TOPIC 10 – Pediatric and congenital heart disease

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Transposition of the great arteries is associated with increased ascending aorta stiffness

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Background: Transposition of the great arteries (TGA) is the consequence of abnormal aorticopulmonary septation. Animal embryonic data indicate that septation and elastogenesis are related events. It was showed that carotid artery is markedly and constitutionally stiffer in patients with TGA using magnetic resonance imaging (MRI).

Objective: to assess aortic dimensions and aortic elasticity in patients with TGA using magnetic resonance imaging (MRI).

Methods: MRI was performed in 29 patients with simple TGA operated by an atrial switch procedure (22 male; mean age 29±4 years) and 29 age and gender-matched healthy subjects. RESULTS: TGA patients showed aortic root dilatation (7.7 ± 2.1 vs 6.2 ± 1.2 cm, p=0.0018, in systole, and 6.8 ± 2.1 vs 5.0 ± 1.2 cm2, p=0.0003, in diastole, at tubular level), reduced aortic root distension (13.5 ± 5.9 vs 24.3 ± 11.7, p=0.0001) and reduced aortic root distensibility (3.5 ± 1.6 vs 5.3 ± 2.4 mmHg-1.0-3, p=0.0009). Biomechanical properties of the ascending aorta and pulse wave velocity were similar in TGA patients and in healthy subjects. Body mass index, systolic blood pressure, diastolic blood pressure and pulse pressure were similar between patients and healthy subjects, and had no influence on ascending aorta stiffness. No significant correlation was found between index of aortic stiffness and right ventricle (RV) function (end-diastolic and end systolic volumes, RVEF, RV mass, presence or absence of myocardial fibrosis). It did not change after indexation to body surface area of RV function values.

Conclusions: Aortic stiffness in TGA is markedly increased and localized to the ascending aorta. This property could contribute to the dilatation of the ascending aorta part of the new aorta in arterial switch procedure.

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Percutaneous right outflow tract valve implantation: substrate matters.

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Introduction: Percutaneous pulmonary valve insertion has been recently introduced in clinical setting. Patient selection is widely accepted. These candidates are however heterogeneous, in regard of heart defects, and type of surgical right ventricular outflow tract (RVOT) reconstruction. It is presently unclear in the literature if type of surgical reconstruction matters for the success of the pulmonary valve insertion. Our goal was to compare the hemodynamic results of percutaneous pulmonary valve in patients with homografts, prosthetic conduit or RVOT reconstructed with patch.

Patients and methods: We reviewed patients included over the last 6 months in the prospective study (REVALV) for patients undergoing RVOT intervention for severe stenosis and/or insufficiency. Only valved stent group is analyzed here. All patients undergoing valved stent implantation are previously pre-stented with a bare metal stent according to present recommendations. Thirty-seven patients were included, distributed in three groups according to type of RVOT reconstruction (homograft, balloon calibration and angiography of the RVOT to all patients in order to define the RVOT morphology, and to establish a personalized technique for the specific requirements to make this technique safe and durable.

Results: We review patients included over the last 12 months in the prospective study (REVALV) for patients undergoing RVOT intervention for severe stenosis and/or insufficiency. Only valved stent on native RVOT group is analyzed here. 10 patients were included. We perform MRI, balloon calibration and angiography of the RVOT to all patients in order to define the RVOT morphology, and to establish a personalized technique for each patient in order to implant a valved stent on the native RVOT. All patients undergoing valved stent implantation are previously pre-stented with a bare metal stent according to present recommendations.

Results: Initial dimensions for these patients were on the upper limit for the established criteria. 2 had a diameter above 24mm. Decision for implanting valved stent was taken based on the fact that pre-stenting reduces RVOT diameter achieving 22 mm, and giving the native outflow tract the stability to prevent valved-stent fractures. For one patient, left pulmonary branch was stented down to the pulmonary trunk in order to have an appropriate diameter for valved-stenting. Pulmonary valve was placed successfully in all cases. All but one had been pre-stented at same procedure than validation. Of those, one freshly implanted bare metal stent dislodged to the right pulmonary artery when tenting to place the delivery system for the percutaneous valve. Two extra bare metal stents were implanted in order to cover the branch to the trunk, and finally valved stent was placed with no further problems.

Conclusions: Percutaneous pulmonary valve implantation can be performed on patients having native RVOT with success. Pre-stenting should be performed in a previous intervention in order to ensure stabilization of the bare metal stent and to avoid dislodgements. MRI, angiography and balloon calibration are not discriminating criteria for discarding candidates if personalized techniques are established for each patient. Pulmonary branches can be used as anchors for PPVI.