Surgery impacts right atrial function in tetralogy of Fallot

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Objective: To analyse the impact of surgery and pericardial integrity on right atrial function and total heart volume variation in the setting of pulmonary valve insufficiency.

Methods: Right atrial function and total heart volume variation were analysed in two subgroups of patients with pulmonary valve insufficiency in comparison to healthy controls: group I with surgically repaired tetralogy of Fallot (n=20 patients) and group II after balloon angioplasty of pulmonary valve stenosis in patients with isolated valve disease without surgery (n=7 patients). Volumetric analysis of MRI data revealed parameters of atrial function (reservoir-, conduit- and pump-function and cyclic volume change) and of total heart volume (enddiastolic and endsystolic total heart volume and the variation). Statistical analysis included uncorrected and corrected pairwise comparisons and the calculation of groupwise Pearson correlation coefficients.

Results: In group I with a pulmonary regurgitation fraction of 31.0 +/- 14.9%, right atrial function was clearly impaired, with reduced reservoir and elevated conduit function, and total heart volume variation was elevated to 13.9 +/- 3.4%. In group II, with a pulmonary regurgitation fraction of 22.8 +/- 6.9%, the values were close to normal, with unaffected atrial function and a total heart volume variation of 9.9 +/- 3.3%.

Conclusion: The hydrodynamic effect of pulmonary valve insufficiency alone is likely not the only reason for impaired right atrial function and elevated total heart volume variation in Fallot patients, it is rather the scar in the right atrium, the injured pericardium and the disease itself that are responsible for the energetically unfavorable alterations.