

Right internal iliac arteriovenous fistula complicated by right heart failure

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History

A 58-year-old female patient, suffering from recurrent and progressive chest tightness and shortness of breath for the past 3 months, came to the hospital for a check up. Her symptoms had worsened over the past week, with orthopnea, coughing up white foamy phlegm and edema in the lower extremities. Her medical and family history were unremarkable. An echocardiography revealed a significantly enlarged right atrium (RA) and right ventricle (RV) with massive tricuspid regurgitation, as well as an ectatic inferior vena cava (IVC) with suspicious thrombotic formation. An ejection fraction (EF) of 0.58 was measured. The patient was immediately admitted with a clinical suspicion of right heart failure. A CT angiography (CTA) was requested for further evaluation.

Diagnosis

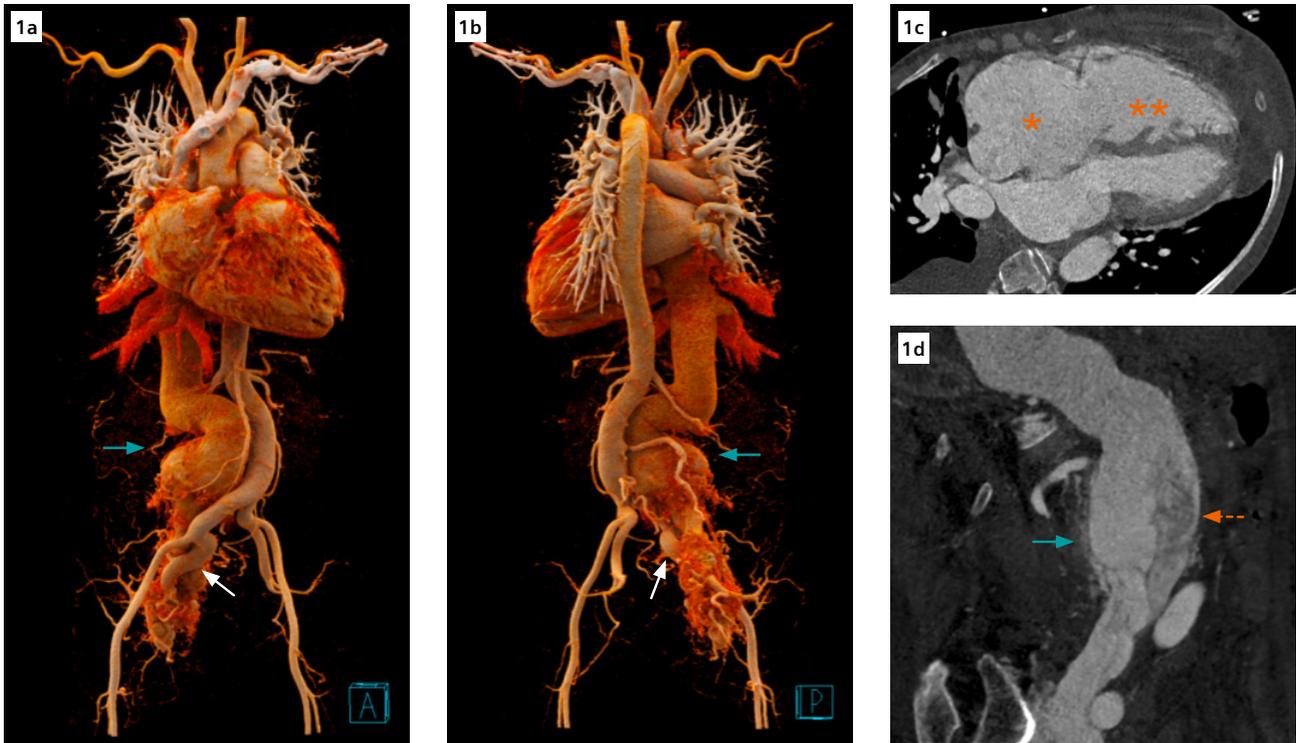
CTA images acquired in the arterial phase showed a dilated right internal iliac artery (RIIA), entangling distally with the right internal iliac vein (RIIV), forming an arteriovenous fistula (AVF) and draining directly into the IVC. Tortuous dilation of the IVC with irregular hypodense areas in the abdominal segment was also seen, suggesting thrombotic formation. The RA and RV were significantly enlarged, this being consistent with findings in echocardiography and clinical suspicion of right heart failure.

