

Case 1

Combined Coronary and Carotid CTA with 60 mL Contrast Agent and a Radiation Dose of only 1.7 mSv

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History

A 55-year-old male patient, with atypical chest pain, syncope, hyperlipidemia, and a family history of coronary artery disease (CAD), underwent a treadmill test. This was inconclusive due to a left-bundle branch block. A coronary and a carotid CT angiography (CTA) were requested by the referring physician to rule out coronary and/or carotid artery disease.

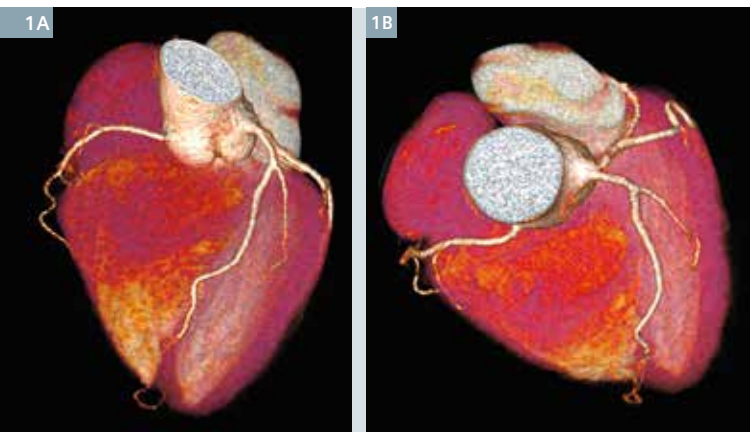
Diagnosis

The coronary CTA (cCTA) showed no evidence of coronary plaques or stenoses. A small calcification area in the pericardium, next to the right atrium posterior wall, was seen. There were also no clinical findings in the carotid CTA.

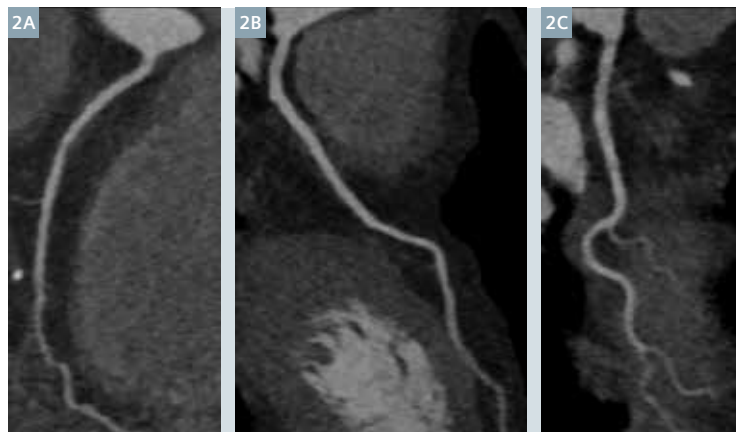
Comments

cCTA and carotid CTA are valuable, noninvasive imaging examinations that support the physician in diagnostic accuracy. Previously, with a single source CT scanner, two separate acquisitions had to be performed resulting in a higher radiation dose and the need

for contrast agent of 70 mL for cCTA and 50 mL for carotid CTA. Using a Dual Source CT scanner (SOMATOM Definition Flash), both acquisitions are combined into one, necessitating only 60 mL contrast agent. This is made possible by performing a spiral scan in Flash mode with a very high pitch of 3.2. Radiation dose is also reduced due to advanced technologies such as a Stellar detector and sinogram affirmed iterative reconstruction (SAFIRE¹). A slice width of 0.5 mm also improves the definition of the vessel lumen and reduces blooming of the stent material. ■



