

Beyond surgical resection: evaluating stereotactic brachytherapy iodine-125 for low-grade gliomas: a systematic review and meta-analysis

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Abstract

Stereotactic Brachytherapy Iodine-125 (SBT I-125) has been investigated by some studies for the treatment of lowgrade gliomas. We performed a meta-analysis to assess the efficacy and safety of SBT I-125 Brachytherapy for treatment of patients with Low-Grade Gliomas. PubMed, Cochrane, Web of Science, and EMBASE databases were searched for randomized and observational studies. This systematic review and meta-analysis was conducted according to the Cochrane Collaboration and the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) statement guidelines. We used relative risk (RR) with 95% confidence intervals and random effects model to compare the effects of I-125 SBT treatment on the interest outcomes. We evaluated heterogeneity using I² statistics; we considered heterogeneity to be significant if the p-value was less than 0.05 and I² was higher than 35%. We performed statistical analysis using the software R (version 4.2.3). A total of 20 studies with a cohort of 988 patients with low grade gliomas who received SBT I-125 as a treatment option. The pooled analysis evidenced: (1) Complication rate of 10% (95% CI: 7-12%; I² = 60%); (2) 5-year PFS of 66% (99% CI: 45-86%; I²= 98%); (3) 10-year PFS was 66% (99% CI: 45-86%; I²= 98%); (4) Malignant transformation rate of 26% (95% CI: 8-45%; I²=0); (5) Mortality of 33% (95% CI: 15-51%; I² = 0%). Our systematic review and meta-analysis of SBT I-125 for low-grade gliomas have revealed significant concerns regarding its safety and efficacy. Despite a proportion of patients remaining progression-free, elevated rates of complications and mortality cast doubt on the intervention's reliability. Future research should prioritize long-term follow-up studies, standardized protocols, and comparative effectiveness research.

Keywords: Brachytherapy; Iodine-125; Low-grade gliomas; Stereotactic.

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