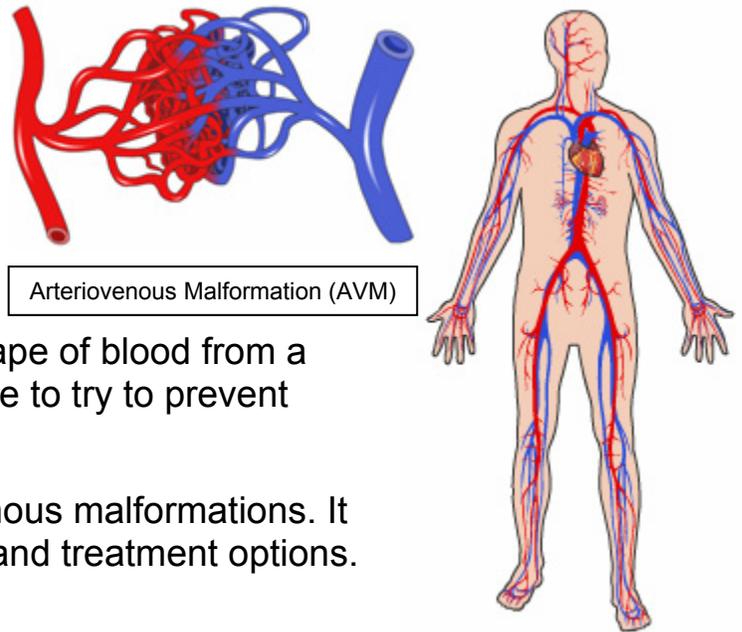


## Arteriovenous Malformations - AVM

### Introduction

An arteriovenous malformation, or AVM, is a tangled knot of blood vessels. It interferes with the blood circulation in an organ.

AVMs can happen anywhere, but AVMs in the brain or spinal cord cause the most problems. The greatest danger of an AVM is hemorrhage. Hemorrhage means an escape of blood from a ruptured blood vessel. Treatment is available to try to prevent hemorrhage.



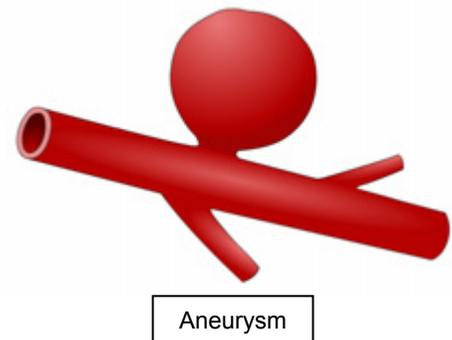
This reference summary explains arteriovenous malformations. It covers their causes, symptoms, diagnosis, and treatment options.

### Blood Vessels

Blood vessels carry blood through the body. Blood vessels divide into smaller arteries. These smaller arteries then divide into capillaries, or very small blood vessels.

AVMs happen when arteries and veins get tangled. As a result, arteries may connect directly to the veins without passing through the smaller vessels.

Sometimes an AVM causes the blood vessels to balloon. The word aneurysm describes this condition. An aneurysm may cause a blood vessel to break open, or rupture. When a blood vessel breaks open, it causes bleeding.



## Arteriovenous Malformations

Arteriovenous malformations, also known as AVMs, are defects of the circulatory system. A person may develop them in the womb before birth, or soon after birth.

AVMs can develop anywhere in the body. If an AVM develops anywhere other than the brain or spine, it rarely causes major health problems. AVMs located in the brain or spinal cord have the most noticeable effects on the body. However, most people with these types of AVMs experience few, if any, significant symptoms.

AVMs are most often found either at autopsy or during treatment for an unrelated disorder. An autopsy is a special examination of a body after death.



## Risk Factors

The exact cause of AVMs isn't known. However, certain factors may raise your risk for having an AVM. These are known as risk factors. Having a risk factor for a disease or medical condition does not mean that you will develop it. Some people with risk factors never develop problems. Sometimes people with no risk factors develop a disease or medical condition.

Anybody can be born with an AVM. But, scientists have discovered that it is more common in the following groups:

- Men
- People with a family history of AVMs

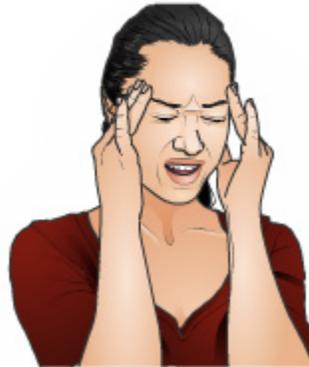
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## Symptoms

Many AVMs do not have any signs or symptoms. Brain AVMs or the aneurysms associated with them may create increased pressure in the brain. The pressure can cause:

- Headache
- Blindness
- Seizures
- Weakness
- Other neurological symptoms



Blood flow in a brain AVM is very high. This may cause blood to go to the AVM rather than the surrounding tissue. This is known as “steal phenomenon” because the AVM steals blood that is needed by the surrounding tissue. In the brain, it can cause stroke-like symptoms.

