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Paediatric catheterization X-ray exposure reference doses: a single centre experience

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BACKGROUND

There is a rising concern among the International Scientific Community over radiation exposure during cardiac catheterization in paediatric patients. To optimize radiation dose the states within the European Union are required to establish and use Diagnostic Reference Level (DRL). However at the time there is a lack of precise benchmarks for hemodynamic procedures.

AIM OF THE STUDY

A) To assess the radiation exposure levels in pediatric interventional cardiology and evaluate the main factors affecting it.

B) To propose Local Diagnostic Reference Levels (DRLs) for diagnostic and interventional cardiac catheterization.

C) To compare the data obtained before (01/2014-11/2015) and after (12/2015-06/2016) the change of instrumentation protocols.

METHODS

We analyzed 97 interventional cardiology (IC) procedures, 41 diagnostic and 56 therapeutic, performed in pediatric patients (age range 6 days - 18 years) between January and June 2016. Fluoroscopic data were collected and analyzed digitally using the "Radiation Dose Monitor" software (Medsquare). Local DRLs were determined for each dosimetric parameter (DAP, Air Kerma and fluoroscopy time) and established on the third quartile value of the dosimetric parameters for diagnostic and interventional procedures.

RESULTS

The median DAP value was 5,62 Gy cm² for the entire sample. For diagnostic procedures was 6,48 Gy cm² and 4,89 Gy cm² for therapeutic procedures; no statistically significant difference was found between the two groups. The third quartile DAP value obtained in diagnostic and therapeutic procedures was respectively: 4,09 Gy cm² and 12,14 Gy cm² for "5 to 15 Kg" group and 20,17 Gy cm² and 14,17 Gy cm² for "15 to 30 Kg" group. The change of protocols reduced the dose: the media DAP value decreased from 17,43 Gy cm² to 11,87 Gy cm² (p<0.05).

CONCLUSION

This study represents the first Italian systematic and digital collection of dosimetric data in order to establish local DRL for diagnostic and therapeutic catheterization. In our centre there is a reduction of dose compared to data collected in the previous two years. It's important an ongoing review and updating of this data, due to the progression of the operator skills, develop new technologies and replacing equipment.