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Evaluation of headache severity after aneurysmal subarachnoid hemorrhage

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ABSTRACT

Objective: The most common complaint from patients after subarachnoid hemorrhage (SAH) is headache. The headache appears to be persistent and often severe. Although this problem is pervasive in the care of SAH patients, very little data have been published to describe the nature and severity of the headache nor is there evidence-based guidance on the appropriate treatment of headache due to SAH.
Methods: This was a retrospective medical record review of adults with aneurysmal SAH. Basic demographics, along with pain scores and analgesic medication administration, were collected. Patients with early vasospasm (within 7 days of ictus) were compared with patients with no vasospasm.
Results: The patient population was characteristic of the typical SAH population. Approximately 31.5% of patients exhibited early vasospasm. These patients had higher pain scores (median 8/10) than did patients without vasospasm (median 6/10) and required more analgesics such as acetaminophen/butalbital/caffeine. Treatment success with any analgesic used in this population was minimal. The pain scores associated with headache increased over the first 7 days in both groups.
Conclusions: Headache after SAH is persistent and treatment refractory. There may be an association with development of vasospasm and worsening of headache. Novel treatment strategies to attenuate headache in this population are needed.

Introduction

Headache is the most common complaint of patients who present with aneurysmal subarachnoid hemorrhage (SAH) [1]. It is thought that the headache is primarily due to the chemical irritation of the blood on the brain meninges, though many other factors are associated (Fig. 1). The hypertension that tends to be present after SAH may also contribute to the development of headache, as may the evolution of cerebral vasospasm and hydrocephalus which may develop as a consequence of SAH. Very little data exist regarding the severity and treatment of headache after SAH, which likely lead to a wide variety in practice. In fact, only one published report of headache treatment in SAH patients is available [2].

Many of the commonly used analgesics for headache are problematic in the acute SAH patient. Aspirin and other non-steroidal anti-inflammatory drugs (NSAIDs) can inhibit platelet aggregation, thereby exacerbating bleeding after SAH. Opioid medications such as oxycodone or morphine can cause sedation, which may confound the neurologic exam in these vulnerable patients. Alternative, non-opioid agents such as tramadol also cause sedation and may reduce seizure threshold [3,4]. Combination agents such as acetaminophen/butalbital/caffeine (Fioricet) may have various adverse effects and variable durations of action (eg. caffeine can cause cerebral vasoconstriction, but has a short half-life; Butalbital causes sedation and has a very prolonged half-life) [5,6]. Other agents such as magnesium and dexamethasone have also been used for SAH patients [2]. Magnesium may cause hypotension with rapid administration, while dexamethasone (like all corticosteroids) is associated with a number of adverse effects (most concerning acutely are hyperglycemia and agitation). Clinicians are often left with few evidence-based options for treating headache, the most prevalent of which is acetaminophen (which, in doses >4 g/day may cause hepatic dysfunction).

The purpose of the present study was to describe the severity and progression of early headache after SAH (within the first 7 days of ictus) and to evaluate headache treatment patterns in our patient population.

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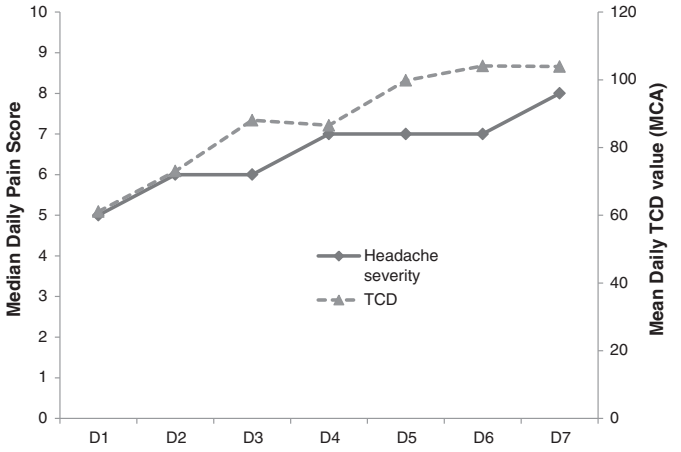

Fig. 1. Daily headache pain scores and TCD measurements.

Materials and methods

The study was a retrospective medical chart review of adult inpatients admitted to the University of Kentucky Chandler Hospital with aneurysmal SAH. The University Health Consortium (UHC) database was used to identify patients with the diagnosis code for a SAH admitted to the University of Kentucky Chandler Hospital between July 2008 and December 2010. Patients were included if they had an aneurysmal SAH and a hospital length of stay of at least 3 days. Patients were excluded if their SAH was due to trauma, if they had inadequate medication administration records or incomplete medical records, or if they presented with Hunt and Hess Grade V SAH [7]. Grade V SAH patients were excluded due to the relative lack of qualitative assessment of pain in these patients by the nursing staff. Local institutional review board approval was obtained via expedited review.

