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New perspectives in pediatric cardiology and cardiac surgery

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Statement of the Problem: The classical congenital heart surgery in complex malformations still carries high risk and poor long term outcome despite the advances marked over the 20th century.

Hypothesis: A very early diagnosis and noninvasive treatment during pregnancy on the light of the modern molecular biology would strongly affect the medical and surgical history of Congenital Heart Diseases (CHD).

Methodology: We reconsidered the embryogenesis and the morphology of the most severe CHD.

Findings: We found a common anatomical denominator in all morphological settings: the Trabecula Septomarginalis sequential malrotation counterclockwise apex-base axis (TSM, Leonardo's cord). The TSM is composed in the normal heart by an Anterior Limb AL committed to the Outlet Septum and by a Posterior Limb PL committed to the inner curvature. Fig.1. TSM (brown) and Outlet Septum (green) rotation in sequential phenotypes from normal to Transposition of Great arteries. Fig.2. TSM rotation seen from the apex: PL green, AL Yellow. The TSM rotating follows the development of the right ventricle and is always traceable in the classical V shape or variants.

Conclusions: The TSM sequential malrotation is proposed as a model for new investigations and treatments during pregnancy. Each malformed cardiac phenotype has a specific molecular profile which can be identified by the Next Generation Sequencing analysis (NGS) and edited by the CRISPR-cas9 technique what we refer as NGS Molecular Cardiac Surgery.

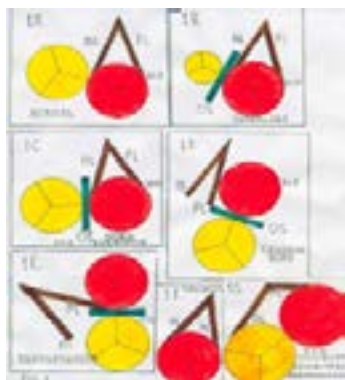


Fig1



Fig2

Biography

Athos Capuani is a Cardiothoracic Surgeon with a long working experience in acquired and congenital heart diseases. For the recent years he is very interested in fetal life. The main area of investigation is the embryology-morphology of CHD and the links with genetic and epigenetic disorders. He found an anatomical common denominator in the most complex malformations: The Trabecula Septomarginalis sequential malrotation. He thinks that many complexes CHD could be addressed during pregnancy on the light of this model and the modern molecular biology what he refers as Molecular Cardiac Surgery.