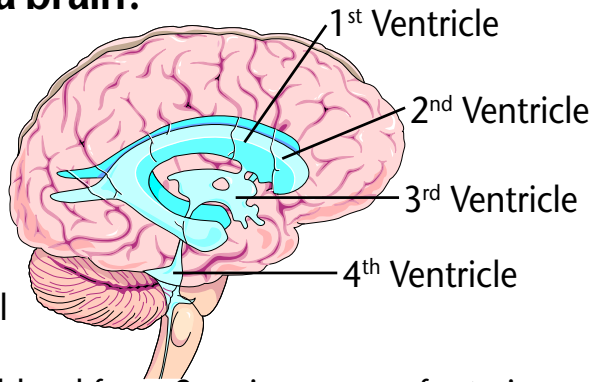


Treatment of Brain Aneurysms

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What is inside a brain?

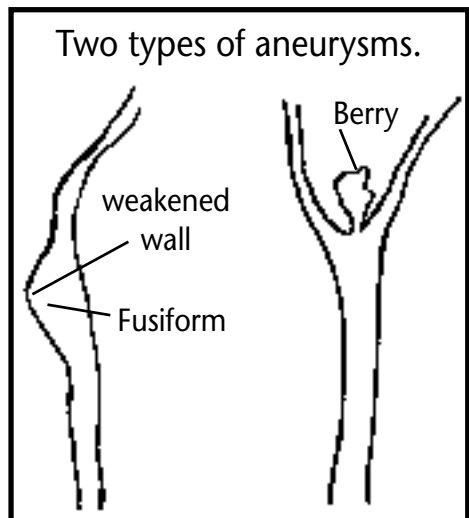
Located inside the skull, the brain has many specialized groups of cells. The 4 ventricles inside the brain make cerebrospinal fluid (CSF).



The brain receives blood from 2 main groups of arteries. It is connected to the spinal cord. The brain and spinal cord are called the body's central nervous system.

What is an aneurysm?

For unknown reasons, an area on an artery wall can weaken. An aneurysm is an abnormal outward bulging of a portion of the artery wall. The wall of an aneurysm is thinner than normal so it can rupture and bleed. Aneurysms come in many sizes and shapes. Sometimes an aneurysm is detected before it



bleeds and is repaired. Aneurysms can occur in any artery of the body but only brain aneurysms will be discussed in this pamphlet.

What happens when a cerebral aneurysm ruptures?

When an aneurysm bleeds inside the head it is called a subarachnoid hemorrhage (SAH). Doctors use a scale to classify bleeding from a SAH. There are 5 grades of bleeding with Grade 1 being the least severe and Grade 5 being the most severe. The blood that belongs in the arteries now spreads out over the brain tissue and damages the cells. The aneurysm must be treated to prevent re-bleeding. If the bleeding does not stop, the patient will die. Blood may also be found in the ventricles and the CSF.

Patients with a low-grade bleed (1 or 2) may have a severe headache, which they will describe as the worst headache of their life. In these cases, the bleeding has stopped. Symptoms may include nausea and vomiting, drowsiness, double vision and neck stiffness. Other problems that can occur are related to the severity of the bleeding and the location of the artery involved. These can include eyelid drooping, blood electrolyte imbalances, facial drooping, loss of consciousness and death. Blood around the brain from the original bleeding can block the normal flow of CSF (hydrocephalus) and irritate the other blood vessels in the brain.

Required Tests

A radiologist may do an arteriogram or angiogram to find the source of the bleeding.

An angiogram involves:

- inserting a flexible catheter into an artery (usually in the groin)

- injecting a dye so the blood can be watched flowing through the blood vessels
- taking pictures that show the size, shape and location of the aneurysm.

Side effects:

- side effects of the dye used in angiogram testing may include allergic reactions and/or kidney failure
- possible side effects of the angiogram are infection, limb loss, haemorrhage and death.

The doctor will explain the possible benefits and risks of the test so an informed consent can be given.

