

Case 6

Whole-Body CTA with Reduced Radiation Dose and only 20 mL of Contrast Media

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History

A 70-year-old female patient was referred to our emergency department complaining about a new onset of back pain and malignant hypertension. The initially performed CTA, on a 16-slice single source CT with 100 mL contrast media, revealed a Stanford B dissection. The patient was again referred to our department for re-evaluation, 12 hours later, with progressive back pain, a new onset of chest pain and increasing blood creatinine levels.

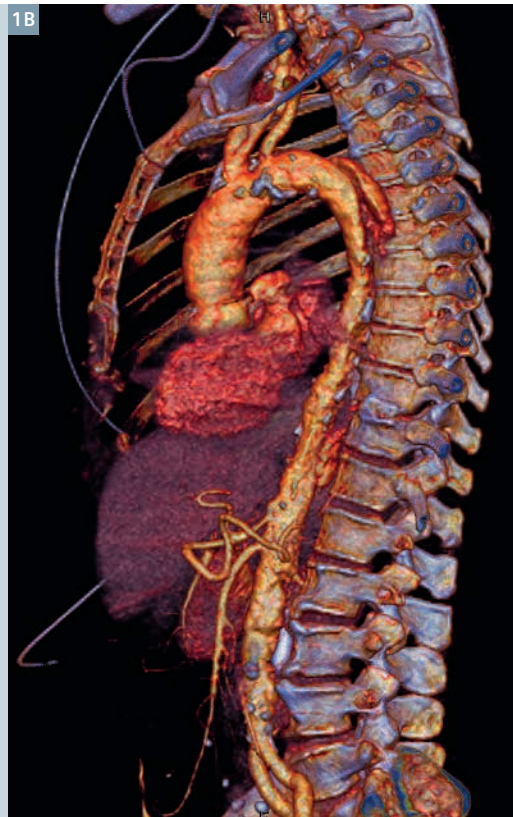
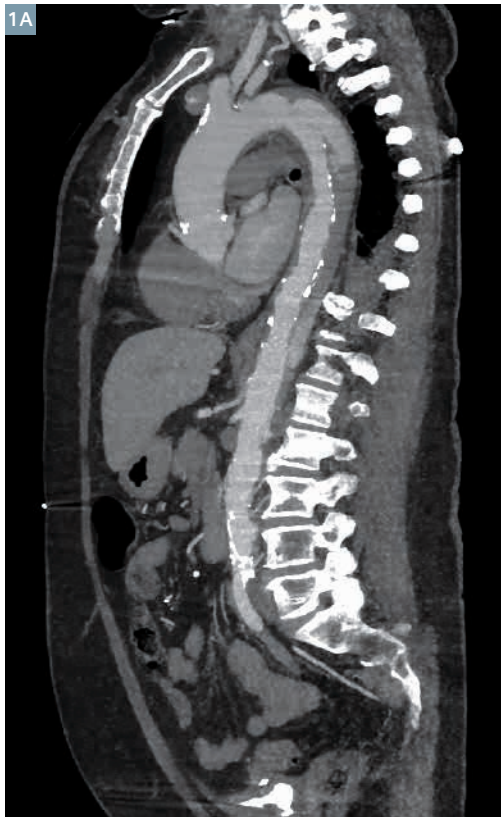
Diagnosis

A re-evaluation CTA confirmed a Stanford B aortic dissection, beginning behind the junction of the left subclavian artery and stretching to just below the diaphragm, with a new partially thrombotic occlusion of the false lumen. The aortic dissection was progressive, compared to the initial CTA 12 hours earlier.

Comments

Aortic CTA is a valuable, fast and non-invasive imaging tool with high availability and diagnostic accuracy.[1]

Recent technological developments allow not only for substantial dose reduction but also for improvements in image acquisition. With the recent introduction of SOMATOM Force, these advantages further influence patient acquisition parameters positively. These technical advantages include the Vectron tube – with increased peak tube current – and Advanced Modeled Iterative Reconstruction (ADMIRE¹), allowing for routine adult CTA imaging at low tube voltages of down to 80 kV while maintaining diagnostic image quality. Low tube voltage imaging



