64-slice CT angiography for diagnosis of coronary artery disease: An investigation of radiation dose reduction with lower tube current

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Purpose: The aim of the study was to investigate the reduction of radiation dose with lower tube current using 64-slice CT angiography with retrospective ECG-gating in patients suspected of coronary artery disease.

Methods: Fourteen consecutive patients with suspected coronary artery disease underwent 64-slice CT angiography with retrospective ECG-gating. Seven patients were examined with the standard multislice CT angiography protocol of 120 kVp and 800 mA, and another seven patients were scanned with the modified protocol of 120 kVp and 600 mA. Signal to noise ratio (SNR) was measured at the ascending aorta corresponding to the locations of right and left coronary arteries to determine the image quality. 2D (axial and multiplanar reformation) and 3D virtual endoscopy images were generated to compare the image quality between these two groups of patients scanned with different protocols. Effective radiation dose was determined based on dose length product.

Results: There were no significant differences in heart rate or risk factors between these two groups (59 bpm vs 60 bpm). The mean SNR measured at the locations of right and left coronary arteries was 22.6 and 21.6 for the scanning protocol of 120 kVp and 800 mA, 19.2 and 17.2 for the scanning protocol of 120 kVp and 800 mA, respectively. There was no significant difference between the SNR measured with the standard protocol and the modified one ($p=0.38$ and 0.2 for right and left coronary artery levels). Use of 600 mA led to significant reduction of radiation dose (600 mA group: 12.2 ± 0.68 mSv; 800 mA group: 15.3 ± 0.62 mSv, $p<0.001$). 2D and 3D virtual endoscopy visualisation of the coronary artery branches did not show significant difference due to the tube current changes.

Conclusion: The use of lower tube current 600 mA with retrospective ECG-gated 64-slice coronary CT angiography results in diagnostic image quality with significant reduction of radiation dose.