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Presentation, surgical outcome, and supplementary motor area syndrome risk of posterior superior frontal gyrus tumors

Megan M J Bauman^{1 2}, Ignacio Jusue-Torres², Jaclyn J White², Samantha M Bouchal^{1 2}, Andrea R Hsu^{1 2}, Yooree Ha^{1 2}, Andrew D Pumford^{1 2}, Sukwoo Hong², Cecile Riviere-Cazaux^{1 2}, Kimberly Wang^{1 2}, Desmond A Brown², Ahmed Helal², Ian F Parney²

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Objective: Following resection of posterior superior frontal gyrus (PSFG) tumors, patients can experience supplementary motor area (SMA) syndrome consisting of contralateral hemiapraxia and/or speech apraxia. Given the heterogeneity of PSFG tumors, the authors sought to determine the risk of postoperative deficits and assess predictors of outcomes for all intraparenchymal PSFG tumors undergoing surgery (biopsy or resection), regardless of histology.

Methods: This was a retrospective single-center cohort study of adult PSFG-region tumors undergoing biopsy or resection by a single surgeon.

Results: A total of 106 consecutive patients undergoing 123 procedures (21 biopsies, 102 resections) fulfilled inclusion and exclusion criteria. Anaplastic astrocytomas were the most frequent among resected tumors (39% vs 29%), while glioblastomas were most common among biopsies (38% vs 27%) ($p < 0.0001$). The biopsy cohort was more likely to have tumor involvement outside the PSFG (90% vs 62%) ($p = 0.011$), most commonly in the motor cortex (67% vs 31%) ($p = 0.005$). Seizures were the most common presenting symptom in the resection cohort ($p = 0.017$), while motor deficits were more common in the biopsy cohort (58% vs 29%) ($p < 0.001$). Immediate postoperative neurological deficits occurred in 71 cases (58%), but only 3 of the deficits were permanent at 6 months of follow-up (2%). Postoperative SMA syndrome occurred in 48 cases (47%) and was significantly associated with involvement of the motor cortex ($p = 0.018$) or cingulate gyrus ($p = 0.023$), which were also significant in multivariate analysis as risk factors for SMA syndrome. However, postoperative SMA syndrome was not significantly associated with overall survival ($p = 0.51$). There were no perioperative deaths, but corpus callosum involvement ($p < 0.001$), contrast enhancement ($p = 0.003$), and glioblastoma pathology ($p = 0.038$) predicted worse overall survival in patients undergoing resection.

Conclusions: Nearly half of all patients undergoing resection of PSFG-region tumors experience a postoperative SMA syndrome. Individuals with corpus callosum and/or motor cortex involvement may be at an increased risk of experiencing SMA syndrome. However, these deficits are usually transient, and the risk of permanent new deficits is very low (3%). Preoperative characteristics including corpus callosum involvement and tumor enhancement-in addition to pathology-might serve as predictors of overall survival within this patient population.

Keywords: SMA syndrome; neurooncology; oncology; posterior superior frontal gyrus; supplementary motor area; tumor surgery.