

## Bleeding in the brain: haemorrhagic stroke

Some strokes are due to bleeding in or around the brain, and are known as haemorrhagic strokes. This guide explains the different types of stroke caused by bleeding, and how they are diagnosed and treated.

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### Blood vessels in the brain

The heart pumps blood around the body through a network of blood vessels called arteries. This blood takes vital oxygen and nutrients to the brain and the rest of the body. If blood leaks from a blood vessel in or around the brain, this is called a haemorrhagic stroke. You may also hear it called a brain haemorrhage or a brain bleed.

In the UK, around 15% of strokes are haemorrhagic, and about 85% are ischaemic (caused by a blockage). Haemorrhagic stroke tends to affect younger people more than other types of stroke, and is most common in people aged between 45 and 70. The average age for all types of stroke in the UK is 74 for men, and 80 for women.

### There are two main types of haemorrhagic stroke

- **bleeding within the brain:** called an intracerebral haemorrhage, or intracranial haemorrhage
- **bleeding on the surface of the brain:** called a subarachnoid haemorrhage (SAH)

### Bleeding within the brain

When an artery inside the brain bursts it is called an intracerebral haemorrhage. About 10% of all strokes are of this type. The blood leaks out into the brain tissue at high pressure, killing brain cells and causing brain swelling.

### Bleeding on the surface of the brain

The brain sits inside a cushion of membranes that protects it from the skull. Between two of the layers of membranes is a space called the subarachnoid space that is filled with cerebrospinal fluid.

If blood vessels near the surface of the brain burst and blood leaks into the subarachnoid space, this is called a subarachnoid haemorrhage (SAH). SAH accounts for around 5% of all strokes, and it is most often caused by a burst aneurysm (a bulging of the wall of an artery – see later in this guide for more information).

## Symptoms

Some people get a sudden, severe headache, or a very stiff neck with vomiting during a haemorrhagic stroke. But the main signs of a haemorrhagic stroke can be any of those in the FAST test.

### FAST test



#### Face

Can the person smile? Has their face fallen on one side?



#### Arms

Can the person raise both arms and keep them there?



#### Speech

Can the person speak clearly and understand what you say? Is their speech slurred?



#### Time

If you see any of these three signs, it's time to call **999**.

The FAST test helps to spot the three most common symptoms of stroke. But there are other signs that you should always take seriously. These include:

- sudden weakness or numbness on one side of the body, including legs, hands or feet
- difficulty finding words or speaking in clear sentences
- sudden blurred vision or loss of sight in one or both eyes
- sudden memory loss or confusion, and dizziness or a sudden fall
- a sudden, severe headache.

If you spot any of these signs of a stroke, don't wait. Call **999** straight away.

## What causes a haemorrhagic stroke?

### High blood pressure

The main cause of haemorrhagic stroke is weakening of the very small arteries in the brain, which is often related to high blood pressure (hypertension). This process, called 'small vessel disease', makes the small arteries in the brain prone to splitting.

### Cerebral amyloid angiopathy (CAA)

This is a common type of small vessel disease where a protein called amyloid builds up inside the small blood vessels near the surface of the brain. The resulting damage can cause a vessel to tear, causing bleeding. This condition is more common among older people, and older people with dementia. Although there are no proven treatments for CAA, controlling blood pressure can help reduce the risk of brain haemorrhage in this condition.

Magnetic resonance imaging (MRI) scans have shown that CAA is present in patients with bleeds in specific areas of the brain near to the surface (called lobar areas), known as lobar intracerebral haemorrhage. Smaller bleeds, which can be detected on MRI scans, are called "microbleeds".

### Burst aneurysm

An aneurysm is a weak spot on an artery that has ballooned out. Artery walls are usually thick and strong, but the walls of an aneurysm are thin and weak because they have been stretched, and therefore they can burst easily. Aneurysms most commonly occur in the artery leading away from the heart to the rest of the body, and the brain.

Some brain aneurysms are present from birth. There are also a number of risk factors that increase your chances of developing a brain aneurysm. These include smoking, high blood pressure, a family history of aneurysms, using cocaine, and having a genetic kidney condition called autosomal dominant polycystic kidney disease (ADPKD).

A brain aneurysm doesn't usually cause any symptoms unless it bursts, but people may experience pain on one side of the face or around an eye, loss of vision or headaches.

A burst aneurysm is the most common cause of a subarachnoid haemorrhage. After a haemorrhage an aneurysm can seal itself, but there is a risk of it bleeding again. The risk of rebleeding decreases with time.

### Abnormal blood vessels

Rarely, people are born with abnormalities in their blood vessels. They are called vascular malformations, and are tangles of blood vessels or enlarged blood vessels.

Cavernous malformation is one type of vascular malformation. It is a cluster of enlarged blood vessels. Many people with this condition do not experience any ill effects, but if the thin vessel walls break it can cause bleeding in the brain.

