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Ventricular Entry During Glioblastoma Resection is Associated With Reduced Survival and Increased Risk of Distant Recurrence

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Abstract

Background and objectives: Although subventricular zone (SVZ) involvement is known to correlate with more aggressive tumor behavior and reduced survival in glioblastoma (GBM), the role of ventricular entry (VE) on outcomes is less clear and remains debated. This study aims to investigate the impact of VE on outcomes and overall survival (OS) in GBM.

Methods: A retrospective analysis of patients with newly diagnosed supratentorial GBMtreated between 2013 and 2023 at the University of Pittsburgh Medical Center was performed. SVZ involvement, size, and extent of resection were identified through preoperative and postoperative imaging. VE was identified through operative notes and postoperative imaging review.

Results: A total of 282 patients met inclusion criteria. VE occurred in 38.3% (n = 108) of patients and was more common in those with SVZ-contacting tumors (P < .001). Patients who had VE had significantly lower median OS compared with non-VE (12 months vs 18 months, P < .001). VE was identified as an independent risk factor for decreased OS in patients with GBM, after adjusting for well-known prognostic factors and SVZ contact (hazard ratios: 1.62 [1.12-2.34], P = .001). Only patients who had VE developed postoperative hydrocephalus (n = 4, 1.4%, P = .021) and had external ventricular drain placed (n = 6, 2.1%, P = .003). Distant parenchymal recurrence and leptomeningeal dissemination (LMD) rates were significantly higher in the VE group compared with the non-VE group (63.9% vs 39.7%, P < .001, and 23.1% vs 13.2%, P = .035), and VE emerged as an independent predictor of distant recurrences/LMDs in multivariable logistic regression (odds ratio: 4.7 [2.11-10.4], P < .001).

Conclusion: Our data suggest that VE during GBM resection is a significant independent risk factor for decreased survival and increased distant recurrence/LMD. While maximizing tumor resection remains critical, neurosurgeons must consider the potential adverse outcomes associated with VE because it may diminish the survival benefits of gross-total resection. Prospective studies are warranted to better understand the risks and benefits of VE in GBM surgery.

Keywords: Glioblastoma; Leptomeningeal disease; Periventricular; Recurrence; Subventricular zone; Ventricular entry.

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