

# Cerebrovascular disorders



**Your brain works tirelessly to maintain all your body functions, even while you sleep. To keep it working well, the brain has a complex network of blood vessels bringing the oxygen and nutrients it needs.**

If something goes wrong within the brain's system of blood vessels, quick and expert care can make all the difference. If you or a loved one has a cerebrovascular disorder, our team of specialists offer advanced diagnostic and management procedures in our state-of-the-art facilities.

## What is a cerebrovascular disorder?

The term 'cerebrovascular' comes from two words: 'cerebro', which refers to the brain, and 'vascular', which refers to arteries and veins. Therefore, cerebrovascular disorders are conditions that affect the brain's blood vessels. The brain needs a constant blood supply to work properly. Cerebrovascular conditions can disrupt this blood supply, leading to brain cell death.

### Types of cerebrovascular disorders

Several diseases can affect blood vessels in the brain. Here are some common cerebrovascular conditions.

#### Brain aneurysms

A brain aneurysm is an abnormal bulge or swelling in the wall of a blood vessel in the brain. Brain aneurysms are also known as intracranial aneurysms or intracranial aneurysms. They usually start from a weak area in the blood vessel wall which balloons out over time. Aneurysms are more common in arteries than veins.

Brain aneurysms are often harmless and don't cause any symptoms. However, they can cause problems if they put pressure on surrounding structures. They can be fatal if they rupture, so a ruptured brain aneurysm is a medical emergency that needs immediate medical attention.

#### Brain arteriovenous malformations (AVMs)

Brain arteriovenous malformations (AVMs) are complex, abnormal tangles of blood vessels within the brain. In normal, healthy blood vessels, there is a clear distinction between arteries and veins. In AVMs, however, this distinction is lost. Instead, there is a network of abnormal connections between arteries and veins. This disrupts normal blood flow in the part of the brain affected.

The size and structure of AVMs can vary significantly. Arteries within the AVM may be enlarged and weak, and the altered blood flow can put pressure on surrounding brain tissue.

AVMs are usually present from birth. They can happen anywhere in the brain, but they are most common in the cerebrum – the large outer part of the brain.

Most AVMs do not cause any symptoms. They are sometimes discovered during testing for something else, or they may never be found if no symptoms arise. When symptoms occur, they can vary widely depending on the AVM's size and location.

#### Stroke

A stroke occurs when the brain's blood supply is suddenly interrupted, leading to brain cell damage and loss of neurological function. There are two types of strokes. In an ischaemic stroke, a blockage in a blood vessel prevents blood from getting to the affected part of the brain. This is the most common type of stroke. A haemorrhagic stroke involves bleeding directly into the brain, which damages the affected area. A stroke is a medical emergency and requires urgent medical attention.

#### Carotid stenosis

The term 'stenosis' means narrowing. Carotid stenosis involves narrowing of the carotid arteries, which supply oxygen-rich blood to the brain. Plaque (a build-up of fat and cholesterol) can form on the inside wall of the carotid arteries, creating a blockage. If this blockage becomes significant enough, it can interrupt blood flow to the brain.

## Cerebrovascular disorder symptoms

If the brain's blood supply is interrupted, a wide range of symptoms can result. They will depend on which part of the brain is affected and the severity of the problem.

Symptoms of a cerebrovascular condition include:

- sudden severe headache
- nausea and vomiting
- loss of consciousness
- neck pain and stiffness
- muscle paralysis or weakness
- numbness or tingling in the face, arms or legs
- difficulty speaking or understanding
- sudden problems with balance, walking or coordination
- sight problems in one or both eyes
- dizziness or confusion
- seizures.

**A stroke or ruptured brain aneurysm is a life-threatening emergency. If you or someone around you has the above symptoms, call 000 (triple zero) and ask for an ambulance.**

Some cerebrovascular disorders do not cause any symptoms. If you have any concerns, talk to your GP. They can refer you to a neurological specialist for further assessment and care if needed.

## What causes cerebrovascular conditions?

Causes of cerebrovascular conditions include:

- inherited or birth conditions (some people are born with an AVM or aneurysm)
- head trauma or injury
- atherosclerosis (thickening or hardening of the arteries caused by a build-up of fatty deposits)
- some connective tissue conditions
- blood clots that form in the brain or travel to the brain from elsewhere in the body
- blood vessel rupture.

Risk factors for cerebrovascular conditions can include family history, smoking, diabetes, and other conditions that affect blood vessel health.

## Referral for cerebrovascular disorder management

If your doctor thinks you might have a cerebrovascular condition, a neurologist or neurosurgeon can provide further assessment and treatment.

To start your treatment with us, ask your GP for a referral to one of our experienced neurological specialists.

Your doctor can address the referral to a specific specialist, or simply to 'Dear Doctor'.

## Cerebrovascular condition prevention

It's not always possible to prevent cerebrovascular disease. However, you may be able to lower your risk by doing things to keep your blood vessels healthy. These include:

- seeing your doctor for regular checks of your blood pressure, heart rate, and blood glucose and cholesterol levels
- getting support to quit smoking, reduce your alcohol use or reach a healthy weight if you need to
- eating a healthy diet
- being physically active
- not using illicit drugs
- learning to relax and manage stress
- getting enough sleep.

## How are cerebrovascular disorders diagnosed?

The following tests can help you and your healthcare team get the right diagnosis.

