DETERMINANT FACTORS OF DOSE OPTIMIZATION FOR BRACHYTHERAPY WITH SINGLE-CHANNELED CYLINDRICAL APPLICATOR

Chen-Chiao Lee[1], Chieh-Sheng Tsai[1], David Y.C. Huang[2], Jun-Der Lee[1,3], Ting-Kuo Fu[1,3], Wen-Han Lee[1,3], Ching-Jung Lo[1]

Department of Radiation Oncology[1], Chang Gung Memorial Hospital, Lin-Kou
Department of Radiation Oncology[2], MSKCC at Mercy Medical Center, NY
Division of Radiation Technology[3], Yuanpei Institute of Science and Technology

Purpose : To evaluate the dose distribution of vaginal brachytherapy with different diameters of cylindrical applicator, source positions and optimized dose points.

Materials and Methods : When using cylindrical applicator for vaginal brachytherapy, ABS (American Brachytherapy Society) recommended treatment report with the vaginal surface dose and the dose at 5 mm beneath mucosa. The affecting factors for dose optimization is this study include: diameter of vaginal cylinder, source positions and optimized dose points.

Results : Vaginal applicator with smaller diameter (1.5 cm) has a higher average surface dose (173.6 cGy vs. 127.3 cGy) and a more inhomogeneous dose distribution (standard deviation 31.8 cGy vs. 11.7 cGy) than a larger one (3.5 cm). When the interval of optimized dose points was increasing to 10 mm, the dose at surface apex point increased 28% with the larger diameter applicator. Increasing interval of source dwelling positions resulted in a rise of dose at apex point. There was a 70% dose enhancement at off-surface dose point when optimized dose points were re-arranged.

Conclusions : When utilizing single-channeled applicator for vaginal brachytherapy, a cylinder with larger diameter will result in more homogenous dose distribution.

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Key words: Brachytherapy, Vagina, Cylindrical applicator, Optimization