### Blood-thinning medication

People taking medication to lower their risk of blood clots have a higher risk of bleeding in the brain. However, your risk of stroke is carefully monitored when you're taking blood-thinning medications, including antiplatelet agents and anticoagulants. People using these have their suitability for the drug assessed by a consultant, which will depend on an assessment of the benefits of the blood-thinning medication and the risks of bleeding. You should always discuss any concerns about your medication with your doctor.

### Illegal drugs

Illegal drugs such as cocaine can raise the risk of a stroke in the days after using them. Others, like cannabis and khat, are associated with an increased risk and higher death rate from stroke.

### How are strokes due to bleeding diagnosed?

When someone is taken to hospital with a suspected stroke, a brain scan should be carried out urgently and within one hour of arriving in hospital. The scan could be either a computed tomography (CT) or MRI scan. The brain scan will show what type of stroke it is – whether it was caused by a blockage or by bleeding. Patients diagnosed with SAH should be referred immediately to a neurosciences centre.

To help diagnose SAH, a lumbar puncture might be carried out as well as a brain scan. This is a procedure to remove a sample of the cerebrospinal fluid that bathes the brain and spinal cord. It will show if any blood has leaked into this fluid.

## Bleeding in the brain: haemorrhagic stroke

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A digital subtraction angiogram (or catheter angiogram) is also occasionally carried out to locate the burst blood vessel.

A fine tube called a catheter is put into an artery and a dye is injected into the blood. X-rays are then used to find where the bleeding occurred.

To help diagnose the cause of intracerebral haemorrhage you might also have further CT or MRI scans, including special scans of the blood vessels (non-invasive angiography).

### How will I be treated?

#### Medication

When admitted to hospital with a brain haemorrhage, if you are taking anticoagulants, you will be immediately prescribed medication to reverse those effects. If you are also diagnosed with high blood pressure, you will be given medication to bring it down.

After an SAH a lack of blood supply to the brain can lead to further brain damage, called cerebral ischaemia. To prevent this, you may be given a drug called nimodipine for about three weeks.

#### Pain relief

Morphine or paracetamol with codeine may be given to you to help with the severe headache associated with an SAH.

#### Epilepsy

Some people develop epilepsy after an intracerebral haemorrhage or SAH. There is a range of different types of medication you may be given to treat it. See our guide F24, *Epilepsy after stroke* for more information.

#### Surgery to relieve pressure on the brain

Emergency surgery is sometimes needed to remove blood, to relieve any pressure that has built up, or to repair the blood vessels. This is usually done with a procedure called a craniotomy. This operation should be carried out by a neurosurgeon.

During the operation, a small piece of skull is cut away so the surgeon can access the cause of the bleeding. They can then repair any damaged blood vessels and ensure there are no blood clots that could restrict the flow of blood in your brain. If a blood clot has formed, it may be removed. After the bleeding has stopped, the piece of skull can be replaced.

With any type of bleed in or around the brain, the escaping blood can sometimes alter the normal flow of cerebrospinal fluid. This can result in a build-up of fluid around the brain called hydrocephalus. This can cause pressure and pain, and if left untreated, can cause damage to the brainstem (the base of the brain which controls most of the automatic functions that keep us alive, such as breathing). Treatments include a lumbar puncture or surgery to drain away the excess fluid. This is carried out using a shunt (a thin tube temporarily implanted into the brain).

#### Surgery to seal an aneurysm

If your stroke was caused by a burst aneurysm, an operation may be necessary to seal it and stop it bleeding again.

During coiling a fine tube is inserted into an artery in the groin and carefully steered up to the aneurysm near the brain. X-rays are used to guide the tube. On the tip of the tube is a platinum coil, which is released into

## Bleeding in the brain: haemorrhagic stroke

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the aneurysm. More than one coil is usually inserted. Once the aneurysm is full of coils, blood cannot enter it, sealing it off and preventing future rupture.

Clipping involves opening the skull and making an incision in the membranes that protect the brain to get to the aneurysm. The surgeon will then put a clip around the base of the aneurysm to seal it shut.

The type of procedure used depends on your health and the aneurysm's position. When either is used, recovery time and length of hospital stay depend on the severity of the rupture.

### Recovering from a haemorrhagic stroke

It is quite common for people to experience headaches after any type of bleeding in the brain. This may be due to swelling or changes in the levels of cerebrospinal fluid. The pain tends to lessen over time and can usually be controlled by painkillers such as paracetamol. You should avoid taking aspirin after this type of stroke. Drinking plenty of water and avoiding caffeine and alcohol can help to reduce these headaches.

If you have another severe headache or a persistent headache, seek medical attention urgently.

Some people report strange sensations in their brain after an SAH, like running water or a tickling feeling on their brain. These are quite common and usually pass in time.

### Effects of a stroke

The effects of a stroke are unique to each individual, and recovering from a stroke is different for each person. A stroke may cause a range of physical and communication difficulties including difficulty walking, slurred speech, cognitive (memory and thinking) problems, incontinence and vision problems.

You may need rehabilitation, like physiotherapy and speech and language therapy. Rehabilitation should begin soon after the stroke, and it can help you make the best recovery possible for you. Your recovery after your brain haemorrhage, and your medical and therapy needs, should be assessed after you are discharged from hospital.

