic results were compared with the intraoperative findings.

Results: An interpretable 3D image was obtained in all patients, and the correlation with intraoperative data was excellent (r=0.95). 3D TEE reconstruction correctly identified the lesions, as confirmed intraoperatively. The mitral valve lesions were vegetations in 13 p, ring abscesses in 4 p, ruptured chordae in 3 p, leaflet abscess in 2 p and leaflet perforation in 2 p. Six patients had successful mitral valve repair and 16 patients required valve replacement. Based on intraoperative findings, sensitivity for the diagnosis of mitral valve lesions using 3D TEE was 97% and specificity 100%.

Conclusion: 3D TEE reconstruction is the method of choice in evaluating postendocarditis mitral valve lesions allowing precise preoperative planning when reconstruction is considered.

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The ascending aorta is not only wider but has also a different shape in bicuspid versus tricuspid aortic stenosis

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Background: Aortic valve stenosis may be associated with ascending aortic dilatation requiring surgery. The ascending aortic dimensions do not correlate with the stenosis severity. Probably due to congenital wall factors, the ascending aorta is wider in patients with bicuspid aortic valve (BAV).

Purpose: To compare the shape of the ascending aorta, as defined by its dimensions from annulus to the level of proximal ascending aorta, in patients with stenosis of the BAV and tricuspid aortic valve (TAV).

Methods: We enrolled 296 patients with dominant aortic stenosis, maximal gradient ≥25 mm Hg, in whom the number of cases could be assessed by transthoracic or transoesophageal echocardiography, excluding those with more than moderate aortic regurgitation.

The ascending aortic dimensions at annulus, sinus of Valsalva, sinotubular junction and proximal ascending aorta were compared, and then transformed, so that for each patient these four measurements equaled vector length one, while every patient was unique by the relative contribution of its components. The transformed values were compared by n-dimensional t-test and then by the unpaired t-test.

Results: The 296 patients (age 69±11 years, 179 males, 57 with BAV) had maximal aortic gradient 0.7±0.9 mm Hg, mean gradient 4.2±2.0 mm Hg. The patients with BAV were younger, had more significant degree of stenosis than those with TAV (maximal gradient 7.7±6.2 vs. 6.5±2.8 mm Hg) and did not differ in the degree of regurgitation. The aorta was wider in BAV than TAV at the annulus (27.0±4 vs. 25.3±3 mm, P<0.01), Valsalva sinuses (37.5±5 vs. 34.8±3 mm, P<0.01), sinotubular junction (34.9±5 vs. 32.1±4 mm, P<0.001) and proximal ascending aorta (39.0±7 vs. 36.0±6 mm, P<0.001).

We found significant difference between the vectors of BAV vs. TAV (P<0.001). The transformed values were higher at the proximal ascending aortic level (P<0.01) in BAV.

Conclusions: The ascending aorta is wider in patients with BAV than TAV stenoses at all levels. The shape of the ascending aorta also differs between BAV and TAV due to relatively wider proximal ascending aorta in patients with BAV.

Functional anatomy of aortic regurgitation. Diagnostic accuracy of transesophageal echocardiography

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Background: In aortic regurgitation (AoR), valve repair (AoVR) is decided on the bases of anatomic lesions. Transoesophageal echocardiography (TEE) provides detailed anatomic view of aortic valve and root. Surgical inspection can identify aortic valves suitable for valve preservation, but is preferable to correlate aortic valve and root function with anatomy prior to thoracotomy.

Objective: To determine the accuracy of preoperative TEE to define the functional anatomy of AoR.

Methods: In 80 patients operated on for AoR, lesions diagnosed with TEE were compared with those observed at surgery. Diagnostic values and agreement among TEE and surgical inspection by kappa coefficient were measured. Their relationship to valve repairability was determined.

Results: Functional anatomy of AoR by TEE compared with surgery was accurate in 86% of cases (kappa = 0.79), with 4 false negatives for 3 aortic valve prolapses (AVP) and 1 infective endocarditis. Accuracy of TEE was > 95% for all specific lesions of leaflets except for AVP (88%). Comparison regarding AoR mechanisms (restriction, perforation, tethering and valve prolapse) was accurate in 85% (kappa = 0.90). Geometric distortion of Aortic Aortic(AAA) was correctly classified as dominant dilatation distal to STJ in 73/15 (86%), sinus dilatation proximal to STJ in 3/6 (50%); Anulodoic ectasia in 20/57 (35%) and normal dimensions in 6/10 (90%). Functional classification was statistically related with successful AoVR (p<0.0001). AoR due to AA Anxysms with structurally normal leaflets were prime candidates for AoVR. Glucose metabolism of OAA and AAA was also associated with surgical procedure for AA replacement (p = 0.004).

Diagnostic values for specific lesions

<table>
<thead>
<tr>
<th>Lesion</th>
<th>Sensitivity</th>
<th>Specificity</th>
<th>PPV</th>
<th>NPV</th>
<th>kappa</th>
<th>Localization</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pneumato/Dogeneate</td>
<td>100%</td>
<td>95%</td>
<td>88%</td>
<td>100%</td>
<td>0.90</td>
<td></td>
</tr>
<tr>
<td>Bicuspid valve</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tricuspid valve</td>
<td>95%</td>
<td>100%</td>
<td>95%</td>
<td>100%</td>
<td>0.95</td>
<td></td>
</tr>
<tr>
<td>Prostigotic</td>
<td>65%</td>
<td>97%</td>
<td>94%</td>
<td>91%</td>
<td>0.88</td>
<td></td>
</tr>
<tr>
<td>Geometry of Aortic Root</td>
<td>98%</td>
<td>100%</td>
<td>100%</td>
<td>75%</td>
<td>0.63</td>
<td>91%</td>
</tr>
</tbody>
</table>

Conclusions: TEE provides accurate anatomic assessment of all types of AoR. Functional anatomy of AoR defined by TEE is related to reparability. Therefore, echocardiographic assessment is essential for identifying patients for AoVR.