Carotid endarterectomy

What is carotid artery disease?

The carotid arteries are in the neck and are the main blood supply to the face, head and brain. Over time fatty deposits may build up in the artery wall called a plaque. The plaque may cause narrowing of the artery and gives the artery lining a rough surface where blood clots may form. Parts of the plaque, or blood clots from the diseased artery, can break off and lodge in the brain causing eye symptoms, mini stroke (TIA), or a major stroke.

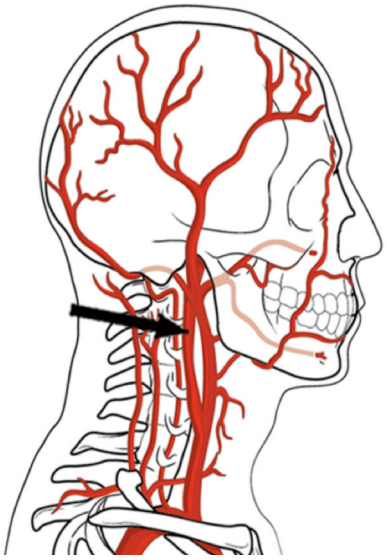
- Carotid artery disease is one the leading causes of stroke in the UK

How is carotid artery disease treated?

Options for treating carotid artery disease include medical therapy (without surgery), or medical therapy plus carotid endarterectomy or carotid stenting. All treatment options aim to reduce the risk of a future stroke.

Best medical therapy involves medications and lifestyle changes. Medications for stroke prevention will usually include a statin tablet and a blood thinning medication (such as aspirin and/or clopidogrel). Management of other long-term health problems such as diabetes and high blood pressure are also important along with giving up smoking. All patients with carotid artery disease should be on best medical therapy.

Carotid artery stenting is an endovascular or 'keyhole' procedure where a mesh like tube is placed inside the carotid artery over the area of narrowing. The stent is inserted through punctures in an artery, normally in the groin, and is moved into position under the guidance of x-rays. This procedure is performed in only a few hospitals in the UK and clinical trials are still ongoing. So far this technique has not been shown to be any safer or more effective than carotid endarterectomy surgery.

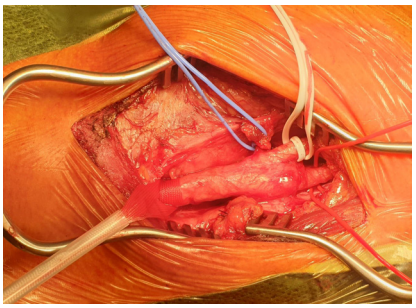


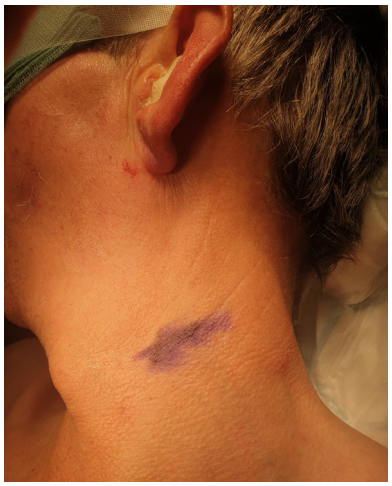
Carotid endarterectomy is an operation to remove the narrowed/diseased inner lining of the carotid artery. There is good evidence that shows a significant reduction in future stroke risk with carotid endarterectomy (in combination with best medical therapy). Surgery might not be recommended if it's felt to be too high risk/where a patients' health is poor. Similarly, where a reduction in stroke risk cannot be clearly demonstrated an operation may not be offered. Further details on the risks and benefits of carotid endarterectomy surgery follow in the section below.

This leaflet has been written in collaboration with:

University Hospitals Dorset NHS Foundation Trust
Dorset County Hospital NHS Foundation Trust
Salisbury NHS Foundation Trust

What does carotid endarterectomy surgery involve?





To remove the diseased inner lining of the artery we make a cut along the side of the neck to expose the carotid arteries.

Clamps are applied to the arteries to temporarily stop the blood flow. A cut is made in the artery and the diseased inner lining is removed. The artery is then closed with stitches and often requires a patch (a thin strip of sterilised material made from a cow's heart) to be sewn on to the artery to widen the area. The clamps are then removed, and blood flow restored.

This procedure may be performed either under a general or local anaesthetic. Details about anaesthesia are covered further on in this leaflet.

What are the intended benefits of carotid endarterectomy surgery?

Removing the diseased and narrowed inner lining of the carotid artery aims to **reduce your risk of future strokes**. It will not improve any symptoms you may currently have.

