

Bleeding in the brain: haemorrhagic stroke

Stroke Helpline: 0303 3033 100
or email: helpline@stroke.org.uk

This guide is about strokes due to bleeding in or around the brain, and how you will be diagnosed and treated.

What is a haemorrhagic stroke?

Haemorrhagic stroke is when you have bleeding in or around the brain. This damages your brain cells, and can affect how your body works, as well as how you think and feel.

It's a less common type of stroke, and around 15% of strokes in the UK are haemorrhagic. The other 85% of strokes are ischaemic (due to a blockage in the blood supply to the brain).

What happens when you have a haemorrhagic stroke?

If you have a haemorrhagic stroke, you will have emergency treatment to reduce bleeding and limit the amount of damage in the brain. Afterwards, you will have support for your recovery including medical treatment and rehabilitation therapy.

The effects of your stroke depend on where the stroke was in your brain, and the amount of damage. For more information, see **page 5**. You can also find comprehensive information about all the effects of stroke at stroke.org.uk/effects-of-stroke.

There are two main types of haemorrhagic stroke

1. Bleeding within the brain (intracerebral haemorrhage, or ICH).
2. Bleeding on the surface of the brain (subarachnoid haemorrhage, or SAH).

1. Bleeding within the brain (intracerebral haemorrhage or ICH)

Intracerebral haemorrhage (ICH) is where blood leaks out of a blood vessel into the brain tissue, sometimes deep inside the brain. ICH is the most common type of haemorrhagic stroke, and around two thirds of all haemorrhagic strokes are ICH.

Main causes of ICH

Cerebral small vessel disease

Cerebral small vessel disease means having damage to very small blood vessels in your brain. This can lead to blood leaking into the brain tissue, often deep inside the brain. There are two main types:

- **Small vessel disease due to high blood pressure**

High blood pressure (hypertension) is a main cause of small vessel disease in the brain. Over a long period, high blood pressure damages the blood vessels inside your brain, making them stiffen, and causing blockages.

Small areas of damage develop, which look like tiny scars on a brain scan. These damaged areas reduce the blood flow to your brain cells. This can affect your thinking ability and mood, and it's linked to cognitive decline and dementia. It also makes a haemorrhagic stroke more likely to happen.

- **Cerebral amyloid angiopathy (CAA)**

This is a common type of small vessel disease where a protein called amyloid beta builds up inside the small blood vessels near the surface of the brain. This damages the blood vessels, making them more likely to bleed. This can cause a haemorrhagic stroke, and can also lead to microbleeds which don't always have obvious symptoms.

It's very common in people with dementia, but you can have CAA without having dementia. Although there aren't any direct treatments for CAA, controlling your blood pressure can help reduce the risk of bleeding in the brain.

Abnormal blood vessels in the brain

Rare abnormalities in the blood vessels of the brain can sometimes cause ICH. These are known as vascular malformations, and they can include tangles of blood vessels or enlarged blood vessels. There are two main types:

- **Arteriovenous malformation (AVM)**

In an AVM, the blood vessels carrying blood to and from the brain grow together in a tangle, instead of linking to the full network of smaller blood vessels in the brain.

An AVM can reduce blood flow and compress the surrounding brain tissue. Inside the AVM, blood flows at high pressure into weak blood vessels, which can sometimes lead to bleeding.

- **Cavernous malformation, or cavernoma**

A cavernoma is a cluster of enlarged blood vessels, often said to look like a raspberry. It is made up of a series of connected 'bubbles' or caverns, filled with blood. Often these don't cause any symptoms, but the blood vessel walls can be weak, making a bleed more likely.

2. Bleeding on the surface of the brain (subarachnoid haemorrhage or SAH)

Subarachnoid haemorrhage (SAH) is where blood leaks out of a blood vessel on the surface of the brain, and gets into the protective layer of fluid surrounding the brain. This layer is known as the subarachnoid space.

SAH is the least common type of stroke, and around one in three of all haemorrhagic strokes are SAH (about one in 20 of all strokes).

What is the subarachnoid space?

