

Fever and Leukocytosis as a Predictor of DCI After SAH

Diane Aum BS; Ananth K. Vellimana MBBS; Alexander Padovano; Eric J. Arias MD; Umeshkumar Athiraman; Gregory J.

Zipfel MD

Washington University School of Medicine, St. Louis, MO



Introduction

Aneurysmal subarachnoid hemorrhage (SAH) is associated with significant morbidity and mortality. Cerebral vasospasm is the primary driver of delayed cerebral ischemia (DCI) and the largest independent contributor to poor outcome after SAH. In this study, we assessed the utility of fever and/or leukocytosis to predict DCI after SAH.

Methods

Retrospective analysis of 185 SAH patients looking at four different endpoints:

- (a) Angiographic Vasospasm
- (b) Moderate-Severe Vasospasm
- (c) Symptomatic Vasospasm
- (d) Clinical DCI

We examined five different time intervals following SAH:

- (1) Day 0-3 (pre-DCI)
- (2) Day 0-7 (rupture to DCI peak)
- (3) Day 3-7 (early DCI)
- (4) Day 7-10 (DCI peak)
- (5) Day 4-14 (DCI overall)

Multiple independent variables included age, Hunt-Hess grade, modified Fisher grade, fever (T=38.0 °C), elevated WBC levels (WBC=10, 12, 14, 15), and concurrent fever with leukocytosis.

Conclusions

Patients with aneurysmal SAH who had higher number of days with fever and/or leukocytosis after aneurysm rupture were more likely to have angiographic vasospasm and symptomatic DCI. Presence of fever and/or leukocytosis may have utility in assessing the risk of DCI following SAH.



Odds ratios are displayed for 1 day, 2 days, and 3 days of fever and/or leukocytosis during various time intervals

following aneurysm rupture (day 0). Significant values are bolded and values with OR>1.5 are in red. The Day 4-7 time interval (yellow) was the most predictive of moderate-severe vasospasm and the Day 0-3 time interval (green) was the most predictive of any vasospasm.





(A-B) Percentage of patients with concurrent fever (38.0°C) and WBC10 on each day following SAH in patients with and without (A) vasospasm and (B) moderate/severe vasospasm. (C-D) Percentage of patients with concurrent fever (38.0°C) and WBC15 on each day following SAH in patients with and without (C) symptomatic vasospasm and (D) clinical DCI.



Distribution of patients that were asymptomatic with vasospasm (dark blue) and without vasospasm (light blue), and symptomatic with vasospasm (dark red) and without vasospasm (light red).



Odds ratios comparing symptomatic vs. asymptomatic among patients with vasospasm (left) and with vs. without vasospasm among symptomatic patients (right). Among patients with vasospasm, fever and WBC15 during day 4-7 was associated with clinical DCI (OR 4.9; CI 1.3 -6.2; p<0.01). Among patients with clinical DCI, fever and WBC10 during day 0-3 was associated with angiographic vasospasm (OR 2.4; CI 1.1-5.4; p=0.03).