Long-term survival after treatment of glioblastoma multiforme with hyperfractionated concomitant boost proton beam therapy.

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Abstract

PURPOSE: Although conventional x-ray therapy of 60 Gy in 30 fractions is generally used in our institute as well as others, the prognosis of patients with glioblastoma multiforme (GBM) is poor. The purpose of this study was to evaluate the characteristics of long-term GBM survivors after postoperative hyperfractionated concomitant boost x-ray radiation therapy and proton beam therapy.

METHODS AND MATERIALS: Twenty-three of 81 GBM patients who met the eligible criteria and consented to the protocol were treated with x-ray radiation therapy (50.4 Gy in 28 fractions in T2-high areas) and proton beam therapy (46.2 GyE in 28 fractions in gadolinium-enhanced volumes >6 hours after x-ray radiation therapy) concurrent with nimustine hydrochloride or temozolomide.

RESULTS: Treatment was completed in all patients within 38-50 days (median, 43 days). Six currently living patients (median follow-up period, 70.9 months) developed radiation necrosis without tumor recurrence. Of these, 5 underwent necrotomy and 2 received bevacizumab after necrotomy. Compared with the pretreatment status, the Karnofsky performance scale (KPS) for the 6 survivors decreased by 10%-30% at the last follow-up. However, radiation necrosis had been well controlled and 5 of 6 patients maintained a stable KPS without hospital care.

CONCLUSIONS: The results suggest that high-dose proton beam therapy could control GBM pathogenesis if the treatment area completely covers tumor infiltration. Although radiation necrosis was inevitable, the remaining brain volume was fairly well preserved in the long-term survivors.

PMID: 25413424 [PubMed - in process]