Stroke Association

Finding **strength** through **support**

Bleeding in the brain: haemorrhagic stroke

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 can damage brain cells. Damage to brain cells can affect how the body works. It can also change how you think, communicate and feel.

It's less common than ischaemic stroke, which is due to a blocked artery (blood vessel). Around 15% of strokes in the UK are haemorrhagic.

What happens when you have a haemorrhagic stroke?

If you have a haemorrhagic stroke, you will have a brain scan to make the diagnosis. You will then have emergency treatment to try to reduce bleeding and limit the amount of damage in the brain. Afterwards, you will have support for your recovery, including medical prevention treatment and rehabilitation.

The effects of your stroke depend on where the stroke was in your brain, and the amount of damage. For more information, see '**How will my stroke affect me?**' on **page 5**. You can also visit **stroke.org.uk/effects-of-stroke** to find more detailed information about all the 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).

These two types of stroke are very different and have different causes.

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. There are two main types:

- **Small vessel disease due to hardening of small deep arteries (sometimes called 'arteriolosclerosis')**
  High blood pressure (hypertension) is a cause of small vessel disease in the brain. Over a long period, high blood pressure damages the small, deep blood vessels inside your brain, making them stiffen, and causing their walls to become fragile and prone to bleeding.

  If one of these small arteries blocks, then small areas of damage develop, which look like tiny scars on a brain scan, due to a loss of blood flow to brain cells. Small vessel disease is strongly linked to cognitive decline and dementia. It also makes a haemorrhagic stroke more likely to happen in deep parts of the brain.

- **Cerebral amyloid angiopathy (CAA)**
  This is a second common type of small vessel disease, especially in older people. CAA is 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 bleed into the brain (ICH) leading to a stroke, or can also cause bleeding over the brain surface. When bleeding is on the surface of the brain, it can trigger recurrent, short-lived attacks of symptoms such as pins and needles, numbness or weakness. These are known as transient focal neurological episodes (TFNEs).

CAA is common in people with dementia, but you can have CAA without having dementia. Although there are not 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 (capillaries), often said to look like a raspberry. It's made up of a series of connected small 'bubbles' or 'caverns', filled with blood. Often these do not 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, causing 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 fluid-filled layer 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 along a blood vessel that runs in the subarachnoid space. 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 back together.

Do all aneurysms need surgery?

A brain aneurysm is usually only found after you have a subarachnoid haemorrhage 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. Most aneurysms do not have a specific cause identified. However, some of the causes may include:

Autosomal dominant polycystic kidney disease (ADPKD)

A kidney condition called autosomal dominant polycystic kidney disease (ADPKD) can make someone more likely to have a brain aneurysm.

Body connective tissue disorders

Some rare disorders affecting 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.

Other risk factors

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

Diagnosing haemorrhagic stroke

Symptoms

Many (but not all) people who have a haemorrhagic stroke experience a headache. A sudden, severe 'thunderclap' headache is very likely with a subarachnoid haemorrhage (SAH) but can also happen with an intracerebral haemorrhage (ICH.)

Other common symptoms of SAH are a stiff neck, nausea and vomiting. In stroke due to ICH, the symptoms depend on where the bleed happens in the brain, but can include weakness, numbness, visual loss or difficulty with speech, and you can 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 within one hour of arriving in hospital. The scan will usually be a computed tomography (CT) scan because this type of scan is very sensitive to bleeding within or around the brain. You may also have a 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 angiogram (CTA)**: this CT scan includes an injection of a special dye into a vein in your arm, to create a picture of the blood vessels in your brain. It is carried out if doctors suspect an aneurysm or other abnormality of larger blood vessels.
- **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 try to find the aneurysm or vascular malformation. A fine tube called a catheter is put into an artery, usually in the groin. A liquid 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 in places, 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 or newer blood-thinning medications (called direct oral anticoagulants), you should be given medication to reverse the effects.

If you have high blood pressure, you should be given medication to rapidly bring it down. You will be offered painkillers to help with severe headache.

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 and evacuation or hemicraniectomy)
If an ICH is large, pressure can build up inside the skull due to bleeding or swelling of the brain. A hemicraniectomy is where a large piece of the skull on one side is removed, to reduce pressure on the brain. A craniotomy is a surgical procedure where part of the skull is removed to allow the surgeon to repair damaged blood vessels.

External ventricular drain surgery for hydrocephalus (excess fluid in the brain)
Haemorrhagic stroke 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 emergency treatment for hydrocephalus is an external ventricular drain, which is a thin tube implanted in the brain to drain the fluid away. An external ventricular drain is often removed once the hydrocephalus improves, but in some cases a shunt is used. A shunt is a tube that stays in and drains fluid to another part of the 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 does not necessarily 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.

