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Use of Three-Dimensional Intra Cardiac Echocardiography for Assessment of Pulmonary Vein Anatomy and Lasso Catheter Localization

Ron D. Simon, Guy's and St Thomas's Hospitals, London, United Kingdom.

Background: We assessed use of 3D intracardiac echocardiography (ICE) in pulmonary vein ablation 

isolation procedures for atrial fibrillation (AF). Methods: 5 patients with paroxysmal AF or persistent AF resistant to medication scheduled for pulmonary vein ablation had a transseptal puncture under fluoroscopic and ICE control. A second transseptal puncture allowed the ICE catheter into the left atrium. An ICE pullback from the LUPPV with ECC and respiratory gating was recorded (real-time 2D on SVHS using a Clearview echo machine (Scomed) and frame-grabbed using a TomTech workstation. Offline 4D reconstructions of the left atrium were created (within 5 minutes). Left inferior and right upper and lower veins were not reimaged.

Results: The 4D ICE images show clearly the nature of the pulmonary vein ostia. All 4 veins could be seen with one pull back. Large shared ostia or early branching could be well identified as well as degree of apposition of the lasso catheter to the ostial wall and the position in relation to the ostium. Conclusions: The pulmonary vein ostia vary in size, shape and branching pattern, some having large shared ostia. 4D ICE is useful in assessing the site of lasso required and checking degree of apposition to the vein wall leading to better signals and more effective isolation.

Geometry of Tricuspid Anulus Determined by Real-Time 3D Echo in Tricuspid Regurgitant Patients With Intact Leaflets

Jian Xin Qin, Taketho Shoji, Yang Jin Kim, Deborah A. Agler, Xiayi Yang, Jun Kwan, Patrick M. McCarthy, James D. Thomas, The Cleveland Clinic Foundation, Cleveland, Ohio.

The aim of this study was to investigate the geometric changes of tricuspid annulus (TA) in patients with moderate to severe tricuspid regurgitation (TR) and normal leaflets by using real-time 3D echocardiography (RT3DE). Methods: RT3DE was performed in 7 TR patients with intact leaflets and 7 normals without TR. 3D data was transferred to a PC with customized software that displayed 9 consecutive rotational apical plane images (20° between each plane). The coordinates of the two tricuspid leaflet insertion points were manually identified in each plane at end systolic (ES) and end diastolic (ED) phases. The TA geometry was reconstructed from these coordinates, and the TA area and its change and motion were automatically calculated. Right ventricular (RV) ejection fraction (EF) was also observed by RT3DE. Results: The unique structure of TA was shown in 3D space (Figure). TA geometry was not typical saddle shape but projected geometry was elliptical in both groups at ED and ES phase. The distances of posterior and septal TA to the apex were shorter than anterior and free wall TA (80 ± 12 mm vs. 83 ± 10 mm; p < 0.01) in TR patients. The TA area was significantly dilated (9.3 ± 1.3 cm² vs. 7.5 ± 1.5 cm²; p < 0.05) and the dynamic changes in TA area were smaller (18 ± 13 % vs. 31 ± 12 %, p < 0.05) in TR patients as compared to normals. The TA motion correlated well with RV EF (r = 0.90, n = 14). Conclusion: RT3DE demonstrated that TA was more dilated, more rigid and less planar in TR patients with intact leaflets than those without TR.