

## What is a brain aneurysm?

A **brain aneurysm** is a bulging, weak area in an artery in the brain. Brain aneurysms can occur anywhere in the brain, though they usually occur on or near the **circle of Willis** (the joining area of several arteries at the bottom side of the brain). Aneurysms can be classified in different ways:

- By shape
- By size
- By whether they have ruptured or bled

## What are the dangers of a brain aneurysm?

If pressure builds up or the wall of the artery becomes too weak, an aneurysm can rupture. If a brain aneurysm ruptures, blood leaks into the space between the skull and the brain (**subarachnoid hemorrhage**) This is a form of a serious stroke called a **hemorrhagic stroke**. Bleeding into the brain can result in a wide range of symptoms including permanent disability or death.

Complications that can develop after the rupture of an aneurysm include:

- **Hydrocephalus** - A serious complication of subarachnoid hemorrhage is hydrocephalus. Hydrocephalus is a buildup of too much cerebrospinal fluid in the brain. This buildup can cause fluid pathways in the brain called ventricles to swell and press on the brain tissue. If left untreated, this increased pressure inside the head can cause permanent disability or death.
- **Vasospasm** - A delayed complication of a ruptured aneurysm is vasospasm. Vasospasm occurs when blood vessels become irritated and clamp down, limiting blood flow to the brain. This reduced blood flow can cause stroke or tissue damage.

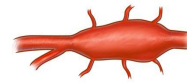
## What are the types of brain aneurysms?

There are two main types of brain aneurysms:

- A **saccular aneurysm** is a round or pouch-like sac on the blood vessel. It is also called a **berry aneurysm** because it looks like a berry hanging from a vine. This is the most common form of brain aneurysm and is typically found at the base of the brain.
- A **fusiform aneurysm** is formed by widening along all walls of the blood vessel.



Saccular or Berry Aneurysm



Fusiform Aneurysm

*Illustrations by Megan Foldenauer, MA, PhD*

## What causes a brain aneurysm?

The causes of brain aneurysms are unknown. They are thought to be a weakness that may be present at birth. Several factors are known to contribute to the formation of a brain aneurysm:

<b>Risk factors you have no control over:</b>	<b>Risks factors you can control:</b>	<b>Less common risk factors include:</b>
<ul style="list-style-type: none"><li>• Certain genetic diseases</li><li>• Family history of brain aneurysms</li><li>• Age over 40</li></ul>	<ul style="list-style-type: none"><li>• Cigarette smoking</li><li>• Uncontrolled high blood pressure</li><li>• Illicit drug and alcohol abuse</li></ul>	<ul style="list-style-type: none"><li>• Trauma or injury to the head</li><li>• Infection in the artery wall</li><li>• Vascular system disorders</li></ul>

## Can a brain aneurysm be prevented?

You can't always prevent brain aneurysms, but you can lower your risk by not smoking, not using drugs, and controlling high blood pressure.

## What are the symptoms of a brain aneurysm?

### Unruptured brain aneurysm symptoms

An unruptured brain aneurysm may not cause symptoms. On rare occasions, an unruptured aneurysm may become large and press on nearby brain tissue or cranial nerves, causing symptoms. Symptoms may include:

- Pain above and/or behind the eye
- Numbness on one side of the face or body
- Weakness
- Paralysis on one side of the face or body
- Dilated pupils
- Vision changes
- A droopy eyelid

### Ruptured brain aneurysm symptoms

A sudden, severe headache, also known as a **thunderclap headache**, is the key symptom of a ruptured aneurysm. Patients often describe it as “the worst headache of my life.” **If you experience this sudden and severe headache, you should seek medical attention immediately.**

Other signs and symptoms of a ruptured brain aneurysm may include:

- Nausea and vomiting
- Vision changes
- Drooping eyelid
- Sensitivity to light
- Changes in mental status
- Loss of consciousness
- Seizures or coma

An aneurysm that is changing in some way may cause a **sentinel** or warning headache in the days or weeks before rupturing. Not all people have a warning

headache before an aneurysm rupture. The most important thing is to seek medical attention if you have a sudden, severe headache.

### **How is a brain aneurysm diagnosed?**

Most brain aneurysms are undetected until they rupture or are discovered during medical imaging tests for another condition. To detect a brain aneurysm, there are several tests your doctor can order. These may include:

- **Magnetic resonance angiography (MRA)** – A painless, non-invasive procedure that produces detailed images of blood vessels. Sometimes gadolinium contrast dye is used. It is used as a screening study for brain aneurysms.
- **Computed tomography angiography (CTA)** – A non-invasive test that uses iodine contrast dye to view blood flow in the brain’s arteries. This is generally considered more specific than an MRA and is used to evaluate an aneurysm further once discovered on another form of testing.
- **Brain angiogram** – A procedure performed through a catheter (flexible tube) that is inserted into an artery in the wrist or groin. Special dye (contrast material) is injected to show blood flow in the brain’s arteries and to look for an aneurysm. This is the most specific test used to study brain aneurysms.

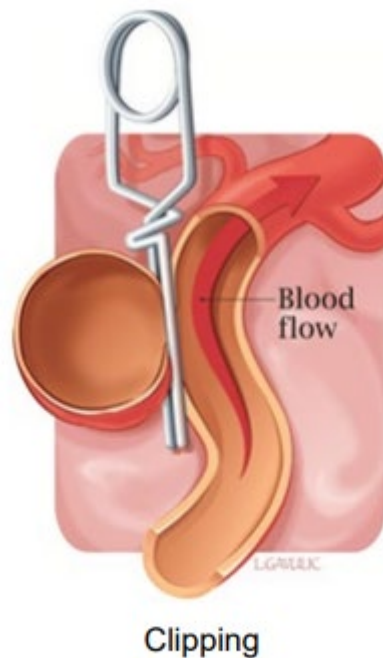
### **How is a brain aneurysm treated?**

Your providers will make decisions on the best treatment for you based on many factors. Each case is unique and considerations for treating unruptured aneurysms include:

- The shape, size, and location of the aneurysm
- Your age and health
- Personal medical and family history
- Risk of treatment

Treatment options include:

- **Microvascular clipping** is an open surgery performed under anesthesia by a neurosurgeon. Typically, a small section of the skull is removed (a procedure called a **craniotomy**) and the aneurysm is located. A small, metal clip will be placed at the bottom of the aneurysm to stop blood flow into the aneurysm and stop the risk of rupture. The clip will stay in place permanently. Finally, the piece of skull will be replaced, and the skin will be sutured back into place.



*Illustration by Lorie Gavulic*

- **Endovascular embolization** is an alternative to open surgery. It is performed in an angiography suite under anesthesia. A neurosurgeon or an **interventional neuroradiologist** (a doctor with training in x-ray guided brain imagery) performs this type of surgery. During the procedure a **catheter** (flexible tube) is placed in an artery (usually in the groin) and guided by imaging to the aneurysm. Through the catheter, a **coil system** (spirals of platinum wire) is placed into the aneurysm. The coils fill the aneurysm and

cause the blood to clot, which seals the aneurysm from the inside and reduces the risk of rupture. Sometimes **stents** (tubes made of wire mesh) are also used to support the coils. If an aneurysm has an unusual shape or a wide neck, the coils can easily float out. In these cases, a stent can be used to secure the coils so they stay within the aneurysm.



### An aneurysm with coils and a stent

*Illustration by Megan Foldenauer, MA, PhD*

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