Case 11

Persistent Bilateral Patent Ductus Arteriosus and Confluent Pulmonary Arteries – A Rare Congenital Cardiac Malformation

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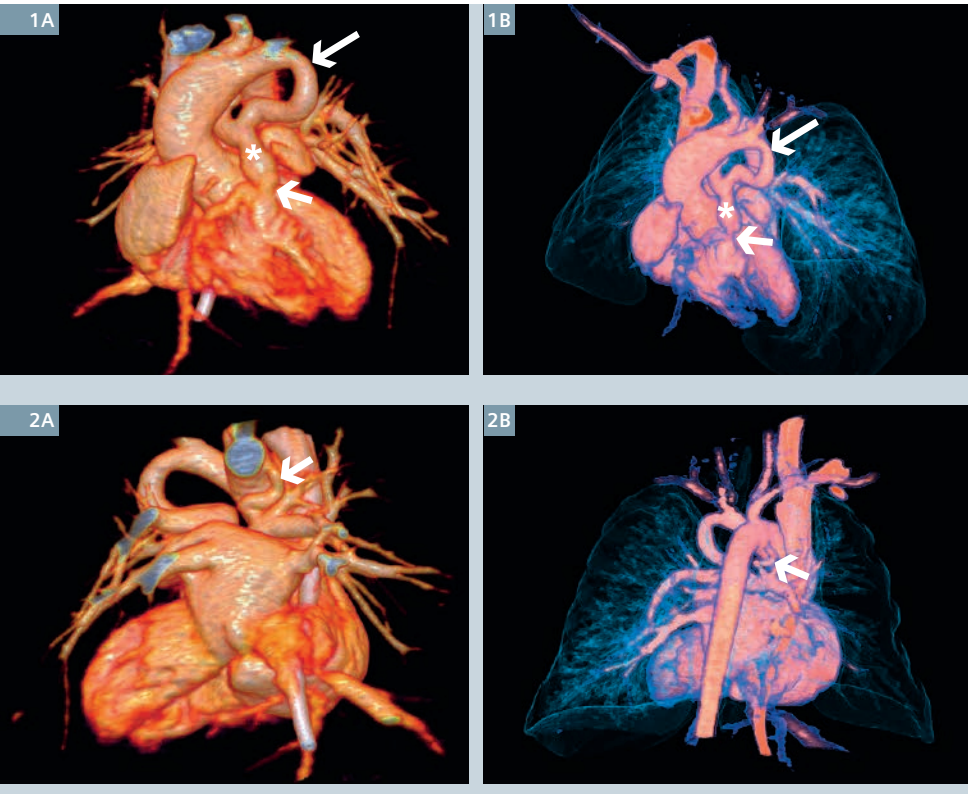
History

A newborn baby, weighing 3 kg, with syndromic facies was referred to the hospital due to a prenatal diagnosis of a complete atrioventricular septal defect and a pulmonary atresia discovered during a fetal echocardiography. A physical examination revealed a continuous heart murmur at the left and right upper sternal border and a systolic murmur at the left lower sternal border. A blood oxygen saturation test in room air resulted in a saturation level of 93%. Since the anatomy and the source of the pulmonary blood flow were unclear, a cardiac CT examination was requested for pre-operative assessment.



1–2 Anterior (Fig. 1) and posterior (Fig. 2) views of VRT images show a confluent pulmonary artery (Fig. 1, asterisks), a pulmonary atresia (Fig. 1, short arrows), a left PDA (Fig. 1, long arrows), and a right PDA (Fig. 2, arrows).

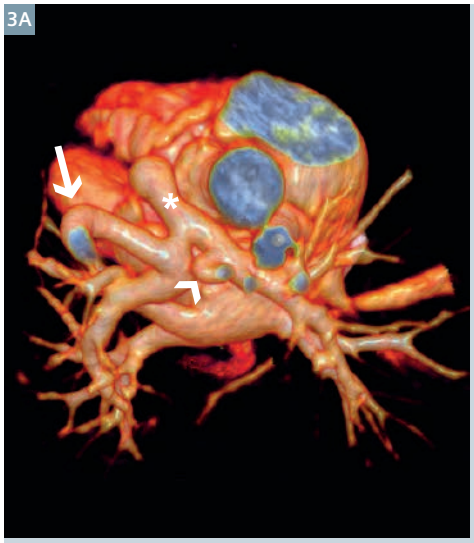
Diagnosis

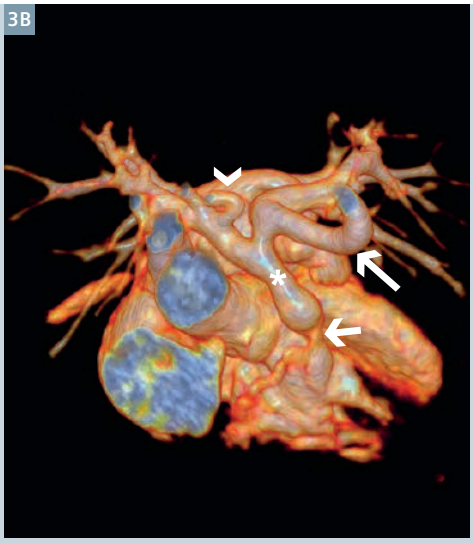
CT images demonstrated a pulmonary atresia and a complete atrioventricular septal defect, hereby confirming the findings of the echocardiography. Additionally, a bilateral patent ductus arteriosus (PDA) with a confluent pulmonary artery, a right-sided descending aorta, and balanced ventricles in the presence of situs solitus were also seen.

