Catheter ablation for ventricular arrhythmias in adults with congenital heart disease: Can we transfer ablation strategies from normal hearts?

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Background: Notable advances in surgical repair have significantly improved the long-term prognosis for adults with congenital heart disease (ACHD). However, congenital heart disease (CHD) itself is still strongly associated with ventricular arrhythmias (VAs) as a relevant cause of morbidity and mortality.

Purpose: This observational multicenter study aimed to evaluate the impact, safety and success of catheter ablation of VAs as a standalone or adjunctive therapy in adults with congenital heart disease (ACHD) transferring ablation strategies established in structural normal hearts.

Methods: Between 2007-2017 a total number of 31 consecutive ACHD (median age 18.9±24.9 years) suffering from VAs underwent catheter ablation including ablation of ventricular tachycardia (VT) and premature ventricular contractions (PVC). Congenital heart disease (CHD) was classified according to the level of complexity into mild, moderate and severe lesions. VA ablation was performed in 46 procedures (1.48 procedures/patient).

Results: The cohort consisted of 15 male and 16 female patients. Follow-up was available for all patients (median 43±32 months). The median duration of volume- and pressure overload prior to corrective surgery/intervention was 6.2±4.1 years. Echocardiography demonstrated a preserved or mildly reduced left ventricular function in the majority of patients (76.1%). At the initial procedure, 18/31 patients (58%) underwent catheter ablation for VT and 13/31 (42%) for PVC. Reentrant VT through an electro-anatomical isthmus was observed in 13 patients (72.2%) and 5 patients (27.7%) demonstrated focal VT. Acute procedural success was achieved in 93.5%. In 2 patients with reentrant VT as arrhythmia mechanism, conduction block of the critical isthmus was not achieved by endocardial ablation and reablation including epicardial ablation was necessary. No patient with confirmed conduction block developed VT recurrence. Reablation during the follow up period was performed in 8 patients (VT n=4; PVC n=4). The mean procedure duration was 240±90.4 minutes and mean fluoroscopy time was 29.1±17.2 minutes. There was one pericardial tamponade as major complication related to the ablation procedure and requiring acute intervention. 3 patients died during FU due to their underlying CHD-condition.

Conclusion: Strategies for VA ablation established in normal hearts can be transferred to ACHD. The treatment is safe and effective with acceptable long-term results. Varying anatomical pre-conditions and the heterogeneous population itself are challenging and contribute towards a higher re-ablation rate. Therefore ablation of VAs in ACHD should be subject to centers highly specialized in catheter ablation of complex arrhythmias as well as treatment of ACHD.