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Salvage boron neutron capture therapy for pediatric patients with recurrent diffuse midline glioma

Wei-Hsuan Huang [1 2 3], Ting-Yu Huang [4], Chun-Mei Lin [4], Pei-Fan Mu [5], Yi-Yen Lee [6], Shih-Hua Liu [1], Shih-Ming Hsu [7 8], Yi-Wei Chen [9 10 11 12]

Affiliations

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Abstract

Purpose: Pediatric diffuse malignant glioma located in the brainstem was officially named "diffuse midline glioma" (DMG) by the World Health Organization in 2016. For this disease, radical surgery is not beneficial, and the only major treatment strategy is radiotherapy. However, the dose limitations to brainstem tissue mean that treatment by radiotherapy can only control and not eradicate the tumors, and there is no effective treatment for recurrence, resulting in short overall survival of 6-12 months. This paper reports our experience with boron neutron capture therapy (BNCT), a new treatment process, and its efficacy in treating children with recurrent DMG.

Methods: From September 2019 to July 2022, we treated 6 children affected by recurrent DMG. With the collaboration of Taipei Veteran General Hospital (TVGH) and National Tsing-Hua University (NTHU), each patient received two sessions of BNCT within 1 month.

Results: Among the six patients, three showed partial response and the rest had stable disease after the treatment. The overall survival and recurrence-free survival duration after treatment were 6.39 and 4.35 months, respectively. None of the patients developed severe side effects, and only one patient developed brain necrosis, which was most likely resulted from previous hypofractionated radiotherapy received.

Conclusion: BNCT elicited sufficient tumor response with low normal tissue toxicity; it may benefit vulnerable pediatric patients with DMG.

Keywords: Boron neutron capture therapy; Brainstem; Diffuse midline glioma; Quality of life.

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