Case 4

Aortic Aneurysm with Complex Endovascular Repair

By Stefanie Mangold, MD; Carlo N. De Cecco, MD; U. Joseph Schoepf, MD

Division of Cardiovascular Imaging, Department of Radiology and Radiological Science, Medical University of South Carolina, Charleston, SC, USA

History

A 66-year-old male patient, with a known history of thoracic and abdominal aortic aneurysms, had undergone multiple aneurysm repairs. Four months ago, a further aneurysm repair was performed on a contained rupture of the abdominal aortic aneurysm (AAA), which was secondary to a large endoleak following complex branched helical endovascular aneurysm repair. The patient was referred for a follow-up CT angiography (CTA) of the entire aorta. At admission, he was asymptomatic with a normal body mass index (22.1 kg/m^2) and normal blood pressure (133/69 mmHg).

Diagnosis

CTA images demonstrated a stent graft within the aneurysmal descending aorta and a bifurcated stent graft extending through the abdominal aortic aneurysm. Additionally, stent grafts were revealed in the superior mesenteric artery (SMA) and in the celiac trunk. A re-implantation of the left renal artery,


1 VRT images show stent grafts in the aneurysmal descending aorta, the abdominal aorta, the SMA, and the celiac trunk (Fig. 1A). The left renal artery is a re-implantation with takeoff from the right common iliac artery (Fig. 1B, arrow). The distal flow of the celiac trunk is reconstituted by the collateral arteries (Fig. 1C).
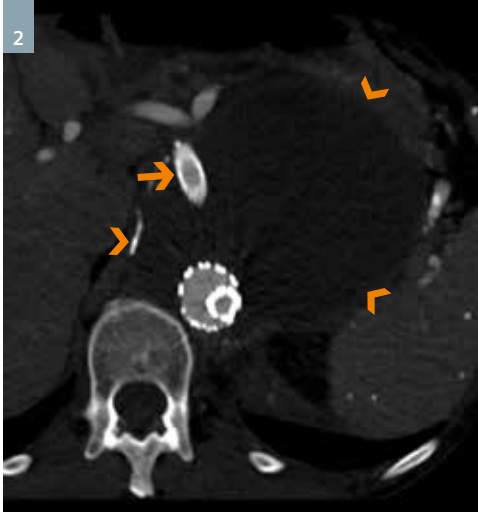
2 An axial image shows a large aneurysm sac (arrowheads) as well as the patent stent graft within the abdominal aorta and the SMA (arrow). No signs of contrast extravasation, indicating a residual endoleak, were seen.

3 Curved MPR images show stent grafts in the celiac trunk (Fig. 3A, arrow) and in the SMA (Fig. 3B, arrow). The origin of the celiac trunk is occluded and its distal flow is reconstituted. The stent in the SMA is patent.
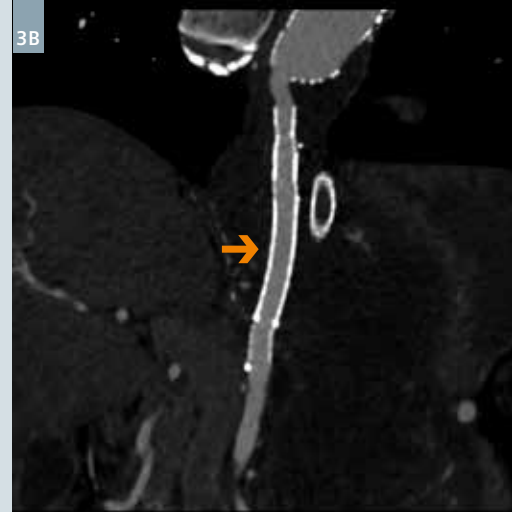
with a takeoff from the right common iliac artery, was also visualized (Fig. 1). The stent graft within the celiac artery was occluded at its origin, with reconstitution of the flow distal to the collateral arteries as it exited the aneurysm sac (Fig. 3A). The stented superior mesenteric artery (Fig. 3B) and the re-implanted left renal artery were patent. No signs of contrast extravasation indicating a residual endoleak, were evident (Fig. 2).

Due to his stable clinical condition and the lack of a residual endoleak, the patient was scheduled for a follow-up CTA in 6 months.

Comments

CARE kV automatically recommends the optimal tube voltage for the individual patient and clinical indication. Simultaneously, CARE Dose4D (Real-time Anatomic Exposure Control) adjusts the tube current. The combination of CARE kV and CARE Dose4D enables an optimized, automatic adjustment of tube current and tube voltage – individualized for each patient and the clinical indication. In this case, 70 kV was applied which resulted in an excellent intravascular contrast enhancement with only 50 mL contrast medium and a significant effective dose reduction to

3.9 mSv. To further reduce the increased image noise, associated with the lower tube voltage setting, images were reconstructed using ADMIRE (advanced modeled iterative reconstruction).

Due to the availability of the various new technologies, diagnostic confidence is greatly enhanced, even in such cases of complex vascular repair. ∎

Examination Protocol

Scanner	SOMATOM Force		
Scan area	Entire aorta	Rotation time	0.5 s
Scan mode	Routine Spiral	Pitch	0.6
Scan length	66.1 cm	Slice collimation	2 × 96 × 0.6 mm
Scan direction	Cranio-caudal	Slice width	1.5 mm
Scan time	9 s	Reconstruction increment	1.5 mm
Tube voltage	70 kV	Reconstruction kernel	Bv36
Tube current	528 eff. mAs	Iterative reconstruction	ADMIRE, level 3
Dose modulation	CARE Dose4D	**Contrast**	350 mgI/mL
Automated tube voltage selection	CARE kV, semi mode	Volume	50 mL + 50 mL saline
CTDI$_{vol}$	3.47 mGy	Flow rate	5.0 mL/s
DLP	229.4 mGy cm	Start delay	Bolus tracking + 4 s
Effective dose	3.9 mSv		