



低剂量双源CT前瞻性心电触发大螺距扫描冠状动脉造影的图像质量和放射剂量

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Coronary Computed Tomographic Angiography Using Low-dose Prospectively Electrocardiographic Triggered High-pitch Spiral Acquisition by Dual-source Computed Tomography: Image Quality and Radiation Dose

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摘要

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摘要 目的 探讨低心率患者应用双源CT前瞻性心电触发大螺距扫描进行CT冠状动脉造影的图像质量和放射剂量。方法对连续75例心率 ≤ 65 次/min且稳定的患者进行前瞻性心电触发大螺距螺旋CT扫描冠状动脉造影。75例患者按扫描时平均心率分成两组: A组(≤ 60 次/min) 55例、B组(60~65次/min) 20例。扫描参数: 层数 2×128 , 层厚0.6mm, 旋转时间0.28s, 管电压80~120kV, 管电流370mAs/转。前瞻性心电触发选在60% R-R间期, 螺距3.4。采用75 ms 时间分辨率进行图像重建, 层厚0.75mm, 间隔0.5mm, 图像质量评价采用4级评分法(1=优秀, 4=不可评价)。结果患者平均心率为(57.2 \pm 4.8)次/min, 平均扫描时间为(0.42 \pm 0.02) s。75例患者的 1103 个冠脉节段中图像质量为1级的934段(84.7%)、2级135段(12.2%)、3级18段(1.6%)、4级16段(1.5%)。A、B两组的图像质量评分差异无统计学意义(A组1.19 \pm 0.52, B组1.22 \pm 0.55; $Z=-1.107$, $P=0.268$)。A、B两组的可评价节段比率差异无统计学意义(A组98.5%, B组98.6%; $\chi^2=0.000$, $P=1.000$)。所有患者平均剂量长度乘积为(67.2 \pm 30.4) mGy \times cm, 平均有效放射剂量为(0.94 \pm 0.43) mSv。结论对于心率慢且稳定的患者, 双源CT前瞻性心电触发大螺距CT扫描可以在较低的放射剂量下提供高质量的图像。

关键词: CT 冠状动脉血管造影术 放射剂量

Abstract: Objective To evaluate image quality (IQ) and radiation exposure of coronary computed tomographic angiography (CTA) with prospectively electrocardiographic (ECG) triggered high-pitch spiral acquisition using dual source CT. Methods Totally 75 consecutive patients with a stable heart rate (HR) ≤ 65 bpm underwent coronary CTA. patients were divided into two groups according to their HR (group A HR ≤ 60 bpm, group B HR > 60 bpm to ≤ 65 bpm). A dual-source CT scanner was used (0.6mm collimation, 0.28s rotation time, 80~100 kV, 370 mAs/rot). Data acquisition was prospectively ECG-triggered at 60% of the R-R interval with a pitch of 3.4. Images were reconstructed with 75ms temporal resolution, 0.75mm slice thickness and 0.5mm increment. IQ was evaluated using a four-point scale (1=excellent, 4=unevaluable). Results The mean HR and scan time of all patients was (57.2 \pm 4.8) bpm and (0.42 \pm 0.02) s. Of 1103 coronary artery segments, 934 (84.7%) had an IQ score of 1, 135 (12.2%) score of 2, 18 (1.6%) score of 3, and 16 (1.5%) were rated as "unevaluable". There was no significant difference between the two groups in IQ [mean score (1.19 \pm 0.52 vs. 1.22 \pm 0.55; $Z=-1.107$, $P=0.268$). The rate of evaluable segments showed no significant difference between the two groups (98.5% vs. 98.6%; $\chi^2=0.000$, $P=1.000$). Mean dose-length product of all patients was (67.2 \pm 30.4) mGy \times cm, mean effective dose was (0.94 \pm 0.43) mSv. Conclusion In patients with a stable HR of 65 bpm or less, prospectively ECG-triggered high-pitch spiral CT acquisition provides high IQ at low radiation dose.

Keywords: computed tomography coronary angiography radiation dose

Received 2010-10-29;

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引用本文:

王怡宁, 李烁, 孔令燕, 王志伟, 周慷, 曹剑, 樊红苓, 张晓娜, 张竹花, 金征宇. 低剂量双源CT前瞻性心电触发大螺距扫描冠状动脉造影的图像质量和放射剂量[J] 中国医学科学院学报, 2010, V32(6): 597-600

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