

Case 10

Pulmonary Atresia with Major Aortopulmonary Collateral Arteries

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History

An 11-month-old girl with pulmonary atresia associated with ventricular septal defect underwent CT examination to evaluate the size of the multiple major aortopulmonary collateral vessels and the integrity of flow to the lungs prior to surgical repair.

Diagnosis

The axial and coronal (Fig. 1) blended images (0.5 blend of Sn140 kV and 80 kV data) revealed large aortopulmonary collateral vessels arising from a right-sided aorta and feeding the lungs bilaterally. There was also cardiomegaly with leftward deviation of the cardiac axis and apex. The main pulmonary artery was absent and there were small caliber right and left pulmonary arteries. The VRT angiographic images (Fig. 2) also showed the right aortic arch and multiple aortopulmonary collateral vessels. The additional dual energy (DE) perfused blood volume (PBV) axial images (Fig. 3) showed normal perfusion bilaterally. Overall, the lungs were well perfused via the collateral vessels.

Comments

Major aortopulmonary collateral arteries (MAPCAs) represent primitive arteries that usually originate from the descending aorta in utero and usually involute as the normal pulmonary arteries develop. In certain heart conditions, such as pulmonary atresia with ventricular septal defect, the native pulmonary arteries do not develop normally. The number and caliber of MAPCAs can increase and can serve as the main supply of blood

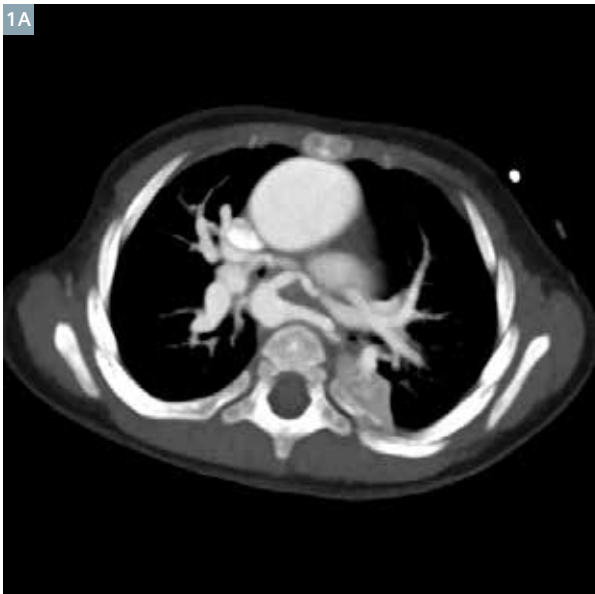
to the lungs. If untreated, this systemic-to-pulmonary shunt can lead to pulmonary hypertension.

syngo DE Lung PBV analysis delivers morphological and functional information in a single examination. The blended and angiographic images can contribute to a comprehensive evaluation of the pulmonary vessels and cardiac anatomy. In this case, the blended and angiographic images

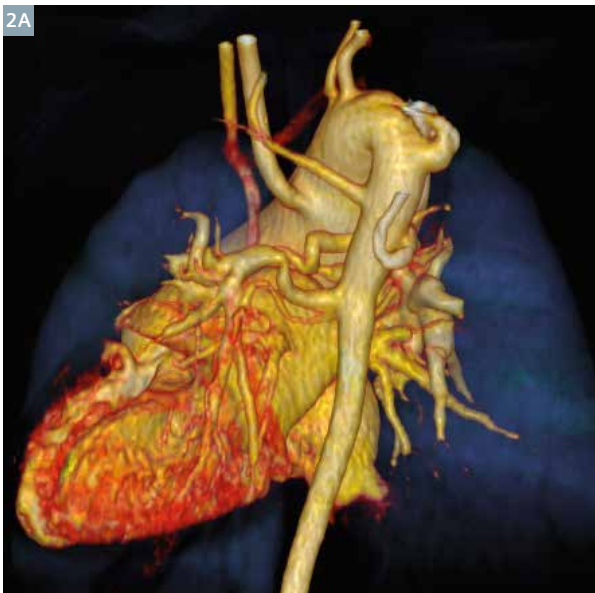
provided an excellent overview of pulmonary vasculature and showed the sites of origin and caliber of the MAPCAs. The DE PBV information allowed the physician to confirm that the collateral vessels were adequately perfusing the lungs. DECT at an incredibly low dose (1 mGy) provided the diagnosis and might obviate further imaging, such as standard catheter angiography or magnetic resonance imaging. ■

Examination Protocol

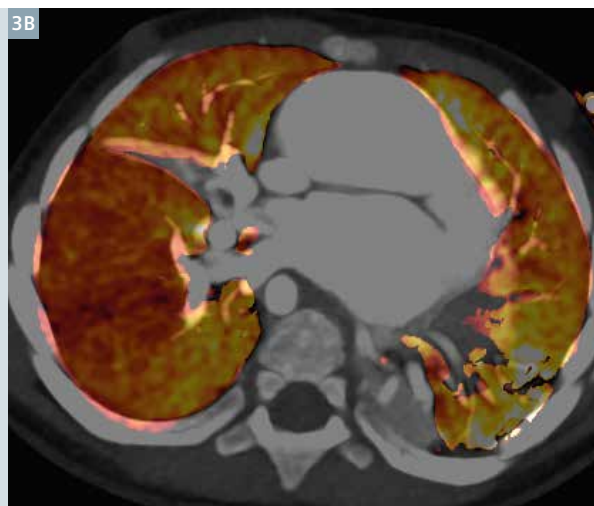
Scanner	SOMATOM Definition Flash
Scan area	Thorax
Scan length	127.5 mm
Scan direction	Cranio-caudal
Scan time	0.79 s
Tube voltage	80 kV/Sn 140 kV
Tube current	24/15 mAs
Dose modulation	CARE Dose4D
CTDI _{vol}	1 mGy
DLP	21 mGy cm
Effective dose	1.26 mSv
Rotation time	0.28 s
Pitch	1.2
Slice collimation	128 × 0.6 mm
Slice width	3 mm
Reconstruction increment	3 mm
Reconstruction kernel	D30f
Contrast	320 mg /mL
Volume	12 mL
Flow rate	2.5 mL/s
Start delay	Bolus tracking + 4 s



1 Axial (Fig. 1A) and coronal (Fig. 1B) images acquired with 0.5 blended ratio of high and low energies show multiple large aortopulmonary collateral vessels arising from a right-sided aorta. The main pulmonary artery is absent and there are small caliber right and left pulmonary arteries.



2 Two VRT angiographic images also show the right multiple aortopulmonary collateral vessels feeding the lungs.



3 DE PBV axial images show the lungs well perfused via the collateral vessels.