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Prognostic and clinical significance of contrast enhancement in WHO grade 2 oligodendrogliomas

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Abstract

Purpose: To investigate the prognostic significance of contrast enhancement (CE) in grade 2 oligodendroglioma (ODG) and explore its clinical implications.

Methods: Patients diagnosed with isocitrate dehydrogenase (IDH)-mutant, 1p/19q co-deleted ODG between 2009 and 2016 were retrospectively enrolled from a single institution. The presence of CE was identified on preoperative MRIs, and clinical, radiologic, and histopathological data that was extracted. Subgroup analyses were performed to evaluate differences in these factors and prognoses. Cox proportional hazards regression analyses were used to identify prognostic factors.

Results: 258 patients with pathologically confirmed WHO grade 2 ODGs were included. The entire cohort was divided into the CE group (n = 133, 51.6%) and the non-CE group (n = 125, 48.4%). Patients with CE on preoperative MRI showed significantly worse progression-free survival (PFS) compared to those without CE (median PFS: 133 months vs. not reached; $p < 0.001$) and overall survival (OS) (mean OS: 151 months vs. 155 months; median OS: not reached; $p = 0.021$). Furthermore, CE presence was identified as an independent prognostic factor in the Cox multivariate analysis. Patients within the CE cohort were further categorized into strong and weak CE subgroups based on the pattern of CE. Logistic regression analysis revealed that non-frontal lobe location (OR = 3.287, $p = 0.042$), higher Ki-67 index (OR = 3.782, $p = 0.027$), and 1q/19p co-polysomy (OR = 9.658, $p = 0.001$) were significantly associated with a higher incidence of the strong CE in ODGs. Furthermore, ODG patients in the strong CE subgroup demonstrated the poorest survival outcomes.

Conclusion: CE on preoperative MRI is a valuable prognostic marker in the grade 2 ODGs, with strong CE indicating the poorest survival outcomes. Further validation through larger cohort studies will help confirm these findings and refine survival stratification in clinical practice.

Keywords: Contrast enhancement; Gadolinium; Neuroimaging; Oligodendroglioma; Prognosis.

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