Prevalence and Morphological Properties of Anatomical Isthmuses involved in Monomorphic Ventricular Tachycardia in Repaired Tetralogy of Fallot.


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Introduction: Ventricular tachycardia (VT) is an important cause of late morbidity and mortality in repaired Tetralogy of Fallot (rTOF). The majority of the VTs in rTOF are monomorphic VTs based on re-entry over well defined anatomical isthmuses that can be successfully targeted with radiofrequent catheter ablation (RFCA) in most patients. The prevalence and properties of these isthmuses in the rTOF population are unknown. Extending this knowledge might facilitate RFCA of VT in rTOF.

Methods: In 28 post-mortem specimens with rTOF (age 80±65 months) the presence and size of anatomical isthmuses were assessed. Isthmuses were defined as (1) the isthmus between tricuspid annulus (TA) and RV-scar or RVOT-patch, (2) the isthmus between RV-scar and pulmonary annulus (PA), (3) the isthmus between PA and VSD-patch and (4) the isthmus between VSD-patch and TA. Furthermore, presence of coronary arteries abnormalities, thickness between isthmus 3 and the aortic root and the degree of infundibular resection were assessed.

Results: Total correction with a transannular patch was performed in 75% (n=21) of hearts; the remaining had RV myectomy with direct closure of the RV. Isthmus 1 (width 23±9 mm) and isthmus 3 (width 13±6, length 13±5 mm) were present in all rTOF specimens. Isthmus 2 (width 7±5 mm) and isthmus 4 (width 6±4 mm) were present in respectively 21% (n=6) and 11% (n=3) of hearts. No major coronary artery abnormalities were found; in 11% of cases a large conal branch, anterior to isthmus 1, was present. The area between isthmus 3 and the aortic root had an average thickness of 7±2mm, independent of age. Infundibular resection was performed in 93% (n=26) of specimens, which was mild to moderate in 39% and severe to extreme in 54% of cases.

Conclusion: Isthmus 1 and 3 were present in all rTOF specimens. The distance between isthmus 3 and the aortic root, as well as the normal coronary artery pattern of most specimens would allow RFCA. Infundibular muscle resection was severe to extreme in 54% of the rTOF specimens, which might result in significant scarring of isthmus 3.