

Subarachnoid haemorrhage

The brain has an interconnected network of blood vessels that receives around one fifth of the blood pumped from the heart. Trauma or a weakening somewhere in this blood vessel network can cause a bleed (haemorrhage). A subarachnoid haemorrhage is any bleed located underneath one of the protective layers of the brain known as the arachnoid layer.

A subarachnoid haemorrhage can be fatal if not diagnosed and treated promptly.

Symptoms of subarachnoid haemorrhage

The wide range of symptoms of subarachnoid haemorrhage can include:

- Sudden and severe onset of headache
- Photophobia (sensitivity to light)
- Neck pain
- Back pain
- Nausea and vomiting
- Seizures
- Decreased conscious state.

Haemorrhagic stroke explained

There are two types of stroke - ischaemic and haemorrhagic. An ischaemic stroke is more common and is caused by a blood clot blocking a blood vessel in the brain. A haemorrhagic stroke is caused by a ruptured blood vessel. The two types of haemorrhagic stroke include the subarachnoid haemorrhage (bleeding in the space around the brain) and the intracerebral haemorrhage (bleeding within the brain tissue). About one in 10 strokes are haemorrhagic.

A range of causes

Some of the causes include:

- **Cerebral aneurysm** - a weakening of any part of a blood vessel network of the brain. This weakening causes the blood vessel to stretch and deform, usually into the shape of a balloon. In this state, the blood vessel is unstable and can easily rupture. Contributing factors to the formation of a cerebral aneurysm are thought to include hypertension and atherosclerosis.
- **Arteriovenous malformation (AVM)** - a condition where blood vessels within the brain cluster together and form abnormal connections. The abnormal formation is very weak and prone to bleeding.
- **Trauma** - any severe blow to the head may rupture blood vessels within the brain.

Common complications

Complications can occur before or after medical treatment, and can include:

- **Rebleed** - until the damaged vessel is repaired, there is a risk of re-bleeding. This commonly occurs 24-48 hours after the first bleed and, if left untreated, carries an increased risk of further complications including death. The risk is highest in the first two weeks post initial bleed without medical intervention.

- **Communicating hydrocephalus** - hydrocephalus is the abnormal enlargement of the brain cavities (ventricles) caused by a build up of cerebrospinal fluid (CSF). The arachnoid villi, which are responsible for CSF reabsorption, can become blocked with blood from the initial bleed, associated surgery or further complications. If the reabsorption of CSF is blocked, communicating hydrocephalus will occur.
- **Cerebral oedema** - a common side effect from any traumatic event involving brain tissue is cerebral oedema, or swelling of the brain. This is caused by lack of oxygen to brain tissue.
- **Seizures** - these occur when abnormal signals are sent from the damaged brain cells. These abnormal signals trigger temporary changes in sensation, behaviour, movement and consciousness. It is regarded as epilepsy if the patient has three or more seizures.
- **Cerebral vasospasm** - this is the most significant cause of morbidity (complications) and mortality (death) in patients surviving subarachnoid haemorrhage. Unidentified substances released after a subarachnoid haemorrhage can cause the blood vessels of the brain to spasm. This changes the structure of the vessel walls and, ultimately, decreases blood supply to parts of the brain. Cerebral vasospasm can happen between one and 28 days after the initial bleed, with the incidence peaking between days seven and 14.

Diagnosis methods

The tests used to diagnose subarachnoid haemorrhage can include:

- **CT scan** - identifies the extent of the subarachnoid haemorrhage and can sometimes pinpoint the location of the bleed. A CT scan can identify complications of a subarachnoid haemorrhage, such as communicating hydrocephalus.
- **Lumbar puncture** - CSF is removed using a needle and examined for the presence of blood.
- **Intra-arterial digital subtraction angiography (IADSA)** - also known as cerebral angiography. This is the most commonly used radiological procedure to locate the cause of an aneurysmal subarachnoid haemorrhage.
- **MRI scan** - this non-invasive scan uses strong magnetic fields to visualise brain blood vessels and their associated abnormalities.

Treatment options for subarachnoid haemorrhages

Treatment can include:

- **Surgery** - surgery can only be used if the cause of the subarachnoid haemorrhage is clear, such as an aneurysm or arteriovenous malformation.
- **Conservative treatment** - neurosurgery is not an option if there is no definable cause, however drainage of the blood from the subarachnoid space is usually performed. Then careful observation is carried out for a specified period of time to ensure there is no further damage to the brain. This course of action may also be taken if the haemorrhage is too large or too risky to operate on.
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Surgical techniques

Surgical techniques include:

- **Clipping** - the neurosurgeon cuts a hole into the skull to access the brain. The ruptured aneurysm is located and surgically clipped. However, clipping may not be possible if the aneurysm is inaccessible or awkwardly shaped. The general area is then wrapped to contain the bleeding.
- **Endovascular coiling** - the affected blood vessel is located using IADSA. Minute coils are introduced into the aneurysm until it is completely filled. This causes the area to clot, which excludes it from blood flow and prevents any further bleeding.

Risks of surgery

Surgery is risky, but death is almost certain if the subarachnoid haemorrhage is left untreated. Risks and complications of surgery include:

- Infection
- Epilepsy
- Stroke
- Death.

Where to get help

- Your doctor
- Neurologist
- Neurosurgeon
- Always call an ambulance in an emergency Tel. 000.

Things to remember

- A subarachnoid haemorrhage is any bleed located underneath one of the protective layers of the brain known as the arachnoid layer.
- Causes which may increase the risk of aneurysm rupture or AVM rupture include high blood pressure, physical exertion and emotional stress. Other causes of SAH can be traumatic, such as head injury occurring from a fall, car accident or blow to the head.
- A subarachnoid haemorrhage can be fatal if not diagnosed and treated promptly.

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