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The detrimental effect of biopsy preceding resection in surgically accessible glioblastoma: results from the national cancer database

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Abstract

Purpose: Aggressive resection in surgically-accessible glioblastoma (GBM) correlates with improved survival over less extensive resections. However, the clinical impact of performing a biopsy before definitive resection have not been previously evaluated.

Methods: We analyzed 17,334 GBM patients from the NCDB from 2010-2014. We categorized them into: "upfront resection" and "biopsy followed by resection". The outcomes of interest included OS, 30-day readmission/mortality, 90-day mortality, and length of hospital stay (LOS). The Kaplan-Meier methods and accelerated failure time (AFT) models were applied for survival analysis. Multivariable binary logistic regression were performed to compare differences among groups. Multiple imputation and propensity score matching (PSM) were conducted for validation.

Results: "Upfront resection" had superior OS over "biopsy followed by resection" (median OS:12.4 versus 11.1 months, log-rank $p = 0.001$). Similarly, multivariable AFT models favored "upfront resection" (time ratio[TR]:0.83, 95%CI: 0.75-0.93, $p = 0.001$). Patients undergoing "upfront gross-total resection (GTR)" had higher OS over "upfront subtotal resection (STR)", "GTR following STR", and "GTR or STR following initial biopsy" (14.4 vs. 10.3, 13.5, 13.3, and 9.1 months;TR: 1.00 [Ref.], 0.75, 0.82, 0.88, and 0.67). Recent years of diagnosis, higher income, facilities located in Southern regions, and treatment at academic facilities were significantly associated with the higher likelihood of undergoing upfront resection. Multivariable regression showed a decreased 30 and 90-day mortality for patients undergoing "upfront resection", 73% and 44%, respectively ($p < 0.001$).

Conclusions: Pre-operative biopsies for surgically accessible GBM are associated with worse survival despite subsequent resection compared to patients undergoing upfront resection.

Keywords: Biopsy; Glioblastoma (GBM); National Cancer Database (NCDB); Overall survival; Upfront resection.

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