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Impact on dose and volume on irradiated brain on recurrence and survival of patients with glioblastoma multiformae

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Introduction: Glioblastoma multiformae is the most common and the most aggressive brain tumor. Despite the major advantages in personalization and precision of the treatment, median survival of patients is approximately 12 to 16 months. Today standard of care for patients with glioblastoma is postoperative radiotherapy with temozolomide followed by adjuvant temozolomide. Radiation is corner stone of the treatment and with highest benefit of all modalities of the treatment.

Methods: Dosimetric analysis of treatment plan data has been performed on 70 patients with glioblastoma, treated with postoperative radiochemotherapy with temozolomide, followed by adjuvant temozolomide. Patients were treated with 2 different treatment approaches, regarding definition of treatment volumes and prescription of radiation dose. First group of patients has been treated with one treatment volume receiving 60 Gy in 2 Gy daily fraction (31 patients) and second group of the patients has been treated with “cone down” technique, which encompass of two phases of treatment, first phase 46 Gy in 2 Gy fraction followed by “cone down” boost of 14 Gy in 2 Gy fraction (39 patients). Quantification of “V57Gy”, volume receiving 57 Gy and more and ratio between brain volume and “V57Gy” has been done. Average values of both parameters have been taken as a threshold value and patients have been split into 2 groups for each parameter (smaller and larger than threshold value).

Results: Mean value for Volume “V57 Gy” was 593,39 cm³ (range 166,94 to 968,60 cm³), Mean value for brain volume has been measured as 1332,86 cm³ (range 1047,00 to 1671,90 cm³) and mean value for ratio of brain and “V57Gy” has been 2,46 (range 1,42 to 7,67). Time to progression and overall survival of patients has been analyzed using Kaplan-Meir methodology. There was no significant difference between two groups for both “V57Gy” and ratio between brain volume and “V57Gy”.

Conclusion: Irradiated volume with dose more than 57Gy (“V57Gy) and ration between whole brain volume and “V57Gy” does not have any impact on recurrence and survival of patients with glioblastoma.

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