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Planning study of comparison of dose in target volumes and volumes of organs at risk in patients with high grade glioma. Intensity Modulated Radiotherapy versus Three-dimensional Conformal radiotherapy (3D-CRT).

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Introduction: Postoperative radiotherapy, together with surgery and temozolomide chemotherapy is one of the treatment modalities with curative intent in patients with high grade glioma (HGG, WHO Grade III). Survival of these patients is significantly longer compared with patients with WHO Grade IV tumors and long term CNS toxicity could be expected after radiotherapy treatment in this group of patients. Recent clinical data on long term survivals in group of high grade glioma patients is showing that decreasing dose in region of hippocampus could have positive impact on mental function in this group of patients. In our institution, standard treatment of patients with high grade glioma is 3D-CRT radiotherapy.

Methodology: In our study we made retrospective planning study on 15 previously treated patients with HGG with 3D CRT. For this purpose we made treatment plan using same CT dataset with MR fusion and performed IMRT planning using inverse planning algorithm on Varian Eclipse Treatment Planning System (TPS). Comparison of 3D-CRT and IMRT plan data has been done.

Dose volume analysis of following structures has been done: V57 Gy (volume receiving dose of 57 Gy and more), maximal dose in brain stem, maximal doses in optic lenses, maximal dose in eye bulbus, maximal dose in hippocampus, maximal dose in optic nerves, optic chiasm and cochlea.

Results: Statistical analysis on patient data has been done and statistically significant difference in favor of IMRT Plans has been shown in V57 Gy volume ($p=0.0461$) and maximal dose in right cochlea ($p=0,0431$). Other critical structures has been shown decreased dose in organs of risk, but without any statistical significance. Maximal dose in right hippocampus has shown highest decrease but without statistical significance ($p=0.0547$)

Conclusion: IMRT treatment of patients is feasible and decrease of dose is possible in some of the organs at risk. Selection of appropriate clinical cases is important to prove value of IMRT in treatment of patients with high grade glioma.

Country

Macedonia

Institution

University Clinic of Radiotherapy and Oncology, Skopje, Macedonia

Primary author: STOJKOVSKI, Igor (University Clinic of Radiotherapy and Oncology)

Co-authors: PETRESKA, Bojana (University Clinic of Radiotherapy and Oncology); POPOSKA, Daniela (University Clinic of Radiotherapy and Oncology); LUKARSKI, Dushko (University Clinic of Radiotherapy and Oncology); PETKOVSKA, Gordana (University Clinic of Radiotherapy and Oncology); RISTESKI, Milan (University Clinic of Radiotherapy and Oncology)

Presenter: STOJKOVSKI, Igor (University Clinic of Radiotherapy and Oncology)

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