Case 2

Coronary CTA with Reduced Contrast and Radiation Dose of 70 kV

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History

A 61-year-old female patient was referred to the hospital complaining of chest pain and shortness of breath. A coronary computed tomography CT Angiography (cCTA) was requested to rule out coronary artery disease.

Diagnosis

The CT images demonstrated a mild stenosis, from soft plaque, in the proximal left anterior descending artery (LAD), and a myocardial bridge in the middle LAD with no evidence of stenosis. The circumflex (Cx) was small in caliber but showed no evidence of stenosis. The right coronary artery (RCA) appeared normal.

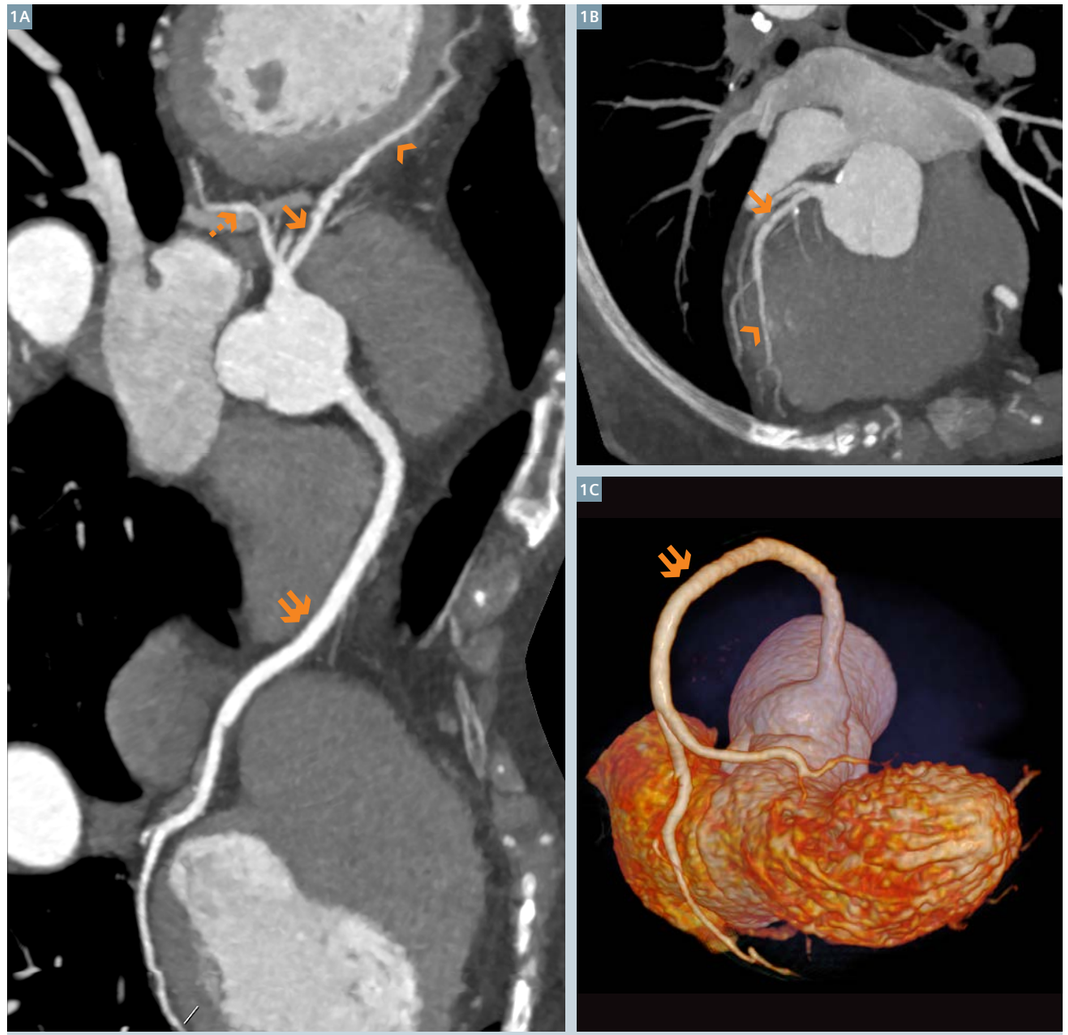
Comments

cCTA is a valuable non-invasive imaging examination with high diagnostic accuracy. Technological advances allow not only dose reduction but also improvement in the image acquisition. The SOMATOM Definition Flash scanner holds several technical advantages, including the latest Stellar Detector and sinogram-affirmed iterative reconstruction (SAFIRE), the first model-based and raw data-based iterative reconstruction application. Both of them make it possible to use lower tube voltage in cCTA examinations with excellent image quality.

The use of a lower tube voltage (70 kV) scanning protocol leads to a significant increase of mean attenuation and mean contrast enhancement of the coronary arteries as well as to significantly higher image noise. The contrast enhancement urges us to minimize the amount of contrast media and the image noise can be solved perfectly with the application of SAFIRE technique. Dual Source CT Flash mode with a very high pitch spiral scanning, can not only shorten the acquisition time, but also reduce both the radiation exposure and the necessary amount of contrast media (in this case, 0.39 s, 0.19 mSv and 45 mL).

Examination Protocol

Scanner	SOMATOM Definition Flash		
Scan area	Heart	Slice collimation	128 × 0.6 mm
Scan length	115 mm	Slice width	0.75 mm
Scan direction	Cranio-caudal	Temporal resolution	75 ms
Scan time	0.39 s	Reconstruction increment	0.5 mm
Tube voltage	70 kV	Reconstruction kernel	I26f
Tube current	270 eff.mAs	Patient heart rate	57 – 69 bpm
$CTDI_{vol}$	0.78 mGy	**Contrast**	
DLP	13.7 mGy cm	Volume	45 mL
Effective dose	0.19 mSv	Flow rate	3.5 mL/s
Rotation time	0.28 s	Start delay	Test Blous Peak Trigger + 21 s
Pitch	3.4		



1 Curved MPR (A), MIP (B) and VRT (C) images demonstrate the LAD with mild stenosis (arrows) from soft plaque, and a myocardium bridge (arrowheads) in the middle LAD with no evidence of stenosis. The Cx (dashed arrow) and the RCA (double arrows) appear to ne normal, although the Cx is small in caliber.