Transcatheter pulmonary valve implantation (TPVI): 3D-roadmapping in grown-up congenital heart disease

Stenger A., Dittrich S., Glöckler M.
Pediatric Cardiology; University Hospital Erlangen; Erlangen; Germany

Introduction: Three dimensional rotational angiography (3DRA) is a useful technique for ruling out coronary compression in pre-testing for transcatheter pulmonary valve implantations (TPVI): One single contrast admission in the aortic root while high pressure ballooning the pulmonary artery (PA) shows the spatial relationship of the coronaries to the position to the planned stented pulmonary valve. Selective angiographies of single coronary arteries become unnecessary. The 3D information from the 3DRA additionally enables intra-procedural 3D guidance after integration and overlay of routinely performed pre-interventional MRI.

Methods and Results: Between September 2012 and December 2014, 33 patients were analysed after pre-testing and TPVI with 3DRA and 3D-guidance in the cardiac catheterization laboratory. 3DRA helped to rule out contraindications for TPVI like coronary compressions in 3 cases. In 30 cases, TPVI were successfully performed. 3D-guidance with MRI overlay was used in 20 patients. Radiation dose, consumption of contrast dye and fluoroscopy time were analysed. In the 3D-guided group median dose-area product (DAP) was 4741.8 (1010.9-12944) μGym², contrast consumption 2.3 (1.0-3.8) ml/kg and fluoroscopy time 22 (7.8-126.5) minutes compared to the non-guided group with DAP of 4513.4 (1861-19820) μGym², contrast consumption of 2.6 (1.4-7.1) ml/kg and fluoroscopy time of 33.6 (9.4-66.3) minutes [Median, (Min-Max)]. In follow-up, no complications like stent fracture or endocarditis occurred.

Conclusions: 3DRA while pre-testing safely displays coronary compression. MRI-overlay is possible by 3D-3D registration with the 3DRA, facilitates TPVI and has the potential to reduce fluoroscopy time, radiation and contrast dye.