

## Case 3

# Unknown Partially Anomalous Pulmonary Venous Connection in a Symptomatic Adult

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## History

A 42-year-old female patient, with a known history of paroxysmal atrial tachyarrhythmia for the past 27 years and exertional dyspnea for the past two, had undergone various exercise stress tests and echocardiographs.

All these results were within the normal range. She developed exertional chest pain within the past month and a coronary CT angiography (cCTA) was requested to rule out coronary anomalies.

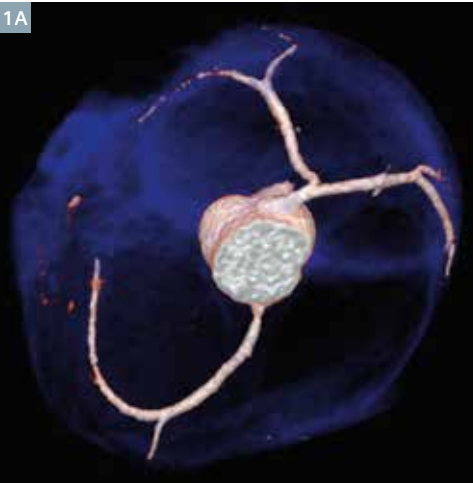
## Diagnosis

cCTA images demonstrated normal coronary arteries (Fig. 1). However, contrast was unexpectedly seen in the right cardiac chambers, which were moderately dilated. Beyond that, mild dilatation of the pulmonary trunk and the pulmonary arteries was also seen. Only one right pulmonary vein, the right inferior pulmonary vein, was demonstrated and was connected to the left atrium (Fig. 2).

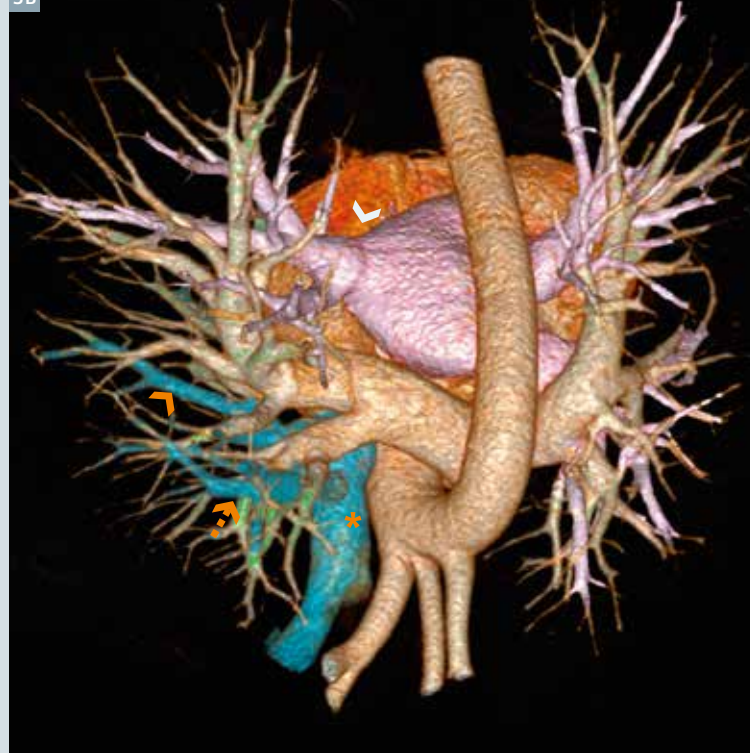
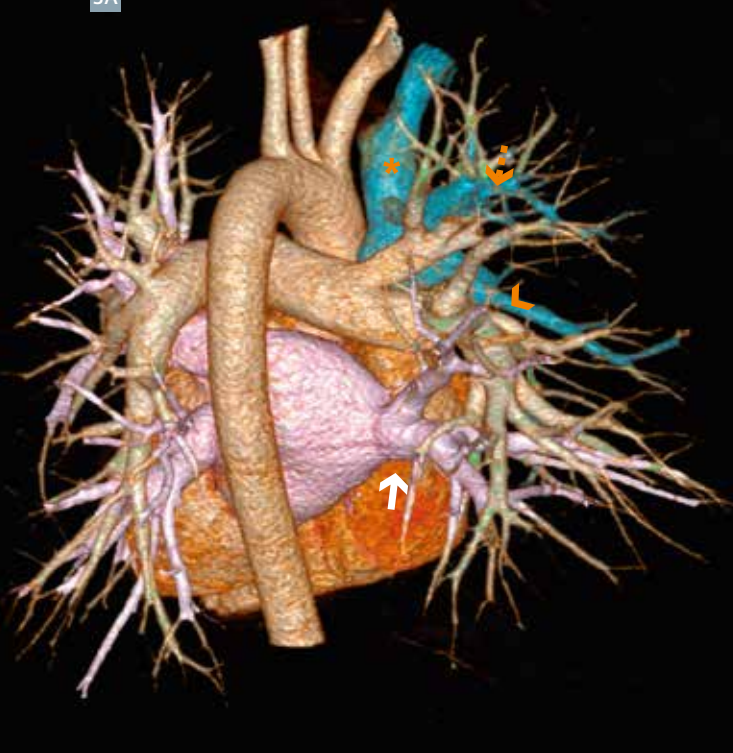
Another high-pitch acquisition of the thorax was performed and these images showed two right pulmonary veins, the right upper and the right middle, anomalously connected to the superior vena cava (Fig. 3). A diagnosis of partially anomalous pulmonary venous connection (PAPVC) was clearly established by the physician.

