عنوان مقاله:

Radiobiological Model-Based Comparison of Three-Dimensional Conformal and Intensity-Modulated Radiation Therapy Plans for Nasopharyngeal Carcinoma

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خلاصه مقاله:

Introduction: Radiobiological modeling of radiotherapy plans are used for treatment plan comparisons. The current study aimed to compare the three-dimensional conformal radiation therapy (3DCRT) and intensity-modulated radiation therapy (IMRT) plans for nasopharyngeal cancer using radiobiological modeling. Materials and Methods: This study was conducted on 10 patients with nasopharyngeal carcinoma, who were planned for 3DCRT and IMRT treatments by using the TiGRT treatment planning system. The planning target volume (PTV) doses of 70 and 72 Gy were administered for the 3DCRT and IMRT plans, respectively. The BIOLPLAN software and the Niemierko's equivalent uniform dose (EUD) model were utilized for the estimation of tumor control probability (TCP) and normal tissue complication probability (NTCP). The NTCPs of the spinal cord, brain stem, parotid glands, middle ears, temporomandibular joints (TMJ), mandible, and thyroid were calculated by using two radiobiological models. Results: According to the results, the mean TCPs for 3DCRT and IMRT plans were 89.92%±8.92 and 94.9%±3.86, respectively, showing no statistically significant difference (P=0.08). The NTCPs of the parotid glands, thyroid gland, spinal cord, TMJ, and mandible were considerably lower in the IMRT plans, compared to those in the 3DCRT plans. On the other hand, the calculated NTCPs for the middle ears and brain stem increased for the IMRT plans, which were not statistically significant. On average, the NTCPs of the critical organs were lower based on the EUD model than the Lyman-Kutcher-Burman model. Conclusion: From the radiobiological point of view, the IMRT plans were significantly advantageous over the 3DCRT plans with some small variations in each patient. On average, the two radiobiological models generated different NTCPs depending on the studied organs. Consequently, more studies are .needed for the optimization of radiobiological models for the prediction of the treatment outcomes in radiation therapy

کلمات کلیدی:

Nasopharyngeal, Cancer, Intensity Modulated Radiotherapy, Radiobiology