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Non Invasive Imaging (Echocardiography, Nuclear, PET, MR and CT)

AUTOMATED DETECTION OF MITRAL VALVE ANNULAR AND LEAFLET GEOMETRY: ECHOCARDIOGRAPHY AND CT COMPARISON

Poster Contributions
Poster Hall, Hall C
Saturday, March 18, 2017, 3:45 p.m.-4:30 p.m.

Session Title: New Technologies in Echocardiography
Abstract Category: 28. Non Invasive Imaging: Echo
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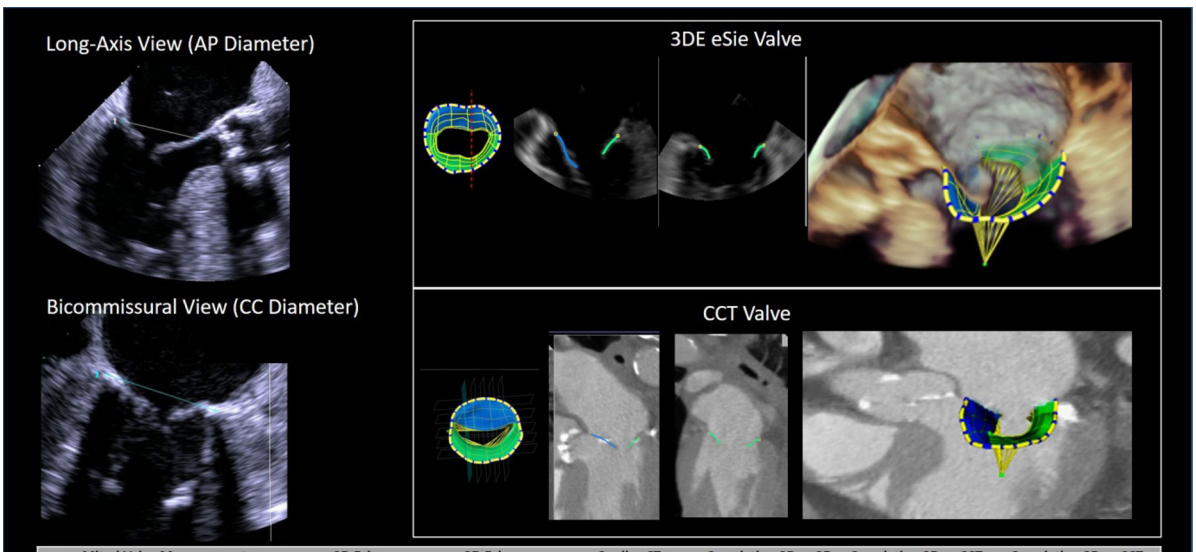
Background: Mitral valve (MV) interventions require accurate anatomic data, but existing methods are time-consuming. We compared novel automated MV detection based on machine learning using both 3D transesophageal echo (3DE TEE) and cardiac CT (CCT). Manual 2D TEE (2DE) measurements were also made.

Methods: 2DE, 3DE (Siemens SC2000) and CCT (GE 64-slice Discovery) studies from 40 aortic stenosis patients prior to TAVR were retrospectively analyzed. 2DE anteroposterior (AP) and intercommissural (CC) diameters were measured with TomTec Cardio-View 4. 3DE and CCT late-diastolic images were analyzed using identical MV detection algorithms (Siemens eSie Valve 1.6 and eSie Valve CT 1.0) with user editing as needed.

Results: (details in table): Mean age was 82 y, LVEF 58 ± 12%, and LA volume index 45 ± 15 ml/m². Good agreement was seen between 3DE and CCT for AP (mean 33.7 vs. 33.2 mm, r=0.85) and CC diameters (37.0 vs. 38.0 mm, r=0.77) and MV annular area (1087 vs. 1120 mm², r=0.79) with no systematic bias. 2DE significantly underestimated MV annular area, AP and CC diameters and had weaker correlations. A2 and P2 leaflet lengths by 3DE and CCT showed weak correlations.

Conclusions: 3DE and CCT results using novel automated MV detection show good agreement, even with MV annular calcification. 2DE AP and CC diameters are underestimated and not optimal for procedure planning. Ideally, 3DE and CCT should be used together to obtain reliable anatomic MV parameters, especially for challenging imaging situations.



Mitral Valve Measurements	2D Echo	3D Echo	Cardiac CT	Correlation 2D vs 3D	Correlation 2D vs CCT	Correlation 3D vs CCT
AP Diameter, mm	30.7 ± 3.2	33.7 ± 2.9	33.2 ± 2.7	r = 0.79	r = 0.77	r = 0.85
CC Diameter, mm	33.5 ± 3.5	37.0 ± 3.8	38.0 ± 3.2	r = 0.49	r = 0.26	r = 0.77
Annular Area, mm²	813 ± 147	1087 ± 173	1120 ± 155	r = 0.76	r = 0.66	r = 0.79
A2 Length, mm	---	20.6 ± 2.6	21.7 ± 3.2	---	---	r = 0.54
P2 Length, mm	---	13.4 ± 2.7	11.6 ± 2.3	---	---	r = 0.17