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Early progressive disease within 2 years in isocitrate dehydrogenase (IDH)-mutant astrocytoma may indicate radiation necrosis

Yukie Ozeki [1 2 3], Mai Honda-Kitahara [2 4], Shunsuke Yanagisawa [2], Masamichi Takahashi [2 5], Makoto Ohno [2], Yasuji Miyakita [2], Miu Kikuchi [2], Tomoyuki Nakano [2], Tomohiro Hosoya [2], Hirokazu Sugino [6], Kaishi Satomi [7], Akihiko Yoshida [6], Hiroshi Igaki [8], Yuko Kubo [9], Koichi Ichimura [7], Hiromichi Suzuki [4], Kenkichi Masutomi [1 10], Akihide Kondo [11], Yoshitaka Narita [2]

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Abstract

Background: Isocitrate dehydrogenase-mutant astrocytoma without cyclin-dependent kinase inhibitor 2A/B (CDKN2A/B) homozygous deletion typically follows a slow clinical course. However, some cases show early progression on magnetic resonance imaging, and these characteristics remain under-reported. This study aimed to elucidate the characteristics of isocitrate dehydrogenase-mutant astrocytoma showing early progression on magnetic resonance imaging.

Methods: This retrospective study included 52 cases of primary astrocytoma, isocitrate dehydrogenase-mutant, Central Nervous System (CNS) 5 World Health Organization grade 2-3 according to the World Health Organization 2021 classification. Patients underwent surgery followed by radiation therapy and/or chemotherapy at our institution from 2006 to 2019. Progression-free survival and overall survival were analyzed.

Results: There were 24 and 28 grade 2 and grade 3 astrocytomas, respectively. The median patient age was 38 years. Forty-three patients underwent radiotherapy. Progression was diagnosed by magnetic resonance imaging in 22 patients with initial radiotherapy. Thirteen of the 22 patients underwent surgery, and seven of the 13 patients received surgery within 24 months of the initial radiotherapy. Histopathologically, radiation necrosis was confirmed in four of these seven patients (57.1%). The true progression-free survival rate, excluding radiation necrosis, at 2 years after surgery was 91.3% for grade 2 astrocytoma and 88.5% for grade 3 astrocytoma. The 5-year overall survival rate was 85.7% for grade 2 tumours and 76.4% for grade 3 tumours.

Conclusions: Radiation necrosis should be considered in cases showing early progression of isocitrate dehydrogenase-mutant astrocytoma, and a second surgery should be performed to confirm true recurrence or radiation necrosis. Astrocytomas with telomerase reverse-transcriptase promoter mutations may relapse relatively early and should be followed up with caution.

Keywords: CDKN2A/B; IDH; TERT promoter; astrocytoma; radiation necrosis; recurrence.