Three-dimensional echocardiography in Ebstein’s anomaly of the tricuspid valve: a comparison with MRI

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Introduction:
Tricuspid valve is the most complex valve with variable geometry. Ebstein’s anomaly further adds to this complexity. Small studies and case reports showed incremental benefits of 3D echocardiography over 2D echocardiography in the evaluation of Ebstein’s anomaly. We aimed to study the utility of 3D trans-thoracic echocardiography in the evaluation of Ebstein’s anomaly and correlate with findings on cardiac magnetic resonance (CMR) imaging.

Methods:
We included 24 patients (with age range of 8 - 45 years) with a diagnosis of Ebstein’s anomaly. 2D echocardiography followed by trans-thoracic 3D echocardiography and CMR were done.

Results:
In all the 24 cases, we could accurately visualize the size, mobility, tethering and degree of displacement of the leaflets using 3D echocardiography techniques. These findings were confirmed by CMR. The morphological details of tricuspid valves were better seen with 3D echocardiography, while right ventricular (RV) volumes were better assessed with CMR. The atrialized RV \( r = 0.7, (p = 0.05) \) and functional RV size estimated by 3D echocardiography and CMR correlated well, but RV systolic volumes and ejection fraction by both the techniques did not correlate well with each other. The most interesting finding on CMR is the presence of late Gadolinium enhancement in septal tricuspid leaflet and interventricular septum, which correlated with the severity of Ebstein’s anomaly as assessed by Carpentier classification.

Conclusion:
Both 3D echocardiography and CMR complement each other for complete morphological and functional evaluation, which is important for planning the optimal treatment strategy in Ebstein’s anomaly.