

In-stent Restenoses and Occlusion – a follow-up of Multiple Peripheral Arterial Stents

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History

A 79-year-old male patient, who had undergone vascular stenting due to severe stenoses in both lower extremities one year ago, was referred to our hospital for a follow-up. A Dual Energy (DE) runoff CT Angiography (CTA) was performed for evaluation.

Diagnosis

CTA images showed multiple stents in the right external iliac artery, as well as bilaterally in the proximal and distal femoral arteries. A complete contrast filling defect was seen in the distal segment of the right proximal femoral stent, measuring 5.6 cm in

length, indicating an occlusion. Collateral vessels allowed visualization of the circulation in the lower limb. Various degrees of lumen irregularity and narrowing caused by hypodense areas within the stents were seen in all stents, suggesting in-stent restenoses.



1 A cinematic VRT image shows an overview of bilateral multiple stents. A transparent distal segment of the proximal femoral stent indicates an occlusion.

2 Inverted MIP images (Fig. 2a, 45 keV; Fig. 2b, 70 keV; same windowing) demonstrate the DSA-like views. Contrast enhancement is significantly improved showing more vascular details in the image displayed at 45 keV (Fig. 2a). Moderate stenoses bilaterally in the external iliac arteries, as well as severe stenoses (Fig. 2b, arrows) in the middle segment of the left femoral artery, the left popliteal artery and the right femoral artery distal to the distal stent are shown.

Extensive calcified and noncalcified plaques were bilaterally demonstrated. Moderate stenoses bilaterally in the external iliac arteies, as well as severe stenoses in the middle segment of the left femoral artery, the left popliteal artery and the right femoral artery distal to the distal stent were visualized. The patient successfully underwent angioplasty.

Comments

Arterial stenoses of the lower extremities are often treated with angioplasty and stents. One of the major problems of this procedure is in-stent restenosis. Although digital subtraction angiography (DSA) is the standard follow-up procedure, CT has been increasingly used in clinical practice as an alternative. In this case, a DE scan was performed using a special tin filter enabling significant separation of energy spectra at 70 and 150 kV settings. The attenuation measured at these two kV settings are used to display images at different keV levels using syngo.CT DE Monoenergetic Plus. Image contrast at 45 keV is significantly enhanced, allowing a clearer visualization of the vascular details. The bone structures can be removed using syngo.CT DE Direct Angio to show non-obscured vasculature. All evaluations are performed in an automated workflow. The image quality achieved is superb in providing a clear overview for the physicians to ensure a confident evaluation of the stents. ●

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	Lower Extremities	Pitch	0.4
Scan mode	Dual Source Dual Energy	Slice collimation	128 × 0.6 mm
Scan length	1045 mm	Slice width	1.5 mm
Scan direction	Cranio-caudal	Reconstruction increment	1.0 mm
Scan time	17 s	Reconstruction kernel	Qr40
Tube voltage	70 / Sn150 kV	Contrast	370 mg/mL
Effective mAs	123 / 43 mAs	Volume	75 mL + 25 mL + 40 mL saline
Dose modulation	CARE Dose4D	Flow rate	5 mL/s + 2 mL/s + 5 mL/s
CTDIvol	2.91 mGy	Start delay	Bolus tracking in the abdominal aorta at the renal level with 120HU and an additional delay of 15 s
DLP	309.6 mGy cm		
Rotation time	0.25 s		



3 Curved MPR images (Fig. 3a, right side; Fig. 3b, left side) show the luminal views of the stents. A complete filling defect of the contrast in the distal segment of the right proximal femoral stent is seen (Fig. 3a, dotted arrow), indicating an occlusion. Various degrees of lumen irregularity and narrowing caused by hypodense areas within the stents are present suggesting in-stent restenoses.