Evalution of absorbed radiation dose to working staff during cardiaccatheterization procedures

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摘要

Abstract

BACKGROUND: Cardiac catheterization has been used frequently for the evaluation and treatment of patients with heart diseases. The working staff, particularly cardiologists who perform these procedures, have the highest potential risk of receiving high radiation doses due to close contact with patients. The purpose of this study was to measure and evaluate the accumulated radiation dosage of the cardiologists while they were performing clinical procedures in the cardiac catheterization laboratory. The working environment of the catheterization laboratory was also monitored for radiation. METHODS: Thermoluminescent dosimeters (TLDs) with very high sensitivity were employed for dose evaluations. They were taped to various parts of the body of the cardiologists during catheterization procedures. For environmental monitoring, TLDs were also distributed at several sites of the catheterization rooms for a period of 2 to 4 weeks. RESULTS: The study showed that the left wrist of the cardiologists received the highest radiation dose (338 microsieverts [microSv]/procedure) and the left lens received the second highest dose (149 microSv/procedure) during the procedures. The dose to the knees was unexpectedly high (92 microSv/procedure), partly due to radiation leakage from the lead curtain shielding under the patient couch. On average, the effective radiation dose per year was 37 mSv/y for a cardiologist who performs 10 catheterization procedures per week. Compare this to the occupational exposure limit of 50 mSv/y. The estimated accumulated equivalent dose to the lens was 152 mSv/y, which exceeded the regulatory limit for occupational exposure. CONCLUSIONS: Using proper lead shielding and increasing the distance from the radiation source are good strategies for reducing the radiation dose in medical staff. The work area outside the catheterization room was considered safe because the radiation level was essentially equivalent to the background radiation level.