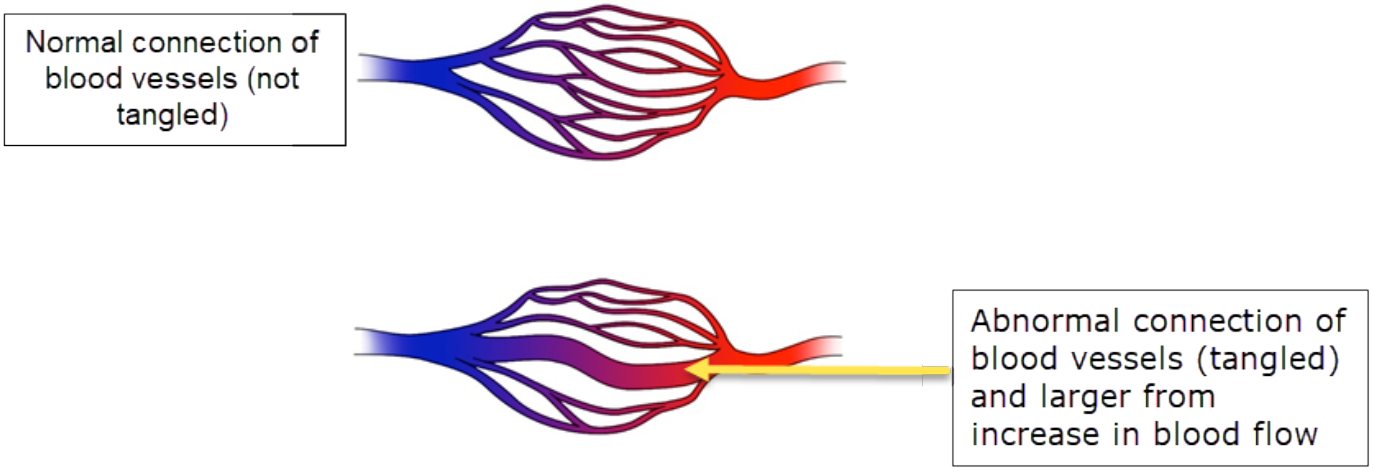
MICHIGAN MEDICINE
UNIVERSITY OF MICHIGAN

Arteriovenous Malformations

What are arteriovenous malformations?

An **arteriovenous malformation** (AVM) is an abnormal tangle of arteries and veins (blood vessels) in the brain. The tangle of blood vessels may become larger (dilate) as blood flow increases. This may cause the walls of the blood vessels to weaken and potentially burst. This would allow blood to spill (hemorrhage) into the brain, and can cause brain damage and stroke.



AVMs can occur anywhere in the brain or on its covering. This includes the four lobes of the front part of the brain (frontal, temporal, parietal, occipital), the back of the brain (cerebellum), the brainstem, or the ventricles (spaces in the brain that produce and circulate cerebrospinal fluid). They may also form on the spinal cord.

What is the cause of an AVM?

- The cause of an AVM is unknown. AVMs in the brain may be present at birth, but are not inherited from parents.
- Scientists believe that AVMs develop during fetal or infant growth and go undetected until symptoms develop later in life.

- AVMs are rare, occurring in only 1% of the population.
- They are more common in men.

How can an AVM damage the brain?

- If an AVM ruptures, it can bleed into the brain. This is called an **intracerebral hemorrhage** (ICH). If the AVM ruptures into the space between the skull and brain, then it is called a **subarachnoid hemorrhage** (SAH).
- When blood leaks into the brain it can cause damage by putting pressure on healthy brain tissue and decreasing oxygen delivery to cells.
- Damage may be temporary or permanent.

What are the symptoms of an AVM?

Symptoms of an AVM depend on its location:

- Seizures
- Localized headaches
- Difficulty with speech or swallowing, movement and vision
- Dizziness, numbness, or tingling
- Memory problems
- Weakness, loss of coordination, or difficulty walking

How is an AVM diagnosed?

There are three main tests used to diagnose AVMs:

- **Brain Computerized Tomography (CT) scan** is an imaging test used to create pictures of the head, including the brain.
- **Brain magnetic resonance imaging (MRI)** is an imaging test that uses powerful magnets and radio waves to create pictures of the brain and surrounding nerve tissues.
- **Cerebral (brain) Angiogram** is a procedure performed through a catheter (flexible tube) which is inserted into an artery in the groin. Special dye

(contrast material) is injected so blood vessels will show up on a screen to show how blood flows through the brain.

How is an AVM treated?

The best treatment depends on the type and location of the AVM. Your doctor will help you determine the best treatment plan.

- **Medical/observational therapy**- You may be prescribed medications to prevent seizures and to lower your blood pressure. You may be asked to avoid heavy lifting and straining. Your doctor will likely recommend regular imaging to monitor the AVM.
- **Surgery**- Open brain surgery is performed through an opening made in the skull to remove the AVM.
- **Endovascular embolization**- This is a minimally invasive procedure, which involves inserting a small catheter into your groin. The catheter is guided inside the blood vessels of the AVM where glue, coils, or other material may be inserted to block the flow of blood to the AVM.
- **Radiation therapy**- Radiation can be delivered directly to the AVM which can eliminate it over time. Radiation is a one-time treatment which can take 2-4 years to work.

Author: Carrie Lint, ACNP
Reviewers: Bethany Lee-Lehner, RN, MSN
Dr. Aditya Pandey
Illustrations by Megan Foldenauer