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Introduction: Glioblastoma (GBM) is the most common malignant primary brain tumor in adults linked to poor survival in affected patients due to its invasive and aggressive nature. The potential role of sexual dimorphism in GBM outcomes has long been overlooked. Notably, males and females differ in tumor behavior across many cancers (Clocchiatti 2016), which may be attributable to differences in genetic makeup and physiology, and in GBM there is a difference incidence rates between males and females.

Objective: The primary objective of the study was to investigate sexual dimorphism in GBM patients, and compare median survival outcomes between sexes based on tumor location, laterality, age, tumor growth velocity, and extent of resection.

Methods: Patients (n = 216, males: n = 129, females: n = 87) who received standard-of-care (Stupp protocol) were included in this study to investigate sex differences in tumor characteristics. Pre-surgical MRIs were analyzed to determine tumor laterality. The patient cohort was divided into three age groups (Group I: 18-29, Group II: 30-49, and Group III: >50). Analyses were done using Cox proportional hazard modeling to determine variables affecting patient survival, and the log-rank test was utilized to compare differences in survival rate in Kaplan-Meier analysis.

Results: We found a significant difference in overall survival (OS), with females showing a substantial increase in median OS (197 days, p = 0.0391). This increase was driven by survival benefit in young female patients (p = 0.0409). Among middle-aged patients, females still showed a trend towards increased survival as compared to male patients (p = 0.0700); however, no notable trends were observed in elderly patients. Female patients who possess a tumor in the right hemisphere show a trend towards increased median OS in comparison to males (345 days, p = 0.0921). Additionally, we found a significant increase in median progression-free survival (PFS) following subtotal resection (STR) in females relative to males (198 days, p = 0.0326).

Conclusion: OS and PFS were significantly different between the sexes, and female patients possessing a left frontal tumor may have a survival advantage in comparison to females with a right hemisphere GBM. Overall, our results suggest that young female patients receiving standard-of-care may have a better prognosis than male patients.