You can read more about the physical and emotional effects of stroke on our website [stroke.org.uk](http://stroke.org.uk) and in our guides L10, *When you have a stroke* and L12, *Next steps after a stroke*.

You can find details of other sources of help and support in the *Where to get help and information* section of this guide.

### Driving

If you drive, you must tell the DVLA (or DVA if you are in Northern Ireland) if you have had a subarachnoid haemorrhage. If you have an intracerebral haemorrhage, you must inform the DVLA if you are having problems affecting your driving after a month. Talk to your doctor about driving, and read our guide F02, *Driving after stroke*.

## Reducing your risk of another stroke

You should be given advice about other ways of reducing your risk of a stroke. Stopping smoking, reducing your blood pressure, and losing weight can help to reduce your risk of a stroke. For ideas and information on avoiding another stroke, read our guide L14, *How to reduce your risk of a stroke*.

You should have your blood pressure checked regularly after a bleed in the brain, as high blood pressure is an important cause of another brain haemorrhage. If you were taking blood-thinning medications these should be reviewed by your doctor to decide whether they should be stopped, continued, or changed.

If you have two or more first-degree relatives (siblings or parents) who have had an SAH, they may also be advised to have a check-up and possibly an MRA (magnetic resonance angiogram: this is an MRI scan with a dye injected into the bloodstream).

## Where to get help and information

### From the Stroke Association

#### Talk to us

Our Stroke Helpline is for anyone affected by a stroke, including family, friends and carers. The Helpline can give you information and support on any aspect of stroke.

Call us on **0303 3033 100**, from a textphone **18001 0303 3033 100** or email **info@stroke.org.uk**.

#### Read our publications

We publish detailed information about a wide range of stroke topics including reducing your risk of a stroke and rehabilitation. Read online at **stroke.org.uk** or call the Helpline to ask for printed copies.

## Other sources of help and information

### Blood Pressure UK

#### Website:

[www.bpassocbloodpressureuk.org.uk](http://www.bpassocbloodpressureuk.org.uk)

#### Helpline: 020 7882 6218

Has a wide range of information on high blood pressure, treatments and lifestyle.

### Brain & Spine Foundation

**Website:** [www.brainandspine.org.uk](http://www.brainandspine.org.uk)

#### Helpline: 0808 808 1000

Provides detailed information about neurological conditions and risk factors, including subarachnoid haemorrhage and vascular malformations of the brain. Their helpline is staffed by specialist nurses.

### Brain and Spinal Injury Centre (Basic)

**Website:** [www.basiccharity.org.uk](http://www.basiccharity.org.uk)

#### Helpline: 0870 750 0000

Provides information, support and advice by staff who have direct experience of brain injury.

### Chest, heart & stroke Scotland

**Website:** [www.chss.org.uk](http://www.chss.org.uk)

#### Advice Line: 0808 801 0899

Information and support for people affected by stroke in Scotland

### DVA (Northern Ireland)

**Website:** [nidirect.gov.uk](http://nidirect.gov.uk)

Gives information about driving after stroke.

# Bleeding in the brain: haemorrhagic stroke

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## **DVLA (England, Wales, Scotland)**

**Website:** [gov.uk/dvla](http://gov.uk/dvla)

Gives information about driving after stroke.

## **Headway: the brain injury association**

**Website:** [www.headway.org.uk](http://www.headway.org.uk)

**Tel:** 0808 800 2244

Has information on strokes due to bleeding and aneurysms. They also have a network of local branches.

## **Glossary**

**Aneurysm** = weak spot on an artery.

**Angiogram** = a medical procedure to locate a burst blood vessel.

**Anticoagulant** = a type of blood-thinning medication.

**CAA** = cerebral amyloid angiopathy (build up of the protein amyloid in the small blood vessels in the brain).

**Craniotomy** = a type of brain surgery after a bleed in the brain to remove any blood, relieve pressure or to repair blood vessels.

**CSF** = cerebrospinal fluid (fluid that bathes the brain and spine).

**CT** = computerised tomography (a type of brain scan).

**Haemorrhage** = a bleed.

**Hydrocephalus** = build up of cerebrospinal fluid in or around the brain.

**Intracerebral** = within the brain.

**Lumbar puncture** = a procedure to remove a sample of cerebrospinal fluid.

**MRA** = magnetic resonance angiogram (an MRI scan with a dye injected into the blood stream).

**MRI** = magnetic resonance imaging (a type of brain scan).

**Subarachnoid space** = space between the brain and skull.

**Vascular malformations** = abnormal blood vessels.

## About our information

We want to provide the best information for people affected by stroke. That's why we ask stroke survivors and their families, as well as medical experts, to help us put our publications together.

### How did we do?

To tell us what you think of this guide, or to request a list of the sources we used to create it, email us at [feedback@stroke.org.uk](mailto:feedback@stroke.org.uk).

### Accessible formats

Visit our website if you need this information in audio, large print or braille.

### Always get individual advice

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**Together we can conquer stroke.**

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