

Image quality and radiation dose for various protocols in high definition CT of the coronary stent

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PURPOSE: To assess the radiation dose and image quality of various protocols for coronary stent using high definition CT.

MATERIALS AND METHODS: After receiving institutional review board approval, 49 consecutive patients with previous stent implantation underwent CT coronary angiography using high definition CT. Patients were randomly assigned to four different protocols: prospective ECG triggering at 100 kV (A) and 120 kV (B), and retrospective gating at 100 kV (C) and 120 kV (D). Two reviewers scored coronary stent image quality (four-point scale) and determined image noise and radiation dose parameters. Chi-square test with Bonferroni correction and Kruskal-Wallis test were used for the statistical analysis.

RESULTS: There was no significant difference in stent image quality between the four protocols. Stent images were interpretable in 92.9% (26/28) stents in protocol A, 83.3% (15/18) stents in protocol B, 97% (32/33) stents in protocol C, 95.7% (22/23) stents in protocol D. The mean image noise was 36.2 ± 9.1 HU, with no significant differences between the four protocols. Protocol A resulted in an effective dose of 4.14 ± 0.5 mSv, protocol B in 5.50 ± 1.49 mSv, protocol C in 8.10 ± 1.50 mSv, and protocol D in 8.55 ± 1.54 mSv. Effective doses were significantly lower ($p < 0.001$) with 100 kV when compared to 120 kV protocols, and were significantly lower ($p < 0.001$) for prospective versus retrospective ECG gating.

CONCLUSION: High definition CT of the coronary stent using prospective triggering and 100 kV significantly reduces the radiation but yield similar image quality and noise, compared with high definition CT using retrospective gating and 120 kV.

IMPLICATION FOR PATIENT CARE: High definition CT of the coronary stent using prospective triggering and lower tube voltage may be an attractive protocols for minimizing radiation doses and maintaining image quality in patients with coronary stent.