Comparison of different imaging modalities for the quantification of tricuspid valve geometry and regurgitation

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Objectives: Tricuspid regurgitation (TR) is a frequent valvular heart disease with relevant adverse impact on patients’ prognosis. Imaging of tricuspid valve and tricuspid Regurgitation is through anatomical circumstances is challenging. In this study, we aimed to compare the ability of different imaging modalities to visualize and quantify tricuspid valve (TV) function and annular dimensions.

Methods and Results: We prospectively included 40 consecutive patients (Age: 77.5 ± 7.1 years) with high surgical risk (EuroSCORE II: 8.8 ± 12.1%) and significant TR, who underwent transesophageal echocardiography (TEE) and multislice computed tomography (MSCT) to evaluate TR, TV function, and dimensions. In general, 2D-TEE showed lower diameters than MSCT with a significant but weak correlation between both imaging modalities for AP diameters (41.4 ± 7.8 mm, 47.2 ± 8.9 mm, r = 0.68, p = 0.03) and for SL diameters (41.6 ± 5.3 mm, 46.6 ± 4.6 mm, r = 0.71, p = 0.05). We found no significant correlation, however significant difference agreement, between MSCT and 2D-TEE on measures for annulus perimeter (117.6 ± 18.9 mm, 130.3 ± 21.5 mm, r = 0.3, p = 0.4) and annulus area (10.1 ± 3.3 cm², 13.4 ± 4.1 cm², r = 0.5, p = 0.03). When comparing 3D-TEE with MSCT, we found a strong correlation between both imaging modalities concerning TV annulus areas (12.9 ± 2.6 cm², 13.4 ± 4.1 cm², r = 0.94, p = 0.0017) and perimeter (130.1 ± 12.4 mm, 130.3 ± 21.5 mm, r = 0.9, p = 0.002), as well as for AP (43.8 ± 3.2 mm, 47.2 ± 8.9 mm, r = 0.73, p = 0.03) and SL diameters (44.5 ± 3.6 mm, 46.6 ± 4.6 mm, r = 0.86, p = 0.02). MSCT was not useful for TR grading and determination of TV function. In addition to conventional 2D echocardiography, only 3D-TEE allowed for direct measurement of effective regurgitant orifice area (EROA), which differed significantly from calculated EROA (p < 0.05).

Conclusion: 3D-TEE is highly comparable to MSCT and superior to 2D imaging for the determination of TV geometry and diameters. In contrast to MSCT, 3D-TEE allows sufficient grading and functional assessment of TR.