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Risk factors for postoperative malignant progression of lower-grade gliomas: a systematic review and meta-analysis

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Abstract

Objectives: The primary aim was to evaluate the risk factors for postoperative malignant progression of lower-grade glioma (LGG) in patients.

Data sources: PubMed, EMBASE, Web of Science and Cochrane Library were searched from database inception to August 2024.

Eligibility criteria: Quantitative and original studies reporting risk factors for postoperative malignant progression of LGGs were included.

Results: 17 observational studies with 3810 glioma patients met the inclusion criteria. Factors including advanced age (HR 1.011, p = 0.042), contrast enhancement (HR 1.540, p = 0.001), rapid expanding speed (HR 4.525, p < 0.001), location in insular lobe (HR 1.514, p = 0.020), eloquence involved (HR 2.413, p < 0.001) and corpus callosum involved (HR 1.695, p = 0.002) were identified as risk factors of postoperative malignant progression of LGGs. High Karnofsky Performance Status (KPS) score (HR 0.955, p = 0.001), oligodendroglioma (HR 0.603, p < 0.001), oligoastrocytoma (HR 0.693, p = 0.016), isocitrate dehydrogenase (IDH) mutation (HR 0.406, p = 0.004), 1p19q codeletion (HR 0.534, p < 0.001), O^6-methylguanine-DNA methyltransferase promoter (MGMTP) methylation (HR 0.539, p = 0.007), resection operation (HR 0.277, p < 0.001) and high extent of resection (EOR) (HR 0.972, p = 0.038) were identified as factors that decreased the risk of postoperative malignant progression of LGGs.

Conclusion: This review identified multiple factors associated with the risk of postoperative malignant progression of LGGs, with moderate to high certainty of evidence supporting several key risk and protective factors. Surgeons should be aware of these factors and consider implementing more active treatment and surveillance measures for high-risk patients to improve prognosis.

Keywords: Glioma; Malignant progression; Meta-analysis; Postoperation; Risk factor; Systematic review.