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HEALTH WORKERS' RADIOPROTECTION EVALUATION IN TREATMENT AND ASSISTANCE PHASES OF AN HCC PATIENT UNDERGONE YTTRIUM-90 RADIOEMBOLIZATION

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BACKGROUND-AIM

The aim of the present study was to evaluate the external exposure and contamination of health workers that took care of hepatocellular carcinoma (HCC) patient undergone Y90 trans-arterial radioembolization (TARE).

METHODS

Y90-TARE was a complex treatment to an organisational point of view. The treatment was performed by injecting 3.4 GBq dose in the hepatic artery. The health workers involved in this procedure phase were technologists, nuclear physicians (NP), interventional radiologists (IR) and healthcare assistants (HA). The critical jobs for the external exposure are: injection of radiopharmaceutical dose, angiographic procedure, haemostasis by femoral pressure, patient assistance. Y90 Therasphere (Nordion, Canada) treatment was performed. Y90 was a pure β -emitter with limited radioprotection problem. The Y90-microspheres dose was shipped to nuclear medicine department in plexiglass vial with lead shielding to stop bremsstrahlung radiation. The health workers involved in delivery and storage of Y90-vial were nuclear technologists. NP and IR were involved in Y90-microsphere intra-arterial injection during angiographic procedure. Contamination measurement (β - γ LB 124 Contamination Monitor, Berthold Technologies) was performed after Y90 Therasphere injection. Hands and feet contamination was monitored to all health workers in operating theatre. Surgery nurses and HA were involved in post-treatment phase. The exposure evaluation was performed during treatment and assistance to the patient. The external radiation of the patient in treatment phase was measured by the use of dose rate meter device (Universal Monitor LB 123, Berthold Technologies). The measurements were performed in contact with liver, 50 and 100 cm at same time, 24 and 48 hours post-Y90 injection.

RESULTS

Dose rate of Y90 Therasphere shielded vial at 30 cm distance was 0.1 mSv/h. Nuclear technologists received 0.003 mSv dose during delivery and storage of the vial. No hands and feet contamination during treatment angiographic procedure for NP, IR and surgery nurses was recorded. The dose rate of the patient post Y90-injection was 9.20 mSv/h (in contact with liver), 0.10 mSv/h (50 cm), 0.06 mSv/h (100 cm). After 24 hours the dose rate was 6.80 mSv/h (in contact with liver), 0.06 mSv/h (50 cm), 0.04 mSv/h (100 cm) and 48 hours it was 0.02 mSv/h (100 cm). Surgery nurses received after Y90-injection for 20 min time assistance to 50 cm distance by the patient 0.03 mSv and 24 hours post-treatment 0.02 mSv. The total dose received by health assistants was 0.08 mSv.

CONCLUSION

In our experience, Y90-TARE was safety procedure in terms of radioprotection of health workers. The critical moment was the treatment phase but no contamination problem was recorded. After Y90-injection the patient is radioactive source and the surgery health assistants were involved. The total dose received by health assistants was less than radioprotection population limit (1 mSv).