Dose Optimization in Paediatric Cardiac X-Ray Imaging

Objective: To quantify the patient radiation dose reduction after the introduction of an X-ray imaging technology using advanced real time image noise reduction and optimized acquisition chain for fluoroscopy in pediatrics and adult population with congenital heart disease.

Background: Pediatric catheterization exposes patients to varying radiation doses. Dose optimization was assessed by obtained radiation data collection. Biplane X-ray angiography Siemens Artis zee equipment was used for clinical procedures. It is equipped with two flat detectors - a frontal detector measuring 30x38cm (48 cm diagonal) and lateral detector measuring 20x20cm (25cm diagonal). The flat detectors are mounted on C-arm of the angiography system and move through a 360 degrees range around the patients.

Methodology: Patients and radiation doses were retrospectively collected August 2014 - August 2015 for 100 consecutive patients treated with a system using state of the art image processing and reference acquisition chain. Radiation dose was quantified using dose area product (DAP), while procedure complexity using fluoroscopy time, procedure duration and volume of contrast medium. Patients were divided into three weight groups: A) below 10kg B) 10-40 kg and c) over 40kg.

Results: For below 10kg, 10-40kg, over 40kg mean DAP values were 63.7cGycm², 200 cGycm², and 1900cGycm² with quantification at 50%, 70% and 60% respectively.

Conclusion: The new system provides significant patient dose reduction compared to the reference system. Despite no other changes in the procedural approach, X-ray imaging technology provides a substantial radiation dose reduction.

Country/Organization invited to participate

Uganda

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Track Classification: Radiation protection for personnel and dose reduction for patients