

EM CASE OF THE WEEK.

BROWARD HEALTH MEDICAL CENTER
DEPARTMENT OF EMERGENCY MEDICINE



Care Warriors

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Subarachnoid Hemorrhage

A 45 year old male with no past medical history presents to the ED with syncope and witnessed seizure. Patient states that while working in his auto shop, he looked up and suddenly felt fullness behind his ears. He next thing he remembers is being the ambulance on his way to the ER. Family, at bedside, states that he fell suddenly to the ground and started shaking. Patient did have loss of bowel and bladder. He currently had no complaints except a mild headache. He is GCS 15 and alert and oriented x3. In route patient's blood pressure was 200/103 and currently read 163/94. Pupils were equal and reactive to light with good motor, sensory and strength in both upper and lower extremities. Heart was regular rate and rhythm with equal breath sounds in all lung fields. Labs were drawn and patient was sent to CT (Figure A). Upon returning from CT, patient complained of worsening headache and nausea. He had repeated seizures despite administration of keppra, valium and Ativan. Patient was sedated with propofol and intubated. A repeat CT (Figure B) was then ordered and a stat neurointerval consult was placed.

What is the most common cause of a subarachnoid hemorrhage?

- A. Head trauma
- B. Rupture of bridging veins
- C. Berry Aneurysm
- D. Age related atrophy
- E. Rupture of middle meningeal artery

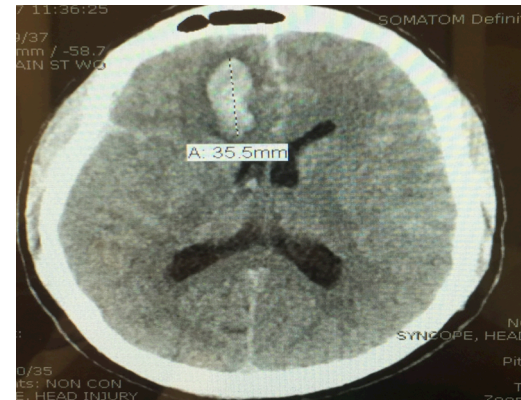


Figure A. Initial CT Brain w/o contrast showing a parenchymal hematoma as well as a subarachnoid hemorrhage and minimal extra-axial blood. Minimal intra-ventricular blood also suspected in the third ventricle.

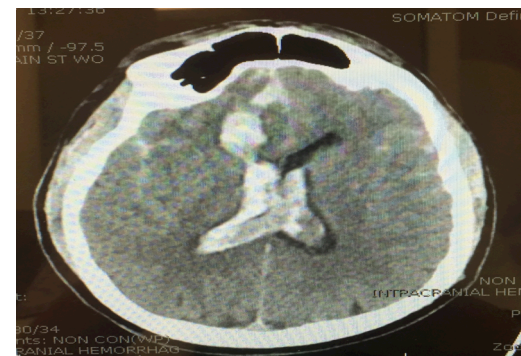


Figure B. Post intubation CT Brain w/o contrast showing progression of abnormalities and large amount of intraventricular blood.

EM Case of the Week is a weekly "pop quiz" for ED staff.

The goal is to educate all ED personnel by sharing common pearls and pitfalls involving the care of ED patients. We intend on providing better patient care through better education for our nurses and staff.

BROWARD HEALTH MEDICAL CENTER

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Warriors

The correct answer is C. A rupture of a saccular or berry aneurysm is the most common cause of a subarachnoid hemorrhage. These aneurysms typically occur at the bifurcation in the circle of Willis, the most common site being the junction between the anterior communicating artery and the anterior cerebral artery. Berry aneurysms are associated with Ehlers-Danlos Syndrome, Autosomal Dominant Polycystic Kidney Disease, advanced age, smoking, hypertension, and African Americans.

Subarachnoid hemorrhages (SAH) occur when there is bleeding between the arachnoid and pia layers of the brain. It is a medical emergency that is usually the result of ruptured aneurysm in traveling arteries. They can lead to permanent brain damage if immediate medical attention is not received. The rapid time course is often initiated with a complaint of the "worst headache of my life."

Diagnosis

A sudden onset headache, regardless of severity or prior headache history should raise clinical suspicion for SAH. Other signs include altered mental status, syncope, nausea and vomiting, meningismus, preretinal subhyaloid hemorrhages, or neurologic deficits. A non-contrast head CT with or without lumbar puncture is the mainstay of diagnosis. On the CT, a clot can most often be appreciated in the subarachnoid space. Often times the bleeding extends in to the intra-cerebral space or intraventricular or subdural blood can be appreciated, as with our patient above. Since the risk of false negatives is devastating, a negative head CT is often followed by a lumbar puncture. Bloody or yellow (xanthochromic) spinal taps suggest SAH. If both tests are negative within a few days of presenting symptoms then SAH can be effectively ruled out. 4-10 days hemorrhage, patients have a high risk rebleeding and for vasospasm that can lead to an ischemic infarct. There is also an increased risk of developing communicating and/or obstructive hydrocephalus.