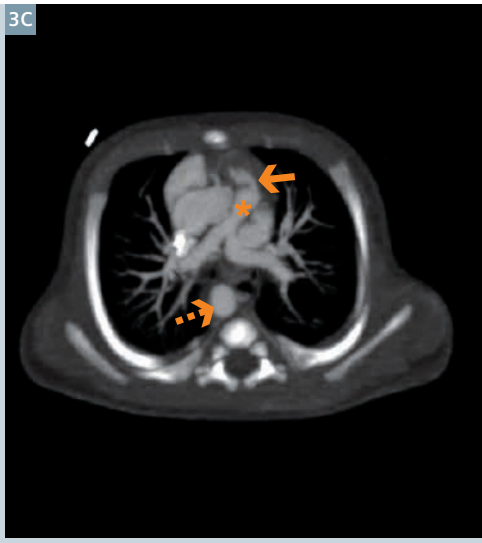
Comments

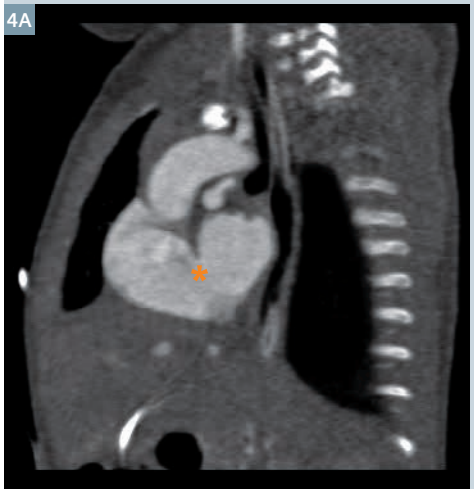
A persistent bilateral PDA is an uncommon abnormality which occurs during the development of the aortic arch and the pulmonary arteries. It is most commonly seen accompanied by pulmonary atresia and non-confluent branch pulmonary arteries and is strongly associated with heterotaxy syndrome. It is important to thoroughly evaluate the pulmonary arterial supply for signs of a pulmonary atresia prior to surgery. In this case, a rarely seen congenital cardiac malformation is presented – a bilateral PDA with a confluent pulmonary artery.

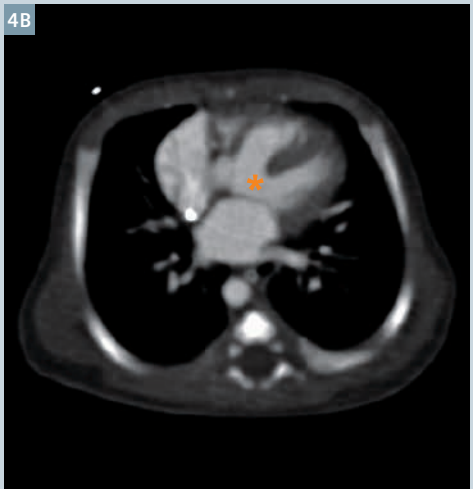
As a non-invasive imaging modality, CT is increasingly used in the diagnosis and management of structural heart disease. It provides complementary diagnostic information to echocardiography and, in some cases, makes an invasive angiography unnecessary. Technological advances allow not only dose reduction but also improved image acquisition. The Dual Source CT Flash mode with its high pitch spiral scanning not only shortens the acquisition time, but also reduces the radiation exposure. ■











3 Cranial views of VRT (Figs. 3A and 3B) and MPR (Fig. 3C) images show the confluent pulmonary artery (asterisks), pulmonary atresia (Figs. 3B and 3C, short arrows), a left PDA (Figs. 3A and 3B, long arrows), a right PDA (Figs. 3A and 3B, arrowheads) and a right-sided descending aorta (Fig. 3C, dashed arrow).

4 MPR images demonstrate the atrial septal defect (Fig. 4A, asterisk) and the ventricular septal defect (Fig. 4B, asterisk).

Examination Protocol

Scanner	SOMATOM Definition Flash		
Scan area	Heart	Rotation time	0.28 s
Scan length	99.3 mm	Pitch	3.0
Scan direction	Cranio-caudal	Slice collimation	128 × 0.6 mm
Scan time	0.25 s	Slice width	0.6 mm
Tube voltage	80 kV	Reconstruction increment	0.3 mm
Tube current	28 mAs	Reconstruction kernel	B30f
Dose modulation	CARE Dose4D	**Contrast**	
$CTDI_{vol}$	0.46 mGy	Volume	6 mL
DLP	7 mGy cm	Flow rate	1 mL/s
Effective dose	0.63 mSv	Start delay	Bolus tracking