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Stereotactic Radiosurgery for Recurrent Medulloblastoma in Pediatric and Adult Patients: A Single-Institution Experience

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Abstract
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Abstract

Objectives:

Medulloblastoma is the most common malignant brain tumor in children. In recent decades, the therapeutic landscape has undergone significant changes, with stereotactic radiosurgery (SRS) emerging as a promising modality for the treatment of recurrent medulloblastoma. Our study aims to provide a comprehensive long-term analysis of the efficacy and safety of SRS for both pediatric and adult patients with recurrent medulloblastomas at a single institution.

Methods:

In our study, we retrospectively reviewed the clinical and radiological records of patients who underwent CyberKnife SRS for medulloblastoma at our institution between 1998 and 2023. Clinical and radiographic follow-up data were available for a total of 15 medulloblastomas in 10 patients. The study population consisted of 8 pediatric patients (ages 3-18) and 2 adult patients (ages 19-75). The median age at the time of SRS was 13 years and the median tumor volume accounted for 1.88 cc. The median biologically equivalent dose (BED) and single-fraction equivalent dose (SFED) were 126 Gy and 18 Gy, respectively. The SRS was administered at 75% of the median isodose line.

Results:

Following a median follow-up of 39 months (range: 6-78) post-treatment, 8 (53.3%) of the medulloblastomas progressed, 2 (13.3%) showed radiographic regression, and 5 (33.3%) remained stable in volume. The 3-year local tumor control rate for all medulloblastomas was 65.2%, with lower rates observed in the adult cohort (50%) and higher rates in pediatric patients (67.3%). The 3-year overall survival rate was 70%, with significantly higher rates in pediatric patients (75%) compared to adult patients (50%). The 3-year progression-free survival rate was 58.3%, with higher rates in pediatric patients (60%) compared to adult patients (50%). Two pediatric patients developed radiation-induced edema, while two adult patients experienced radiation necrosis at the latest follow-up, with both adult patients passing away.

Conclusion(s):

SRS is a safe and effective long-term treatment option for recurrent medulloblastoma in both pediatric and adult patients, resulting in improved patient outcomes. Although rare, radiation-induced edema and necrosis were observed as adverse events but were manageable. Overall, our findings provide optimistic evidence for the use of SRS as a viable treatment modality for medulloblastoma.