

En bloc Resection of Glioblastoma is Independently Associated with Improved Outcomes

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Introduction

Surgical resection is a critical component in the initial treatment of glioblastoma (GBM). En bloc resection (EBR) of the contrast-enhancing portion has been described in the literature but with limited data. Therefore, we undertook a retrospective analysis to test whether EBR produced a greater extent of resection.

Methods

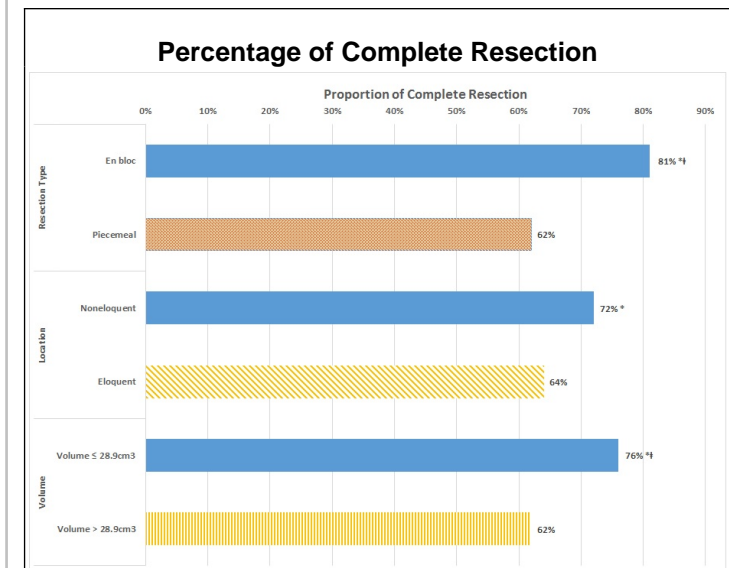
We identified all patients with a newly diagnosed GBM who underwent resection at MD Anderson from 6/1/1993 to 12/31/2015. Demographics, presenting symptoms, intraoperative data, method of resection (en bloc vs. piecemeal), postoperative outcomes, and volumetric imaging data were obtained. Complete resection (CR) was defined as 100% resection of all enhancing disease. EBR was defined as removal of a tumor as a single specimen using a circumferential technique. A neurological complication was counted if the patient developed new/worsening neurological deficits postoperatively. Multivariate analyses were performed using propensity-score weighted multivariate logistical regression.

Results

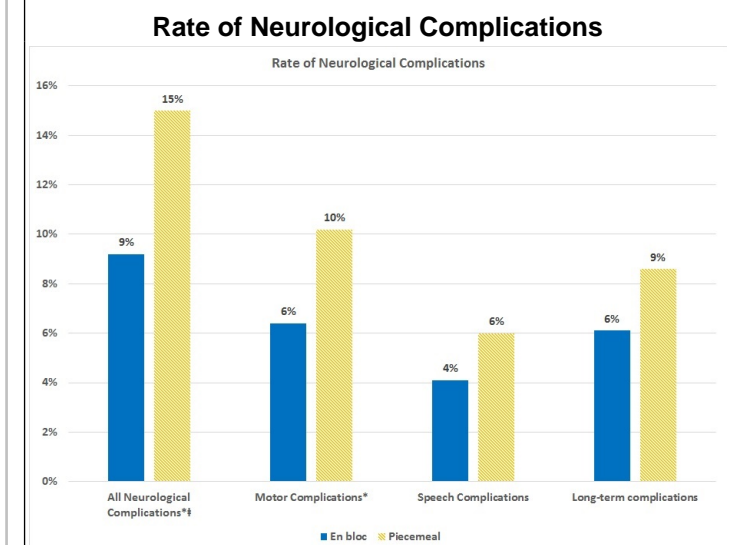
We identified 1204 patients who underwent resection for a newly diagnosed GBM. 436 cases (36%) were resected using an EBR and 766 cases (64%) were resected using a piecemeal technique. CR was achieved in 69% of cases. Multivariate analysis demonstrated that EBR was associated with a significantly higher rate of CR compared to piecemeal resection (81% vs 62%, respectively) (OR=2.4, 95% CI: 1.8-3.3, $p < 0.001$). Postoperative neurological complications occurred in 13% of patients. In a multivariate analysis, EBR was associated with a significantly lower rate of neurological complications compared with piecemeal resection (9% vs 15%, respectively) (Odds ratio=0.6, 95% CI: 0.4-0.9, $p = 0.028$). We performed a subgroup analysis of tumors located in eloquent cortex. Multivariate analysis of this subgroup showed that EBR had a significantly higher rate of CR (79% vs 58%, $p < 0.001$), and a lower rate of neurological complications (11% vs 20%, $p = 0.018$) compared to piecemeal resection.

Conclusions

EBR of GBM is associated with significantly higher rates of CR and lower rates of neurological complications, even for tumors arising in eloquent locations. Use of an EBR technique should be considered when resecting GBMs.



The percentage of complete resection is shown for each variable. Tumor volume is dichotomized for the purpose of visualization. * = Statistically significant based on univariate analysis. = based on multivariate analysis.



The percentage of all neurological complications and specific subtypes are shown for the different resection techniques (en bloc vs piecemeal).