If you have had a stroke or a transient ischaemic attack (mini stroke) that is likely to be related to carotid artery narrowing, then medication will reduce your chances of a further event. In some patients we can reduce this lifetime risk further with surgery in addition to medication. We know this from large randomised controlled trials. Your vascular consultant will discuss the likely risks and benefits of surgery in your individual circumstances.

The greatest benefit from the operation is given if the surgery is performed within two weeks of having had a TIA/stroke. After two weeks the benefit of surgery begins to reduce.

What are the risks of carotid surgery?

- **Stroke** - there is a small risk of having a stoke from undergoing carotid surgery. The risk of stroke and/or death is approximately 2% or 1 in 50
- **Unstable blood pressure** - after surgery, usually within the first 24 hours, a person's blood pressure may be unstable. The blood pressure can either become too high or too low and may require medications to correct this. For this reason, blood pressure is observed very closely during and after surgery. Patients may be cared for on the High Dependency Unit (HDU) after surgery to allow for close blood pressure monitoring, or if required, medications to alter their blood pressure. Uncontrolled blood pressure may increase the risk of stroke, cardiac (heart) events, or cerebral hyperperfusion (too much blood flow to the brain).
- **Cardiac (heart) events** - all major operations carry general risks including problems with the heart. On average there is a 1 to 2% (1 in 50) risk of a heart attack following surgery. Often this is related to problems with unstable blood pressure in the first 24 hours following surgery.
- **Cranial nerve injury** - there are a number of important nerves that lie near to the carotid arteries. Permanent damage to these nerves is relatively uncommon (in only 1% of patients [1 in 100]), however, temporary nerve problems are more common (10% [1 in 10]). These usually recover completely. This temporary damage to the nerves can result from stretching them slightly to expose the disease in the arteries. This can affect the nerve to the voice box, which results in a hoarse voice. The nerve to the tongue can be affected resulting in a numb tongue that feels 'clumsy'. Occasionally, the nerve responsible for swallowing can be affected. This usually resolves over time, however very rarely you can end up with long term hoarseness of the voice or difficulty swallowing . Also, the nerve to the corner of the mouth can be affected causing temporary drooping of the side of the mouth. Most people get some numbness to the skin around the jaw and can take some months to recover and may not recover completely

- **Bleeding** - surgery on the carotid arteries always produces bruising and soreness. Occasionally blood can collect in the wound in the hours after surgery, which causes the neck to swell and, in some patients, (less than 5% [1 in 20]) this haematoma (blood clot) needs to be removed with further surgery. The wound to the neck is usually red and sore immediately after the operation; however, this should improve in the days after your surgery. Because of the blood thinning medication, the bruising can occasionally extend from the neck down on to your chest. You may require a blood transfusion after surgery, but this is rare.
- **Infection** - if the wound becomes increasingly red and sore, this might indicate the presence of infection, which requires prompt treatment with antibiotics and assessment by the vascular team. This risk of wound infection is small (1 to 5% chance). Very occasionally, the patch (if used) we use to close the artery can get infected (<1%). If this occurs, it may require further surgery to correct.

What will happen before my procedure?

You will undergo pre-assessment to ensure you are prepared and fit for the surgery and to give you a further opportunity to ask any questions you may have. You may need a blood test and an ECG (a tracing of your heart). We will ask if you take any tablets or use any other types of medication either prescribed by a doctor or bought over the counter in a pharmacy. Please bring all your medications and any packaging (if available) with you. Please tell the ward staff about all the medicines you use. If you wish to take your medication yourself (self-medicate), please ask your nurse. Pharmacists visit the wards regularly and can help with any medicine queries.

Depending on the arrangements made for you, most patients will be admitted to the admissions ward on the day of surgery. However, some patients may have the operation during the initial presentation with a stroke or mini stroke.

You must follow the written advice given to you regarding starving details strictly.

The ward nursing staff will show you to a room, confirm your details, and completed the necessary paperwork for your procedure. They will explain the preparations for the operating theatre and show you where the amenities are.

Your surgeon will visit you before your operation to explain the procedure again and answer any questions. We will mark on your body the side of the operation (i.e. left or right) and complete a consent form. The operation involves the use of anaesthesia. Information about the different types of anaesthesia or sedation we may use are outlined elsewhere in this document. You will see an anaesthetist before your procedure to explore these options.

During surgery, you may lose blood. If you lose a considerable amount of blood your doctor may want to replace the loss with a blood transfusion as significant blood loss can cause harm. The blood transfusion can involve giving you other blood components such as plasma and platelets which are necessary for blood clotting. Your doctor will only give you a transfusion of blood or blood components during surgery or recommend for you to have a transfusion after surgery, if you need it. If you do not wish to receive blood products- please inform the health professional completing your consent form and responsible consultant.

