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Cesium 131 seeds for high-grade gliomas: a systematic review and meta-analysis of gammatile as a brachytherapy innovation

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Abstract

High-grade gliomas (HGG) are a neuro-oncology challenge due to their aggressive nature, with conventional therapies like radiation and chemotherapy often yielding limited success. Cesium-131 (Cs-131) brachytherapy is a promising adjunct due to its short half-life (9.7 days) and high energy, enabling targeted radiation delivery with less exposure. GammaTile (GT Medical Technologies) uses Cs-131 seeds in a bioresorbable collagen matrix, enabling immediate post-surgical radiation while safeguarding healthy tissue. Therefore, this study aims to evaluate the current evidence of using GammaTile in HGG. We performed a systematic review and single-arm meta-analysis. PubMed, Web of Science, Scopus, and Embase were searched for eligible trials. A random-effects model was used to calculate the Proportions and Means, with 95% confidence intervals (CIs) and a significance level of 5%. Statistical analyses were conducted with RStudio 4.3. Twelve studies included 110 patients, 57 male (51.8%), with a mean age of 50.2 years and a follow-up of 29.47 months. Four endpoints were analyzed: Mortality (Proportion 6%; 95% CI 2% to 15%; $I^2 = 0\%$); Recurrence (Proportion 100%; 95% CI 11% to 100%; $I^2 = 0\%$); Overall Survival (OS) (Mean 27.30 months; 95% CI 17.34 to 42.96; $I^2 = 63.9\%$); Progression-Free Survival (PFS) (Mean 8.81 months; 95% CI 7.43-10.43; $I^2 = 0\%$). GammaTile shows promising outcomes for HGG, with mean OS of 27.30 months, and PFS of 8.81 months. Despite the 100% recurrence rate, the 6% mortality rate suggests contribution to prolonging patient survival.

Keywords: Cesium 131; GammaTile; High-grade gliomas; Meta-Analysis; Systematic review.

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