

## **Congenital Heart Disease Imaging Trend: Are we already moving toward to the Use of Non-invasive Technique?**

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Congenital heart disease (CHD) occurs in about 6 to 8 of 1000 live births with the increasing prevalence can be attributed to major improvements in diagnosis and treatment. Imaging is fundamental in the diagnosis of CHD. It outlines the anatomy and physiology, helps to refine management, evaluates the consequences of interventions and helps guide prognosis. The choice of imaging modality has thus become an important issue. However, no single available imaging modality fulfills these roles for all patients and diseases. Therefore, assessment for CHD must involve a variety of modalities that can be used in a complementary fashion, and that together are sensitive, accurate, reproducible, and cost effective, whilst minimizing harm.

Transthoracic echocardiography examination (TTE) that has been the first modality has few limitations. In previous years, the diagnosis and the treatment of congenital malformations have often depended on cardiac catheterization. In many institutions, cardiac catheterization still remains the gold standard against which other modalities are measured.

The state-of-the-art computed tomography (CT) imaging techniques for CHD are useful to evaluate diverse cardiovascular and airway abnormalities with improved accuracy and patient- and user-friendliness. Therefore, CT is steadily becoming an invaluable imaging modality to fill the gap among echocardiography, cardiac catheterization and cardiac Magnetic Resonance (CMR) imaging. Multi-slice CT has important strengths in comparison with each of these imaging modalities. Unlike echocardiography, CT provides excellent anatomic information, ably identifying the aorta, right ventricle, pulmonary arteries, and pulmonary veins. Moreover, CT is faster to perform than echocardiography.

Currently, CMR imaging has been demonstrated to be an adequate technique to evaluate several important aspects of ventricular function, intra cardiac flow dynamics, including valve regurgitation and stenosis, and large vessel flow. Furthermore, it has been shown to be an important technique in the anatomical characterization of complex congenital abnormalities, particularly of the venous connections, atrial arrangement and ventricular-great arteries relationship. Eventually, it may help to reduce the number of invasive procedures required in pre and postoperative evaluation of patient with CHD. The use of CMR also minimize the dose radiation risk of diagnostic or interventional catheterization.

In the past decade, however, imaging methodologies have increasingly shifted toward to the use of less invasive and noninvasive techniques. Although echocardiography is the most commonly used imaging modality for diagnosis and follow-up of subjects with CHD, the evolution of cardiovascular magnetic resonance (MR) imaging and increasingly computed tomography (CT) does offer new ways to visualize the heart and the great vessels.