BEST PRACTICES

ANEURYSMAL SUBARACHNOID HEMORRHAGE (SAH)

Diagnosis & Management

Clinical Presentation
Sudden-onset severe headache, which may be associated with brief loss of consciousness, seizures, nausea or vomiting, or meningismus.

Evaluation & Diagnosis
Noncontrast head CT
If negative, LP (elevated opening pressure, elevated red blood cell count in all tubes, and xanthochromia).

Source of Bleeding
CT Angiography (CTA)
If negative digital subtraction angiography (DSA) as it remains the gold standard test.

Hunt and Hess Grading System
I-III: good-grade
IV-V: poor-grade

Score	Neurological Status
I	Asymptomatic or mild headache and slight nuchal rigidity
II	Severe headache, stiff neck, no neurologic deficit except cranial nerve palsy
III	Drowsy or confused, mild focal neurologic deficit
IV	Stuporous, moderate or severe hemiparesis
V	Coma, decerebrate posturing

Management

STABILIZATION
Ensure adequate airway protection and cerebral perfusion

ICU Monitoring
BP/HR/RR
Temperature/O2 saturation
Neuro checks q 1-2 hours
Strict Input/output
Glucose, BMP, CBC, INR/PT
CXR/EKG/Echocardiography
ICP monitoring for grade ≥3
Daily Transcranial Doppler (TCD) (every other day in Grade I and II)
CTA/EEG when indicated

ACUTE CARE
Ensure adequate perfusion and prevent rebleeding, vasospasm, and complications

Within 24-72 hrs
Team approach to consider neurologic grade and clinical status of the patient, the availability of expertise in surgical and endovascular techniques, as well as the anatomic characteristics of the aneurysm.
Continue ICU Monitoring

TREATMENT OF ANEURYSM
Prevent occurrence of rebleeding
Timing & Choice

Up To 14 Days
Continue ICU Monitoring

Prompt response to focal neurologic impairment, decreased level of consciousness, and seizure activity- stat CT/EEG
Advanced hemodynamic monitoring in selected cases

EARLY COMPLICATIONS
Early detection and management

01

- Airway intubation (GCS ≤8, elevated ICP, poor oxygenation or hypoventilation, hemodynamic instability, and requirement for heavy sedation or paralysis).
- Hemodynamic support.
- Management of seizure if present.

02

- SBP <160, DBP <110, CPP >70 mm Hg.*
- Discontinuation of all antithrombotic agents and anticoagulation reversal†.
- Seizure prophylaxis in selected cases.‡
- Euvolemia.
- Nimodipine 60 mg q4 hrs X21 days
- Bedrest, analgesia, and venous thromboembolism prophylaxis.§
- Prevent and treat hypoxemia, hyperglycemia, and fever.

03

- Good-grade: should be performed as early as feasible, preferably within 24-72 hours. Endovascular coiling is preferred over surgical clipping in patients with endovascularly accessible lesions.
- Poor-grade: the optimal timing and choice is uncertain. Decisions should be individualized in consultation with family members.

04

- Vasospasm and delayed cerebral ischemia.¶
- Elevated intracranial pressure: progressive deterioration in level of consciousness, and ventricular dilation on head CT scan.**
- Seizures, consider continious EEG‖.
- Hyponatremia: <133 mEq/L or a decrease of 6 mEq/L in 24 to 48 hours due to SIADH or cerebral salt wasting. ⁅
- Others: anemia, ECG abnormalities, takotsubo cardiomyopathy, troponin elevation, fever, and hyperglycemia.

* IV labetalol, nicardipine, clevidipine, or enalapril are preferred. Vasodilators such as nitroprusside or nitroglycerin should be avoided.

† Platelets, desmopressin, PCC, FFP, vitamin K, and andexanet alfa in specific cases.

‡ In poor neurologic grade, unsecured aneurysm, and associated intracerebral hemorrhage. Avoid phenytoin.

§ SCDs prior to aneurysm treatment, and chemoprophylaxis once the aneurysm is secured.

¶ Flow velocity >120 cm/s, an increase of >50 cm/s, or Lindegaard ratio (MCA velocity/ICA velocity) >6: Hemodynamic augmentation via induced hypertension, balloon angioplasty, and/or intra-arterial administration of vasodilators.

** Immediate CSF diversion with an external ventricular drain (EVD). Additional options for some patients include osmotic diuresis and hemicraniectomy.

‖ Seizures should be treated promptly and antiseizure medications are usually stopped in a few months following SAH unless seizures recur. Avoid phenytoin.

⁅ Hyponatremia: NaCl tabs 3 g PO/NGT every 6 hours, initiate and titrate 3% percent NaCl infusion based on a local protocol.

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