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CLINICAL REVIEW

The diagnosis of and emergent care for the patient with subarachnoid haemorrhage in resource-limited settings

Étude clinique : Le diagnostic et les soins d'urgence des patients souffrant d'hémorragie sous-arachnoïdienne dans des contextes caractérisés par des ressources limitées

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Non-traumatic subarachnoid haemorrhage (SAH) is a neurosurgical emergency that may present similarly to a benign headache, yet poses high morbidity and mortality in what often times are young and otherwise healthy patients. While the diagnosis may be made via several different modalities, not all of these are available to every emergency physician. A high suspicion for SAH along with a good history and physical examination may best serve patients in these resource-limited settings. Adequate resuscitative and supportive care, combined with prompt transfer to a facility with neurosurgical capabilities is integral to optimizing patient outcomes.

L'hémorragie sous-arachnoïdienne (HSA) non traumatique est une urgence neurochirurgicale que l'on peut aisément confondre avec une méningée bénigne, mais qui est pourtant associée à de forts taux de morbidité et de mortalité chez des patients souvent jeunes et généralement en bonne santé. S'il est possible d'établir un diagnostic en suivant différentes modalités, celles-ci ne sont pas toutes à la disposition de tous les médecins urgentistes. De forts soupçons de HSA associés à un bon examen des antécédents et un bon examen physique constituent probablement la meilleure option pour les patients dans ces contextes caractérisés par des ressources limitées. Des soins de réanimation et de maintien, suivis d'un transfert rapide vers une structure dotée d'un service de neurochirurgie, sont essentiels pour optimiser l'état de santé des patients.

African relevance

- There is a dearth of epidemiologic research on the incidence, mortality, and economic impact of subarachnoid haemorrhage (SAH) in Africa.
- Diagnosis and management of SAH is challenging in resource-limited settings and requires less reliance on neuroimaging and early efforts for transfer to an institution with neurosurgical care.
- Several areas of controversy including seizure prophylaxis, blood pressure control, and antifibrinolytic therapy are aspects of management to discuss with the accepting physician at a transferring institution if possible.

Introduction and importance to Africa

Subarachnoid haemorrhage (SAH) can be secondary to trauma or due to non-traumatic, aneurysmal disease. The latter will be discussed exclusively here.

An idea of the basic incidence and mortality of SAH in Africa can be gleaned from the small, country-specific articles that are available. For example, in a recent Kenyan autopsy study, 2.1% of 134 deaths were due to subarachnoid haemorrhage and in a Nigerian stroke registry, 11.3% of strokes over a two year period were due to subarachnoid haemorrhage.[1,2] One study from Morocco suggests that the incidence or at least the detection of aneurysmal disease is rapidly increasing with 2 patients identified to have cerebral aneurysm in 1983 to 24 patients in 1999 at a specialty hospital.[3] The outcome of patients diagnosed with SAH was found in one study to vary little by geography and depends more on neurological grade, patient age, and amount of SAH rather than any treatment variations. This study examined data from 3567 patients

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between 1991 and 1997 worldwide and found a minimal variation in outcome based on geography. However, the only African country included in this study was South Africa.[4]

Another major difference in the clinical evaluation of SAH specific to African countries is the relative shortage of computed tomography (CT) scanners available to clinicians as compared to other clinical settings. Without CT scanners, healthcare providers must rely on history, physical exam, and lumbar puncture to make the diagnosis of SAH.

Between 1% and 4% of patients with headache reporting to the emergency centre in low to middle income countries are ultimately diagnosed with subarachnoid haemorrhage.[5] Between 3% and 26% of patients with SAH die prior to reaching the hospital and those who do arrive alive have a high likelihood of rapid deterioration and mortality rate of up to 33%.[6] Therefore, considering SAH in the differential diagnosis of every headache patient and having the knowledge to recognize when it is appropriate to initiate the diagnostic evaluation for SAH are important clinical skills for every emergency physician.

