

Carotid artery disease

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

If the large blood vessels in the neck supplying blood to the brain become blocked, you are at risk of a stroke. This guide explains how the arteries become blocked (carotid artery disease) and treatments you may have to reduce your risk of a stroke.

What is carotid artery disease?

In carotid artery disease, the arteries inside the neck become narrowed and stiff. This makes it harder for blood to flow smoothly, and makes clots more likely to form.

How do the arteries become narrowed?

Arteries are blood vessels carrying blood from the heart to the brain and body. These blood vessels can get clogged with fatty substances in the blood sticking to the lining of the artery walls. These substances include cholesterol and other fats, which combine with other materials like blood cell fragments.

This can build up to form thickened areas, also known as plaques, on the artery wall. This is also known as atheroma, or atherosclerosis. These plaques often form where the artery branches off inside the neck.

As we age, our arteries gradually become stiffer and thicker. Atherosclerosis speeds up this process. The build-up of plaques makes the artery narrower inside (also known as stenosis).

How can carotid artery disease cause a stroke or TIA?

A stroke is a brain attack. It happens when the blood supply to part of the brain is cut off, killing brain cells. There are two main types of stroke. It can be due to a blockage to the blood supply in the brain (clot), or a bleed in or around the brain.

Carotid artery disease can lead to a stroke due to a clot in the brain, also known as an ischaemic stroke. It can also cause a transient ischaemic attack (TIA or mini-stroke). A TIA is the same as a stroke, but the symptoms last a short amount of time.

Carotid artery disease causes up to 15% of all ischaemic strokes in the UK.

The carotid arteries bring blood from the heart to the brain, face and neck. You have two carotid arteries, one on each side. One branch of the artery reaches the face and scalp, and the other branch travels inside the neck up to the brain.

This type of stroke can happen in two ways:

1. Total blockage (occlusion)

Occlusion is the medical term for when the artery becomes completely blocked, cutting off the blood supply to the brain and causing a stroke.

2. Clot in the artery (thrombosis)

As well as making the arteries narrower (stenosis), plaques of atheroma can damage the lining of the blood vessels. Plaques can become inflamed and make the inner surface of artery walls thinner. If the plaque ruptures, it exposes the artery lining, and a clot forms over the damaged area.

Clot fragments can then break off and go up to the brain, to block a blood vessel inside the brain and cause a stroke. Sometimes a clot can block the artery itself, cutting off the blood supply at this point.

Who is at risk of carotid artery disease?

While we all develop some narrowing in our arteries as we get older, other factors can make you more likely to develop carotid artery disease. The main risk factors are:

- Getting older.
- High blood pressure.
- Smoking.
- Eating unhealthy food with high amounts of saturated fats,
- Not getting enough exercise,
- High cholesterol.
- Being overweight.
- Diabetes.
- A family history of atherosclerosis, stroke and heart disease.

How is carotid artery disease diagnosed?

Carotid artery disease is usually diagnosed when you have a stroke or a TIA.

Tests and checks

Your doctor may listen to the sound of your blood flow through your carotid arteries using a stethoscope. A whooshing sound, known as a carotid bruit, can be a sign that there is some narrowing, although this is not very reliable. You will then be referred to a hospital specialist for further tests.

A useful test for carotid artery disease is an ultrasound scan (known as a carotid Doppler). It is a completely painless procedure. A small probe is passed over the side of your neck to build up a picture of your arteries. The specialist can then see whether there is any narrowing and, if so, whether it is severe enough to benefit from having an operation

You will probably have further imaging checks to confirm this diagnosis. These might be computed tomography angiography (CTA) or magnetic resonance angiography (MRA) scans, which usually need a special dye injection (called a contrast agent) into a vein in your arm.

Measuring the narrowing of the arteries

In the UK, the NASCET scale (North American Symptomatic Carotid Endarterectomy Trial) is usually used to measure carotid stenosis. This has three categories of measurement which are:

- Minor: less than 50% narrowed.
- Moderate: 50-69% narrowed.
- Severe: 70% narrowed or more.

How can it be treated?

