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Current trends in reoperation for recurrent glioblastoma: a meta-analysis (2007-2023)

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Abstract

Purpose: Despite conflicting evidence, reoperation for recurrent glioblastoma (rGBM) achieving complete resection of enhancing-tumor (CRET) may offer benefits over partial resection or salvage therapy alone. However, pooled analyses remain limited.

Methods: A systematic search identified rGBM studies comparing reoperation and non-reoperation, including chemotherapy with/without radiotherapy, radiation-based therapies (RBT), and best supportive care (BSC).

Results: Thirty-six studies, comprising 10,738 patients, were included, with 2,806 undergoing reoperation. Nine propensity-score-matched studies and one clinical trial were identified. Mean overall survival (OS) favored reoperation (19.66 months) over chemotherapy with/without radiotherapy (12.56 months, $p < 0.00001$) and BSC (4.04 months, $p < 0.00001$), but not over chemotherapy alone (14.60 months) or RBT (14.26 months)($p > 0.05$). Multivariate OS favored reoperation over chemotherapy with/without radiation(HR = 0.62,95%CI:0.50-0.76,$p < 0.00001$), but not to stereotactic radiosurgery (SRS) (HR = 0.52,95%CI:0.25-1.08,$p = 0.08$) or chemotherapy alone (HR = 0.80,95%CI:0.63-1.00,$p = 0.05$). Progression-free survival after recurrence (PFS2) was only compared between reoperation and chemotherapy with/without radiotherapy, favoring reoperation (8.36 vs. 4.97 months, $p < 0.00001$). Multivariate analysis also favored reoperation (HR = 0.56, 95% CI:0.41-0.76,$p = 0.0002$).The mean post-recurrence survival (PRS) was 12.18 months in the reoperation group, 9.19 months in the chemotherapy with/without radiotherapy, and 9.64 months in SRS. Multivariate PRS favored reoperation over chemotherapy with/without radiotherapy (HR = 0.78, 95%CI: 0.62-0.98,$p = 0.04$). CRET with < 1 cm^3 residual tumor correlated with improved PRS over incomplete resection (HR: 0.54, 95%CI:0.39-0.73, $p = 0.04$).

Conclusion: The role of reoperation in rGBM remains uncertain. While it may improve survival in selected cases, limited high-quality data hinder definitive conclusions. Achieving CRET may correlate with improved PRS over partial resection. Further prospective trials are necessary to guide optimal management of rGBM.

Keywords: Complications; Glioblastoma; Overall Survival; Post-Recurrent Survival; Progression-Free Survival-2; Reoperation.