## Comments

PAPVC is defined when one or more pulmonary veins are connected to the right (rather than to the left) atrium. These may be directly connected to the right atrium or indirectly via the superior or inferior vena cava. Children with isolated PAPVC are usually symptomatic whereby the development of symptoms, depends on how many pulmonary veins are anomalously connected to the right atrium. The most common symptoms, include exertional dyspnea, palpitations from atrial tachyarrhythmia, and, in the latter course of the disease, chest pain and symptoms from right heart failure and pulmonary hypertension.



- 1 VRT images show normal coronary arteries.
- 2 VRT image acquired from the first scan reveals only one right pulmonary vein, the right inferior (arrow), connected to the left atrium.



- 3 VRT images acquired from the second scan show anomalous connections of the right upper (dashed arrows) and the right middle (arrowheads) pulmonary veins to the superior vena cava (asterisk). The right inferior pulmonary vein (arrows) is connected to the left atrium.

Although echocardiography is the primary noninvasive imaging method for this investigation, it is limited in providing the necessary anatomical information concerning the pulmonary veins. CT angiography (CTA) can evaluate the origins, the courses, and the connections of the anomalous pulmonary veins and is useful in pre-operative planning.

In this case, a high-pitch acquisition with the SOMATOM Definition Flash scanner was performed to evaluate the coronary arteries and the pulmonary veins, resulting in a very low radiation dose. The scan provided all the necessary anatomical information to plan a surgical intervention with no need for an additional invasive angiography. ■

## Examination Protocol

Scanner	SOMATOM Definition Flash	
Scan area	Heart	Thorax
Scan length	138 mm	262.8 mm
Scan direction	Caudo-cranial	Caudo-cranial
Scan time	0.3 s	0.57 s
Tube voltage	120 kV	100 kV
Tube current	350 mAs	360 mAs
Dose modulation	CARE Dose4D	CARE Dose4D
CTDI <sub>vol</sub>	5.72 mGy	3.52 mGy
DLP	114 mGy.cm	114 mGy.cm
Effective dose	1.6 mSv	1.6 mSv
Rotation time	0.28 s	0.28 s
Pitch	3.4	3.4
Slice collimation	128 × 0.6 mm	128 × 0.6 mm
Slice width	0.6 mm	0.6 mm
Reconstruction increment	0.4 mm	0.4 mm
Reconstruction kernel	B26f, I26f	B26f, I26f
Heart rate	53 bpm	55 bpm
<b>Contrast</b>		
Volume	50 mL + 40 mL saline	40 mL + 20 mL mixed with 20 mL saline
Flow rate	5 mL/s	4 mL/s
Start delay	Test bolus + 5 s	Test bolus + 5 s