

J Neurosurg Pediatr. 2024 Mar 8;1-8. doi: 10.3171/2024.1.PEDS23225. Online ahead of print.

Risk factors for postoperative ventriculoperitoneal shunt requirement in pediatric patients with brain tumors invading or adjacent to CSF circulation pathways

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PMID: 38457814 DOI: [10.3171/2024.1.PEDS23225](https://doi.org/10.3171/2024.1.PEDS23225)

Abstract

Objective: Hydrocephalus is a common comorbidity of brain tumors in children that may persist following brain tumor resection. This study aimed to explore perioperative risk factors associated with postoperative ventriculoperitoneal shunt (VPS) placement for tumors located at or adjacent to the CSF circulation pathway.

Methods: Patients aged 0-18 years with tumors invading or adjacent to the CSF circulation pathways who underwent brain tumor resection between October 2015 and September 2021 were included in this study. The outcome metric was whether patients underwent VPS placement within 6 months of tumor resection. Patients were followed up every 3-6 months after surgery. Demographic and perioperative imaging characteristics, clinical variables, and long-term treatments, including radiotherapy or chemotherapy, were included in the analysis.

Results: Two hundred sixty-five children were included in this study. Of these patients, 38 (14.34%) underwent VPS placement within 6 months of tumor resection. One hundred thirty-two patients (49.81%) presented with preoperative hydrocephalus. Results from the multivariate analysis showed that medulloblastoma (OR 4.15, 95% CI 1.74-9.91, $p = 0.001$), lateral/third ventricle tumors (OR 4.07, 95% CI 1.33-12.30, $p = 0.014$), postoperative intraventricular hematoma (OR 3.36, 95% CI 1.53-7.38, $p = 0.003$), and presence of subdural hygroma in the nonoperated area within 48 hours after tumor resection (OR 2.78, 95% CI 1.15-6.74, $p = 0.024$) were independent risk factors for postoperative VPS placement.

Conclusions: Postoperative lateral/third ventricle hematoma and subdural hygroma in the nonoperated area, anatomical location, and tumor histology may be potential risk factors for a postoperative VPS after brain tumor resection.

Keywords: cerebrospinal fluid diversion; hydrocephalus; pediatric brain tumor.

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