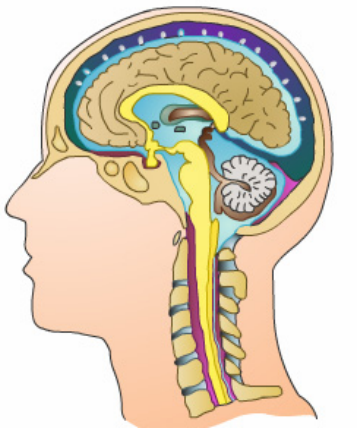
AVM and Surgical Treatment

Introduction

Cerebral arteriovenous malformations, also known as AVMs, are a very serious condition that can cause major strokes. AVMs can be fatal.



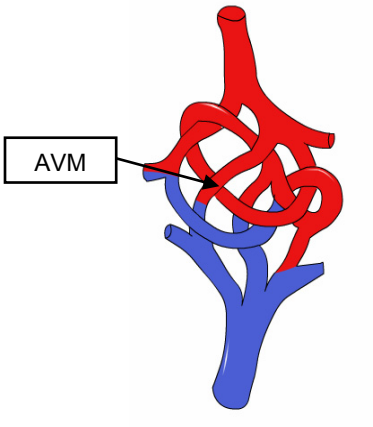
Depending on the age of the patient and the size and location of the AVM, health care providers may recommend surgery for brain AVMs. If your health care provider recommends surgery for you, the decision of whether or not to have surgery is yours.

This reference summary explains AVMs and surgical treatment. It talks about the symptoms and causes of AVMs. It also explains the benefits and risks of surgery for AVMs.

Anatomy

The brain is the control center of the body. It is inside of and protected by the skull. The brain is fed by many blood vessels. Arteries coming to the brain from the heart often divide into smaller arteries. These smaller arteries in turn divide into capillaries, or very small blood vessels. Capillaries allow oxygen to be delivered to the brain. The capillaries then get together to form bigger venules, which get together to form veins. These veins take blood back to the heart.

AVMs are abnormal tangles of blood vessels. The arteries may connect directly to the veins without the intervening smaller vessels. Sometimes the blood vessels balloon, producing aneurysms.



Symptoms and their Causes

AVMs or the aneurysms associated with them may create pressure on and compress the brain. This can cause seizures, weakness, blindness, and other neurological symptoms.

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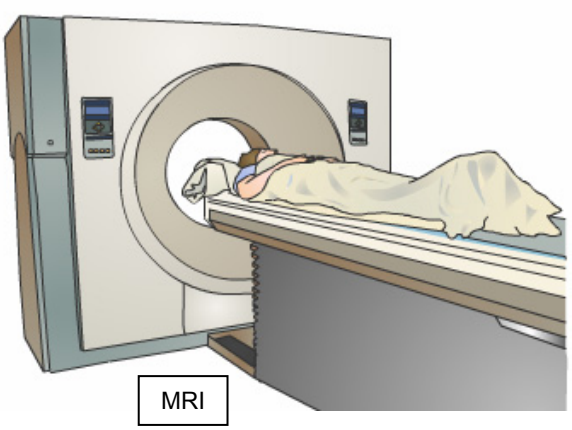
The blood flow in the AVM is very high. This may cause the blood to go to the AVM rather than the surrounding brain. This can cause stroke-like symptoms. This is known as steal phenomenon. The AVM steals needed blood from the surrounding brain. An AVM or the associated aneurysm may also cause a brain bleed, or hemorrhage, around the brain or into it. Many people who suffer from this kind of bleeding go to nursing homes for the rest of their lives because of severe neurological problems.

An AVM may be found when a brain CT scan or MRI is done for the above mentioned symptoms or other reasons.

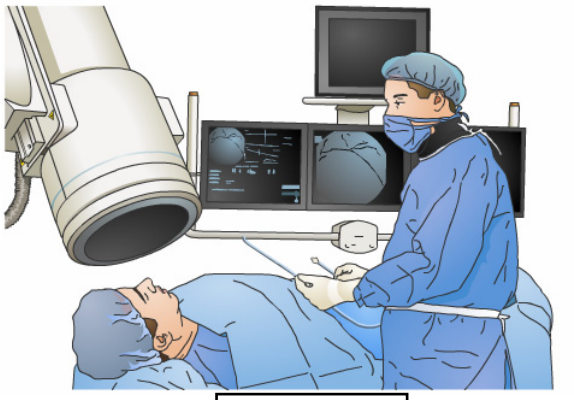


MRI

Alternative Treatments

AVMs can be treated in many different ways. Surgical treatment is the only one that immediately and definitely takes care of the problem and decreases the chances of a future bleed.

Small AVMs in places in the brain that are hard to reach may respond to radiation therapy. Radiation therapy causes the blood vessels to clog and the risk of bleeding to decrease. But this does not always happen. It takes between 1 1/2 to 2 years before the blood vessels clog. During that time, the brain is not protected from the risk of bleeding. Radiation therapy also has possible risks. It could lead to strokes near the AVM. An angiogram can be done to give a clearer picture of the anatomy of the AVM. An angiogram is a test where dye is injected in the blood vessels of the brain.



Angiogram

If an operation is considered, often the radiologist doing the angiogram will attempt to clog part of the blood vessels with small particles or special glue. This part of the angiogram is known as “embolization.” This helps decrease the blood flow to the AVM and usually makes the surgery to remove the AVM easier. The location of some AVMs may not allow embolization. The embolization decreases the flow for a short time. It does not count as long-term treatment for AVMs. There are risks to angiography and embolization. These include strokes and bleeding.

