Neurosurgery. 2025 Jun 25. doi: 10.1227/neu.0000000000003592. Online ahead of print.

Risk Factors, Indications, and Effectiveness of Cerebrospinal Fluid Diversion in Patients With High-Grade Glioma-Associated Hydrocephalus: A Systematic Review and Meta-Analysis

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PMID: 40558064 DOI: 10.1227/neu.0000000000003592

Abstract

Background and objectives: The role of cerebrospinal fluid (CSF) diversion in patients with high-grade glioma (HGG)-associated hydrocephalus is debated. This systematic review and meta-analysis summarizes the risk factors, indications, and effectiveness of CSF diversion in patients with HGG-associated hydrocephalus, with the goal of evaluating patient survival, functional improvement, and symptomatic improvement after CSF diversion.

Methods: PubMed, SCOPUS, CINAHL, Cochrane, and Embase databases were queried according to Preferred Reporting Items for Systematic Reviews and Meta-Analyses guidelines to identify studies describing adult HGG patients with hydrocephalus who underwent CSF diversion. Primary outcomes included symptomatic improvement, survival after CSF diversion, and Karnofsky Performance Status (KPS) before and after CSF diversion. Secondary outcomes included risk of hydrocephalus with ventricular opening during initial tumor resection, and CSF diversion-related complications and mortality.

Results: A total of 15 studies yielded 4901 patients with HGG, of whom 333 suffered from HGG-associated hydrocephalus. Pooled proportion of patients with hydrocephalus among those with HGG was 8% (95% CI 3.63-16.3). Of 248 patients for which presenting symptoms of hydrocephalus were reported, the most common symptoms were cognitive decline (n = 110, 44%), gait disturbance (n = 87, 35%), headache (n = 79, 32%), and deteriorating consciousness (n = 48, 19%). After CSF diversion, 79% (95% CI 70.1-89.7, P < .01) of patients demonstrated symptomatic improvement. In studies that reported both pre- and post-shunt KPS score, there was a pooled mean increase of 15.04 points (95% CI 10.16-19.91, P < .00001) after shunting. The average, nonweighted median post-CSF diversion survival was 4.7 months (range, 2.7-7 months). The complication rate of CSF diversion was 28% (67/243) for patients in publications that reported complications. No cases of peritoneal seeding after CSF diversion were reported in the included studies.

Conclusion: CSF diversion in adults with HGG-associated hydrocephalus led to a significant improvement in both KPS score and symptoms. If functionality and symptom improvement are

patients' priorities, CSF diversion may be recommended.

Keywords: Cerebrospinal fluid diversion; High-grade glioma; Hydrocephalus; Malignant glioma; Ventriculoperitoneal shunt.

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