There are procedures that can reduce the risk of a stroke or TIA, but they will only be offered to you if your artery has moderate or severe stenosis. This is because the procedures themselves carry risks, and are most successful at reducing stroke risk when stenosis is over 50%. The main procedure is an operation called carotid endarterectomy.

For arteries with minor stenosis, the risks of the operation are considered too high. These arteries are much less likely to cause a stroke and can still supply your brain with enough blood.

Carotid endarterectomy

Carotid endarterectomy is an operation to clear the blockages from inside an artery. It is well-established and is the main procedure used.

If you smoke you will be advised to stop smoking before the operation. Smoking reduces the amount of oxygen in your blood and can increase your risk of breathing problems during the procedure or getting a chest infection.

Surgery should be carried out as soon as possible and within one week of your stroke or TIA.

Carotid endarterectomy may be carried out under local or general anaesthetic in an operation that takes one to two hours. If both of your carotid arteries need surgery, this is usually done on two separate operations.

The surgeon makes a small cut in the side of your neck so they can see your carotid artery, which will then be clamped shut. If need be, a small piece of tubing (shunt) can be used to re-route blood flow along another artery to make sure your brain still gets enough blood.

The surgeon then opens up your artery and removes the inner lining and any fatty deposits (plaques). The artery is closed with stitches, or with a patch. The patch can be made of artificial fibres or be a graft taken from another blood vessel.

The operation usually takes between one and two hours. Most people recover remarkably quickly. Within a few hours you can usually sit up in bed, and are able to go home in a couple of days.

The wound in your neck should heal to a fine scar after a few months. You may be advised to limit your physical activity for a short period. Most people can return to work after three to four weeks but extra care needs to be taken in jobs that involve manual labour. Where possible, light duties should be performed until you fully recover.

Driving

You should be able to return to driving two to three weeks following your operation, providing that you can perform an emergency stop safely and look over your shoulder.

But remember that you can't drive for one month after a stroke or TIA. Depending on the type of stroke you had and the kind of driving licence you hold, this period can be longer. If you are not sure how this applies to you, check with the DVLA (or DVA in Northern Ireland) before you start driving again.

What are the risks?

As with any operation, there are some risks associated with carotid endarterectomy.

There is about a 2% risk of having a stroke during surgery. This is due to the chance of a small blood clot, or other debris, breaking free during the operation and travelling to your brain. So carotid endarterectomy is only recommended if you have a moderate or severe stenosis, where the risk of having another stroke is greater than the risk associated with the procedure. Just under one in a hundred people die, which usually happens when there is stroke or heart attack soon after the operation.

Complications are more likely if you are older, a smoker, or have had a recent stroke. You can also be more at risk of complications if you have a blockage in both carotid arteries, and if you have other health conditions such as heart disease and high blood pressure.

Complications can include:

- Wound infection, which affects less than 1% of people, and can be treated with antibiotics.
- Bleeding from the site of your wound.
- Nerve injury, which affects around 4% of people and is usually temporary. This can cause a hoarse voice, weakness, or numbness on one side of your face. These symptoms usually disappear within a month.
- Numbness or slight pain around your wound, which can be treated with painkillers.
- Re-stenosis, or the carotid arteries becoming blocked again. About 2 – 4% of people will need to have further surgery.

As with any major operation, these risks should be explained to you. It is normal to feel anxious or frightened by this so talk to your surgeon and anaesthetist about your concerns. It is a good idea to prepare for an appointment with specialists by writing down a list of questions in advance. You may like to consider the following:

Questions to ask before the operation

1. What is the success rate for this operation at this hospital?
2. What is my risk of a stroke without the operation?
3. Am I at an increased risk during this operation because of other health conditions?
4. Can I choose to have a local or a general anaesthetic?
5. Is it likely that I will have to have this operation again in the future?
6. Do you have a diagram to help explain the operation?
7. You may want to write down what the specialists tell you and discuss it with friends or family.

Carotid artery stenting

There is an alternative to the carotid endarterectomy surgery that is called carotid artery stent placement, often known as stenting.

