Title : Hippocampal Sparing Post-Operative Radiation Therapy and Its Impact on Memory Function in Newly Diagnosed High Grade Glioma Patients

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Asbstract :

Background: Gliomas are the most common primary brain tumors. The combination of surgery, post-operative radiotherapy with concurrent and adjuvant chemotherapy represents the standard approach to the treatment of high grade gliomas. Threedimensional conformal therapy (3DCRT) is increasingly used in the treatment of primary brain tumours. The use of intensitymodulated radiotherapy (IMRT) yields conformal dose distributions and better avoidance of organs at risk. Memory impairment

is a well-documented side effect of cranial irradiation. One possible hypothesis focuses on a neurogenic stem cell compartment in the hippocampus that is highly sensitive to radiation and potentially central to radiation-induced memory impairment.

Objectives: In this study we evaluated the possibility of sparing the hippocampi in post-operative radiation therapy for high grade glioma (3DCRT/IMRT technique) and its impact on preservation of memory function.

Methods: A total of 20 newly diagnosed, histologically confirmed cases of high grade glioma fulfilling the eligibility criteria were enrolled into the study. Patients received post-operative radiation therapy with concurrent and adjuvant temozolomide via the 3DCRT (3DCRT arm) / IMRT (IMRT arm) technique. Evaluation of dose to hippocampi (ipsilateral and contralateral) was done along with serial evaluation of memory function. Two groups were compared for the dose received by hippocampi and its impact on

memory function.

Results: Bilateral hippocampal sparing was achieved in all patients in IMRT arm. Whereas, in 3DCRT arm ipsilateral, hippocampus could be spared in 60% of patients. Memory function analysis showed that patients in IMRT arm had maintenance of the score for a period of 3 months post radiotherapy, while patients in 3DCRT arm showed a decline immediately after radiotherapy.

Conclusions: Bilateral hippocampal sparing with preservation of memory function is achievable with IMRT technique for delivery of post-operative radiotherapy in patients with high grade glioma without compromise in prescribed dose delivery.