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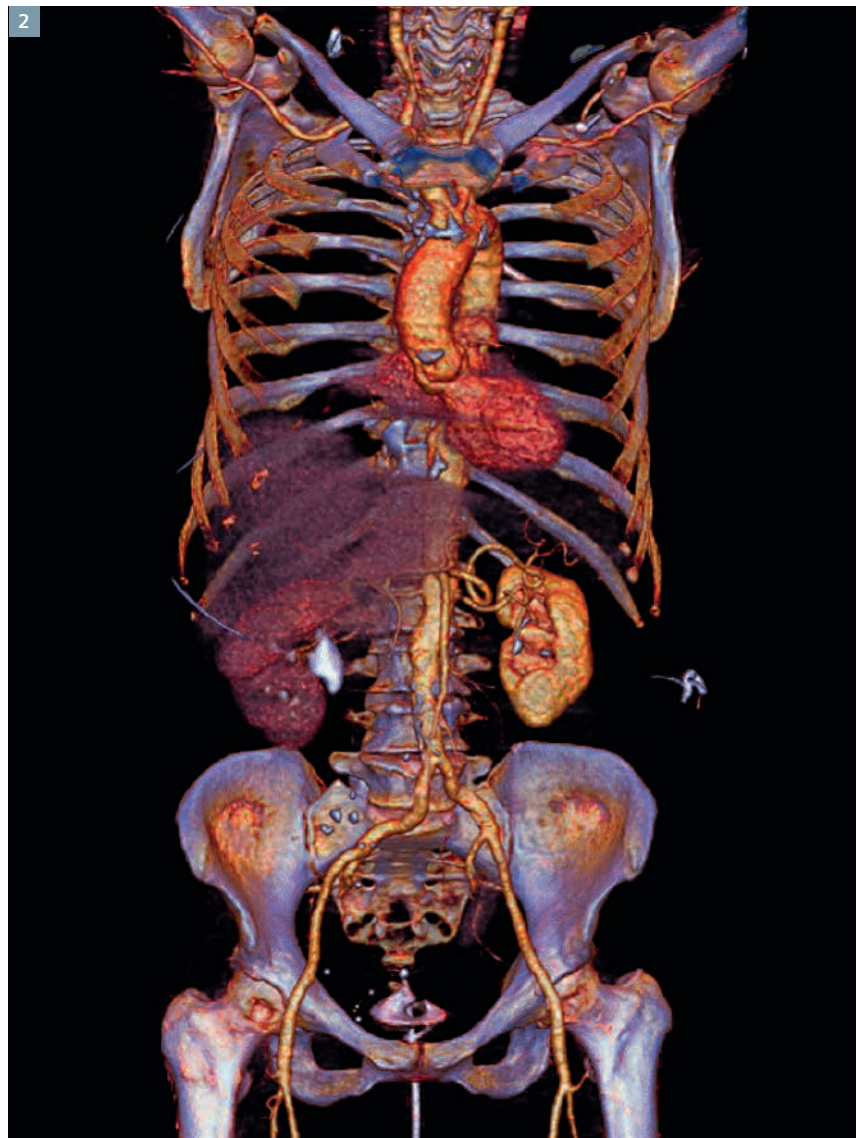
Sagittal MIP (Fig. 1A) and VRT (Fig. 1B) images show the partially occluded Stanford B dissection beginning after the junction of the left subclavian artery.

results in higher vascular attenuation but also higher image noise. This effect leads to low tube voltage protocols with a reduced amount of contrast media – in this whole body CTA using 20 mL compared with 100 mL used in the previous CTA scan – while preserving diagnostic image quality throughout the application of ADMIRE¹. Aortic CTA, using a Dual Source CT high-pitch mode acquisition protocol with 80 kV tube voltage, shortens the acquisition time (in this case 0.91 s) on the one hand and reduces radiation exposure – to the effective dose of 2.3 mSv compared with the previous CTA scan – on the other hand. ■

References

- [1] Nienaber, C.A., *et al.*, Noninvasive imaging approaches to evaluate the patient with known or suspected aortic disease. *Circ Cardiovasc Imaging*, 2009. 2(6): p. 499-506.

¹ In clinical practice, the use of ADMIRE may reduce CT patient dose depending on the clinical task, patient size, anatomical location, and clinical practice. A consultation with a radiologist and a physicist should be made to determine the appropriate dose to obtain diagnostic image quality for the particular clinical task.



2 3D reconstruction of the vascular structures of the same patient with excellent vascular contrast.

Examination Protocol

Scanner	SOMATOM Force		
Scan area	Chest – Pelvis	Pitch	3.2
Scan length	673.6 mm	Slice collimation	192 × 0.6 mm
Scan direction	Cranio-caudal	Slice width	1 mm
Scan time	0.91 s	Reconstruction increment	0.8 mm
Tube voltage	80 kV	Reconstruction kernel	Bv36 (ADMIRE 5)
Tube current	140 mAs	Contrast	400 mg / mL
Dose modulation	CARE Dose4D	Volume	20 mL contrast mixed with 20 mL saline
CTDI _{vol}	2.09 mGy	Flow rate	3.9 mL / s
DLP	154.6 mGy cm	Start delay	Bolus tracking in the descending aorta + additional delay of 4 s
Rotation time	0.25 s		