

Subarachnoid Hemorrhage (SAH)

What is it?

A **subarachnoid** [suhb-uh-RAK-noid] **hemorrhage** [HEM-rij] happens when blood vessels rupture (break) and cause blood to leak and build up in the **subarachnoid space** (folds of the brain). A subarachnoid hemorrhage can:

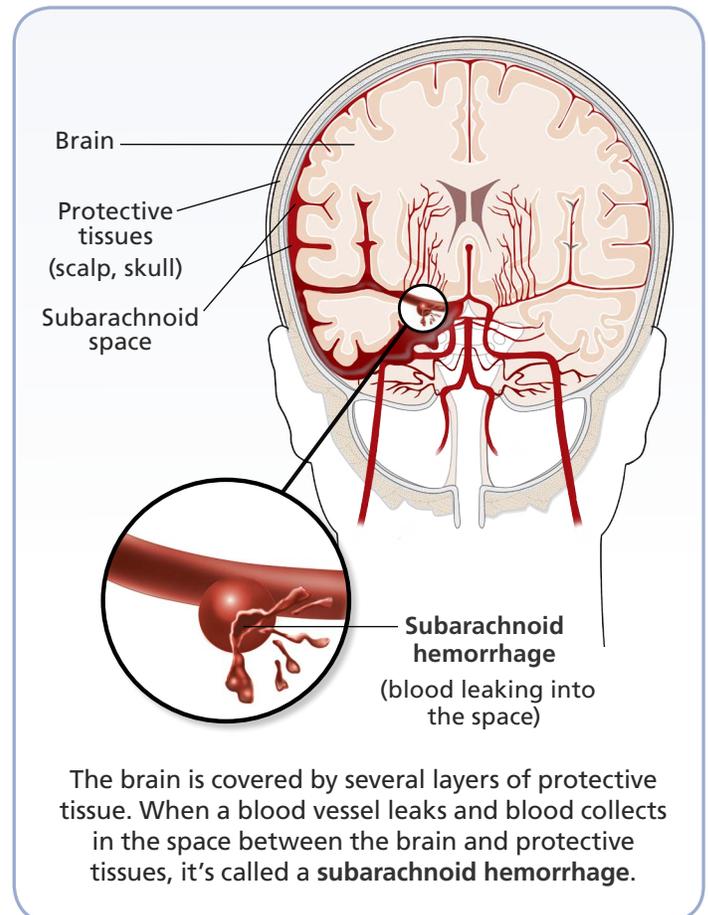
- Put pressure on the brain
- Irritate the tissues that cover the brain
- Clog the flow of **cerebrospinal** [suh-ree-broh-SPAHYN-l] **fluid** (fluid that cushions and protects the brain and spinal cord)
- Cause blood vessels to spasm (suddenly tighten)

For this reason, **SAH may be a life-threatening condition.**

What are the symptoms?

- **Severe headache.** The first symptom is often a fierce, sudden headache — like no other headache you’ve ever had. Phrases used to describe the pain include “worst headache of my life” and “thunderclap headache.”
- **Other symptoms.** These include:
 - Nausea or **vomiting**.
 - **Stiff neck**, which may appear suddenly.
 - **Trouble moving** or loss of movement or feeling.
 - **Mood changes** such as suddenly feeling confused or irritable.
 - **Seizures**.
 - **Light sensitivity** (light bothers or hurts your eyes).
 - **Vision/eye problems** including blurry or double vision, blind spots, or temporary vision loss in 1 eye. Eyelids may also droop or pupils may appear to be different sizes.
 - **Loss of consciousness.**

If you have any of these symptoms, call 911 immediately. Note the exact time symptoms started and give this time to paramedics or hospital staff.



What causes it?

The causes of SAH include:

- Bleeding from a **cerebral** [suh-REE-bruhl] **aneurysm** [AN-yuh-riz-uhm], which is a weak area or bulge in a blood vessel near the brain
- Bleeding from an **arteriovenous** [ahr-teer-ee-oh-VEE-nuhs] **malformation (AVM)**, which is an abnormal tangle of tiny blood vessels
- A head injury
- Bleeding disorders

In as many as 1 out of 10 people with an SAH, no clear cause can be identified — in these cases, the SAH is called **idiopathic** [id-ee-uh-PATH-ik].

How is it diagnosed?