The brain is surrounded by a double layer of protective membranes, with cerebrospinal fluid in between. This layer of fluid is called the subarachnoid space, and it helps to cushion the brain from injury.

Main causes of SAH

SAH is often due to a burst aneurysm. An aneurysm is a blood vessel that has ballooned out. The walls of an aneurysm are weak, and they sometimes burst, causing bleeding into the layer of fluid around the brain.

Surgery to treat SAH

Surgery for SAH aims to stop the bleeding by sealing the weak area of blood vessel. The procedure used depends on how big the aneurysm is, and where it's located in the brain. Your doctors will discuss the options with you and explain the likely recovery times. If it's an emergency procedure, they will use the method that works best for you and your stroke.

The main surgical procedures to repair a burst aneurysm are:

Coiling

A fine tube (catheter) 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. Tiny platinum coils are passed through the tube, and placed in the aneurysm. More coils are added until the aneurysm is sealed.

Clipping

Clipping involves removing a small flap of bone from the skull, and using a tiny titanium clip to seal the aneurysm. After the clip is in place, the piece of bone is replaced and the scalp is stitched together.

Do all aneurysms need surgery?

A brain aneurysm is usually only found after you have a stroke. However, it's possible to have a stable aneurysm that never causes a stroke. If you're diagnosed with an aneurysm and haven't had a stroke, or if more aneurysms are found after a stroke, you will be carefully assessed. If it's likely that the aneurysm could cause another stroke, you may be offered surgery.

To help reduce your stroke risk, you'll also be given treatment for high blood pressure, and advice on healthy lifestyle changes such as quitting smoking and losing weight.

How does an aneurysm happen?

An aneurysm can be present from birth, or it can develop later in life. Some of the causes include:

Autosomal dominant polycystic kidney disease (ADPKD)

A kidney condition called autosomal dominant polycystic kidney disease (ADPKD) can also make someone more likely to have an aneurysm in the brain. Around one in every 20 people with ADPKD may develop an aneurysm.

Body tissue disorders

Some rare disorders affecting the connective tissues in your body can make you more likely to have a brain aneurysm. Connective tissues are part of the structure of blood vessels and other tissues like skin and tendons. Body tissue disorders include Ehlers-Danlos syndrome, and Marfan syndrome.

Coarctation of the aorta

If someone is born with narrowing of the main artery in their body (the aorta) it can make a brain aneurysm more likely to develop.

Other risk factors

Other things like smoking and high blood pressure can increase your chances of developing a brain aneurysm. See **page 6** 'Who is at risk?'

Diagnosing haemorrhagic stroke

Symptoms

The most typical symptom of a haemorrhagic stroke is a sudden, severe headache, sometimes called a thunderclap headache. This is especially likely with a subarachnoid haemorrhage (SAH) but it can also happen with an intracerebral haemorrhage (ICH).

Other common symptoms are a stiff neck, nausea and vomiting. You can also have any of the signs of stroke in the FAST test. See **page 7** for more information.

Thunderclap headache

People describe a thunderclap headache as the worst pain they have ever had, and like being hit on the head. If you or someone you know has a thunderclap headache, even if it goes away by itself or with painkillers, you should call 999.

Tests and checks for diagnosing stroke

When someone is taken to hospital with a suspected stroke, a brain scan should be carried out urgently and if possible within one hour of arriving in hospital. The scan could be either a computed tomography (CT) or magnetic resonance imaging (MRI) scan. Scans can help doctors decide if you have had a stroke, and if you need other tests.

Other tests and checks for haemorrhagic stroke include:

- Computed tomography (CT) scan: shows if there is bleeding in or around the brain.
- Lumbar puncture: This looks for blood in the cerebrospinal fluid (the fluid around your brain and spinal cord), which can be a sign of bleeding around the brain (subarachnoid haemorrhage). The fluid is taken from your lower spine using a very thin needle, and it's done under local anaesthetic.
- Digital subtraction angiogram or catheter angiogram: this uses X-rays to find the burst blood vessel. A fine tube called a catheter is put into an artery, usually in the groin. A liquid called a contrast, or dye, is injected into the blood to make the blood vessels show up on an X ray and find any bleeding.

