

Dose reduction in computed tomography (CT) by the integration of a dose monitoring system

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Introduction

By integrating a dose monitoring system, dose saving protocols in computed tomography (CT) were developed and compared with the conventional standard protocols.

Objectives

Appraisal of the effectiveness of the dose savings of specific oncology protocols from spring 2014 and their subsequent comparison with the standard protocols in CT with the objective of a dose optimisation to improve patient safety.

Material & method

Difficulties have existed with the current data collection of dose values. For a reliable data collection of dose values, the CT Siemens Sensation Edge at the Luzerner Kantonsspital was integrated in November 2013 with the software solution DoseWatch from the company GE Healthcare AG. The collection of the data through DoseWatch is a fully automated process. The dose values are collected in a virtual server and are always available for review. By the use of the web browser, the reports and statistics are compiled, stored and easily retrieved. The data access is secured and recorded by an individual login.

To measure the dose values, you need two calculation methods. One is DLP (dose length product) and the second is the CTDIvol (computed tomography dose index). The DLP defines the effective received radiation dose and CTDIvol calculates the applied radiation dose per tube rotation and layer.

In this analysis the adapted protocols for the areas thorax, abdomen and thorax-abdomen were reviewed.

Results

In total 54 thorax protocols, 106 abdomen protocols and 84 thorax-abdomen protocols were scanned, in which the percentages of the oncological protocols were as follows: thorax 20.4 %, abdomen 4.7% and combined protocols 13.1%. The results show a dose reduction in DLP as follows: thorax 44.64%, abdomen 57.74% and for the thorax-abdomen 83.79%. The CTDIvol declined in the thorax by 64.53% and in the abdomen by 45.42%. For the thorax-abdomen-protocol, the software displays no CTDIvol because two totally different volumes are scanned.

Discussion

Based on these first encouraging results, the dose optimising for specific adapted oncology protocols in CT will be expanded for additional areas of the body. In this connection the balance between the quality of the images and the dose saving must be optimised.

With DoseWatch it is possible to create and implement practical regulatory standards and control their effectiveness. The resulting dose optimisation can sustain long-term patient safety levels.

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