

Case 9

D-Transposition of the Great Arteries – CT Evaluation of a Newborn

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History

A 13-day-old female newborn suffering from desaturation was scheduled for a surgical operation on an arterial switch. A cardiac CT scan was

ordered to evaluate the anatomy of the heart, the great vessels and the coronary arteries prior to the operation.

Diagnosis

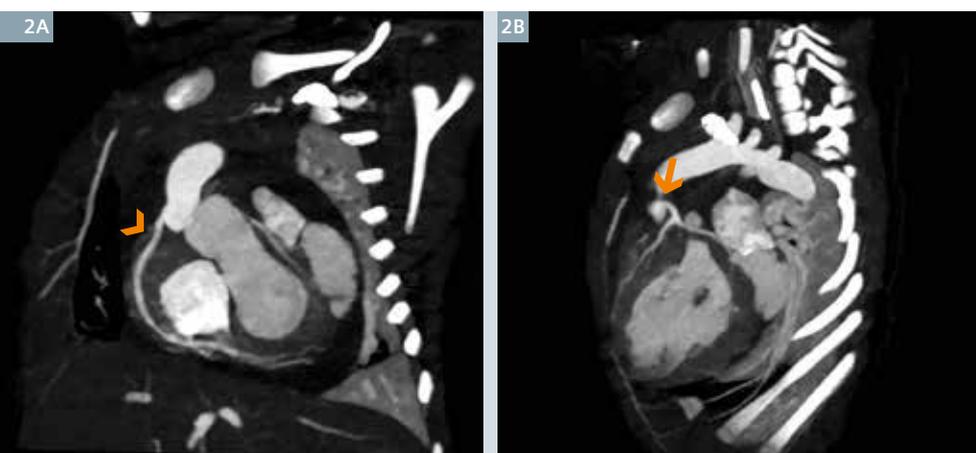
CT images showed a dextro-transposition of the great arteries (d-TGA) with a usual type of the coronary arteries. The aorta, originating from the right ventricle (RV), was anterior and to the right of the pulmonary trunk which originated from the left ventricle (LV) and was enlarged. A cardiomegaly with an atrial septal defect (ASD), a ventricular septal defect (VSD) and a patent ductus arteriosus (PDA) were seen along with a juxta-ductal type coarction of the aorta with hypoplastic aortic arch. Bilateral hyperattenuation in the posterior lung sections was present, suggesting pulmonary edema.

Comments

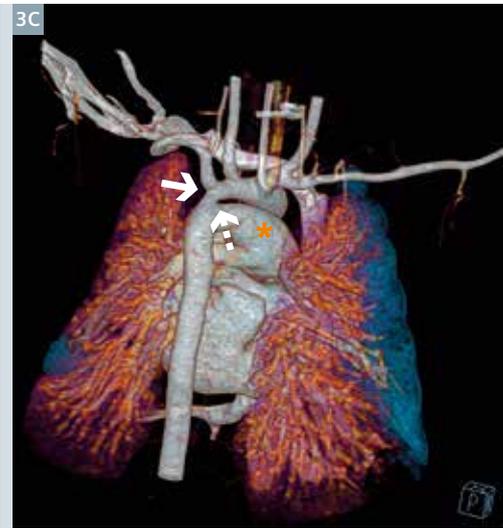
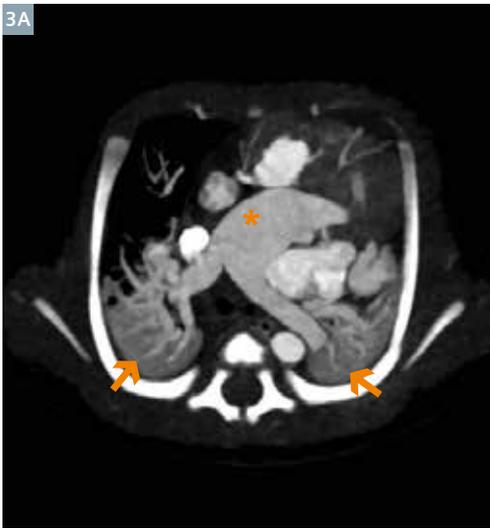
Cardiac CT scan on a newborn is always challenging due to a higher heart rate and difficulties in breathhold. In this case, an ultrafast scan mode, the Turbo Flash mode with a scan speed of 737 mm/s, was performed, enabling an acquisition of 98 mm in 0.13 s. The newborn was free-breathing during the scan. A fast true temporal resolution of 66 ms provided by dual source CT allowed an ECG-triggering in the systolic phase (at 35% RR) and maintained an excellent image quality to depict all three coronary arteries despite the infant's higher heart rate (142 bpm). The 70 kV, selected automatically by CARE kV (automated dose-optimized selection of X-ray tube voltage), allowed for an excellent enhancement with only 6 mL of contrast agent. The combination of all these advanced techniques contributed to a confident diagnosis with a very low radiation dose (0.72 mSv). ■



1 VRT images show a d-TGA with the aorta originating from the RV, and the pulmonary trunk from the LV. Coronary arteries are with normal pattern.



2 MIP images (Fig. 2A, 5 mm; Fig. 2B, 8 mm) show the right coronary artery (Fig. 2A, arrowhead) and the left main coronary artery (Fig. 2B, arrow) branching into the left anterior descending and left circumflex arteries.



3 MIP (Figs. 3A and 3B) and VRT (Fig. 3C) images show that the ascending aorta is anterior and to the right of the enlarged pulmonary trunk (asterisk). An ASD (arrowhead), a VSD (dashed arrow), aortic coarctation (white arrow) with a PDA (white dashed arrow), and hyperattenuation in both posterior lungs (arrows) are present.

4 VRT (Fig. 4A) and MinIP (Fig. 4B) images show a normal bronchial tree with limited volume of inflated lungs.

Examination Protocol

Scanner	SOMATOM Force		
Scan area	Thorax to upper abdomen	Pitch	3.2
Scan length	97.5 mm	Table speed	737 mm/s
Scan direction	Cranio-caudal	Slice collimation	192 × 0.6 mm
Scan time	0.13 s	Slice width	0.6 mm
Tube voltage	70 kV	Reconstruction increment	0.3 mm
Tube current	160 mAs/rot.	Reconstruction kernel	Bv40
Dose modulation	CARE Dose4D	Heart rate	142 bpm
CTDI _{vol}	0.45 mGy	Contrast	
DLP	6.9 mGy cm	Volume	6 mL
Estimated Dose	0.72 mSv	Flow rate	0.7 mL/s
Rotation time	0.25 s	Start delay	CARE Bolus

The outcomes by Siemens' customers described herein are based on results that were achieved in the customer's unique setting. Since there is no "typical" hospital and many variables exist (e.g., hospital size, case mix, level of IT adoption), there can be no guarantee that other customers will achieve the same results.