



Risk factors for hydrocephalus requiring ventriculostomy in patients with intraventricular hemorrhage

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Introduction

Ventriculostomy (external ventricular drainage [EVD]) after intraventricular hemorrhage (IVH) without clinical or radiographic evidence of symptomatic hydrocephalus is controversial. No study has examined factors that might predict which patients will develop hydrocephalus requiring EVD after IVH.

Methods

Records from January 2007–January 2014 were searched for “intraventricular hemorrhage” or “IVH”. Inclusion criteria were IVH after intracerebral hemorrhage (ICH), trauma, tumor, or vascular anomalies. Exclusion criteria were IVH with more than minimal subarachnoid hemorrhage, catastrophic ICH, layering IVH only, or symptomatic hydrocephalus treated immediately with EVD. Symptomatic hydrocephalus was defined as causing more than drowsiness. The modified Graeb Score(mGS) was used to measure IVH. Statistics included Chi -squared, Student’s t-, and Mann-Whitney tests, and univariate and multivariate logistic regression.

Results

105 patients met inclusion criteria, 30(28.6%) required EVD. Factors significantly different (p<0.05) between the EVD and No-EVD groups were hydrocephalus at presentation (73.3%v29.3%), midline shift >5mm (63.3%v24%), GCS=8 (70.0%v18.7%), and median mGS [18.5±5.4(5-29) v 9±4.5(2-21)]. The two most common IVH patterns were unilateral (n=31,29.5%) or panventricular (n=49,46.7%); no unilateral IVH required EVD, while 25(51%) patients with panventricular IVH required EVD. The median mGS for the panventricular IVH EVD v No-EVD groups were 19±4.4(12-29) and 12±3.3(8-21)(p<0.001). The majority of patients required EVD (n=25,83.3%) within the first day with a mean of 6.4±3.3(1.5-14) hours (n=25,83.3%). The remaining 5(16.7%) patients did so at a mean of 70.7±22.7(50-104.5) hours. On multivariate analysis, mGS [1.18(1.02-1.41),p=0.029], GCS=8 [6.94(1.73-35.48),p=0.006], and hydrocephalus at admission [4.3(1.01-22.81),p=0.048] were associated with EVD placement.

Conclusions

Among patients with IVH but no symptomatic hydrocephalus at presentation, the risk of subsequent need for EVD is variable, but greater with more extensive IVH, asymptomatic hydrocephalus on initial brain imaging, and coma. While the need for EVD occurs within the first day in most patients, a minority require EVD after 48 hours.

Learning Objectives

- 1) Risk of symptomatic hydrocephalus requiring ventriculosomy increases with increasing IVH hemorrhage volume and ventricular involvement
- 2)Hydrocephalus after IVH occurs most often within a day of presentation, but delayed hydrocephalus may occur days after IVH