

Comparison of Stereotactic Body Radiation Therapy Virtual Treatment Plans Obtained With Different Collimators in the Cyberknife System in Partial Breast Irradiation: A Retrospective Study

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Abstract : It is aimed to compare target volume and critical organ doses by using CyberKnife (CK) in accelerated partial breast irradiation (APBI) in patients with early stage breast cancer. Three different virtual plans were made for Iris, fixed and multi-leaf collimator (MLC) for 5 patients who received radiotherapy in the CyberKnife system. CyberKnife virtual plans were created, with 6 Gy per day totaling 30 Gy. Dosimetric parameters for the three collimators were analyzed according to the restrictions in the NSABP-39/RTOG 0413 protocol. The plans ensured critical organs were protected and GTV received 95 % of the prescribed dose. The prescribed dose was defined by the isodose curve of a minimum of 80. Homogeneity index (HI), conformity index (CI), treatment time (min), monitor unit (MU) and doses taken by critical organs were compared. As a result of the comparison of the plans, a significant difference was found for the duration of treatment, MU. However, no significant difference was found for HI, CI. V30 and V15 values of the ipsi-lateral breast were found in the lowest MLC. There was no significant difference between Dmax values for lung and heart. However, the mean MU and duration of treatment were found in the lowest MLC. As a result, the target volume received the desired dose in each collimator. The contralateral breast and contralateral lung doses were the lowest in the Iris. Fixed collimator was found to be more suitable for cardiac doses. But these values did not make a significant difference. The use of fixed collimators may cause difficulties in clinical applications due to the long treatment time. The choice of collimator in breast SBRT applications with CyberKnife may vary depending on tumor size, proximity to critical organs and tumor localization.

Keywords : APBI, CyberKnife, early stage breast cancer, radiotherapy.

Conference Title : ICAITR 2022 : International Conference on Advancements in Immuno Therapy and Radiology

Conference Location : Istanbul, Türkiye

Conference Dates : July 28-29, 2022