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# Does waiting for surgery matter? How time from diagnostic MRI to resection affects outcomes in newly diagnosed glioblastoma

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## Abstract

**Objective:** Maximal safe resection is the standard of care for patients presenting with lesions concerning for glioblastoma (GBM) on magnetic resonance imaging (MRI). Currently, there is no consensus on surgical urgency for patients with an excellent performance status, which complicates patient counseling and may increase patient anxiety. This study aims to assess the impact of time to surgery (TTS) on clinical and survival outcomes in patients with GBM.

**Methods:** This is a retrospective study of 145 consecutive patients with newly diagnosed IDH-wild-type GBM who underwent initial resection at the University of California, San Francisco, between 2014 and 2016. Patients were grouped according to the time from diagnostic MRI to surgery (i.e., TTS):  $\leq 7$ ,  $> 7$ -21, and  $> 21$  days. Contrast-enhancing tumor volumes (CETVs) were measured using software. Initial CETV (CETV1) and preoperative CETV (CETV2) were used to evaluate tumor growth represented as percent change ( $\Delta$ CETV) and specific growth rate (SPGR; % growth/day). Overall survival (OS) and progression-free survival (PFS) were measured from the date of resection and were analyzed using the Kaplan-Meier method and Cox regression analyses.

**Results:** Of the 145 patients (median TTS 10 days), 56 (39%), 53 (37%), and 36 (25%) underwent surgery  $\leq 7$ ,  $> 7$ -21, and  $> 21$  days from initial imaging, respectively. Median OS and PFS among the study cohort were 15.5 and 10.3 months, respectively, and did not differ among the TTS groups ( $p = 0.81$  and  $0.17$ , respectively). Median CETV1 was 35.9, 15.7, and 10.2 cm<sup>3</sup> across the TTS groups, respectively ( $p < 0.001$ ). Preoperative biopsy and presenting to an outside hospital emergency department were associated with an average 12.79-day increase and 9.09-day decrease in TTS, respectively. Distance from the treating facility (median 57.19 miles) did not affect TTS. In the growth cohort, TTS was associated with an average 2.21% increase in  $\Delta$ CETV per day; however, there was no effect of TTS on SPGR, Karnofsky Performance Status (KPS), postoperative deficits, survival, discharge location, or hospital length of stay. Subgroup analyses did not identify any high-risk groups for which a shorter TTS may be beneficial.

**Conclusions:** An increased TTS for patients with imaging concerning for GBM did not impact clinical outcomes, and while there was a significant association with  $\Delta$ CETV, SPGR remained unaffected. However, SPGR was associated with a worse preoperative KPS, which highlights the importance of

tumor growth speed over TTS. Therefore, while it is ill advised to wait an unnecessarily long time after initial imaging studies, these patients do not require urgent/emergency surgery and can seek tertiary care opinions and/or arrange for additional preoperative support/resources. Future studies are needed to explore subgroups for whom TTS may impact clinical outcomes.

**Keywords:** glioblastoma; outcomes; time to surgery; tumor growth; wait time.