Aneurysms associated with an AVM may be treated non-surgically with small coils and balloons. These small coils and balloons are used to block off the aneurysm and prevent it from rupturing. They are placed inside or near the aneurysm through special catheters threaded through the main arteries of the brain. This type of treatment is known as endovascular treatment. The endovascular procedure is not for everyone. Your health care provider will consider many factors including:

- The size and location of the aneurysm.
- If the aneurysm has bled.
- If bleeding has happened.
- Where in the brain it is located.
- Your age.
- Your overall medical condition.

Surgical Treatment

An operation to take out the AVM and clip any associated aneurysms decreases the risks of future bleeding. 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 brain.

The operation itself is not meant to reverse the effect of any bleeding that may have occurred. It is instead meant to prevent any further bleeding. The operation consists of opening up the skull and very carefully dissecting the AVM from the surrounding brain. Any aneurysms will be clipped. If the AVM has already bled, the clot is removed. This operation takes anywhere from 2 to 6 hours depending on where and how big the aneurysm is.

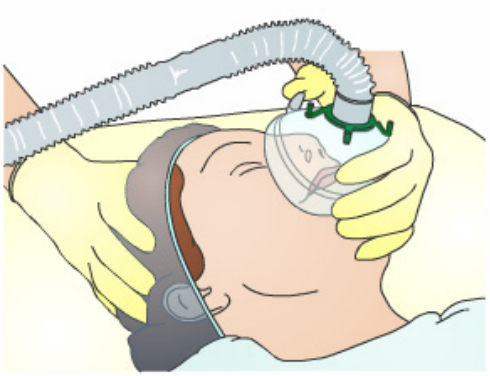
The hair in the proposed area of the head is usually clipped before the skin incision is made. Holes are made in the skull and a piece of bone is taken out. The brain covering is then entered. The AVM is taken out and any aneurysms are clipped. At the end of the operation, the piece of skull is placed back and the skin is closed.
Your health care provider will tell you how long you are likely to stay in the hospital. This depends on several factors, such as your age and medical condition.

Risks and Complications

This operation is relatively safe. But there are several possible risks and complications. You need to know about them just in case they happen. By being informed, you may be able to help your health care provider detect complications early. The risks and complications include those related to anesthesia and those related to any type of surgery.

Risks of general anesthesia include:

- Nausea.
- Vomiting.
- Urinary retention.
- Chipped teeth or cut lips.
- Sore throat.
- Headache.



More serious complications of anesthesia can include:

- Lung infections.
- Stroke.
- Heart attack.
- Death.

Your anesthesiologist will discuss these risks with you and ask you if you are allergic to certain medications.

Some of the risks are seen in any type of surgery. These include:

1. Infection, deep in the brain or at the skin level.
2. Bleeding. AVM surgery could cause significant blood loss. Transfusions may be necessary.
3. Skin scar that may be painful or ugly.

Other risks and complications are related specifically to this surgery. These are also unlikely. But it is important to know about them. The likelihood of these risks depends on the location and size of the AVM.

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The bigger the AVM and the deeper it is in the brain, the greater the risk of complications. These complications include, but are not limited to:

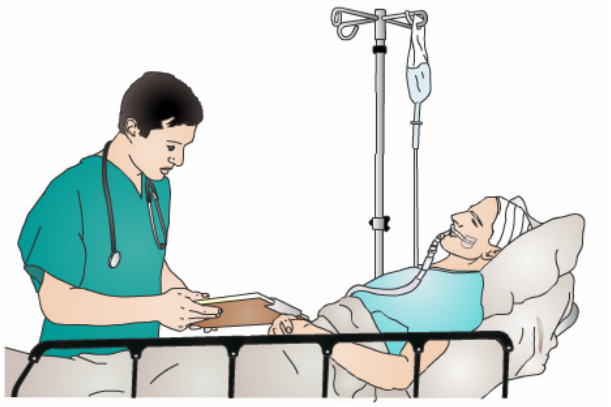
- Stroke.
- Paralysis.
- Weakness.
- Inability to understand or speak.
- Blindness.
- Personality changes.
- Seizures.
- Death.

Infections may also occur. Infections can be limited to the skin only or can be deep. If the bone flap is infected, it must be removed and replaced with plastic material months after the surgery. The infection can also involve the brain itself. Brain infections can require antibiotics and possibly another operation.

Blood clots in the legs can occur due to inactivity during and after the surgery. These usually show up a few days after surgery. They cause the leg to swell and hurt. Blood clots can become dislodged from the leg and go to the lungs. This can cause shortness of breath, chest pain, and possibly death. It is important to let your health care providers know if any of these symptoms occur. Sometimes the shortness of breath can happen without warning. Getting out of bed shortly after surgery may help decrease the risk of blood clots in the legs.

The operation's aim is to prevent further bleeding. It is not intended to reverse damage already caused by bleeding.

After the Surgery



After the surgery you may need to spend a day or two in the intensive care unit, or ICU. How long you stay depends on how well you are doing. The nurses in intensive care will watch you carefully. This involves the repeated checking of your neurological status. They will also watch over your heart and blood pressure. Later you may receive physical therapy, occupational therapy, and other therapies to aid your recovery.

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Whether or not you will be able to resume your usual activities depends on how well you are doing at the time of your follow-up. Your health care provider will tell you how long it will take before you are healed and when you can go back to work. This depends on your age, type of work and medical condition, as well as other factors.

Summary

Cerebral AVMs are a serious condition that may lead to bleeding in the brain, stroke, or even death.

The outcome of AVMs is worse after a bleed. It is recommended in many cases to operate on them before a bleed.

The outcome of AVMs that have bled is uncertain despite treatment. Surgery for brain AVMs can relieve a variety of serious symptoms. It can even be life saving.

Brain surgery has become safer than before, thanks to advances in technology and anesthesia. Complications of AVM surgery are possible. Knowing about them may help you detect them and treat them early if they happen.

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