

RADIATION SOURCE CHARACTERISTICS ANALYSIS DURING BRACHYTHERAPY WITH THE RING APPLICATOR FOR DIFFERENT IRRADIATION PLANS

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Inaccuracies in brachytherapy treatment occur due to two reasons mainly: anatomical misalignment or as a result of errors that are usually associated with incorrect positioning of the applicator or radiation source during treatment. The purpose of this work is to test the degree of inconsistency in the positioning of the radiation source at the most distant position of the ring applicator when different dosimetric exposure plans are used. An IBU-Digital X-ray machine was used to check the quality of the source positioning. The ring applicator was secured with an applicator clamp with a base plate and placed on the patient table perpendicular to the direction of the x-ray beam. Dosimetric exposure plans were created on the planning system Oncentra Brachy v4.5.2 for microSelectron HDR v3 Digital, Elekta, Sweden. The plans included one distal active position as well as several active positions in the annular part of the applicator. After the source moved to the distal position, planar X-ray images of the applicator with the source were obtained, as well as lateral images at an angle of 90 degrees for reconstruction. The coordinates of the points of the center of the radiation source capsule for the respective treatment plan were used to measure the distance between the distal position of the source on the reference plan (plan with one distal active position) and the distal position on the remaining plans. The maximum deviation of the source location in the distal position was observed during the implementation of the dosimetric plan, in which the last 2 positions were deactivated and amounted to 1.7 mm. The number of inactive positions in front of the outermost active position in the ring applicator did not affect the positioning accuracy of the source. The observed differences in the accuracy of positioning the source in the distal position when implementing different irradiation plans lead to uncertainty in dose delivery on brachytherapy devices. The results obtained indicate the need for quality control procedures when putting applicators into clinical operation, as well as the need to develop an additional device for dose delivery quality checking for various applicators in brachytherapy.

The speaker is a student or young scientist

No

Section

1. Nuclear technology and methods in medicine, radioecology

Primary author: Dr KOZLOVSKY, D.I.

Presenter: Dr KOZLOVSKY, D.I.

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