Treatment

Patients with SAH are high risk for hemodynamic instability and for neurologic deterioration, and therefore must be monitored in an acute care setting. If patients have a Glasgow Coma Scale <8, elevated intracranial pressure, poor oxygenation or hyperventilation, hemodynamic instability, or requirement for heavy sedation or paralysis then intubation is required. Hyponatremia is typically with SAH and daily sodium levels should be checked. Hypoxemia, metabolic acidosis, and hyperglycemia should be adequately maintained. The American Stroke Association guidelines recommend a systolic blood pressure <160 mmHg, which is often maintained with the help of labetalol, nicardipine, or enalapril. Vasodilators such as nitroglycerin and nitroprusside are avoided because they increase intracerebral blood volume.

Generally a ventriculostomy is placed in patients to allow for direct measurement of intracranial pressures and provide treatment by draining CSF when needed. Elevated ICP can also be medically managed with osmotic therapies and diuresis. Hyperventilation is generally avoided because it causes intracranial blood vessels to constrict leading to vasospasm. Calcium channel blockers like Nimodipine can be given to prevent such vasospasm. In even more severe cases, decompressive craniectomy is the only solution.

Antiepileptic drug (AED) use to prevent seizures in SAH patients is minimized as it may worsen neurologic and cognitive outcomes. The decision to start AED is based on blood distribution on imaging. In higher risk patients with poor neurologic grade, unsecured aneurysm, and associated intracerebral hemorrhage, starting AED is reasonable.

When aneurysms contribute to SAH, there is a high risk of rebleeding or rerupture and aneurysmal repair is the effective treatment to prevent this recurrence.

For a list of educational lectures, grand rounds, workshops, and didactics please visit BrowardER.com and click on the "Conference" link.

All are welcome to attend!

SAH Grading Scales

Hunt and Hess Grading Scale:

Hunt and Hess grading system for patients with subarachnoid hemorrhage

Grade	Neurologic status
1	Asymptomatic or mild headache and slight nuchal rigidity
2	Severe headache, stiff neck, no neurologic deficit except cranial nerve palsy
3	Drowsy or confused, mild focal neurologic deficit
4	Stuporous, moderate or severe hemiparesis
5	Coma, decerebrate posturing

Fisher Grade Scale

Fisher grade of cerebral vasospasm risk in subarachnoid hemorrhage

Group	Appearance of blood on head CT scan
1	No blood detected
2	Diffuse deposition or thin layer with all vertical layers (in interhemispheric fissure, insular cistern, ambient cistern) less than 1 mm thick
3	Localized clot and/or vertical layers 1 mm or more in thickness
4	Intracerebral or intraventricular clot with diffuse or no subarachnoid blood

Ogilvy and Carter Grading System

Ogilvy and Carter grading system to predict outcome for surgical management of intracranial aneurysms

Criteria	Points
Age 50 or less	0
Age greater than 50	1
Hunt and Hess grade 0 to 3 (no coma)	0
Hunt and Hess grade 4 and 5 (in coma)	1
Fisher scale score 0 to 2	0
Fisher scale score 3 and 4	1
Aneurysm size 10 mm or less	0
Aneurysm size greater than 10 mm	1
Giant posterior circulation aneurysm size 25 mm or more	1

The total score ranges from 0 to 5, corresponding to grades 0 to 5

SAH are associated with high mortality. It has an average fatality rate of about 51% with about 10% percent of patients dying prior to reaching hospital. Within the first 30 days after a SAH, about 50% of patients had rebleeding episodes. Key predictive factors included GSC, level of conscious, patients age, and amount of blood on initial CT. Survivors had increased memory, mood, and neurocognitive impairment. There is a high risk of reoccurrence despite aneurysm treatments like coiling or clippings.

Take Home Points

- SAH most commonly occurs due to rupture of a berry aneurysm leading to blood between the arachnoid and pia mater.
- Noncontrast head CT and lumbar puncture help get definitive diagnosis.
- Acute management is crucial to maintain airway, manage ICP, and blood pressure.
- Some of the serious complications of SAH include vasospasm, rebleeding, rerupture, seizures, and death.



ABOUT THE AUTHOR

This month's case was written by Banshi Patel. Banshi is a 4th year medical student from NSU-COM. She did her emergency medicine rotation at North Broward Medical Center Emergency Department in October 2017. Banshi plans on pursuing a career in Anesthesiology after graduation.

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