

Validation of the Barrow Neurological Institute Scale for Symptomatic Vasospasm Prediction Following Aneurysmal Subarachnoid Hemorrhage

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Introduction

The Barrow Neurological Institute (BNI) scale (Table) was introduced in 2012 as a simple and quantitative method for symptomatic vasospasm prediction following aneurysmal subarachnoid hemorrhage (SAH). The scale was developed from data collected from 218 patients from the Barrow Ruptured Aneurysm Trial (BRAT). Validation of this scale in a large, multicenter aneurysmal SAH cohort may encourage its use in broader clinical neurovascular practice.

Methods

The records of 474 patients with aneurysmal SAH were studied to evaluate the predictive capacities of the BNI and original Fisher scales. The study sample included 241 patients from Massachusetts General Hospital (MGH) and 233 patients from the University of California, San Francisco (UCSF).

Results

Within this external cohort, the mean age at the time of presentation was 55.7 years and there were 353 (74.5%) female patients. Of the 474 total patients, 108 (22.8%) developed symptomatic vasospasm, which occurred in 44% and 42.4% of patients with BNI grade 4 and 5 SAH, respectively, and 26.7% of patients with Fisher grade 3 SAH (Figure). Chi-square for trend analysis demonstrated that the BNI scale (Chi-square 40.9, $P < 0.0001$) performed better than the Fisher scale (Chi-square 7.9, $P = 0.0048$) with respect to symptomatic vasospasm prediction in the combined cohort. Mean intra- and inter-observer agreement was greater for the BNI scale (kappa 0.83 and kappa 0.76, respectively) than the Fisher scale (kappa 0.62 and kappa 0.52, respectively).

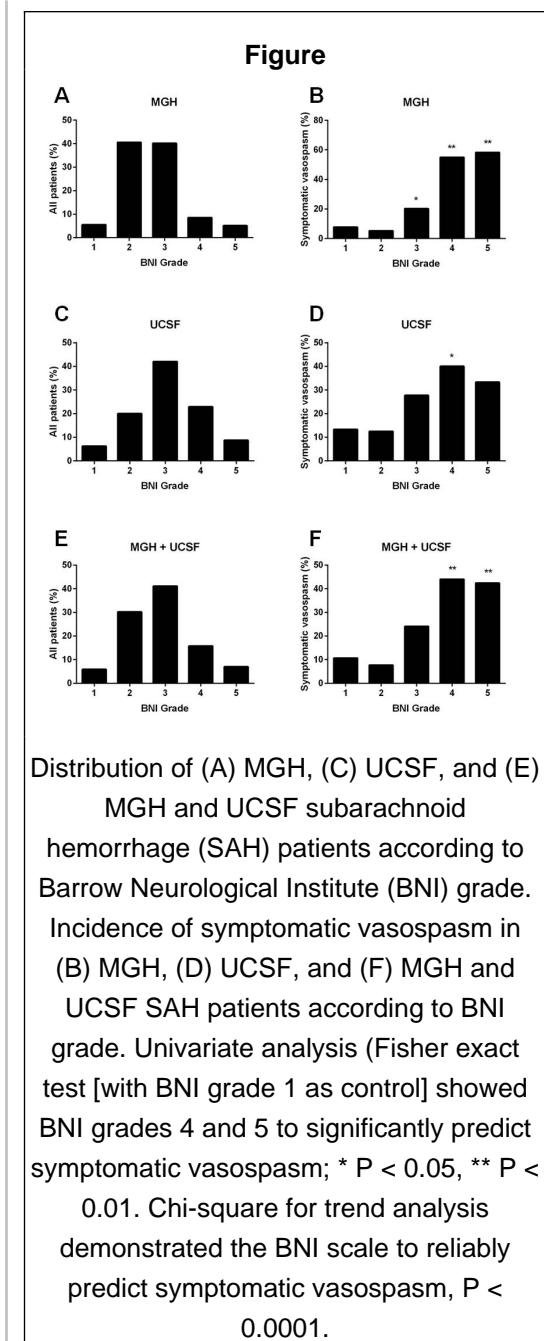
Conclusions

The present study demonstrates that the BNI scale reliably predicts symptomatic vasospasm in a large, multicenter cohort of 474 patients. The quantitative nature of the BNI scale circumvents the potential subjectivity associated with Fisher scale assessments, which may result in more reliable SAH measurements and predictions regarding symptomatic vasospasm development.

Learning Objectives

By the conclusion of this session, participants should be able to:

- 1) Describe the importance of subarachnoid hemorrhage (SAH) volume/thickness on the development of symptomatic vasospasm.
- 2) List the gradations of the original Fisher and Barrow Neurological Institute (BNI) scales and their associated risks of symptomatic vasospasm.
- 3) List the shortcomings of the original Fisher scale and how the BNI scale attempts to overcome these issues.



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