

Vena contracta area size predicts effectiveness of interventional edge-to-edge repair in tricuspid valve regurgitation

Goebel B.; Salomon C.; Awada H.; Costello E.; Sassenberg N.; Lauten P.; Lapp H.

Central Clinic Bad Berka, Bad Berka, Germany

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Background: Percutaneous tricuspid valve edge-to-edge repair (pTVR) is a promising interventional technique for patients with tricuspid regurgitation (TR), but guidance regarding patient selection and echocardiographic screening is lacking. The aim of this study was to identify echocardiographic measurements which may predict pTVR success.

Methods: Before and after pTVR, echocardiographic data, including 3D full-volume datasets, were obtained and quantified. Right ventricular assessments included ejection fraction (RVEF3D) and diastolic (RVVd3D) and systolic (RVVs3D) volumes. Also evaluated were: right atrial (RA) volume, effective regurgitant orifice area by PISA method (EROA_{PISA}), vena contracta area (VCA3D) by multiplanar reconstruction from a 3D colour Doppler loop (Figure 1a), maximal diastolic tricuspid annulus area from a 3D zoom image (Figure 1b), and tricuspid tenting area. TR severity was graded according to EROA_{PISA} and VCA3D as grade 1+ to 5+.

Results: Patients (n= 44, age 72 ± 9 years, 20 male) with at least moderate to severe TR undergoing pTVR were consecutively included. The patients were divided into groups according to their post-pTVR TR grade. Group 1 had TR grade ≤2+, and group 2 had TR grade ≥3+. Echocardiographic parameters before pTVR for both groups are presented in Table 1. As expected, patients with TR ≥3+ after pTVR had significantly worse pre-intervention echocardiographic measurements of TR severity, valve dimensions, and chamber volumes. ROC curves for the prediction of TR ≤2+ (mild to moderate) after pTVR (defined as VCA3D <0.75 cm² and EROA_{PISA} <0.4 cm²) were drawn for different echocardiographic features (Figure 2). VCA3D by 3D colour Doppler yielded the highest area under the ROC curve followed by TV anatomy measurements (Annulus area3D, Tenting area) and right atrial volume.

Conclusion: A thorough evaluation of TR and valve dimensions by 3D echocardiography, particularly the evaluation of VCA3D by 3D colour Doppler, aids in the prediction of the probability of pTVR success.

Abstract Figure.

