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LATE BREAKING ABSTRACTS

Scientific Session 22- LBA
New Technologies in Radiation Protection
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Room: Flagstaff 2

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4:30 PM – 4:41 PM

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CT Fluoroscopy Shielding – A Dramatic Decrease in Scattered Radiation for Both Patient and Operator.

Purpose: High radiation exposure occurs during CT fluoroscopy (CTF). Patient and operator dose during thoracic and abdominal interventional procedures in adult and pediatric models were studied. A tungsten antimony shielding device to reduce exposure to both the patient and operator was designed and evaluated.

Materials and Methods: Using a 16 multi-slice CT scanner in CTF mode, surface dosimetry was measured on adult and pediatric anthropomorphic phantoms. An electronic dosimeter was used to measure exposures. The shielding was composed of a lightweight tungsten antimony lead-free sheet. Multiple shielding geometries and designs were evaluated. Doses to the adult and pediatric phantoms were measured with and without shielding for both thoracic and abdominal procedures. Scattered doses to the operator were recorded with patient, gantry and table shielding in place. The radiation exposure to the patient and operator was evaluated as a function of procedure duration and distance from the scanning plan. Also, collimator leakage attributing to the stray radiation dosage to the phantoms was evaluated.

Results: Maximum patient doses documented during a 30-frame CTF procedure were 4.5 and 6.634 mGy for adult and pediatric models respectively. Maximum torso, gonad, leg and hand doses to the operator with and without various shielding designs were documented as well. Tungsten antimony shielding adjacent to the scan plane resulted in as high as a 92.3% dose reduction to the patient. A maximum of 85.6%, 93.3%, and 85.1% dose reductions were observed for operator's torso, gonads and hand respectively. Additional shielding of the operator's hand using double layer lead gloves resulted in a maximum reduction of 94%.

Conclusions: Significant levels of radiation exposure may result to both patient and staff during CTF guided interventional procedures. Utilizing the As Low As Reasonably Achievable (ALARA) concept, that any exposure to ionizing radiation carries some risk, methods to reduce exposure during CTF should be sought. In addition to reducing scan time and modifying CT scanning parameters, significant reduction in scatter to patient and operator can occur with the use of tungsten antimony shielding.