Inner architecture of the right ventricle: the role of the tricuspid valve.

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Background: A major anatomic characteristic of the right ventricle (RV), in addition to the coarseness of the apical trabeculations, is the presence of muscular bands arranged in a semicircular fashion. Recent publications show that, while parietal band and subpulmonary conus represent the embryologic ventriculo-infundibular fold (VIF), the septal band (septomarginal trabeculation), moderator band and anterior papillary muscle of the tricuspid valve (APM) could derive from the muscular tricuspid primordium and from the inlet portion of the heart.

Objectives: To analyze the anatomy of the RV in heart specimens with tricuspid atresia (TA), in order to confirm the hypothesis of different embryologic origins for the muscular bands of the RV.

Material and methods: We reviewed 54 hearts with TA from the anatomic collection of the French Center of Reference for Complex Congenital Heart Defects: 32 postnatal and 22 fetal hearts. The presence of a VIF, septal band, moderator band was assessed as well as the position of great vessels, the type of TA, muscular (musTA) or membranous (mbTA), the type and patency of the ventricular septal defect (VSD), and the associated lesions.

Results: Forty specimens had ventriculo-arterial concordance, 14 had D-transposition. There were 50 musTA (including 6 without any RV cavity), and 4 mbTA. Among the 48 specimens with a RV cavity, all had a well-developed VIF. A rudimentary septal band (with demonstrable limbs in only 3) was present in 7/44 musTA vs 3/4 mbTA (p<0.04), rudimentary moderator band and APM in 2/44 musTA vs 2/4 mbTA (p<0.03). A patent VSD was found in 40 hearts, muscular in 90% of musTA, outlet type in 75% of mbTA (p=0.03).

Conclusion: Septal band and moderator band were absent in the vast majority of hearts with tricuspid atresia, particularly in musTA, while parietal band and subpulmonary conus are always present. These anatomic findings confirm the hypothesis of a dual embryologic origin for the muscular bands of the RV: the VIF is reminiscent of the inner curvature of the heart, while the septal band, moderator band and APM develop later from the muscular tricuspid primordium, itself developed from the posterior part of the primary fold.