

Complete Occlusion of the Left Internal Carotid Artery

By Chunmiao Chen*, MD; Xianghua Hu*, MD; Xi Zhao**, MD; Prof. Guihan Lin*, MD; Xiao Chen*, MD; Hong Lei*, MD; Miaoqing Ye*, MD; Shufang Cheng*, MD; Minjiang Chen*, MD; Jiansong Ji*, MD, PHD
 *Department of Radiology, Lishui Central Hospital, Zhejiang, P. R. China
 **Siemens Healthineers China

History

A 58-year-old male patient, after having had an ischemic stroke one year ago, returned to our hospital for a follow up. A craniocervical Dual Energy (DE) CT angiography (CTA) was performed for evaluation.

Diagnosis

CTA images showed a complete occlusion of the left internal carotid artery (ICA), caused by a large calcified plaque at its origin as well as a severe stenosis of the right proximal vertebral artery (VA). Both calcified and non-calcified plaques were seen at the origins of the left common carotid artery (CCA), the brachiocephalic artery (BCA) and both subclavian arteries (SA), causing moderate to mild stenosis. The Circle of Willis was

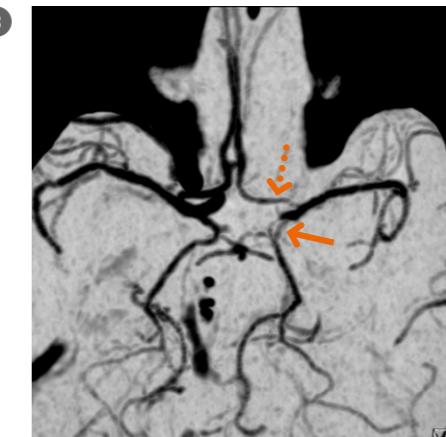
fully shown, with collateral blood supplies from the left anterior cerebral artery (ACA) and the left posterior communicating artery (PCA) to the left middle cerebral artery (MCA).

Comments

ICA occlusion is an important cause of cerebral or retinal ischemia. It can remain asymptomatic, or may become

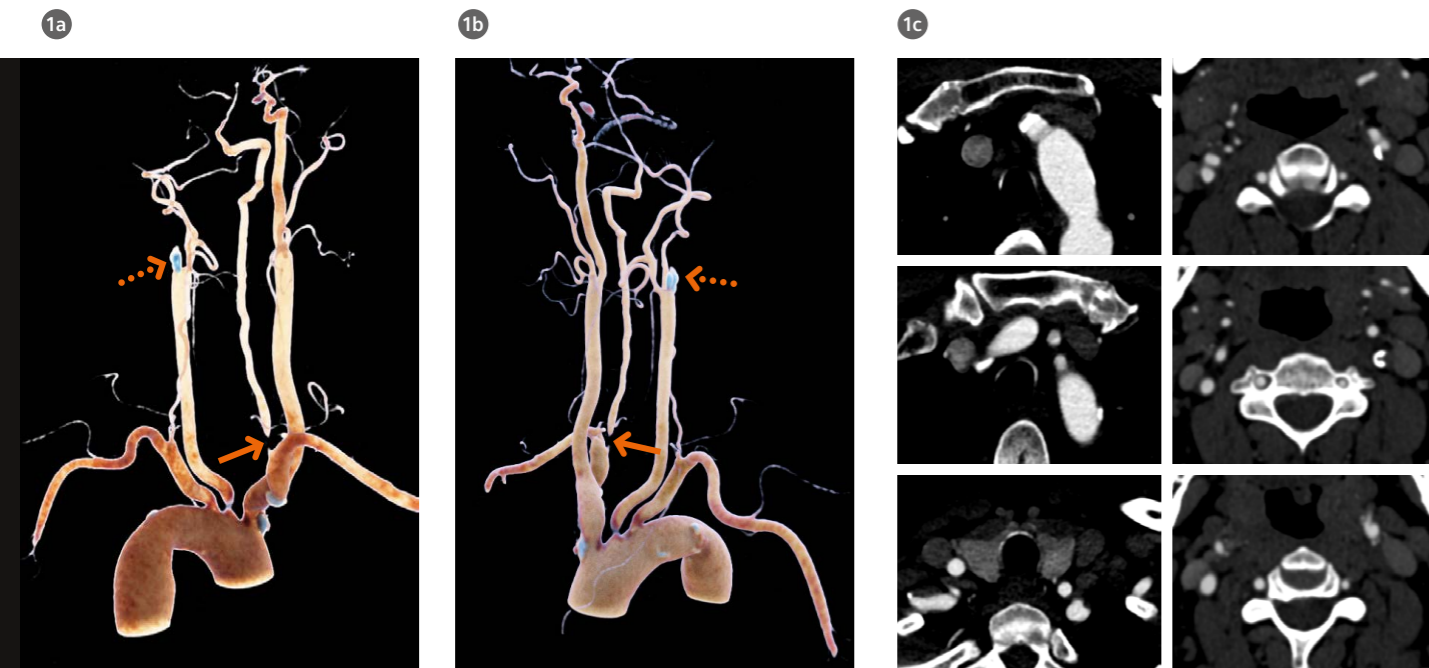
symptomatic. CTA plays an important role in carotid imaging since it can visualize not only carotid stenosis and occlusion but also the cause, e.g. the calcified and non-calcified atheromatous plaques. DECT additionally enables the simultaneous image acquisition at two different energy levels. It also provides an automated workflow of bone removal for non-obscured visualization of the vasculature, as well as calcium subtraction from atheromatous plaque for better assessment of the vascular lumen. Compared to conventional VRT, cinematic rendering images have a better 3D perspective with improved depth and shape perceptions, allowing for an optimal visualization and lifelike demonstration. In this case, a complete craniocervical CTA acquisition was achieved in only 3 seconds, with a radiation dose of 3.8 mGy and 40 mL of contrast agent. ●

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.



2 A comparison of MIP images with "plaque on" (Fig. 2a) and "plaque off" (Fig. 2b) shows the luminal views after the removal of the calcified plaques – an occluded left ICA (arrowheads) and a moderate stenotic right SA (arrows) at their origins.

3 An inverted MIP image shows the Circle of Willis. The left MCA is supplied by the left ACA (dotted arrow) and the left PCA (arrow).



1 Cinematic rendering images (Figs. 1a and 1b) show a complete occlusion of the left ICA caused by a large calcified plaque at its origin (dotted arrows) and a severe stenosis of the right proximal VA (arrows). Mild to moderate stenosis at the origins of the left CCA, the BCA and both SAs are seen. The findings are confirmed on the axial source images (Fig. 1c).

Examination Protocol

Scanner	SOMATOM Force		
Scan area	Head and Neck	Rotation time	0.25 s
Scan mode	Dual Source Dual Energy	Pitch	0.7
Scan length	326.2 mm	Slice collimation	128 × 0.6 mm
Scan direction	Caudo-cranial	Slice width	1 mm
Scan time	3.1 s	Reconstruction increment	0.7 mm
Tube voltage	90 / Sn150 kV	Reconstruction kernel	Qr40 (ADMIRE 3)
Effective mAs	87 / 63 mAs	Contrast	320 mg/mL
Dose modulation	CARE Dose4D™	Volume	40 mL + 40 mL saline
CTDI _{vol}	3.76 mGy	Flow rate	5 mL/s
DLP	135.8 mGy cm	Start delay	Bolus tracking triggered at 100 HU in the aortic arch + 4 s