Pre-operative predictors of post-operative seizure control in low-grade glioma: a systematic review and meta-analysis

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PMID: 38411788   DOI: 10.1007/s10143-024-02329-9

Abstract

As many as 80% of low-grade gliomas (LGGs) present with seizures, negatively impacting quality of life. While seizures are associated with gliomas regardless of grade, the importance of minimizing impact of seizures for patients with low grade tumors cannot be understated given the prolonged survival period in this population. The objective of this systematic review and meta-analysis was to summarize existing literature and identify factors associated with post-operative seizure control (defined as Engel I classification) in patients with LGGs, with a focus on pre-operative factors. Patient data extracted include tumor location and histology, pre-operative anti-seizure medication use, extent of resection (EOR), adjuvant treatment, pre-operative seizure type, duration, and frequency, and post-operative Engel classification. A random-effects model was used to calculate the effects of EOR, pre-operative seizure duration, adjuvant radiation, and adjuvant chemotherapy on post-operative seizure control. The effect of tumor location and histology on post-operative Engel I classification was determined using contingency analyses. Thirteen studies including 1628 patients with seizures were included in the systematic review. On meta-analyses, Engel I classification was associated with pre-operative seizure type (OR = 0.79 (0.63-0.99), p = 0.0385, focal versus generalized), frontal lobe LGGs (OR = 1.5 (1.1-2.0), p = 0.0195), and EOR (OR (95% CI) = 4.5 (2.3-6.7), p < 0.0001 gross-total versus subtotal). Pre-operative seizure duration less than one year, adjuvant radiation, adjuvant chemotherapy, and tumor histology were not associated with achieving Engel I classification. In addition to the known effects of EOR, Engel I classification is less likely to be achieved in patients with focal pre-operative seizures and more likely to be achieved in patients with frontal lobe LGGs.

Keywords: Focal seizure; Low-grade glioma; Seizures and tumors; Tumor-associated epilepsy; Tumor-related epilepsy; Tumoral epilepsy.

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