Image quality of low-dose CCTA in obese patients: impact of high-definition computed tomography and adaptive statistical iterative reconstruction.

Summary / Zusammenfassung

The accuracy of coronary computed tomography angiography (CCTA) in obese persons is compromised by increased image noise. We investigated CCTA image quality acquired on a high-definition 64-slice CT scanner using modern adaptive statistical iterative reconstruction (ASIR). Seventy overweight and obese patients (24 males; mean age 57 years, mean body mass index 33 kg/m(2)) were studied with clinically-indicated contrast enhanced CCTA. Thirty-five patients underwent a standard definition protocol with filtered backprojection reconstruction (SD-FBP) while 35 patients matched for gender, age, body mass index and coronary artery calcifications underwent a novel high definition protocol with ASIR (HD-ASIR). Segment by segment image quality was assessed using a four-point scale (1 = excellent, 2 = good, 3 = moderate, 4 = non-diagnostic) and revealed better scores for HD-ASIR compared to SD-FBP (1.5 ± 0.43 vs. 1.8 ± 0.48; p < 0.05). The smallest detectable vessel diameter was also improved, 1.0 ± 0.5 mm for HD-ASIR as compared to 1.4 ± 0.4 mm for SD-FBP (p < 0.001). Average vessel attenuation was higher for HD-ASIR (388.3 ± 109.6 versus 350.6 ± 90.3 Hounsfield Units, HU; p < 0.05), while image noise, signal-to-noise ratio and contrast-to-noise ratio did not differ significantly between reconstruction protocols (p = NS). The estimated effective radiation doses were similar, 2.3 ± 0.1 and 2.5 ± 0.1 mSv (HD-ASIR vs. SD-ASIR respectively). Compared to a standard definition backprojection protocol (SD-FBP), a newer high definition scan protocol in combination with ASIR (HD-ASIR) incrementally improved image quality and visualization of distal coronary artery segments in overweight and obese individuals, without increasing image noise and radiation dose.


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