To diagnose a subarachnoid hemorrhage, the doctor will perform a complete neurological exam on you and run various tests such as:

- **Head CT scan** to look for areas of bleeding.
- **Lumbar puncture** (spinal tap), which may be performed if the CT scan is normal, but SAH is still suspected. This test checks for blood in your spinal fluid.
- **CT angiogram** [AN-jee-uh-gram], which is a CT scan that uses contrast dye and x-rays to check your blood vessels. This test helps the doctor check for an aneurysm or AVM.
- **Cerebral angiogram**, which involves inserting a **catheter** (tiny tube) into a blood vessel and moving it up to an artery in your neck. The catheter is used to inject contrast dye, and x-rays record how the dye passes through the brain's blood vessels. This test can provide more detail than a CT scan about a potential aneurysm or AVM.
- **Magnetic resonance imaging (MRI)** or **magnetic resonance angiogram (MRA)**. These tests involve powerful magnets and radio waves to create detailed brain tissue and blood vessel images.

How is it treated?

Treatment depends on what caused your SAH and the amount of bleeding. Treatment of the SAH focuses on:

- Managing symptoms and preventing complications
- Treating the cause of bleeding
- Helping you recover

Managing symptoms and preventing complications

Treatments vary depending on the primary symptoms caused by SAH and can include:

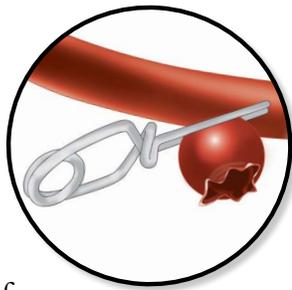
- **Life-support procedures**, such as a breathing tube, for treatment of coma or decreased alertness.
- **Pain medicine**. Note: when pain medicine would alter a neurological exam, it will be minimally used.
- **Testing for blood vessel spasms**. You might have a test called a **transcranial** [trans-KREY-nee-uh] **doppler ultrasound** to check for blood vessel **spasms** (tightening) as a result of the SAH. This test may also be used to guide treatment.
- **Other medicines**. Medicines may be given for:
 - Controlling your blood pressure
 - Treating or preventing blood vessel spasms
 - Preventing or treating seizures
- **Procedures to reduce pressure and irritation in the brain**. You may have surgery to remove a **hematoma** [hee-ma-TOH-muh], which is a collection of blood, or to clear away dead tissue, or temporarily remove part of your skull. If fluid builds up inside the brain because of bleeding or pressure needs to be monitored, your doctor may need to place a **ventriculostomy** [ven-TRIC-u-los-toe-mee] **drain**. This can be used to measure pressure and drain excess fluid.
- **Precautions against further pressure on your brain**. You may need to avoid anything that increases pressure inside the head such as sudden changes in position, bending over, or straining. You may need to take laxatives to prevent you from straining during bowel movements.
- **Rest and observation**. Further bleeding or blood vessel spasms can happen soon after the initial SAH. Healthcare providers may want you to stay in the hospital for several days or weeks for monitoring and continued treatment.

Treating aneurysm and AVM

Treating an aneurysm can be done by:

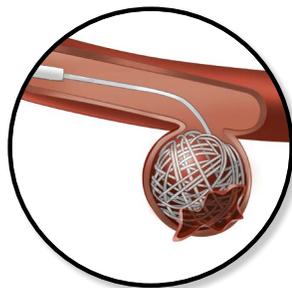
- **Clipping the aneurysm.**

The surgeon performs a **craniotomy** [krey-nee-OT-uh-mee] to access the brain (see box at right). Then, the surgeon places a small clip on the aneurysm. This can help prevent re-bleeding or rupture of the aneurysm.



- **Using coil embolization**

[em-buh-luh-ZEY-shuh n], or **coiling, to seal off a blood vessel.** This procedure does NOT require a craniotomy. Instead, the doctor places a tube (catheter) inside your blood vessel and pushes a tiny platinum coil through the catheter into the aneurysm. Once there, the coil fills the aneurysm, causing it to clot and seal itself off from connecting blood vessels.



Treating an AVM can be done by performing:

- **A craniotomy** (see box at right)

to access the brain and then **removing the AVM** (if not too large or too deep inside the brain). Removing the AVM can lower the chance of future bleeding.



- **Endovascular treatment.** [ehn-doh-VAS-kyuh-ler] The doctor places a catheter (small tube) inside the blood vessel, which is moved up to the AVM. Then, a liquid glue is injected into the AVM to block the artery and reduce blood flow to the AVM. This can be done alone or along with surgery.

