

Cardiac CT derived 3D reconstruction discriminates for complexity and hemodynamic effect of transcatheter mitral valve repair

F. Meijerink¹, I. Wolsink², M. Holierook², E.V. Chekanova², R.N. Planken³, A. Van Randen³, R.J. De Winter², M.A.M. Beijck², K.T. Koch², D. Robbers-Visser², S.M. Boekholdt², B.J. Bouma², J. Baan²

¹Amsterdam UMC - Location Academic Medical Center, Amsterdam, Netherlands (The); ²Amsterdam UMC - Location Academic Medical Center, Cardiology, Amsterdam, Netherlands (The); ³Amsterdam UMC - Location Academic Medical Center, Radiology, Amsterdam, Netherlands (The)

Funding Acknowledgement: Type of funding sources: Private grant(s) and/or Sponsorship. Main funding source(s): Abbott Vascular

Background: Transcatheter mitral valve repair (TMVR) is increasingly used to treat mitral regurgitation (MR) in high risk patients. Optimal transseptal access and guiding catheter position are essential to perform adequate repair. Anatomy of the inter-atrial septum (IAS) and mitral annulus (MA) are often complex and difficult to determine from echocardiography.

Purpose: The aim of the current study was to evaluate whether pre-TMVR cardiac CT and 3D reconstruction of the IAS and MA could discriminate for complexity and hemodynamic effect of TMVR.

Methods: Patients planned for TMVR, underwent cardiac CT scan (if eligible). Post-processing software was used to segment and reconstruct the aortic root, IAS, fossa ovalis (FO) and MA, resulting in a 3D model. The following parameters were measured in each model: (1) IAS angle (°) (2) Posterior-FO angle (°) (3) FO-perpendicularity angle (°) (4) MA area (cm²). Patient specific anatomy was categorized in 4 groups as either (1) Posterior-perpendicular (PP) FO + limited IAS angle, (2) PP FO + wide IAS angle, (3) non-PP FO + limited IAS angle or (4) non-PP FO + wide IAS angle. PP FO was defined as posterior-FO angle >65° and FO-perpendicularity angle >135°. IAS angle was considered limited if <110°.

Device implantation time (min) was used to assess complexity of the procedure and was compared between the different groups. MR reduction (grades), number of clips used and mitral valve (MV) gradient (mmHg) were compared for patients with MA area <14 cm² vs. ≥14 cm².

Results: 46 patients (mean age 75 years, 41% male) were included. Anatomy was classified (1) PP FO + limited IAS angle in 13, (2) PP FO + wide IAS angle in 13, (3) Non-PP FO + limited IAS angle in 8 and (4) Non-PP FO + wide IAS angle in 12. Median device implantation time was 20 min in group 1, compared to 39 min in group 2 (p=0.02), 33 min in group 3 (p=0.03) and 29 min in group 4 (p=0.08). In patients with MA area <14 cm², MR reduction was greater (2.22 vs. 1.68, p=0.02), number of clips used was lower (1.44 vs. 1.79, p=0.05) and MV gradient was higher, though not significant (3.15 vs. 2.58, p=0.26).

Conclusion: The current study showed that TMVR seemed less complex in patients with an optimal anatomy. In patients with limited mitral annulus area a more favorable hemodynamic effect was achieved. Cardiac CT and 3D reconstruction could therefore be of strong aid for procedural planning of TMVR.

