

Spontaneous localized dissection of the right coronary sinus of Valsalva

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History

A 61-year-old male patient, with a history of poorly controlled hypertension, suffered an acute onset of chest pain. This radiated into his back and was accompanied by dyspnea, occurring after an emotional event. He was admitted to the hospital with a clinical suspicion of ischemic heart disease. A coronary angiography examination was performed. This revealed no significant alterations in the left coronary arteries, however the right coronary artery (RCA) could not be catheterized. A coronary CT angiography (cCTA) was requested for further evaluation.

Diagnosis

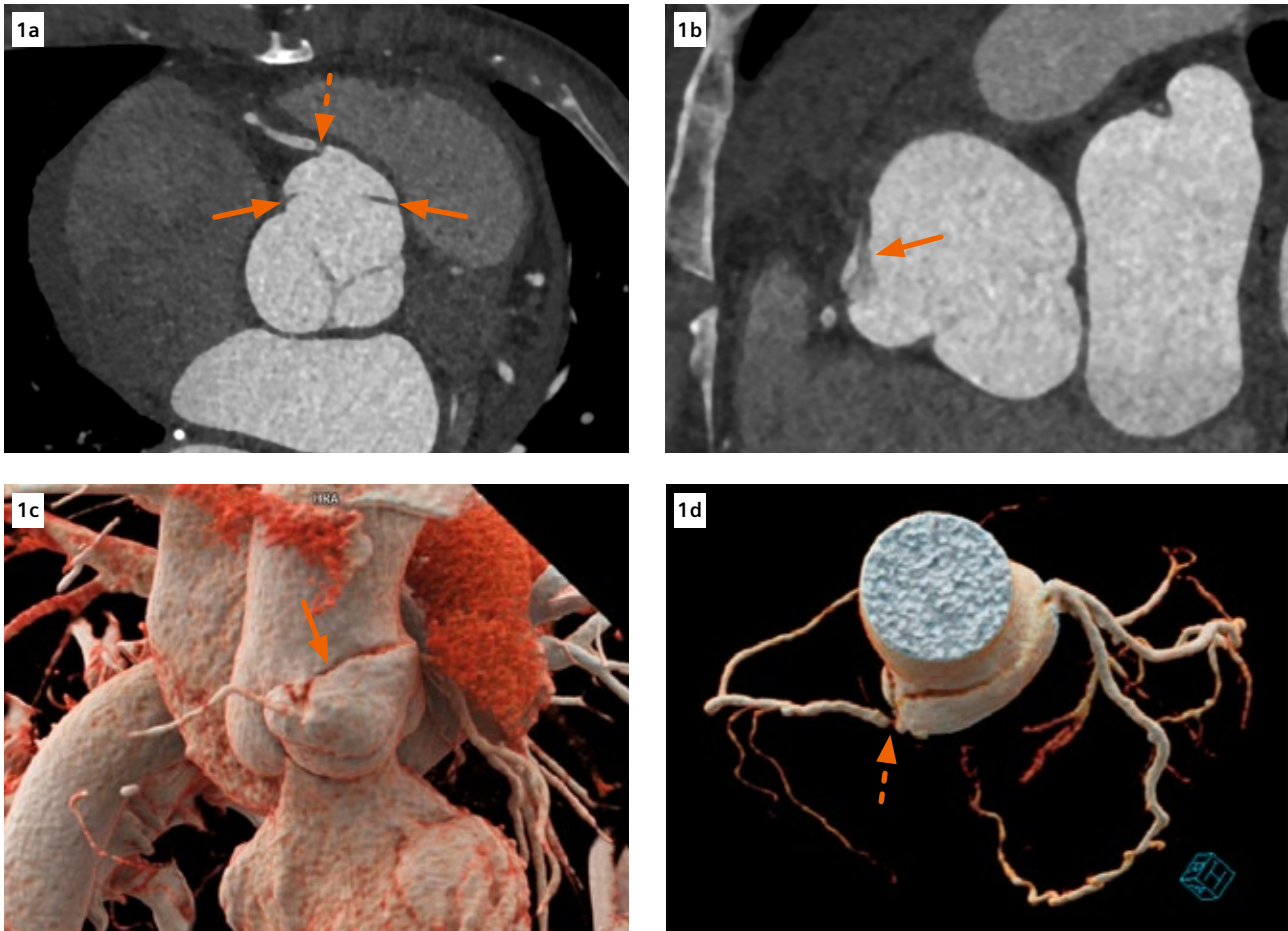
CT images showed a localized dissection flap, involving the RCA sinus of Valsalva. The sinus was moderately dilated. The RCA, originating off the false lumen, was severely stenosed at its ostium and well enhanced distally throughout its course. Mixed plaques in the proximal left anterior ascending artery (LAD) and calcified plaques in the proximal circumflex artery (Cx) were seen, causing no significant stenoses. No signs of valvular calcification or vegetation were seen. Subsequently, the patient underwent surgical repair, using the Bentall procedure, which confirmed the CT findings.