This procedure is less invasive than the endarterectomy because it does not involve open surgery of the neck. The evidence shows that this procedure is as safe as surgery in carefully selected patients. It is effective at preventing strokes, with similar long-term risks of a stroke as carotid endarterectomy.

The procedure is done under local anaesthetic. A small flexible tube is passed into the carotid artery through the femoral artery in your groin. This is done under the guidance of an X-ray of your arteries, and a contrast (also known as dye) will be injected. The contrast allows your blood vessels to show up on the X-ray. The tube has a small balloon at the end of it. When this tube reaches the narrowed area, the balloon is inflated up to around 5mm.

A small wire mesh cylinder called a stent is inserted to keep your artery open, improving blood flow. The stent stays there permanently. This widens your artery, allowing your blood to flow through it again. The balloon is then removed.

After the operation you will need to lie flat and still for an hour or so afterwards to prevent bleeding from the artery. You will stay in hospital overnight and go home the following day.

What are the risks?

As with carotid endarterectomy, complications can occur after stenting and the risk of a major stroke and death after both procedures are similar. Therefore, as with endarterectomy, it will also only be recommended if you have moderate to severe stenosis.

Other rare complications of this procedure include:

- Bruising where the tube enters your femoral artery.
- Bleeding from this point which may require an operation (affects about 1% of all cases).
- An allergic reaction or kidney problems due to the X-ray contrast (dye).
- A blockage or rupture in your carotid artery – this is very rare but may need to be treated with a stent. If this isn't possible, an operation may be needed to repair your artery.

The advantages of stenting are that it is less invasive, avoids wound complications and has a lower risk of nerve damage. However, clinical trials suggest that the short term risk of minor stroke seems to be higher with stenting than endarterectomy, especially in patients over 70. So stenting is usually offered only when endarterectomy is not recommended.

Speak to your consultant about your options and ask lots of questions until you feel you understand everything. You may wish to ask why you are being offered stenting rather than endarterectomy. There are several possible answers to this question, and they may include the anatomy of your carotid arteries, the experience of the medical staff, or your general health and age.

Other options

If you choose not to have an operation, or if you are unsuitable for an operation, you will be given medicine and lifestyle advice to help to reduce your risk of a further stroke or TIA.

How can I reduce my risk of stroke or TIA?

If you have carotid artery disease, it is particularly important to maintain a healthy lifestyle. Even if you have had surgery or stenting, you can still make a big difference to your health by following any medical treatments you need, and making healthy lifestyle choices.

You can help reduce the risk of your arteries becoming blocked up again, and reduce the risk of a further stroke or TIA.

Treat your medical conditions

After a stroke or TIA, doctors look for any other health conditions linked to stroke. By taking any medication regularly and following advice on living with these conditions, you can reduce your risk of another stroke.

The main health conditions that raise your risk of a stroke are:

- High blood pressure.
- Atrial fibrillation (irregular heartbeat).
- Diabetes.
- High cholesterol.

If you have high blood pressure, it is important to be checked regularly to make sure your blood pressure is below your target value.

Even if your cholesterol is not high, you may well be given statins to lower your risk further. You will also be given blood thinning medication to reduce the risk of blood clots forming.

Healthy lifestyle choices

You will be given advice about making healthy lifestyle choices, like stopping smoking and losing weight if you need to, and being more active. All of these can help to manage your health conditions, as well as reducing your risk of a stroke. Find out more about active steps everyone can take in our guide 'How to reduce your risk of a stroke' or visit our website stroke.org.uk.

Where to get help and information

From the Stroke Association

Helpline

Our 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

Circulation Foundation

Website: circulationfoundation.org.uk
Tel: **01543 442 194**

Produce patient information leaflets on carotid artery disease and treatments. Have details of patient support groups and a UK-wide counselling directory.

NHS UK

Website: nhs.uk
Provides patient health information, including carotid endarterectomy, for people in England, Wales and Northern Ireland.

NHS Inform website (Scotland)

Website: nhsinform.co.uk
Provides health information for the public in Scotland.

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.

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