Visit **stroke.org.uk/seizures-and-epilepsy** for more information about seizures and epilepsy after stroke.

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 sudden, severe headache or a headache that does not go away, seek medical attention urgently.

Recovering from a haemorrhagic stroke

Everyone recovers from a stroke differently. Some people recover fully, and other people will have health problems or a disability. The fastest recovery takes place in the first few months, but you can continue to improve for years after a stroke.

How will my stroke affect me?

The effects of a stroke are different for different people. Effects of stroke can include:

- Movement and balance problems.
- Communication difficulties.
- Memory, concentration and thinking problems (cognition).
- Emotional changes.
- Vision problems.
- Swallowing problems.
- Bladder and bowel problems.
- Fatigue.

Visit **stroke.org.uk/effects-of-stroke** to find out more about these and other effects.

Rehabilitation and recovery

You should receive rehabilitation soon after your stroke to help you if you have stroke-related problems. It should begin in hospital and carry on at home for as long as you need it. Rehabilitation is part of your recovery. It means trying to restore function to as near normal as possible, and helping you adapt to disability.

During rehabilitation, a therapist assesses you and works with you to set goals. Depending on the type of therapy, you may have exercises or activities to practise. You may work towards building up stamina, or learn new ways of doing things. Practising exercises outside of therapy sessions can help you make progress.

Support after leaving hospital

Hospital discharge

When you're able to leave hospital, the discharge process should ensure you get all the support you need. You and your family will be involved in planning your discharge.

The discharge plan covers:

- Rehabilitation.
- Medical treatment.
- Care at home.
- Equipment you may need.
- Follow-up.

Post-stroke review

Around six months after your stroke, you should get a review of your progress. If a review does not take place, contact your GP to see if this can be arranged. Visit **stroke.org.uk/six-month-post-stroke-reviews** for more information.

Who will support me?

- Your GP coordinates your care after leaving hospital, and can help with your medical problems or support needs.
- You might need support from therapists, such as physiotherapists, occupational therapists, speech and language therapists and psychologists.
- You might have a community stroke nurse.
- You may have a social worker.
- Depending on where you live, you may have support from a Stroke Association Stroke Support Coordinator.

Who is at risk of a haemorrhagic stroke?

After a haemorrhagic stroke, you should be given advice about ways of reducing your risk of another stroke. There are some things that can affect your risk of another 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. If you have high blood pressure, you will be offered blood pressure medication, which can help reduce your risk of another stroke.

Other things you can do to reduce your blood pressure include stopping smoking, being more active, eating less salt, and losing weight if you need to. We have more information about medication and healthy lifestyle changes at **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 can increase the risk of bleeding, including in the brain. If you have a haemorrhagic stroke while taking blood-thinning medication, doctors will assess you and help you decide if you should stop taking the medication, or change to a different type, and whether there are any other options to reduce your ischaemic stroke risk.

If you're worried about side effects, speak to your GP or pharmacist. Do not stop taking medication without speaking to a GP or pharmacist, as this can put you at risk of a stroke. Visit **stroke.org.uk/blood-thinning** for more information.

Drinking large amounts of alcohol

Regularly drinking more than the recommended weekly limits for alcohol can make you more likely to have high blood pressure and increase your risk of a stroke. Visit **stroke.org.uk/stroke/manage-risk/alcohol** for more information.

Illegal drugs

Some illegal drugs such as cocaine and amphetamines can raise the risk of a haemorrhagic stroke. You can get confidential advice about drugs from the FRANK helpline on **0300 123 6600** or visit **talktofrank.com** to use the live chat.

Driving

Stroke can affect your ability to drive safely. You must not drive for a minimum exclusion period after a stroke. The rules about driving after a stroke are complex, so it's important to find out what you should do. Talk to your doctor for individual advice. Visit **stroke.org.uk/driving** for more information.

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 in the FAST test.

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 confusion.
- Dizziness or a sudden fall.

If you spot **any one** of these signs of a stroke, do not wait. Call **999** straight away.

Where to get help and information

From the Stroke Association

Stroke Support Helpline

Our Stroke Support 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**
Email **helpline@stroke.org.uk**

Read our information

Log onto **stroke.org.uk**, where you can find easy-to-understand information, videos and an online community to support you. You can also call the Helpline to ask for printed copies of our guides.

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 Stroke Support 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.

The Stroke Association is the only charity in the UK providing lifelong support for all stroke survivors and their families.

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