A follow-up CTA showed patent coronary arteries that had been re-implanted into the graft. The celiac artery (CA) and the superior mesenteric artery (SMA) stemmed off the same branch. A hematoma, measuring 2.4 x 3.9 cm in size, was seen on the right outside the graft. It gradually shrunk, in later follow-up CT examinations, and had disappeared one year later.

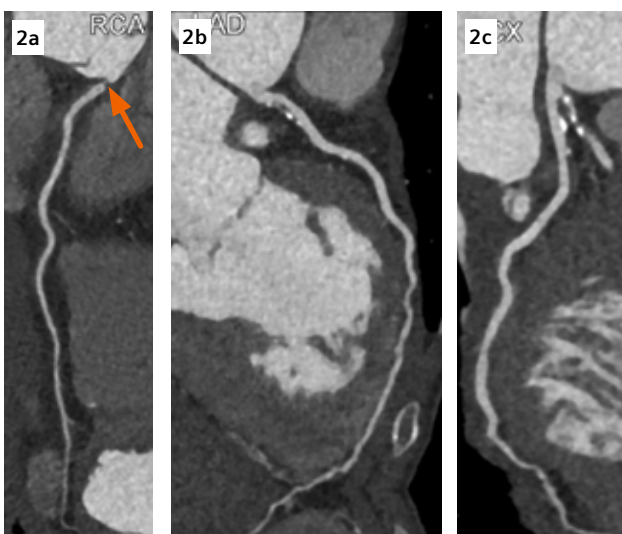
Comments

Spontaneous localized dissection of the sinus of Valsalva is rare yet critical. An acute clinical course can cause rapid deterioration, leading to death. Immediate surgical repair is the mainstay treatment, and a prompt diagnosis is paramount for proper planning. Cardiac CT imaging with ECG triggering technique and high temporal resolution of 66 ms granted by dual source CT, can significantly reduce the motion artifact in the aortic root and ascending aorta caused by cardiac pulsation and breathing. Hereby, optimal image quality is achieved to demonstrate the anatomy of the sinus of Valsalva. In this case, a severe stenosis at the ostium of the RCA is also clearly visualized. Another unique scanning technique, the Turbo Flash mode, is also noteworthy – it is a spiral scan mode using ECG triggering and a large pitch to obtain

an ultrafast scanning speed of maximum 737 mm/s. In the follow-up scan, a range of 639 mm, covering the complete trunk, is acquired in just 0.9 s during free breathing. A lower kV setting of 70 kV is applied to improve the contrast-to-noise ratio, reducing the radiation exposure and the amount of contrast agent needed. Standard dose reduction techniques, such as CARE Dose 4D (automatic controlled tube current modulation) and ADMIRE (Advanced Modeled Iterative Reconstruction) are applied as well. Image demonstration, using cinematic volume rendering technique (cVRT), provides a better 3D perspective with improved depth and shape perceptions, enabling a lifelike demonstration. ●



1 MPR (Figs. 1a & 1b) and cVRT (Figs. 1c & 1d) images show a localized dissection flap (arrows) involving the RCA sinus of Valsalva. The RCA, originating off the false lumen, is severely stenosed at its ostium (dotted arrows), and well enhanced distally throughout its course.



2 Curved MPR images show a severely stenosed RCA at its ostium (Fig. 2a, arrow) with a normal course. Mixed plaques in the proximal LAD and calcified plaques in the proximal Cx are seen causing no significant stenoses.



- 3** A cVRT image shows an overview of the follow-up scan after the Bentall procedure. The graft with implanted aortic valve (white arrow) is in place and the re-implanted coronary arteries are patent. The CA and the SMA stem off the same branch (arrow). A hematoma (dotted arrow) on the right outside the graft is seen.

Examination Protocol

Scanner	SOMATOM Force	SOMATOM Force
Scan area	Heart	Trunk
Scan mode	Prospective ECG triggered sequential scan	Turbo Flash scan
Scan length	156 mm	639.2 mm
Scan direction	Cranio-caudal	Cranio-caudal
Scan time	6.9 s	0.9 s
Tube voltage	70 kV	70 kV
Effective mAs	166 mAs	128 mAs
Dose modulation	CARE Dose4D	CARE Dose4D
CTDI _{vol}	4.9 mGy	1.2 mGy
DLP	77.1 mGy cm	79 mGy cm
Rotation time	0.25 s	0.25 s
Pitch	NA	3.0
Slice collimation	152 x 0.6 mm	192 x 0.6 mm
Slice width	0.75 mm	1.0 mm
Reconstruction increment	0.5 mm	0.8 mm
Reconstruction kernel	Bv40	Bv36
Heart rate	51 – 56 bpm	NA
Contrast	350 mg/mL	370 mg/mL
Volume	40 mL + 40 mL saline	50 mL + 50 mL saline
Flow rate	4 mL/s	4 mL/s
Start delay	Bolus tracking with 100 HU at the ascending aorta + 5 s	Bolus tracking with 100 HU at the descending aorta + 5 s

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