Frankfurt Grading system

Prophylactic ventricular catheter placement (EVD) is often performed prior to a posterior fossa tumor surgery (PFT); however, there is no general consensus regarding the indications.

The purpose of the study was to establish a novel grading system for the prediction of required CSF drainage due to symptomatic elevated intracranial pressure (ICP) after resection of a PFT to identify patients who require an EVD.

The authors performed a retrospective analysis of data from a prospective database. All patients who had undergone resection of a PFT between 2012 and 2017 at the University Hospital, Goethe University Frankfurt, were identified and data from their cases were analyzed. PFTs were categorized as intraparenchymal (iPFT) or extra parenchymal (ePFT). Prior to resection, patients underwent EVD placement, prophylactic burr hole placement, or neither. The authors assessed the amount of CSF drainage (if applicable), rate of EVD placement at a later time point, and complication rate and screened for factors associated with CSF drainage. By applying those factors, they established a grading system to predict the necessity of CSF drainage for elevated ICP.

A total of 197 patients met the inclusion criteria. Of these 197, 70.6% received an EVD, 15.7% underwent prophylactic burr hole placement, and 29.4% required temporary CSF drainage. In the prophylactic burr hole group, 1 of 32 patients (3.1%) required EVD placement at a later time. Independent predictors for postoperative need for CSF drainage due to symptomatic intracranial hypertension in patients with iPFTs were preoperative hydrocephalus (OR 2.9) and periventricular CSF capping (OR 2.9), whereas semi-sitting surgical position (OR 0.2) and total resection (OR 0.3) were protective factors. For patients with ePFTs, petroclival/midline tumor location (OR 12.2/OR 5.7), perilesional edema (OR 10.0), and preoperative hydrocephalus (OR 4.0) were independent predictors of the need for CSF drainage. According to the grading system, CSF drainage after resection of iPFT or ePFT, respectively, was required in 16.7% and 5.1% of patients with a score of 0, in 21.1% and 12.5% of patients with a score of 1, in 47.1% and 26.3% of patients with a score of 2, and in 100% and 76.5% of patients with a score \geq 3 (p < 0.0001). The rate of relevant EVD complications was 4.3%, and 10.1% of patients were shunt-dependent at 3-month follow-up.

This novel grading system for the prediction of the need for CSF drainage following resection of PFT might be of help in deciding in favor of or against prophylactic EVD placement ¹⁾

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Tumor category and predictive variables	Points
Intraparenchymal tumors	
Hydrocephalus	
Yes	1
No	0
Periventricular CSF capping	
Yes	1
No	0
Surgical position	
Other than semi-sitting position (park bench/prone	1
Semi-sitting	0
Expected extent of resection	
Subtotal	1
Total	0
Extraparenchymal tumors	
Location	
Petroclival	2
Midline	1
Lateral	0
Perilesional edema	
Yes	2
No	0
Hydrocephalus	
Yes	1
No	0

In the first external validation study for the two predictive systems in use. Modified Canadian Preoperative Prediction Rule for Hydrocephalus demonstrated poor predictive accuracy and the Frankfurt grading system demonstrated good accuracy. EVD insertion and its duration were significantly predictive of the need for permanent CSF diversion²⁾

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Won SY, Gessler F, Dubinski D, Eibach M, Behmanesh B, Herrmann E, Seifert V, Konczalla J, Tritt S, Senft C. A novel grading system for the prediction of the need for cerebrospinal fluid drainage following posterior fossa tumor surgery. J Neurosurg. 2019 Jan 4;132(1):296-305. doi: 10.3171/2018.8.JNS181005. PMID: 30611134.

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