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CT Dose Optimization for Biopsy and Drainage Interventional Procedures on a Philips Brilliance iCT Scanner

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Keywords

Computed Tomography (CT), Dose Optimization, Philips Brilliance iCT, DoseRight, iDose^4, Mercury 4.0 Phantom

Abstract

Purpose

Computed tomography (CT) is an imaging modality commonly used as a diagnostic tool. CT is also utilized as a form of image guidance during clinical procedures that require 3D localization to be performed. The purpose of this study is to optimize the CT protocol used for the two most common CT procedures performed at OHSU: bone biopsy and interventional drainage procedures. Specifically, the optimization will examine the impact of dose reduction on image quality.

Methods

With the use of Imalogix™, the radiation dose tracking software used at OHSU, a biopsy and drainage cohort were analyzed. For these CT procedures, there are two scan modes used: helical scan mode and CCT single axial scan mode. The two protocol parameters that can be adjusted for optimization include the DoseRight Index (DRI) and iDose^4 level. The Mercury 4.0 Phantom was utilized to perform an analysis of dose metrics and image quality with various DRI and iDose^4 settings. The data was then presented to radiologists for approval of the proposed protocol change.

Results

It was found that the helical scan protocol parameters used for procedures were the same as the parameters used for the diagnostic routine abdomen pelvis protocol. Since CT is used for guidance and not for diagnosis during procedures, the helical scan protocol was targeted for optimization. With the approved DRI and iDose^4 level changes, the phantom

data indicated an achievable dose ($CTDI_{vol}$) reduction of 28.85% and a minimal noise increase of 8.88% compared to the original protocol.

Conclusion

The helical scan protocol used for two common CT procedures at OHSU was optimized by adjusting the DRI and iDose^4 settings to allow for a dose reduction of close to 30%. Due to the numerous helical acquisitions performed during procedures, this protocol optimization will significantly reduce the dose to the patient.