Comments

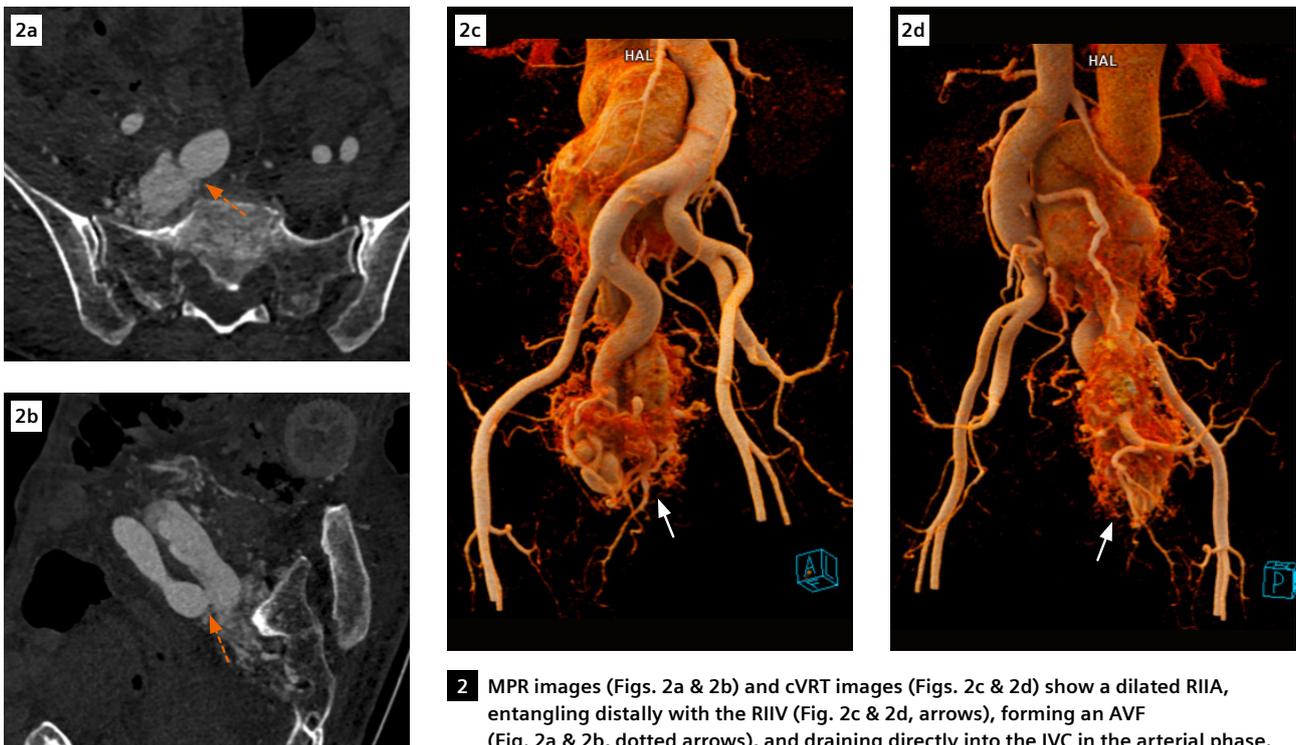
An AVF is an abnormal connection between an artery and a vein, causing the blood flow to bypass the capillaries and tissues below it. A large untreated AVF may cause massive shunt flow, leading to serious complications, such as congestive heart failure and venous hypertension. Timely identification and treatment of an AVF can dramatically improve the patients' hemodynamics as well as symptoms. CT imaging plays an important and valuable role in the evaluation of an AVF. It is also widely accepted by the patients, since it is non-invasive. In this case, an AVF between the RIIA and the RIIV causing a significant dilation of the IVC and right heart failure, is critical and very rare. The scan and contrast injection protocols are modified to successfully catch the opacity of the IVC in the arterial phase. The optimal image quality and automated workflow granted by dual source CT (DSCT) support the physicians in reaching a quick and confident diagnosis, as well as effective treatment planning. Advanced techniques, such as cinematic volume rendering technique (cVRT), enable a lifelike, three-dimensional demonstration of the anatomical details facilitating an easy and straightforward communication. ●

Examination Protocol

Scanner	SOMATOM Definition Flash
Scan area	Trunk
Scan mode	Spiral
Scan length	625 mm
Scan direction	Cranio-caudal
Scan time	6.8 s
Tube voltage	100 kV
Effective mAs	96 mAs
Dose modulation	CARE Dose4D
CTDI _{vol}	3.96 mGy
DLP	261 mGy*cm
Rotation time	0.5 s
Pitch	1.2
Slice collimation	128 x 0.6 mm
Slice width	0.75 mm
Reconstruction increment	0.5 mm
Reconstruction kernel	I30f
Contrast	370 mg/mL
Volume	60 (70%) mL + 38 mL+ 30 mL saline
Flow rate	5 mL/s
Start delay	Bolus tracking at 100 HU in the descending aorta + 5 s



1 cVRT images (Figs. 1a & 1b) and MPR images (Figs. 1c & 1d) show a dilated RIIA (white arrows), entangling distally with the RIIV. The IVC (Fig. 1a, 1b & 1d, petrol arrows) is opacified in the arterial phase, tortuous and dilated with irregular hypodense areas in the abdominal segment (Fig. 1d dotted arrow), suggesting thrombotic formation. The RA (Fig. 1c, asterisk) and the RV (Fig. 1c, double asterisk) are significantly enlarged.



2 MPR images (Figs. 2a & 2b) and cVRT images (Figs. 2c & 2d) show a dilated RIIA, entangling distally with the RIIV (Fig. 2c & 2d, arrows), forming an AVF (Fig. 2a & 2b, dotted arrows), and draining directly into the IVC in the arterial phase.

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