Compared to other everyday risks, the likelihood of getting a serious side effect from a transfusion of blood or blood component is very low. Your doctor can explain the benefits and risks of a blood transfusion. Your doctor can also give you information about whether there are suitable alternatives to blood transfusion for your treatment. There is a patient information leaflet for blood transfusion available for you to read if required.

Information and support

The Circulation Foundation available at **www.circulationfoundation.org.uk**

Who will perform my procedure?

This procedure will be performed by the consultant or the vascular registrar under the supervision of a consultant.

What happens after my procedure?

How you feel will depend on the type of anaesthetic and operation you have, how much pain-relieving medicine you need, and your general health. Most people will feel fine after their operation. Some people may feel dizzy, sick, or have general aches and pains. Others may experience some blurred vision, drowsiness, a sore throat, headache or breathing difficulties.

You may have fewer of these effects after local or regional anaesthesia. When the effects of the anaesthesia wear off you may need pain relieving medicines.

The side of your neck will feel stiff and swollen.

Once your surgery is completed you will be monitored in the theatre recovery area for several hours, before being transferred to critical care or an enhanced surgical care ward bed, where you will be looked after by trained nurses. During this time, the nurse looking after you will take careful measurements of your pulse, blood pressure and breathing. The nurses will ask questions to check you are awake and ask you to perform certain tasks, for example ‘squeeze my hand’, ‘stick out your tongue’.

You will be carefully monitored until the effects of any general anaesthetic have adequately worn off and you are conscious. You may be given oxygen via a facemask, fluids via your drip and appropriate pain relief until you have completed the required period of observation and are comfortable enough to leave recovery.

If there is not a bed in the necessary unit on the day of your operation, your operation may be postponed as it is important that you have the correct level of care after major surgery.

The following day, if all the measurements are satisfactory and you have recovered sufficiently, you will be discharged (90% of cases) or transferred to the ward for a further period of treatment, where you will continue to be monitored closely until discharge.

- Eating and drinking. If all is well after transfer from recovery, you will be allowed to start to eat and drink (approximately 4-6 hours post-surgery).
- Getting about after the procedure. The day after the operation, if all is well, the monitors, catheters and drains should be removed. We will help you to become mobile as soon as possible after the procedure. This helps improve your recovery and reduces the risk of certain complications. If you have any mobility problems, we can arrange nursing or physiotherapy input.
- Leaving hospital. While you are staying with us, the surgical team will visit you every day and can answer any questions you might have about your surgery. On each visit, they will assess your progress and work out the best time for you to be discharged from hospital. Most people are discharged one day after the operation.
- Resuming normal activities including work. You will probably need two to four weeks off work or study, please return when you feel comfortable. You should avoid driving for at least four weeks i.e. until you regain the full range of pain-free movement in your neck and follow advice from the stroke doctor about when you are legally allowed to return to driving. Gentle exercise (for example, walking) is good, but avoid any heavy lifting or straining for as long as possible. You may resume sex after two to four weeks.
- Check-ups and results: we will make arrangements to review you in the outpatient clinic six to eight weeks after the operation. If all is well, you can be discharged back to the care of your GP. You will be discharged with a dressing applied to your neck wound, if this is stained prior to discharge it will be changed before you leave. You will need to arrange a practice nurse appointment at your GP surgery for removal of the dressing and a wound check at five days post discharge. Your nurse will make a referral to the district nurses if you are housebound/ immobile.

If you develop a severe headache (often associated with a raised blood pressure)
and/or
sudden swelling/bleeding /arm/leg weakness or speech difficulties
you must call 999 for emergency assistance

Who will perform my procedure?

If you have any other queries or concerns prior to surgery, or following discharge, please call the vascular nurse practitioners who can be contacted on the numbers below within office hours. For out of hours advice please call **111** or in case of emergency please dial **999**

University Hospital Dorset (Bournemouth/Poole site)

Vascular nurse practitioners **07747460938**

Dorchester Hospital

Consultant nurse **01305**

Secretary **01305 255480**

Salisbury District Hospital

Vascular nurse practitioners **01722 336262** ext **4937** or bleep **1112**

Anaesthesia for carotid endarterectomy

This section gives you information to help you prepare for surgery on a major blood vessel in your body (vascular surgery). It provides information about the types of anaesthetic available and what you can expect from your surgery.

Your operation can be performed under local or general anaesthetic. You will be able to speak to the surgeon and anaesthetist about which is most suitable for you. This will depend on the condition of your carotid artery, any medical conditions you may have and your preference.