Treating haemorrhagic stroke

Medication

After an SAH, the blood vessels in the brain can become narrowed, reducing the blood flow in the brain (vasospasm). This causes more stroke symptoms and can be very serious. Vasospasm can happen from around a day to three weeks after the stroke. To prevent it, you may be given a drug called nimodipine for about three weeks.

If you are taking warfarin (a blood-thinning medication), you may be given medication to reverse the effects.

If you have high blood pressure, you will be given medication to bring it down. You will be offered painkillers to help with the severe headache associated with an SAH.

Surgery

As well as surgery to repair aneurysms, other procedures can sometimes be used to deal with the impact of haemorrhagic stroke on the brain.

Procedure to relieve pressure on the brain (craniotomy)

Occasionally, pressure can build up inside the skull due to bleeding or swelling of the brain. A craniotomy is a surgical procedure where part of the skull is removed to reduce pressure on the brain, and allow the surgeon to repair damaged blood vessels.

Shunt surgery for hydrocephalus (excess fluid in the brain)

A subarachnoid haemorrhage (SAH) can sometimes lead to a dangerous build-up of fluid around the brain, known as hydrocephalus. This happens when the flow of cerebrospinal fluid that normally surrounds the brain and spinal cord is disrupted. Symptoms include headache and vomiting, as well as other stroke-like symptoms.

The main treatment for hydrocephalus is shunt surgery. A shunt is a thin tube implanted in the brain to drain the fluid away to another part of your body. There is a valve attached, which you can feel under the skin on your scalp.

Seizures

Some people have a seizure after a haemorrhagic stroke. Having a seizure doesn't mean you will go on to develop epilepsy. You will be assessed to help decide the best treatment for you, which might include epilepsy medication, depending on your age and your risk of developing epilepsy.

For more information about seizures and epilepsy after stroke visit stroke.org.uk/epilepsy.

Headaches after haemorrhagic stroke

While you are recovering from a haemorrhagic stroke or treatment such as surgery, you might have headaches which can often be treated with painkillers. Ask your GP or pharmacist for advice about what type of painkillers you can use.

Some people also 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.

If you have a very sudden, severe headache or a headache that doesn't go away, seek medical attention urgently.

Find more information about headaches after a stroke at stroke.org.uk/headache.

Recovering from a haemorrhagic stroke

Everyone recovers differently. Some people recover fully, and other people will have health problems or a disability.

For more information visit stroke.org.uk

The fastest recovery takes place in the first few months. After that progress can be slower, but you can continue to improve for months or years after a stroke.

How will my stroke affect me?

The effects of a stroke are unique to each individual. A stroke can affect any part of your body, as well as your communication, emotions, and memory and thinking. The main effects of stroke include:

- Movement and balance problems.
- Communication problems.
- Memory, concentration and thinking problems (cognition).
- Problems being able to notice things to one side (spatial neglect).
- Vision problems.
- Swallowing problems.
- Bladder and bowel problems.
- Fatigue.

Find out more about all the effects of stroke in our guide 'Next steps after a stroke' or visit stroke.org.uk/effects-of-stroke.

Rehabilitation and recovery

You should receive rehabilitation soon after your stroke. It may begin in hospital and should carry on at home if you need it.

During rehabilitation, the therapist assesses you, and designs treatment tailored to your needs. Depending on the type of therapy, you may have exercises to practise. You may work towards building up stamina, or learn new ways of doing things.

Neuroplasticity

Although brain cells that have been severely damaged or have died can't grow back, the brain can re-wire itself, allowing you to relearn things like walking, speech and swallowing. This is called neuroplasticity.

Neuroplasticity is the process that happens in the brain when you do rehabilitation therapy.

By repeating the therapy activities, your brain starts to form new connections, allowing you to improve.

Support after leaving hospital

Hospital discharge

When you are able to leave hospital, the discharge process should ensure that you get all the support you need including your medical treatment, rehabilitation therapy, care and equipment. You and your family will be involved in planning your discharge.

Post-stroke review

Around six months after you leave hospital, you should get a review of your progress. This makes sure you are getting the right support if your needs have changed, including rehabilitation.