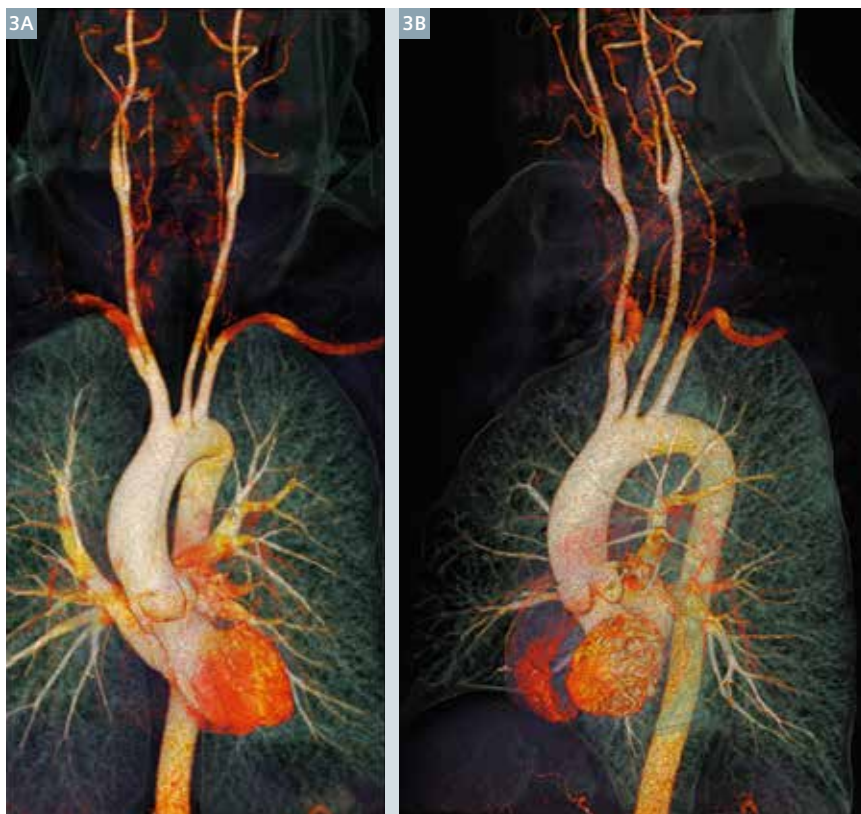
1 VRT images from the cCTA show no evidence of coronary plaques or stenosis.



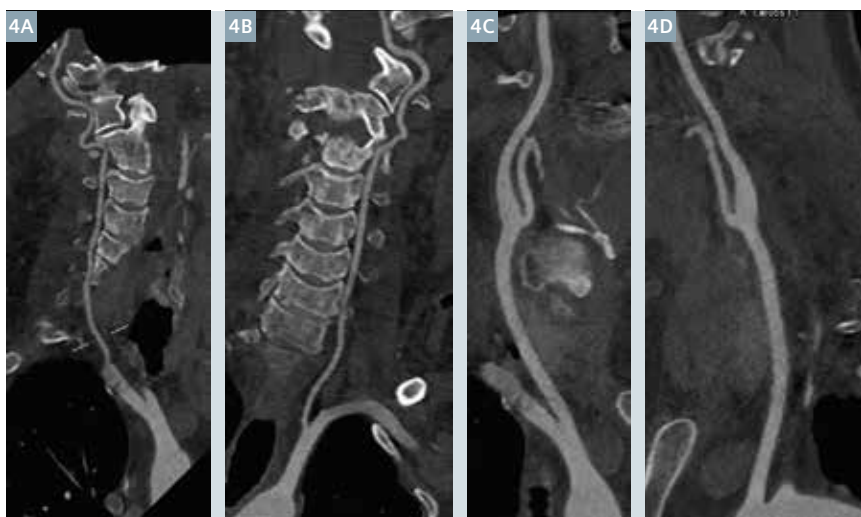
2 Curved MPR images of the RCA (Fig. 2A), the LAD (Fig. 2B) and the Cx (Fig. 2C) show no evidence of coronary plaques or stenosis.

Examination Protocol

| Scanner | SOMATOM Definition Flash |
|--------------------------|--------------------------|
| Scan area | Neck/Thorax |
| Scan length | 416.5 mm |
| Scan direction | Caudo-cranial |
| Scan time | 0.91 s |
| Tube voltage | 100 kV |
| Tube current | 282 mAs/rot. |
| Dose modulation | – |
| CTDI _{vol} | 2.75 mGy |
| DLP | 129 mGy cm |
| Effective dose | 1.73 mSv |
| Rotation time | 0.28 s |
| Pitch | 3.4 |
| Slice collimation | 128 × 0.6 mm |
| Slice width | 0.5/0.6/0.75 mm |
| Reconstruction increment | 0.3/0.4/0.5 mm |
| Reconstruction kernel | I26 (SAFIRE) |
| Temporal resolution | 75 ms |
| Heart rate | 60–73 bpm |
| Contrast | |
| Volume | 60 mL |
| Flow rate | 5 mL/s |
| Start delay | Test bolus + 5 s |



3 VRT images show an overview of the whole scan range.



4 Curved MPR images show normal bilateral vertebral and carotid arteries.

¹ In clinical practice, the use of SAFIRE 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. The following test method was used to determine a 54 to 60% dose reduction when using the SAFIRE reconstruction software. Noise, CT numbers, homogeneity, low contrast resolution, and high contrast resolution were assessed in a Gammex 438 phantom. Low-dose data reconstructed with SAFIRE showed the same image quality compared to full dose data based on this test. Data on file.

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