Subarachnoid Hemorrhage

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KEYWORDS

• Subarachnoid hemorrhage • Aneurysm • CT • Lumbar puncture
• Clinical decision rules • Grading scales • Delayed cerebral ischemia
• Cerebral vasospasm

KEY POINTS

- All patients with acute thunderclap headache should be evaluated for subarachnoid hemorrhage.
- Noncontrast computed tomography scanning, the first diagnostic test, is extremely sensitive early after the hemorrhage, but the sensitivity decreases with time.
- Once the diagnosis of subarachnoid hemorrhage has been established, the next steps, which should be coordinated with a neurosurgeon or cerebrovascular specialist, include imaging to define the vascular lesion and identification and prevention of complications such as rebleeding and vasospasm.

INTRODUCTION

Subarachnoid hemorrhage (SAH) is simply defined as the extravasation of blood into the subarachnoid space **Fig. 1**. Overwhelmingly, the most common cause of SAH is traumatic injury to the brain. Most of the remainder of cases are caused by spontaneous rupture of a blood vessel. The cause of spontaneous SAH can be classified into aneurysmal, nonaneurysmal, and perimesencephalic causes. Because the preponderance of morbidity and mortality related to SAH is from the aneurysmal type, the article focuses on this entity.

Aneurysmal SAH is associated with a 30-day mortality of approximately 45% and 30% of the survivors have significant disabilities.[1] There are few diseases that cause as much difficulty as SAH for emergency physicians. Debate over the recommended diagnostic algorithms exists in the specialties of emergency medicine, neurology, and neurosurgery. Current advances in imaging modalities, fear of invasive diagnostic testing, and a possible debilitating outcome for patients who are misdiagnosed fuel this fervent debate. The low incidence of the disease also complicates matters, because the diagnosis can easily be missed. However, once diagnosed, management of this

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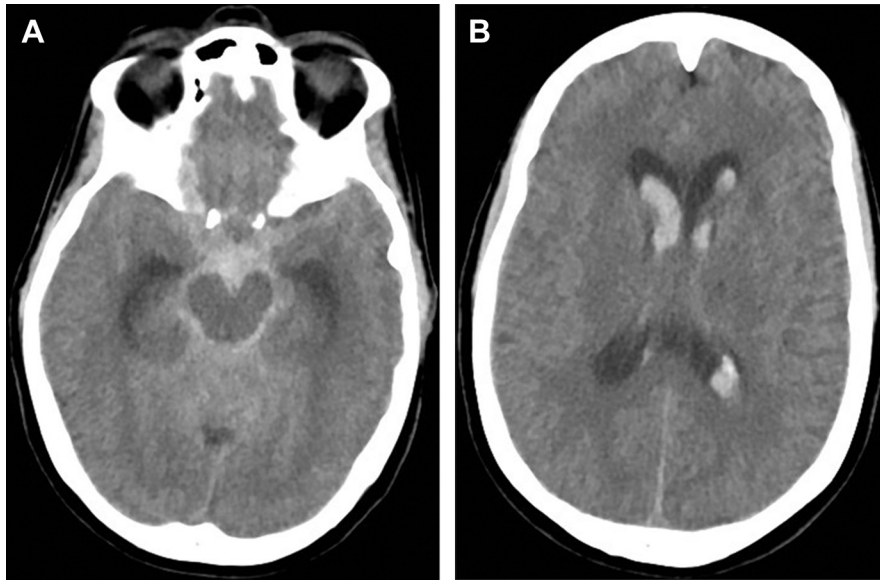

Fig. 1. (*A* and *B*) Noncontrast enhanced computed tomography of the head; a classic example of subarachnoid hemorrhage with intraventricular extension. Note the starfish appearance of the hyperdensity caused by the blood in the subarachnoid space. (*Courtesy of* Michael Abraham MD, MS, Baltimore, MD.)

neurosurgical emergency is less debatable. This article discusses the epidemiology, diagnosis, and management of aneurysmal SAH in the emergency department (ED).

Causes and Incidence

Approximately 80% of nontraumatic SAHs are from a ruptured aneurysm. Other causes of nontraumatic SAH include arteriovenous malformations, moyamoya disease, vasculitis, and amyloid angiopathy. The initial identification of the cause can be important, because the treatments of traumatic SAH and spontaneous nontraumatic SAH can be different. However, this distinction can also be difficult, because the rupture of the aneurysm may have led to the traumatic incident.

The incidence of spontaneous SAH worldwide ranges from 2 to 20 per 100,000 people, with the United States at approximately 10 per 100,000 people or roughly 30,000 patients annually, making it an uncommon disease. SAH is associated with both modifiable and nonmodifiable risk factors (Table 1). Smoking and hypertension are the

Table 1
Risk factors for subarachnoid hemorrhage

Modifiable Risk Factors	Nonmodifiable Risk Factors
Hypertension	Female gender
Smoking history	First-degree family member with SAH
Alcohol abuse	Autosomal dominant PCKD
Cocaine use	Sickle cell disease
Caffeine consumption	Alpha1-antitrypsin deficiency

Abbreviation: PCKD, polycystic kidney disease.

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