Abdomen Imaging

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Reduced Contrast Volume and Radiation Dose for CT Chest Abdomen and Pelvis Examination: Protocol Design and Optimisation

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Objective: In general, the standard protocol of a contrast enhanced CT uses a fixed volume (FV) of contrast media with tube potential of 120 kVp. This study compared the image quality, contrast enhancement and radiation dose using a customized CT protocol using weight based volume (WBV) and low tube potential (100 kVp).

Materials & Methods: Data was retrospectively collected for 220 patients who underwent CT thorax-abdomen-pelvis studies using FV with standard tube potential 120 kVp (protocol A) and WMV with standard tube potential 120 kVp (protocol B) between June 2017 to December 2019. A subset of 39 patients also underwent CT studies using WBV with low tube potential 100 kVp (protocol C). Contrast enhancement of the portal venous phase images from the 3 scanning protocols were assessed quantitatively and qualitatively. Radiation dose was also compared.

Results: Quantitative assessment of CE (n = 39) showed protocol A > B, A > C and C > B with $p = 0.030$, $p = 0.320$ and $p = 0.200$ respectively. Median effective dose in protocol A, B and C were 12.4, 12.3 and 10.8 mSv respectively. Patients experienced a mean contrast volume reduction of 23.9 mL when WBV used compared to FV. On qualitative assessment, all images were rated good or excellent.

Conclusion: Weight based protocol with low tube potential improved patient outcomes with reduced contrast volume and radiation dose while maintaining good image quality as compared to standard protocol.