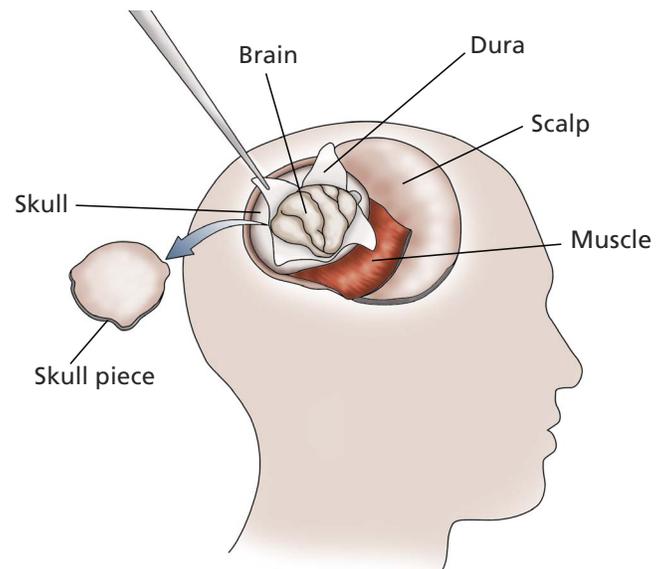
- **Radiation.** Some AVMs are treated with radiation, which causes the vessel to scar and seal off the bleeding over time.

What is a craniotomy?

A **craniotomy** is a surgery where an opening is made in the skull to expose and operate on the brain. Here's what to expect:

- 1 A neurosurgeon makes an incision through the skin and removes a small section of your skull, called a **bone flap**. The bone flap is removed to expose the brain underneath.
- 2 Pressure on the brain is relieved or a blood vessel repaired.
- 3 The bone flap is secured back in place, and the skin is closed back up with either **sutures** (stitches) or staples.
- 4 You are closely monitored in the ICU.

NOTE: The incision site on the head must be kept clean and dry. Your surgeon will discuss wound care issues with you.



Helping you recover

You will have treatment to help you recover from complications caused by the SAH. For example, an SAH can cause a stroke or symptoms very similar to those of a stroke. In these cases, you will begin **stroke rehab** — a general name for a variety of therapies and services that can help your brain learn new ways of working and help you regain more of the abilities you lost during the stroke.

For more information on stroke recovery, see Intermountain's handbook *Life after a Stroke or TIA*.

What can I expect afterward?

Your long-term outlook depends on the location and amount of bleeding during the SAH, as well as any complications that occurred. Here are several things you might expect:

- **Continued stroke rehab if you lost brain function during the SAH.**
- **Continued medicine to prevent future complications.** After going home, you will probably continue to take medicine long-term. For example, you might take medicines to control your blood pressure or prevent blood vessel spasms.
- **Monitoring yourself for warning signs (see information in the box at right).** There's a chance that a subarachnoid hemorrhage can bleed again, so it's important to watch for the symptoms of SAH.

Are some people more at risk for SAH?

Subarachnoid hemorrhage can occur at any age, and is slightly more common in women than in men. The following factors can increase your risk for SAH:

- Smoking
- High blood pressure
- Aneurysms in other blood vessels anywhere in your body
- A strong family history of aneurysms
- Use of illegal drugs such as methamphetamines (meth) or cocaine
- History of **polycystic** [pol-i-SIS-tik] **kidney disease**
- Connective tissue disorders that weaken blood vessels such as **fibromuscular** [fy-broh-MUHS-kyuh-ler] **dysplasia** [dis-PLYE-zhuh], or **FMD**



When to seek medical help

Call your doctor if you experience any of these:

- Side effects from your medicine — ask your doctor what to watch for
- Frequent headaches (“normal” headaches, not the sudden, severe headache of SAH)
- Fatigue (extreme tiredness) — this can be common after a brain injury

Warning signs: Call 911 immediately and make a note of the time if you experience sudden:

- Intense headache — similar to the headache you had with the first SAH
- Numbness or weakness of the face, arm, or leg, especially on one side of the body
- Vision problems, confusion, trouble speaking or understanding
- Trouble walking, dizziness, or loss of balance or coordination

How can I reduce my risk?

You can help reduce your risk of a future SAH by:

- **Quitting smoking.** If you smoke, this is the single biggest difference you can make in your health. Intermountain's booklet, *Quitting Tobacco: Your Journey to Freedom*, has information and encouragement. And, help is available by calling 1-888-567-TRUTH (the Utah Tobacco Quit Line) or visiting <http://www.utah.quitnet.com>.
- **Controlling your blood pressure.** Have your blood pressure checked frequently. If your doctor prescribes blood pressure medicine, continue to take it even if you feel fine.

Questions for my doctor: _____

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