Based on the results of this test, treatment is planned.

Aneurysm Repair

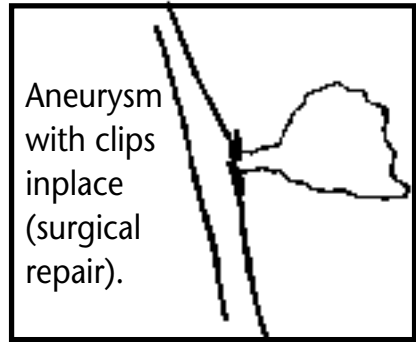
Surgical Repair or Endovascular Repair (Coiling)

The decision to proceed with either surgery or aneurysm coiling is only made after the treating doctors and the patient/family discuss the matter. The size, shape and location of the aneurysm are considered when the decision to do surgery or coiling is made. The patient's condition will also be considered. Sometimes an aneurysm is found and repaired before it bleeds. There are risks and benefits with any procedure including infection, artery dissection, bleeding, stroke and death. These will be explained to you. Coils have been in use for a few years. They can become compacted allowing aneurysms to reform. Patients who have coiling are followed closely with x-rays and angiograms. Before surgery or coiling the patient will not be allowed to eat or drink. The patient will be given a general anaesthetic, as he/she needs to be very still for either procedure. We are unable to predict how long the surgery or coiling will take but it will be at least several hours.

Surgical Repair

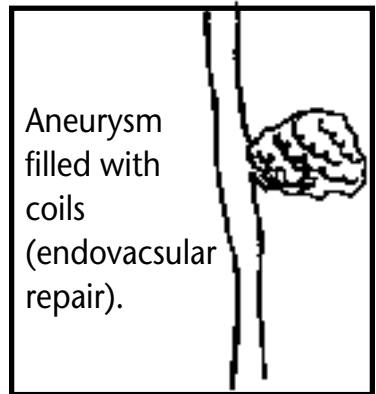
When surgery is done to repair an aneurysm, a metal clip is applied to the neck of the aneurysm (see diagram). This repairs the artery by preventing blood from flowing into the aneurysm.

Surgery has been the primary treatment for years and has proven to be very effective.



Endovascular Repair (Coiling)

This procedure begins as if an angiogram is being performed. A special tube (sheath) is placed into the groin. A soft flexible tube is then inserted and positioned at the base of the aneurysm. Each tube contains one platinum coil. Several coils may be needed to fill the aneurysm. It is very important to



fill the entire aneurysm to minimize the risk of re-bleeding. The mass of coils attracts blood-clotting factors inside the aneurysm. This will form a blood clot and seals the aneurysm off from the blood vessel. Within about 24 hours a new blood vessel wall covers the opening to the aneurysm. The aneurysm is now repaired. During the coiling, the patient needs to receive a blood thinner called heparin to prevent blood clots from forming in the wrong places. This intravenous medicine may be continued after the procedure. The sheath in the groin will be removed with a doctor's order. This is often the day after the coiling.

Major Complications

- Some of the aneurysm remains
- Rupture of the aneurysm
- Stroke
- Death

Minor Complications

- Bruising at puncture site in the groin
- A lump (hematoma) at the puncture site

Vasospasm

This is a complication of subarachnoid hemorrhage (SAH).

Vasospasm is a narrowing of arteries in the brain that can cause a stroke. The development of vasospasm has little to do with the type of treatment but is the result of the initial subarachnoid hemorrhage (bleed).

Vasospasm may be treated with:

1. Intravenous fluids and increased fluids if drinking.
2. Increased blood pressure. Sometimes a medication or several medications are given to increase blood pressure.
3. A drug called **nimopidine** is given to help prevent narrowing of the arteries in the brain.

A ventricular drain may be needed if the patient develops hydrocephalus. After a prolonged period of time, a ventriculo-peritoneal (VP) shunt may be inserted if the normal pathway for CSF flow remains blocked.

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