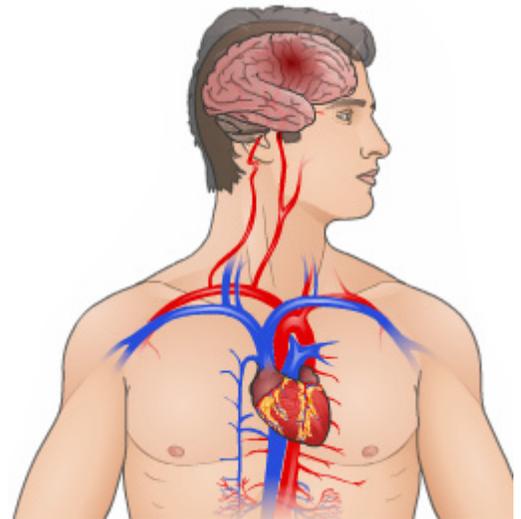
## Complications

Most people with AVMs experience few, if any, symptoms or complications. Some types of AVMs are more likely to create complications. AVMs located in the brain and spine are more likely to cause problems.

AVMs in the brain may cause the following complications:

- Hemorrhage, which is bleeding in the brain
- Less oxygen to brain tissue
- Thin or weak blood vessels
- Brain damage

AVMs cause the walls of the affected arteries and veins to become thin or weak. Because there are no capillaries available to slow down the blood flow, AVMs put a lot of pressure on these walls. This may cause a hemorrhage, which is the escape of blood from a ruptured blood vessel.



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A tiny hemorrhage may cause a small amount of damage to surrounding tissues. It is unlikely to cause noticeable symptoms. But a larger hemorrhage can cause damage.

AVMs cause blood to bypass capillaries and flow directly from arteries to veins. Blood moves quickly through this path because it isn't slowed down by the many smaller blood vessels.

When brain tissue doesn't get enough oxygen, it weakens or may completely die off. This can cause stroke-like symptoms. These symptoms include difficulty speaking, weakness, numbness, vision loss, or severe unsteadiness.

AVMs can put a lot of pressure on the walls of blood vessels, which may be thin and weak. This may result in a bulge forming in a blood vessel wall, called an aneurysm. Aneurysms may rupture and cause severe health problems.

AVMs can enlarge as you get older. If a brain AVM becomes larger, it may move or put pressure on parts of the brain. This can prevent protective fluid from flowing around the different areas of the brain. The fluid may push brain tissue up against the skull. This is a condition known as hydrocephalus.



## Diagnosis

Most AVMs in the body go undiagnosed and do not cause a problem. Your doctor will do a physical exam and ask you about your symptoms. More tests may be requested depending on the results of the exam. Imaging tests are often used. These tests can show areas inside of the body.

Some tests your doctor may recommend to diagnose AVMs include:

- Cerebral arteriography, also known as a cerebral angiography
- Computerized tomography, also called a CT
- Magnetic resonance imaging, also called an MRI



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Cerebral arteriography is the most detailed test and the best way to diagnose a brain AVM. The test reveals the location of arteries and veins in the brain, as well as the blood flow through them. During a cerebral arteriography, a thin tube is inserted into an artery in the groin. This tube is threaded up toward the brain to the blood vessels. Dye is injected into the blood vessels of the brain and X-rays are taken.

A CT scan takes pictures using X-rays. Sometimes dye is injected through an intravenous, or IV, tube in a vein. This allows the arteries feeding the AVM and the veins draining the AVM to be viewed in greater detail. This is called a computerized tomography angiogram.

An MRI creates images using a large magnet and radio waves. An MRI also provides information about the exact location of the malformation. This is very important for deciding the best treatment options. Dye can also be injected during an MRI to better see the blood circulation in the brain.

## Treatment

Treatment for AVMs depends on where the AVM is located as well as its size and the symptoms it is causing. Some symptoms can be eased with medications. However, brain AVMs are best treated with either surgery or radiation therapy.

Radiation therapy causes the blood vessels to clog and the risk of bleeding to decrease. It can take between 1 1/2 to 2 years to work. During that time, the brain is not protected from the risk of bleeding. Radiation therapy also has possible risks. It could lead to strokes.



Surgical treatment is the only treatment that immediately takes care of the problem and decreases the chances of a future bleed. Endovascular embolization is a procedure where a health care provider guides a catheter from a vein in your leg to the site of the aneurysm. He then sends small coils, particles or a substance like glue into the aneurysm to block blood flow. This is usually done in combination with surgery or radiation therapy.

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The aim of surgical treatment is to take out the AVM and clip any associated aneurysms, if present. The clip on the aneurysm isolates the aneurysm from the blood stream, allowing it to deflate. This prevents further bleeds and also takes the pressure off the surrounding tissue.

## Summary

Arteriovenous malformations, or AVMs, are defects in your circulatory system. An AVM is a tangled knot of arteries and veins. It interferes with the blood circulation in an organ. AVMs can happen anywhere, but the ones located in the brain or spinal cord can cause health problems.

The exact cause of AVMs isn't known. Anybody can be born with an AVM. But scientists have discovered that it is more common among men and people with a family history of AVMs.

Brain AVMs or the aneurysms associated with them may create pressure on and compress the brain, causing:

- Blindness
- Seizures
- Weakness
- Other neurological symptoms

Most AVMs in the body go undiagnosed. Sometimes diagnosis can be made using some type of imaging test, such as a cerebral arteriography, CT scan, or MRI.



Treatment for AVMs depends on where the AVM is located as well as its size and the symptoms it is causing. Some symptoms can be eased with medications. However, brain AVMs are best treated with either surgery or radiation therapy.

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