

These are general recommendations for the “typical” management of patients with aSAH. However, treatment for these patients often needs to be tailored individually, depending on their clinical status, age, and co-morbidities.

1. General Treatment

Every aSAH patient will be evaluated by the vascular surgeon and INR physician who are on-call. This will facilitate multidisciplinary decisions regarding best treatment strategy, except in cases requiring emergency evacuation of an associated hematoma.

All aSAH patients will be observed in the ICU. The day of the aSAH is considered day 0.

Any initial DSA prior to surgical or endovascular treatment should be a complete 3- or 4-vessel study.

All patients will have an ICU service in co-management.

Patients should receive SCDs; be on bedrest until the aneurysm has been secured; and have HOB at 30o.

Neurologic checks should be q 1hr until the aneurysm has been secured for 24 hours or if there are any concerns about a fragile or volatile neurological status. If the patient is clinically stable, consider decreasing neurologic checks to q 2hr (and possibly q 4hr from 2200 until 0600) to avoid sleep deprivation.

2. Post-Treatment Imaging

A formal 3- or 4-vessel DSA should be obtained at some point during hospitalization. It should be done either (1) at the time of initial diagnosis or (2) for the assessment of vasospasm. The purpose is to identify any additional aneurysms or other vascular abnormalities.

Imaging for asymptomatic vasospasm should be performed on day 7-10 post-SAH:

- a. For a surgically-treated patient
 1. obtain a 3- or 4-vessel DSA, if this study has not been previously completed
 2. obtain a CTA if prior 3-or 4-vessel DSA has been completed
- b. For an endovascularly-treated patient
 1. obtain an MRA with gadolinium. If the patient has impaired renal function, obtain an MRA without gadolinium (TOF). All INR patients should have had a 3- or 4-vessel DSA with their treatment.

Imaging for symptomatic vasospasm should be done with DSA. These studies will be ordered as indicated (typically during 4-10 days post-SAH).

3. TCD

Patients will receive TCDs of both MCAs every M, W, F from day 3-14 post-SAH TCDs will be routinely discontinued after the patient leaves the ICU, unless otherwise specified.

4. Vasospasm watch

Patients will be observed in ICU for vasospasm for a minimum of 7 days post-SAH. An imaging study (CTA, MRA, or DSA) should be obtained on day 7-10 post-SAH as described above.

For a patient with no clinical signs or symptoms of vasospasm:

- a. If the imaging study shows mild or no spasm, the patient may transfer to the floor if medically stable.
- b. If the imaging study demonstrates moderate-to-severe vasospasm, the patient remains in ICU until TCDs are normalized or until patient is day 12-14 post-SAH.

5. Pharmacologic management

Patients will receive a prophylactic anticonvulsant (usually levetiracetam 500mg BID). Patients will receive prophylactic anti-convulsant for 7 days. The treating physician may recommend the prophylactic anti-convulsant be continued longer.

Nimodipine (60mg q 4h) is utilized for 21 days. If the patient is discharged before 21 days, it is discontinued. Reduce dosage to 30mg q 4h if there is difficulty with hypotension. If hypotensive side effects persist at the lower dose, nimodipine should be discontinued.

A statin is utilized for 21 days. If discharge occurs before day 21, the statin is discontinued unless the treating physician requests it to be continued. The patient should resume their home statin.

Steroids, such as dexamethasone, will not be used routinely.

Upon discharge, the patient may resume home anti-hypertensive medication if recommended by ICU or the hospitalists.

Heparin 5000 units SQ TID will be initiated 24 hours after a procedure in which the aneurysm is obliterated, or when therapeutic anticoagulation is discontinued following the procedure. SQ heparin may be used along with any antiplatelet agents prescribed for the procedure. If the patient has a heparin allergy, discuss other options with the treating physician.

6. IV Fluids (IVF) day 0-14

IV fluid will typically be 0.9% NaCl with 20 mEq KCl.

Patients without clinical evidence of vasospasm will be kept on maintenance IVF (80cc/hr) until transferred from the ICU or until day 14 post-SAH, whichever comes first. IVF tapered off over 2 days, unless needed for other medical issues.

For asymptomatic patients felt to be at high risk for vasospasm (markedly elevated TCD or moderate-severe spasm on imaging), the maintenance rate may be increased to 100-125cc/hr, if physiologically tolerable.

7. Blood pressure control day 0-14

Prior to the aneurysm being secured, keep SBP < 140 unless there are overriding medical reasons. If physiologically tolerated, a lower target of SBP <120 may be utilized.

Once the aneurysm is secured, keep SBP < 180 (permissive hypertension) unless there are overriding medical reasons.

After day 14, maintain BP at normal range if no symptomatic vasospasm.

8. Symptomatic vasospasm management

As initial treatment for symptomatic vasospasm, elevate the SBP by increments of 20 mmHg, up to an SBP = 200. This may be accomplished with pressor and increased volume, if needed.

Consider placing a CVP line to guide hypervolemic therapy (with an initial target of CVP = 8-12).

If early management fails to reverse focal neurologic deficits, obtain DSA for possible intra-arterial treatment. Maintain elevated SBP parameters following interventional treatment.

Euvolemia and normotension may be resumed when vasospasm has subsided.

9. Discharge

Nimodipine will be stopped at discharge (if discharge occurs before day 21).

If a patient is still on seizure prophylaxis, check with treating physician.

Statins will be stopped at discharge (if before day 21), unless the patient has been on a statin prior to admission.

Salt tablets will be stopped by discharge unless the patient has documented ongoing hyponatremia.

All patients will be evaluated by PT and OT for rehab needs prior to discharge.

If the patient has a shunt, the type of shunt and its setting (if programmable) should be documented in the hospital record and NextGen.

10. Follow-up

All aSAH patients will be seen by the vascular surgeon 4-6 weeks following discharge. Subsequent surgical follow-up will then be determined.

Coiled/stented patients will receive an MRA with gadolinium (unless contra-indicated) and INR clinic follow-up 6 months after presentation and one-time neurosurgical follow-up 4-6 weeks after discharge.

The treating INR physician may elect to have the first-follow-up visit at 3 months, depending on the clinical situation. Subsequent visits will be determined by the INR physician. If the endovascularly treated patient has a basilar apex aneurysm or aneurysm 1cm or larger, MRA should be obtained annually for at least 5 years. Otherwise, if an aneurysm is completely occluded at the 6 month visit, repeat MRA may be deferred for up to 5 years.

If a patient undergoing MRA has a VP shunt (with programmable valve), a visit at the GCBS office will be scheduled on the same day to verify the correct shunt setting post-MRA.