

## What is an Arteriovenous Malformation- cerebral?

Arteriovenous malformations (AVMs) are defects in your vascular system. The vascular system includes arteries, veins, and capillaries. Arteries carry blood away from the heart to other organs; veins carry blood back to the heart. Capillaries connect the arteries and veins. An AVM is a snarled tangle of arteries and veins. They are connected to each other, with no capillaries. That interferes with the blood circulation in an organ.

AVMs can happen anywhere, but they are more common in the brain or spinal cord. Most people with brain or spinal cord AVMs have few, if any, major symptoms. Sometimes they can cause seizures or headaches.

AVMs are rare. The cause is not known, but they seem to develop during pregnancy or soon after birth. Doctors use imaging tests to detect them.

Medicines can help with the symptoms from AVMs. The greatest danger is hemorrhage. Treatment for AVMs can include surgery or focused radiation therapy. Because surgery can be risky, you and your doctor need to make a decision carefully.

A cerebral arteriovenous malformation is an abnormal connection between the arteries and veins in the brain that usually forms before birth.

### Causes

The cause of cerebral arteriovenous malformation (AVM) is unknown. The condition occurs when arteries in the brain connect directly to nearby veins without having the normal vessels (capillaries) between them.

Arteriovenous malformations vary in size and location in the brain.

An AVM rupture occurs because of pressure and damage to blood vessel tissue. This allows blood to leak into the brain or surrounding tissues, and reduces blood flow to the brain.

Cerebral AVMs occur in less than 1% of people. Although the condition is present at birth, symptoms may occur at any age. Hemorrhages occur most often in people ages 15 - 20, but can also occur later in life. Some patients with an AVM also have cerebral aneurysms.

### Symptoms

In about half of patients with AVMs, the first symptoms are those of a stroke caused by bleeding into the brain.

Symptoms of an AVM that is not bleeding are:

- Confusion
- Ear noise/buzzing (also called pulsatile tinnitus)
- Headache in one or more parts of the head, may seem like a migraine
- Problems walking
- Seizures
- Symptoms due to pressure on one area of the brain °Blurred, decreased, or double vision

- Dizziness
- Muscle weakness in any part of the body or face
- Numbness in any part of the body

### Exams and Tests

A complete physical examination and neurologic examination are needed, but they may be completely normal.

Tests that may be used to diagnose an AVM include:

- Cerebral angiogram
- Computed tomography (CT) angiogram
- Cranial MRI
- Electroencephalogram (EEG)
- Head CT scan
- Magnetic resonance angiography (MRA)
- Magnetic resonance veinogram

### Treatment

Finding the best treatment for an AVM that is found on an x-ray or other imaging tests but is not causing any symptoms can be difficult. Your doctor will discuss with you:

- The risk that your AVM will break open (rupture). If this happens, there may be permanent brain damage.
- The risk of any brain damage if you have one of the surgical treatments listed below.

Your doctor may discuss different factors that may increase your risk of bleeding, including:

- Current or planned pregnancies
- What the AVM looks like on imaging tests
- Size of the AVM
- Your age
- Your symptoms

A bleeding AVM is a medical emergency. The goal of treatment is to prevent further complications by controlling bleeding and seizures and, if possible, removing the AVM.

Three surgical treatments are available. Some treatments are used together.

Open brain surgery -- removes the abnormal connection through an opening made in the skull. It must be done by a highly skilled surgeon.

Embolization (endovascular treatment):

- A catheter is guided through a small cut in your groin to an artery and then to the small blood vessels in your brain where the aneurysm is located.
- A glue-like substance is injected into the abnormal vessels to stop blood flow in the AVM and reduce the risk of bleeding. This may be the first choice for some kinds of AVMs, or if surgery cannot be done.

Stereotactic radiosurgery is another alternative.

- This procedure delivers very focused radiation directly to the area of the AVM to cause scarring and shrinking.
- It is particularly useful for small AVMs deep in the brain, which are difficult to remove by surgery.

Anticonvulsant medications, such as phenytoin, are usually prescribed if seizures occur.

### Outlook (Prognosis)

About 1 in 10 people whose first symptom is excessive brain bleeding will die. Some patients may have permanent seizures and brain and nervous system problems.

AVMs that do not cause symptoms by the time people reach their late 40s or early 50s are more likely to remain stable and rarely cause symptoms.

### Possible Complications

- Brain damage
- Intracerebral hemorrhage
- Language difficulties
- Numbness of any part of the face or body
- Persistent headache
- Seizures
- Subarachnoid hemorrhage
- Vision changes
- Water on the brain (hydrocephalus)
- Weakness in part of the body

Possible complications of open brain surgery include:

- Brain swelling
- Hemorrhage
- Seizure
- Stroke

### When to Contact a Medical Professional

Go to the emergency room or call the local emergency number (such as 911) if you have:

- Numbness in parts of the body
- Seizures
- Severe headache
- Vomiting
- Weakness
- Other symptoms of a ruptured AVM

Also seek medical attention if you have a first-time seizure, because AVM may be the cause of seizures.