

Neurosurgery Department



# Brain Aneurysms



National  
Neuroscience Institute

SingHealth

## Understanding Brain Aneurysms

A brain aneurysm is a weak or thin spot on a blood vessel in the brain that balloons and fills with blood. It is usually located along main arteries on the underside of the brain and the base of the skull.

Brain aneurysms may rupture and bleed (subarachnoid haemorrhage), causing serious complications like stroke, coma and death. After an initial rupture, brain aneurysms may rupture and bleed again.

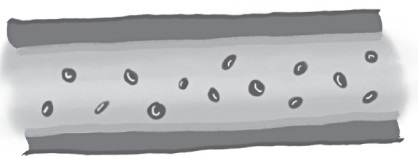
Complications arising from a rupture could include:

- **Hydrocephalus**

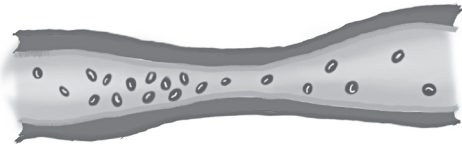
Blood from a ruptured brain aneurysm blocks the fluid circulation in the brain. This causes an excessive build-up of fluid within the brain cavity (ventricles) and increases brain pressure. A temporary external drain may be inserted to relieve the brain pressure and permanent shunt (catheter) may be needed if it cannot be removed.

- **Cerebral Vasospasm**

About a week after the rupture, blood vessels in the brain may contract spontaneously and limit blood flow to other areas of the brain, resulting in a stroke (Figure 1).



Normal blood vessel



Constricted blood vessel (Vasospasm vessel)

Figure 1

Normal and constricted blood vessel

To prevent vasospasm, a drug called Nimodipine is usually given orally or through the veins for 21 days or lesser. The patient is also kept well-hydrated and the blood pressure slightly higher.

- **Brain Swelling**

Brain swelling increases pressure in the skull and prevents blood flow to the brain. Further surgery may be needed to remove parts of the skull to release pressure.

- **Seizure**

Brain injury following a rupture results in the formation of scar tissue. This may cause a seizure. A seizure is a sudden, uncontrolled electrical disturbance in the brain leading to changes in behaviour, movements, feelings and consciousness. Medication to prevent or control seizures may be needed.

## Signs of Brain Aneurysms

Most will not experience any signs until the aneurysm becomes fairly large or ruptures.

A large aneurysm may exert pressure on a nerve or surrounding brain tissue and may cause widening of the pupils (pupillary dilatation), visual disturbances, numbness, weakness, or paralysis on one side of the face or eye pain.

Some patients may experience sudden, intense and persistent headaches (sentinel headaches) days to weeks before the aneurysm ruptures.

When it ruptures, these signs may follow:

- Sudden onset of severe headache, often described as the “worst” headache of their lives
- Nausea and/or vomiting
- Change in mental state or loss of consciousness
- Seizure
- Stiff neck
- Sensitivity to light
- Vision and/or speech impairment
- Numbness and/or weakness of body

**Call 995 or visit the Emergency Department if you experience any of these symptoms. A rupture may be fatal or cause permanent brain damage.**

## **Diagnosing Brain Aneurysms**

Brain imaging and cerebrospinal fluid analysis are commonly used to diagnose brain aneurysms.

- **Computed Tomography (CT) Scan**  
CT scan is a fast and painless test to detect blood in the brain (subarachnoid haemorrhage). This is often the first test to detect a rupture.
- **Computed Tomography Angiography (CTA)**  
CTA is a non-invasive test where a contrast dye is injected into the vein while a CT scan is carried out to produce detailed images of blood flow in the brain arteries.
- **Cerebral Angiography**  
Cerebral angiography is an invasive test that produces pictures of the blood vessels in the head and neck.

- **Cerebrospinal Fluid Analysis**

Brain fluid is retrieved from the spine using a needle. The fluid is tested for presence of blood. This may be ordered if a ruptured brain aneurysm is suspected despite a normal CT scan.

## Preventing Brain Aneurysms

There is no known way to prevent brain aneurysms. However, people who are diagnosed should keep their blood pressure under control and abstain from smoking.

## Risk Factors

Brain aneurysms can occur in all age groups, but has a higher incidence among those aged 40 - 60 and in women.

It is more common in people with genetic diseases where multiple cysts grow in the kidney (polycystic kidney disease) and circulatory disorders where abnormal and poorly formed blood vessels tangle together (arteriovenous malformation).

It is not fully known how aneurysms develop but risks include:

- Age
- High blood pressure
- Smoking
- Blood vessel disease where fats build up on the inside of artery walls (atherosclerosis)
- Injury or trauma to blood vessels
- Infections
- Tumour

## Treating Brain Aneurysms

- **Surgical Clipping**

One or more clips is placed on the neck of the aneurysm to cut blood flow (Figure 2). The clip remains in the patient permanently. Usually, aneurysms that are completely clipped do not return.

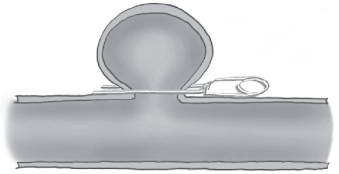


Figure 2  
A clipped aneurysm

- **Endovascular Embolisation**

A less invasive procedure, a small plastic tube (microcatheter) is inserted and guided to the aneurysm. Platinum coils are passed through the microcatheter and placed in the aneurysm. The coil fills the aneurysm, inducing a blood clot. Regular follow-up is needed to see if the aneurysm recurs.

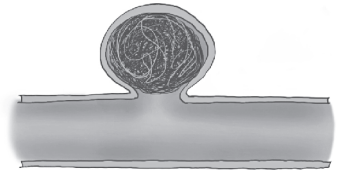


Figure 3  
An aneurysm coil

Both methods help prevent future rupture or re-bleeding. The prognosis is dependent on the patient's age and health, severity of bleeding and re-bleeding. Recovery may take weeks to months.

Patients with very small aneurysms may be monitored. For aneurysms which have yet to rupture, the neurosurgeon will consider the type, size and location of the aneurysm, patient's age and health condition, family history and risks of treatment. Patients who receive treatment for an unruptured aneurysm generally recover more quickly.

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