Graft-artery Anastomosis Stenosis of an Arteriovenous Graft

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History

A 43-year-old female patient, suffering from swelling and pain in the left arm for the past month, came to the hospital for a checkup. She had undergone arteriovenous graft (AVG) surgery on her left arm, for hemodialysis treatment, a year ago. A Dual Energy (DE) CT angiography (CTA) was performed to evaluate the patency of the AVG.

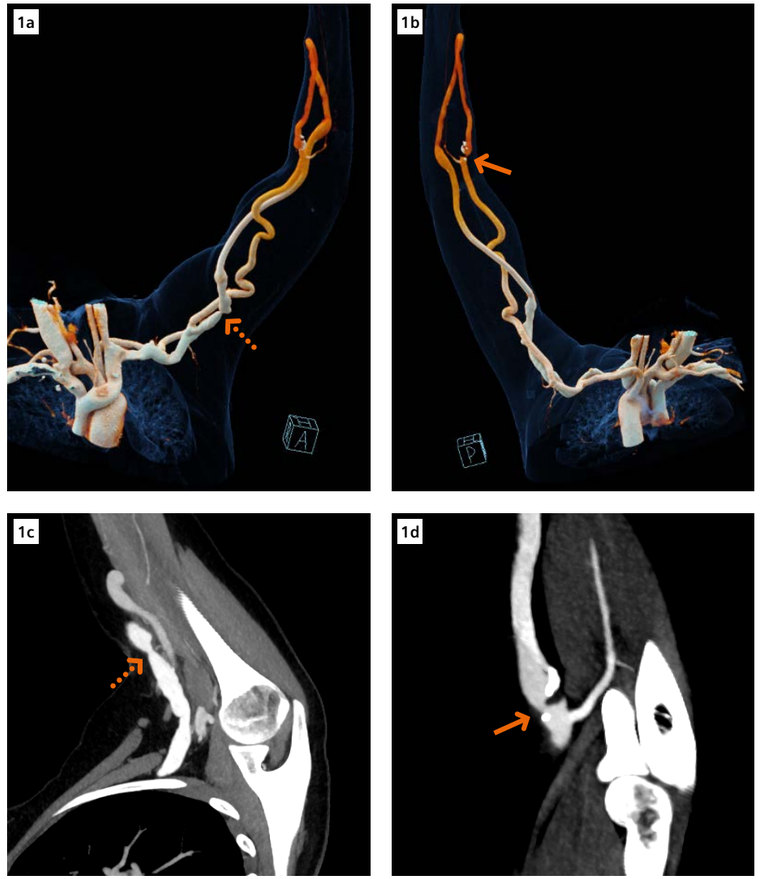
Diagnosis

CTA images showed a U-shaped AVG cannulated between the brachial artery and the cephalic vein in the left forearm. Severe stenoses with calcified plaques were seen at the graft-artery anastomosis and, without plaques, in the middle cephalic vein.

Comments

An AVG is a looped, artificial tube that connects an artery to a vein. It is surgically created in an extremity for routine hemodialysis treatment. Patients, who are not candidates for renal transplantation or those for whom a compatible donor cannot be secured, are lifelong dependent upon hemodialysis. Therefore, a long-term and careful maintenance of dialysis access is a must. Detecting AVG stenoses on time will allow to perform preemptive angioplasty and is of great interest for both physician and patient.

CTA is a noninvasive, widely available imaging tool for the evaluation of the AVG. Our experience with DECT has been promising in this sector. DECT applies special tin filter technique which enables significant separation of energy spectra at 90 and 150 kV settings. The attenuation differences between the two energies are used to distinguish iodine from bone or calcifications, allowing the removal of bone structures in an automated workflow using "*syngo*.CT DE Direct Angio". An optimal visualization and lifelike demonstration can be achieved with a cinematic Volume Rendering Technique (cVRT), resulting in a better 3D perspective with improved perceptions of both depth and shape. An AVG stenosis most commonly develops at the graft-vein anastomosis; however, as in this case, is rarely found at the graft-artery anastomosis. ●



1 cVRT (Figs. 1a, 1b) and thin MIP (Figs. 1c, 1d) images show a U-shaped AVG cannulated between the brachial artery and the cephalic vein. Severe stenoses with calcified plaques are seen at the graft-artery anastomosis (arrows) and, without plaques, in the middle cephalic vein (dotted arrows).

The outcomes by Siemens Healthineers customers described herein are based on results that were achieved in the customer's unique setting. Since there is no "typical" hospital and many variables exist (e.g., hospital size, case mix, level of IT adoption), there can be no guarantee that other customers will achieve the same results.

Examination Protocol

Scanner	SOMATOM Force		
Scan area	Left Arm	**Rotation time**	0.5 s
Scan mode	Dual Source Dual Energy	**Pitch**	0.7
Scan length	670 mm	**Slice collimation**	192 × 0.6 mm
Scan direction	Caudo-cranial	**Slice width**	1.0 mm
Scan time	8.3 s	**Reconstruction increment**	0.7 mm
Tube voltage	90 kV / Sn150 kV	**Reconstruction kernel**	Qr40
Effective mAs	57 mAs / 37 mAs	**Contrast**	320 mg/mL
Dose modulation	CARE Dose4D™	**Volume**	30 mL + 40 mL saline
$CTDI_{vol}$	2.75 mGy	**Flow rate**	4 mL/s
DLP	197.2 mGy cm	**Start delay**	Bolus tracking triggered at 100 HU in the aortic arch + 7s