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THE IMAGE QUALITY AND DIAGNOSTIC ACCURACY OF HIGH-PITCH DUAL-SOURCE CORONARY ANGIOGRAPHY USING FLASH SPIRAL MODE IN PATIENTS WITH HIGH HEART RATES

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Objectives To investigate the image quality, diagnostic accuracy and radiation doses of prospectively ECG-triggered spiral acquisition mode (Flash Spiral mode) coronary CT angiography (CCTA) using high-pitch dual-source CT in patients with high heart rates, compared with retrospectively ECG-gated spiral acquisition mode (Spiral mode) and catheter coronary angiography (CCA).

Methods One hundred and thirty-four consecutive patients with mean heart rate (HR) >65 beats per minute (bpm) who were performed CCTA using Flash Spiral mode setting at 20–30% of the R-R interval were included in this study as group A, while group B used Spiral mode to acquire data. Among them, there were 47 cases in group A (as group A1) and 45 cases in group B (as group B1) were underwent CCA. The general characteristics, image quality scores, the image noise, contrast-to-noise ratio (CNR) and effective radiation dose between two groups were assessed. Considered CCA as the standard of reference, the sensitivity, specificity, positive predictive value and negative predictive value of two groups were calculated.

Results There were no significant differences in general characteristics between the two groups (all $p > 0.05$). The non-diagnostic coronary artery segments were no significant differences between group A and group B (segment-based analysis 1.52% vs 1.74%, $p = 0.345$; patients-based analysis 7.5% vs 6.7%, $p = 0.812$). There were no significant differences in the image quality scores [1.064 ± 0.306 (group A) vs 1.084 ± 0.327 (group B), $p = 0.063$]. The average image noise was 21.4 ± 4.5 HU (range: 19–27 HU) and CNR was 12.1 ± 4.2 (range: 6.4–25.3) in group A, and the corresponding numbers were 20.9 ± 4.3 HU (range: 19–28 HU) and 13.8 ± 5.1 (range: 7.1–28.2) in group B. There were no significant differences in image noise or CNR between the two groups. The average HRV of score 3 in group A was significantly lower than that in group B (17.33 ± 10.06 vs 23.89 ± 32.94). The sensitivity, specificity and positive and negative predictive values of two groups were no significant differences. The average effective radiation doses of groups A was significantly lower than that of group B.

Conclusions In conclusion, in patients with high heart rates (>65 bpm), compared with the retrospectively ECG-gated spiral acquisition mode, the prospectively high-pitch spiral acquisition mode with image acquired timing set at 20–30% of the R-R interval provides a similar image quality and diagnostic accuracy, while being associated with significant reduction of radiation exposure in patients with high heart rates. The HRV is a considerable factor which affects the image quality of high-pitch dual-source CCTA in patients with high heart rates.