

## Echocardiography-computed tomography fusion imaging: a new approach for congenital heart disease

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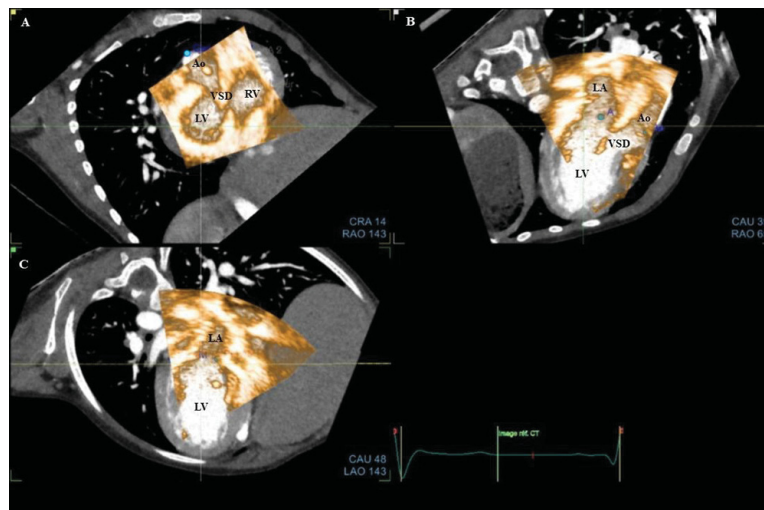
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**Introduction:** Diagnosis, management and surgical decision making in children and adults with congenital heart disease are based on echocardiography. One of the most recent developments in cardiac imaging is "fusion" of different imaging modalities. Our objective was to evaluate the feasibility of imaging fusion between computed tomography (CT) and 3D trans-thoracic echocardiography (TTE) in children and adults with congenital heart disease.

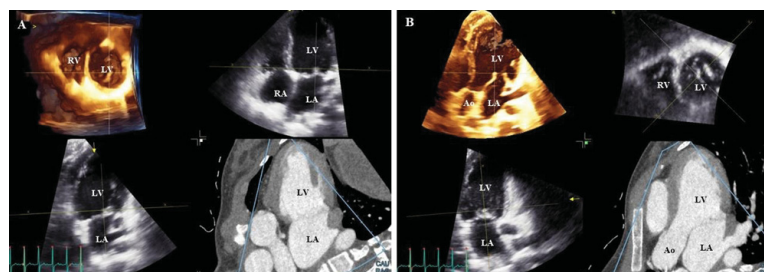
**Methods:** Fourteen patients with congenital heart disease who had a CT and a 3D TTE (9.5 years [2.7–15.7], 57% male, BSA 0.9 m<sup>2</sup> [0.6–1.7]) were prospectively included for their usual monitoring in our center. Congenital heart disease was classified as simple (n=4, 29%), moderate (n=4, 29%) or complex (n=6, 42%). A full-volume 3D heart acquisition on three cycles was performed using a VividTM E95 GE. Image fusion between CT and TTE was done using General Electrics (GE) Fusion Software. Steps required for images importation, for fusion process (alignment, landmarks, superposition), navigation and analysis were described.

**Results:** Fusion imaging between 3D TTE and CT was successful for all patients and superposition was good with a median scored at 8.5/10. Median total time required to complete the fusion process was 735 seconds [628–1163], without significant difference according to the degree of complexity of the cardiopathy. Landmarks were significantly placed differently from the reference landmarks in complex congenital heart disease. For complex cardiopathy, navigation into the heart at the same time with multiple modalities demonstrate its interest, for diagnosis or for planning surgery.

**Conclusion:** We have investigated the feasibility and the accuracy of imaging fusion between 3D TTE and CT in a varied population of patients with congenital heart disease, from children to adult. These advances allow simultaneous visualization of intracardiac structures and may help in understanding the complex anatomy of congenital heart disease, without limitations in terms of age, weight or type of congenital heart disease.



Validation of fusion imaging



Navigation in fusion imaging