

3D imaging of heart specimens: a new teaching tool for understanding the anatomy of double outlet right ventricle

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Introduction: One of the key success factors of the surgical treatment of complex congenital heart defects remains a detailed and in-depth understanding of the intracardiac anatomy. Currently, heart specimens are the best available teaching tools for studying the spatial relationships of the various components of the heart in complex congenital heart defects, like double outlet right ventricle (DORV). However, the access to anatomic collections is possible in only a few centres worldwide, and heart specimens may become damaged with time.

Objective: to study the intracardiac anatomy in DORV by using 3D imaging of heart specimens. The secondary objective is to build a database for teaching purposes.

Methods and results: We performed CT scans with high resolution in 15 heart specimens with various anatomic types of DORV (with subaortic, subpulmonary and non-committed ventricular septal defect (VSD)). Heart specimens were fixed in 10% formalin. Openings were carefully stitched together before putting the heart in the CT scan. All 3D images were produced with a 3D reconstruction platform from Paris Descartes University. The 3D view from the right and left ventricles showed the anatomic details very neatly for all hearts. We described the VSD, its localization, borders and surface. We described also the relationship of the VSD with the aorta and the pulmonary trunk and the length and orientation of the outlet septum (figure). The ability to navigate through the heart cavities and vessels was very useful to understand the specific anatomy of the malformation.

Conclusion: This study underlines the role of 3D scan reconstruction as an imaging modality to increase our understanding of the anatomy of complex congenital hearts defects like DORV. This could constitute an innovative pedagogic approach, and a way to preserve the anatomic collections in the future.