Patients with SAH that are initially misdiagnosed have been found to appear clinically well as opposed to their counterparts with SAH and altered level of consciousness, focal motor deficit, or have a severe headache with classically abrupt onset during exertion who are much more likely to be correctly diagnosed on initial presentation. The most common alternate diagnoses that patients are ultimately found to have SAH are initially given are: headache of unknown cause, migraine/cluster/tension headache, or meningitis/encephalitis. Jonathan Edlow MD asserts that the misdiagnosis of SAH stems from three recurring patterns of error, ''failure to appreciate the spectrum of clinical presentation, failure to understand the limitations of computed tomography (CT), and failure to perform and correctly interpret the results of lumbar puncture.''[7]

Pathophysiology

Subarachnoid haemorrhage is a type of stroke in which bleeding occurs in the subarachnoid space alone or in conjunction with bleeding elsewhere in the central nervous system. The haemorrhage is classified as either primary (non-traumatic) or secondary (traumatic). This is a clinically important distinction as treatment options and prognosis differ with the specific aetiology of the haemorrhage. Approximately 75% of SAH are primary and, of those, 74% are due to a ruptured aneurysm. Twenty percent of patients with one aneurysm will have a second. A non-traumatic aetiology of SAH, based either on history or aneurysmal distribution pattern on head CT requires further imaging, such as CT Angiography (CTA), to identify aneurysms that may be amenable to surgical or endovascular intervention. The majority of non-traumatic SAH without an aneurysm are idiopathic while a minority are due to more rare conditions including arteriovenous malformations (AVM), cerebral artery dissection, coagulopathies, moyamoya syndrome, mycotic aneurysms, neoplasms, pituitary apoplexy, vasculopathies, or use of sympathomimetic drugs, such as cocaine, methamphetamine or phenylephrine.[8]

The deleterious effects of SAH include direct damage to the brain by the haemorrhage and resultant mass effect as well as the inflammatory cascade it triggers. Cerebral blood flow and autoregulation are reduced, resulting in global brain ischaemia. This leads to increased intracranial pressure (ICP), decreased cerebral perfusion pressure (CPP), and the continued propagation of the inflammatory cascade resulting in increased permeability of the blood brain barrier.[9]

History

Subarachnoid haemorrhage can occur in any age group, but its highest incidence is amongst those aged 40 to 60 years old and it occurs in a 3:2 female to male ratio.[10] Multiple international studies have identified hypertension, cigarette smoking, alcoholism, and cocaine use as risk factors for SAH.[11] Patients with a history of prior aneurysmal haemorrhage have a 1–2% risk of recurrence per year.[12] Up to 20–50% of patients have a warning headache in the days or weeks before presenting with acute SAH. This is sometimes called a ''sentinel headache'' or ''sentinel bleed'' and is, as the name implies, thought to be due to a relatively small bleed from the offending aneurysm that warns of a more catastrophic haemorrhage to come. In these patients, the goal is to make the diagnosis and intervene before the catastrophic bleed occurs. It is important to ask patients about family history since 2% of patients with a first degree relative with a history of an aneurysm will develop the disease themselves. This risk is even greater if multiple family members have been diagnosed with an aneurysm or if there is a family of autosomal dominant polycystic kidney disease (ADPKD).[13]

Physical exam

Physical exam findings may vary widely with one study demonstrating most patients with SAH arriving to the emergency centre with a GCS of 15 (55%) and a Hunt and Hess score of less than 3 (35%).[15] Providers should keep in mind that as cited above, most patients with SAH will present awake and alert. See below for Hunt and Hess scoring. In any patient with headache, abnormal level of consciousness, or vomiting the physician should strongly consider the possibility of SAH. In the presence of high-risk features (Table 1), improvement in symptoms alone, spontaneously or in response to treatment, should not dissuade the physician from continuing to pursue the diagnosis of SAH.

In the unconscious patient, ocular haemorrhages may be the only physical exam finding indicating SAH as a cause of the altered level of consciousness. These ocular haemorrhages may be flame-shaped, subhyaloid, or vitreous and are thought to be due to venous obstruction from increased intracranial pressure in SAH.[16]

Excluding SAH with clinical decision rules

Perry et al. enrolled close to 2000 patients over five years in Canada to identify high risk characteristics of patients to develop a clinical decision rule to exclude patients from further work-up for SAH. They developed three different rules for adult patients with non-traumatic headaches whose intensity peaked within an hour of onset or were associated with syncope. The most applicable version of their clinical rules for Africa is the only one that does not include arrival by ambulance (Table 2).