Case 9

Diagnosis of Tetralogy of Fallot using ECG-Triggered Adaptive Sequential Cardiac CT Scan

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History

A 9-month-old baby girl, with a history of a "heart murmur" for the past 6 months, was admitted for diagnosis and treatment. Physical examination revealed a cyanosis, an acropachy, and a heart murmur (level 3/6) on the left side of the sternum. An echocardiography showed a Tetralogy of Fallot, a patent ductus arteriosus (PDA), a persistent left superior vena cava (PLSVC) and a suspected double-outlet right ventricle (DORV). Cardiac CT examination was requested to specify the diagnosis of a DORV.

Diagnosis

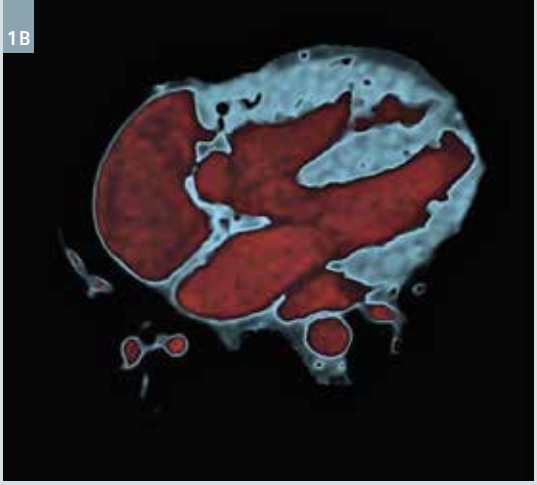
CT images showed the characteristic findings of a Tetralogy of Fallot: A ventricle septal defect (VSD, Fig. 1), an overriding aorta (Fig. 2), and an infundibular pulmonary stenosis (Fig. 3). Additionally, a PDA (Fig. 4) and a PLSVC (Fig. 5) were also clearly demonstrated. There was no evidence of a DORV.

Comments

The Tetralogy of Fallot is the most common cyanotic congenital heart defect and normally requires surgical repair. It is important to specify the diagnosis and the associated abnormalities for treatment planning. In this case, a DORV was clearly ruled out. Taking into consideration the higher heart rate (127 – 130 bpm) and the dose reduction, an ECG-triggered adaptive sequential scan was performed in the systolic phase which resulted in excellent image quality and a definite diagnosis. ■

Examination Protocol

Scanner	SOMATOM Definition AS+		
Scan area	Thorax	Slice collimation	128 × 0.6 mm
Scan mode	ECG-triggered adaptive sequential scan	Slice width	0.75 mm
Scan length	102.5 mm	Reconstruction increment	0.5 mm
Scan direction	Cranio-caudal	Reconstruction kernel	B26f
Scan time	2.8 s	Temporal resolution	150 ms
Tube voltage	80 kV	Heart rate	127 – 130 bpm
Tube current	68 mAs	**Contrast**	350 mg/mL
$CTDI_{vol}$	0.79 mGy	Volume	13 mL
DLP	8 mGy cm	Flow rate	1 mL/s
Effective dose	0.78 mSv	Start delay	22 s
Rotation time	0.3 s		



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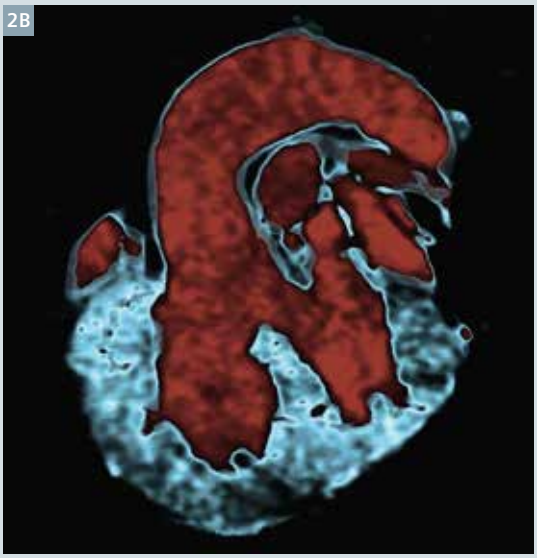
MPR (row A) and VRT (row B) images show the characteristic findings of a Tetralogy of Fallot: a VSD (Fig. 1A, arrow), an overriding aorta (Figs. 2), and an infundibular pulmonary stenosis (Fig. 3, arrow).



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VRT image shows a PDA (arrow).

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MPR (Fig. 5A) and VRT (Fig. 5B) images demonstrate a PLSVC draining into the coronary sinus.