Service Priorities and Programmes

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Enhanced Clinical and Radiation Safety of Routine Computed Tomography of the Brain by Excluding the Lens During Image Acquisition in Three Regional Hospitals

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Introduction

The human lens is a radiosensitive structure. Ionizing radiation has a non-stochastic effect on the lens, with a dose of 5000mGy resulting in radiation-induced cataract. Computed tomography (CT) of the brain is a very common imaging investigation in hospitals. The lens is exposed to ionizing radiation during CT brain. The radiation dose absorbed by the lens is about 43mGy if both lens are completely included during image acquisition, and this drops approximately 8 fold to 5.5mGy if the lens are excluded during image acquisition.

Objectives

To enhance clinical and radiation safety of CT brain by changing the line of image acquisition from Reid's line (RL) to the supraorbitomeatal (SOM) line so as to exclude the lens from direct irradiation.

Methodology

Patient demographics, CT dose index (CTDI), dose length product (DLP), and percentage of cases with lens excluded were reviewed and calculated over a period of 2 weeks before and 2 weeks after departmental implementation of SOM line in three regional hospitals with a total of 6 CT machines. Paediatric cases, cases of phthisis bulbi and those with prior cataract operations were excluded.

Result

Both lens were included in 100% of CT brain prior to departmental implementation of SOM line. After departmental implementation of SOM line, there were a total of 1250 CT brain performed. Both lens were excluded in 47.9% of the cases, one lens was partially included in 9.6%, both lens were partially included in 32.4%, and both lens were completely included in 10.1%. Independent t-test showed no

statistically significant between ages of the subjects in patients scanned with RL prior to implementation and with SOM line after implementation. Mann-Whitney U test showed no statistically significant difference between the CTDI and DLP of the two groups. The lens is a radiosensitive structure which is exposed to ionizing radiation during CT brain. Reducing the radiation dose absorbed by the lens is essential to minimize radiation-induced lens damage. We improved radiation safety by minimizing the radiation dose to the lens in 3 regional hospitals by excluding them during image acquisition, with no change in overall dose of CT brain examination. The potential implication is reduction in radiation-induced cataract formation.