Välkommen till halvtidskontroll av Fredrik Holmquists avhandlingsarbete

80-kV computed tomography to reduce contrast medium doses in patients at risk of acute renal injury

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Halvtidsbedömare

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Lokal
Dem 11, BoF, plan 4

Välkomna!

Professor Mats Geijer
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Abstract

Title: 80-kV computed tomography to reduce contrast medium doses in patients at risk of acute renal injury.

Background: Elderly patients with reduced renal function may be at risk of contrast medium induced acute kidney injury (CI-AKI) following intravenous contrast medium (CM) enhanced computed tomography (CT). One way to potentially reduce the amount of CM is to reduce the X-ray tube potential (kilovoltage, kV) to get higher iodine attenuation due to its photoelectric properties. Lower tube potential, however, increases image noise which may be controlled by increasing the x-ray tube loading (milliampere seconds, mAs) to keep image quality, e.g. contrast-to-noise ratio (CNR) unchanged. Complete compensation of tube loading increases the radiation dose to the patient, but the introduction of noise reducing iterative reconstruction algorithms may prevent this.

Aim: To investigate if low-kV CT with reduced CM doses is a feasible alternative in CT of the thorax and abdomen in patients at risk of CI-AKI.

Method: In three cross-sectional studies 80-kV CT protocols with 40-50% reduction of CM dose and increased tube loading to control image noise was compared with standard 120-kV protocols, in two studies to diagnose pulmonary embolism and in one hepatic CT study. Based on a phantom study and a clinical hepatic CT study, iterative reconstruction algorithms were used to control image noise with no increase in tube loading. Image quality was evaluated objectively and subjectively.

Results: Using low-kV CT protocols with reduced CM doses (40-50%) and mAs compensation seems to provide satisfactory diagnostic quality in pulmonary CT angiography and hepatic CT for patients with GFR <45-50 mL/min and a body mass index <30 kg/m². However, the use of iterative reconstruction algorithms to control image noise without increased mAs resulted in inferior subjective image quality.

Conclusions: Using low-kV CT protocols with reduced CM dose could benefit patients at risk of CI-AKI. The usefulness iterative reconstructions to reduce radiation dose remains unclear.

Publications:
