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Right atrial volume and body mass index in corrected tetralogy of Fallot correlate with the incidence of supraventricular arrhythmia - an MRI study

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Background

Patients with corrected Tetralogy of Fallot (cTOF) can develop supraventricular arrhythmias. So far, right atrial (RA) volume in TOF has not been evaluated in the context of arrhythmia. The aim of this study was to evaluate if right atrial (RA) volume in TOF correlates with the occurrence of supraventricular arrhythmias. To identify other risk factors for arrhythmias additional parameters were included in the analysis: anthropomorphic parameters (BMI, age, gender), previous shunt, high right ventricular (RV) volumes and pulmonary regurgitation (PR).

Methods

Cardiac MRI (CMR) and 24h Holter ECG-monitoring were performed in 69 consecutive patients with cTOF (Table 1). CMR protocol included triplanar HASTE sequences, standard SSFP cine images, flow measurements of the aorta, pulmonary trunk and pulmonary arteries. RA and LA volumes were retrieved from HASTE sequences and SSFP cine images.

Results

Mean values for RA volume were 49 +-19 ml/m^2 from HASTE sequences. In 23 patients endsystolic and enddiastolic RA-volumes were obtained from cineSSFP and compared to HASTE sequences. Bland-Altman analysis confirmed correlation of RA volumes from both sequences in atrial diastole with minimal overestimation by HASTE sequences. Mean RV volumes were 97 +-27 ml/m^2, pulmonary valve regurgitation fraction 21 +-19 %. Mean heart rate on Holter was 75, ranging from from 52 to 124 bpm. 57 of 69 patients had supraventricular arrhythmias as singular extrasystolies, couplets or short runs. Mean BMI was 25 kg/m^2 with a range from 15.5 to 36 kg/m^2.

Table 1 Patient cohort characteristics

	Number of patients	Mean
n	69	
Female	35	
Male	34	
Age	11 - 54	31 years
BMI	15.5 - 36.1	25 kg/m^2
shunt	37	
Transanular patch plasty	47	
pulmonary vavle comissurotomy	13	
Pulmonary conduit/ homograft	41	

Based on multivariate regression analysis RA volume ($p<0.01$) as well as BMI ($p<0.01$) were identified as independent risk factors for supraventricular arrhythmias. No correlation was found for gender, age, previous shunt, RV volume or degree of residual pulmonary regurgitation.

Conclusions

TOF patients with high RA volumes or high BMI exhibited supraventricular arrhythmias more often, regardless of age, gender, previous shunt, RV volume or PR.

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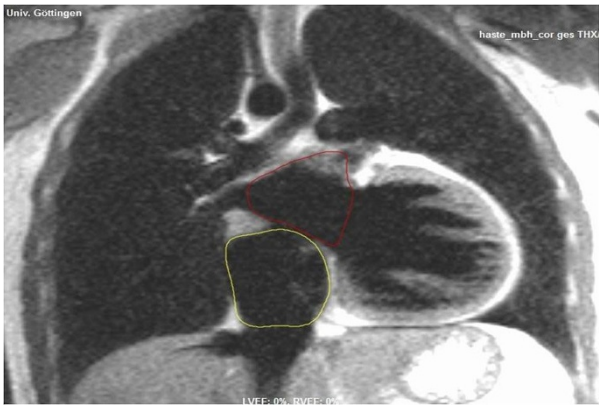

Figure 1 Example of right atrial segmentation on coronal HASTE.

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