Local anaesthetic:

This is known as an ‘awake carotid endarterectomy’

- A drip (small plastic tube) will be placed in your hand or arm
- The anaesthetist will inject some local anaesthetic (numbing medicine) into the skin around your neck.
- It is normal to feel some pressure once the operation starts, such as a ‘toothache’. Importantly, the anaesthetist is always present, so you will be able to tell them if you are feeling uncomfortable. In this case, the surgeon can inject more local anaesthetic.
- There will be a screen so that you cannot see your procedure being performed.
- You will be asked questions and asked to perform simple tasks e.g. wriggling your toes to check there is enough blood flowing to your brain.
- In certain cases, we can offer you light sedation in addition to the injection. Sedation makes you feel more relaxed and sleepier. This means you may be aware of the operation and voices around you.
- Rarely, you will need to have a general anaesthetic as well. The surgery will be paused while the general anaesthetic is given.

General anaesthetic:

- A drip (small plastic tube) will also be placed in your hand or arm
- You may be given oxygen to breathe before the anaesthetic is administered
- The anaesthetic medicine will be injected through the drip and you will fall asleep quickly
- Once you are asleep, the anaesthetist will place a breathing tube into your windpipe via your mouth to help you breathe during the operation.
- To ensure you are comfortable after the operation, the local anaesthetic injection described above will also be performed once you are asleep.

Other monitors:

- All patients have their blood oxygen levels, blood pressure, and heart rhythm monitored. This is done using a pulse oximeter (clip on the finger), blood pressure monitor (tight band on the arm) and ECG monitor (three leads attached to the chest using stickers).
- Most patients will benefit from an extra drip in the artery in their wrist. This allows closer monitoring of their blood pressure and oxygen levels. This is usually inserted while you are awake.

Recovery:

- After the operation, you will be taken to the recovery area to be closely monitored for a few hours. From there you will either be cared for on the High Dependency Unit (HDU) or on the surgical ward.

Risks and side effects

Serious problems are uncommon with all types of anaesthetics. Below are potential side effects that are useful to know about prior to your procedure.
Local anaesthetic:

- The injection not working well enough (see section above on local anaesthesia)
- Having a fit or another life-threatening event, especially if the injection is close to, or in, a blood vessel.
- Damage to nerves in the neck. This tends to be temporary but can persist in some cases. You will be followed up by the anaesthetic team if this is the case

Sedation:

- Your breathing may become slow. In this case, the anaesthetist may ask you to take a deep breath or change your head position slightly.
- There is a low risk of stomach contents entering your lungs. It is important to follow the instructions for eating and drinking before the surgery.
- You may also feel drowsy or unsteady after having sedation, but this will be temporary.

General anaesthetic:

- Common effects (1 in 10 people) include feeling thirsty, having a sore throat, feeling sick or shivering. If you are over the age of 60, you may also have temporary memory loss.
- Rare risks include damage to teeth (1 in 1000) and corneal abrasion (scratch on the eye - 1 in 2800)
- Death as a result of anaesthesia is a very rare side effect (1 in 100,000 people)

Key points of your anaesthetic:

- **your operation will be performed with either local anaesthetic or general anaesthetic**
- **serious side effects of both options are rare**
- **the type of anaesthetic will be decided after discussion with the anaesthetist and surgeon before your operation**
- **you will have the opportunity to ask questions at any stage**

Information about important questions on the consent form

1. Photography, audio or visual recordings

As a leading teaching hospital, we take great pride in our research and staff training. We ask for your permission to use images and recordings for your diagnosis and treatment, they will form part of your medical record. We also ask for your permission to use these images for audit and in training medical and other healthcare staff and UK medical students. You do not have to agree and this will not affect the care and treatment we provide. We will ask for your separate written permission to use any images or recordings in publications or research.

2. Students in training

Training doctors and other health professionals is essential to the NHS. Your treatment may provide an opportunity for such training, where necessary under the careful supervision of a registered professional. If you would prefer not to take part in the formal training of medical and other students, your care and treatment will not be affected.

The Royal Bournemouth Hospital, Castle Lane East, Bournemouth, Dorset, BH7 7DW
Poole Hospital, Longfleet Road, Poole, Dorset, BH15 2JB

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w: www.uhd.nhs.uk : @UHD_NHS : @UHDTrust : @uhd_nhs

Dorset County Hospital, Williams Avenue, Dorchester, Dorset, DT1 2JY

w: www.dchft.nhs.uk : @DCHFT : @DCHFT : #TeamDCH

Salisbury NHS Foundation Trust, Salisbury District Hospital, Salisbury, Wiltshire, SP2 8BJ

w: www.salisbury.nhs.uk : @SalisburyNHS : @salisburydistricthospital