Image quality in low-dose coronary computed tomography angiography with a new high-definition CT scanner

Summary / Zusammenfassung
A new generation of high definition computed tomography (HDCT) 64-slice devices complemented by a new iterative image reconstruction algorithm-adaptive statistical iterative reconstruction, offer substantially higher resolution compared to standard definition CT (SDCT) scanners. As high resolution confers higher noise we have compared image quality and radiation dose of coronary computed tomography angiography (CCTA) from HDCT versus SDCT.

Consecutive patients (n = 93) underwent HDCT, and were compared to 93 patients who had previously undergone CCTA with SDCT matched for heart rate (HR), HR variability and body mass index (BMI). Tube voltage and current were adapted to the patient's BMI, using identical protocols in both groups. The image quality of all CCTA scans was evaluated by two independent readers in all coronary segments using a 4-point scale (1, excellent image quality; 2, blurring of the vessel wall; 3, image with artefacts but evaluative; 4, non-evaluative). Effective radiation dose was calculated from DLP multiplied by a conversion factor (0.014 mSv/mGy × cm). The mean image quality score from HDCT versus SDCT was comparable (2.02 ± 0.68 vs. 2.00 ± 0.76). Mean effective radiation dose did not significantly differ between HDCT (1.7 ± 0.6 mSv, range 1.0-3.7 mSv) and SDCT (1.9 ± 0.8 mSv, range 0.8-5.5 mSv; P = n.s.). HDCT scanners allow low-dose 64-slice CCTA scanning with higher resolution than SDCT but maintained image quality and equally low radiation dose. Whether this will translate into higher accuracy of HDCT for CAD detection remains to be evaluated.

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