

Accuracy of Computed Tomography Dose Monitor Values: A Multicentric Study in India

Authors : Adhimoolam Saravana Kumar, K. N. Govindarajan, B. Devanand, R. Rajakumar

Abstract : The quality of Computed Tomography (CT) procedures has improved in recent years due to technological developments and increased diagnostic ability of CT scanners. Due to the fact that CT doses are the peak among diagnostic radiology practices, it is of great significance to be aware of patient's CT radiation dose whenever a CT examination is preferred. CT radiation dose delivered to patients in the form of volume CT dose index (CTDIvol) values, is displayed on scanner monitors at the end of each examination and it is an important fact to assure that this information is accurate. The objective of this study was to estimate the CTDIvol values for great number of patients during the most frequent CT examinations, to study the comparison between CT dose monitor values and measured ones, as well as to highlight the fluctuation of CTDIvol values for the same CT examination at different centres and scanner models. The output CT dose indices measurements were carried out on single and multislice scanners for available kV, 5 mm slice thickness, 100 mA and FOV combination used. The 100 CT scanners were involved in this study. Data with regard to 15,000 examinations in patients, who underwent routine head, chest and abdomen CT were collected using a questionnaire sent to a large number of hospitals. Out of the 15,000 examinations, 5000 were head CT examinations, 5000 were chest CT examinations and 5000 were abdominal CT examinations. Comprehensive quality assurance (QA) was performed for all the machines involved in this work. Followed by QA, CT phantom dose measurements were carried out in South India using actual scanning parameters used clinically by the hospitals. From this study, we have measured the mean divergence between the measured and displayed CTDIvol values were 5.2, 8.4, and -5.7 for selected head, chest and abdomen procedures for protocols as mentioned above, respectively. Thus, this investigation revealed an observable change in CT practices, with a much wider range of studies being performed currently in South India. This reflects the improved capacity of CT scanners to scan longer scan lengths and at finer resolutions as permitted by helical and multislice technology. Also, some of the CT scanners have used smaller slice thickness for routine CT procedures to achieve better resolution and image quality. It leads to an increase in the patient radiation dose as well as the measured CTDIv, so it is suggested that such CT scanners should select appropriate slice thickness and scanning parameters in order to reduce the patient dose. If these routine scan parameters for head, chest and abdomen procedures are optimized than the dose indices would be optimal and lead to the lowering of the CT doses. In South Indian region all the CT machines were routinely tested for QA once in a year as per AERB requirements.

Keywords : CT dose index, weighted CTDI, volumetric CTDI, radiation dose

Conference Title : ICRPPD 2017 : International Conference on Radiological Physics and Radiation Dosimetry

Conference Location : London, United Kingdom

Conference Dates : May 25-26, 2017