The primary outcome of the study was to evaluate the pain scores associated with headache in patients within seven days of a SAH. Secondary outcomes included a description of the use of analgesic medications for the treatment of headache within the same time period and the incidence of early vasospasm as it related to headache. Data points that were collected included patient demographic data, SAH characteristics (location, severity, method of embolization), total analgesic dose per day for the first seven days after ictus, daily maximum pain scores (standardized score of one to ten), presence of clinical vasospasm as dictated in daily physician progress notes, cerebral blood flow velocity measurements (via transcranial Dopplers (TCDs)), and pertinent laboratory values.

Management of SAH patients in our institution is consistent with published guidelines [8]. Specifically, blood pressure is rigorously controlled upon admission (typical goal is systolic blood pressure < 140–150 mmHg). Nimodipine 60 mg PO/per tube q4 h and atorvastatin 80 mg PO/per tube daily are initiated on hospital day 1. Digital subtraction angiography is performed as soon as is feasible to describe the location and morphology of the aneurysm and aneurysms are secured via endovascular coiling or surgical clipping as soon as possible. After the aneurysm is secured, patients are kept euvolemic and the blood pressure is typically permitted to rise to no greater than a systolic blood pressure of 180 mmHg. TCDs are evaluated daily. Sedating medications are avoided whenever possible. SAH patients typically reside in the intensive care unit for frequent and, often invasive, monitoring. Pain scores (on a 10-point analog scale) are monitored routinely. Magnesium concentrations are routinely monitored and serum concentrations are generally targeted to be in the normal range (2–2.8 mg/dl). Vasospasm was defined as clinical symptoms or radiographic findings as judged by the attending physician and documented in the medical record.

For the primary outcome, a univariate analysis was used to determine if there is an association between the presence of vasospasm and the amount of Fioricet® in tablets per day administered. A two sample t-test was used for interval/ratio data and the Chi squared test was used for categorical variables. Multivariate logistic regression was used to model the odds of vasospasm among patients with Fioricet® exposure, adjusting for age and SAH severity (as measured by Hunt and Hess Score) [9]. We dichotomized Hunt and Hess Score into groups of 1–2 and 3–4 for the purposes of the multivariate analysis [10,11]. Data analysis was conducted using SAS, v.9.3; an alpha level of 0.05 was used throughout.

Results

The UHC database identified 244 patients who were admitted with a SAH within the designated time period. Of those patients, 136 patients were excluded. The top reasons for exclusion included a length of hospitalization less than 3 days or Hunt and Hess Grade V SAH on presentation. Of the 108 patients who were included within the analysis, 34 patients (31.5%) experienced vasospasm within

Table 1
Patient demographics.

	Total (n=108)	Vasospasm (n=34)	No vasospasm (n=74)	P-value
Age (years) Mean(S.D)	52.3 (13.1)	48.7 (11.8)	54.6 (12.6)	0.02
Gender (n, % female)	68 (63.1%)	25 (73.5%)	43 (58.1%)	0.123
Weight (kg) Mean (S.D.)	81.7 (27)	80.9 (21.1)	82.9 (29.4)	0.726
History of tobacco use (n, %)	69 (63.6%)	23 (67.6%)	45 (61.6%)	0.494
Presenting Hunt & Hess score Median (IQR)	2 (0)	2 (1)	2 (0)	0.21
Method of aneurysm embolization				
Clipping	12 (11.1%)	5 (14.7%)	7 (9.5%)	
Coiling	59 (54.6%)	20 (58.8%)	39 (52.7%)	
None	37 (34.3%)	9 (26.5%)	28 (37.8%)	
N, (%)				
ICU length of stay (days) Mean (S.D.)	4.5 (7)	8 (9)	4 (5)	0.002
Hospital length of stay (days) Mean (S.D.)	9 (7)	13.5 (7.75)	9 (5)	0.004
Discharge disposition				
Home	87 (80.6%)	24 (70.6%)	63 (85.1%)	
Acute rehabilitation	15 (13.9%)	8 (23.5%)	7 (9.5%)	
Long-term care facility	3 (2.8%)	0 (0%)	3 (4.1%)	
Deceased	3 (2.8%)	2 (5.9%)	1 (1.4%)	