If a review does not take place, contact your GP.

Who is at risk of a haemorrhagic stroke?

On top of the main causes of ICH and SAH, there are some things that can affect your risk of a haemorrhagic stroke.

Age

- Intracerebral haemorrhage (ICH) can happen at any age, but it is more common in people over the age of 70.
- Subarachnoid haemorrhage can also happen to anyone, but it's more common in people between 45 and 70.

High blood pressure

High blood pressure damages the blood vessels in your brain, and it can make them more likely to bleed. You may need blood pressure medication to reduce your risk of another stroke.

For more information visit stroke.org.uk/high-blood-pressure.

Blood-thinning medication

Blood-thinning medication is often given to people who have had an ischaemic stroke (due to a blockage or clot), and people at risk of stroke due to a heart condition such as atrial fibrillation.

This medication gives you a higher risk of bleeding, including a greater risk of a bleed in the brain. If you have a haemorrhagic stroke while taking blood thinning medication, doctors will carefully assess you to decide if you should stop taking the medication or change to a different type.

If you're worried about side effects, speak to your GP or pharmacist. But don't stop taking medication without advice, as this can put you at risk of a stroke. For more information visit stroke.org.uk/blood-thinning.

Drinking large amounts of alcohol

Regularly drinking more than the safe limits of alcohol can make you more likely to have high blood pressure, and increase your risk of a stroke. For more information visit stroke.org.uk/alcohol.

Illegal drugs

Some illegal drugs such as cocaine, amphetamines and cannabis can raise the risk of a haemorrhagic stroke. If you or someone you know needs help and advice about drugs, you can get confidential advice from the FRANK helpline **0300 123 6600** or live chat on the website talktofrank.com.

Driving

By law, you must not drive for a month after a stroke. You might need to tell the DVLA (or DVA in Northern Ireland) about your stroke. The rules about driving after a stroke are complex, so it's important to find out what you should do. For more information visit stroke.org.uk/driving.

Spotting the signs of a stroke

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**.

As well as the specific symptoms for ICH and SAH such as headache or nausea, someone may have any of these main signs of a stroke.

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.

Where to get help and information

From the Stroke Association

Helpline

Our Stroke Helpline offers information and support for anyone affected by stroke, including family, friends and carers.

Call us on **0303 3033 100**, from a textphone **18001 0303 3033 100**
Email helpline@stroke.org.uk.

Read our information

Get more information about stroke online at stroke.org.uk, or call the Helpline to ask for printed copies of our guides.

My Stroke Guide

The Stroke Association's online tool My Stroke Guide gives you free access to trusted advice, information and support 24/7. My Stroke Guide connects you to our online community, to find out how others manage their recovery.

Log on to mystrokeguide.com today.

Other sources of help and information

Blood Pressure UK

Website: bloodpressureuk.org

Helpline: **020 7882 6218**

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

Brain & Spine Foundation

Website: 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: 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: chss.org.uk

Advice Line: **0808 801 0899**

Information and support for people affected by stroke in Scotland.

Headway: the brain injury association

Website: headway.org.uk

Tel: **0808 800 2244**

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

DVA (Northern Ireland)

Website: nidirect.gov.uk

Gives information about driving after stroke.

DVLA (England, Wales, Scotland)

Website: gov.uk/dvla

Gives information about driving after stroke.

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.

Accessible formats

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

Always get individual advice

This guide contains general information about stroke. But if you have a problem, you should get individual advice from a professional such as a GP or pharmacist. Our Helpline can also help you find support. We work very hard to give you the latest facts, but some things change. We don't control the information provided by other organisations or websites.

© Stroke Association 2022

Version 4. Published May 2022

To be reviewed: April 2024

Item code: **A01F25**

Every five minutes, stroke destroys lives. We need your support to help rebuild them. Donate or find out more at stroke.org.uk.

The Stroke Association is registered as a charity in England and Wales (No 211015) and in Scotland (SC037789). Also registered in the Isle of Man (No. 945) and Jersey (No. 221), and operating as a charity in Northern Ireland.