### Physical examination

Your doctor will do physical tests to check for any changes in neurological function. For example, they might look at your reflexes, balance, vision, sensation, muscle strength, walking, and co-ordination.

### Blood tests

Blood tests can detect underlying problems such as diabetes or high cholesterol and check how effectively your blood clots.

### CT (computerised tomography) scan

This test uses x-rays to take multiple images of your brain, which a computer puts together to provide detailed pictures. A CT scan can help doctors see the details of blood vessels associated with a brain aneurysm or AVM.

## MRI (magnetic resonance imaging)

In an MRI scan, the machine uses a powerful magnet, radio waves and a computer to generate detailed, cross-sectional images. An MRI provides comprehensive images of the brain's blood flow. This can help with identifying and evaluating the size, location, and characteristics of blood vessel disorders.

## MRA (magnetic resonance angiography)

This imaging technique uses the same process as an MRI to create images of the blood vessels. It provides detail about blood flow and can help doctors to identify and assess blood vessel problems.

## DSA (digital subtraction angiography)

In this test, specialists pass a thin tube (called a catheter) through an artery in the arm or leg to the area of the brain being examined. Then they inject a small amount of radioactive solution, which clearly highlights the blood vessels on images. DSA provides detailed pictures of abnormal blood vessels, along with any feeding arteries and draining veins.

## Heart tests

Problems with the heart and circulatory system can lead to a stroke, so these may need to be assessed. Your doctor will check your blood pressure. You may need to wear a Holter monitor, which monitors your blood pressure over 24 hours or more. You might also be referred for an electrocardiogram (ECG) to check your heart rhythm.

The choice of imaging tests depends on various factors, including the urgency of the problem, how severe it is, and the suspected diagnosis. Your specialist will talk to you about the options and the best approach for you.

## Cerebrovascular disorder treatment

Treatment for cerebrovascular disorders will depend on which condition you have and how severe it is. Factors such as your age and general health may also affect treatment decisions.

## Arteriovenous malformation management

The options for managing an AVM include:

- surgical resection – in some cases, especially if an AVM is small, easy to access, and has a high risk of bleeding, it may be possible to remove it surgically. This procedure involves removing abnormal blood vessels to restore normal blood flow.
- endovascular embolisation – this procedure involves guiding tiny tubes (called catheters) into the small blood vessels that feed into the AVM. Once they are in position, a special glue or particles are injected to block off blood flow to the AVM or its feeding arteries. This procedure may be a standalone treatment. It is also sometimes used to reduce the size of an AVM before surgery.
- stereotactic radiosurgery – this non-invasive technique uses computer-guided, highly-focused radiation beams to target and close off abnormal vessels. It may be suitable for AVMs in critical or hard-to-reach areas, or in cases where surgery is not feasible.
- rehabilitation – allied health therapies such as physiotherapy, occupational therapy and speech therapy may be recommended to manage any functional issues resulting from AVM complications or treatment.

## Management of carotid stenosis

The following options might be considered for treating carotid stenosis:

- medications – if the arteries are narrowed less than 50 per cent, you might be prescribed medications to reduce your risk of having a stroke. These include medications to control high blood pressure or cholesterol and help prevent blood clots.
- surgery – in some cases, you might be advised to have a procedure known as a carotid endarterectomy. This involves making an incision into the carotid artery to remove plaque and widen the blockage.
- carotid angioplasty and stenting – this new type of treatment involves guiding a balloon-tipped catheter into the blocked artery. Once in position, the balloon is inflated, which helps to open up the artery. Then a tiny mesh tube (known as a stent) is fitted inside the carotid artery to help stop it from collapsing or closing up again.

Treatment for cerebrovascular conditions often involves a team of specialists, which may include neurosurgeons, interventional radiologists, neurologists, anaesthetists and others. Your specialists will discuss appropriate treatment for your condition and situation. They can talk to you about the risks and benefits of different options and advise you about the most appropriate course of action in your situation.

## Recovery from a cerebrovascular condition

Your recovery time will depend on which condition and type of treatment you have. Factors such as your age, health, and lifestyle can also influence your recovery. Importantly, cerebrovascular disorders often require ongoing management. After initial measures to restore the brain's blood flow, treatment often involves managing the symptoms and reducing any risk of complications.

If you have brain surgery, here's a guide about what to expect afterwards.

### Hospital stay

Most people need to spend at least a few days in hospital for monitoring after a cerebrovascular procedure. The length of your stay will depend on the type of surgery you have and your post-operative progress.

### Medications

Your healthcare team might prescribe medications such as pain relievers, antibiotics, and anti-seizure medications.

### Physical recovery

After any procedure involving the brain, you may need rehabilitation to restore your physical capabilities. You may have physiotherapy and occupational therapy to optimise your function and help with mobility, strength, balance, coordination and flexibility.

### Cognitive recovery

Some people experience changes to their cognitive (thinking) function after brain surgery. These changes can include difficulties with memory, concentration, attention, and problem-solving. Working with an occupational therapist can support your cognitive recovery.

## Speech and language therapy

If a cerebrovascular condition affects brain areas involved in speech and language, you might need speech therapy to regain or improve your communication skills. Speech therapists can also help with swallowing difficulties.

## Emotional and psychological support

Being diagnosed with a cerebrovascular disorder can be emotionally and mentally challenging. You might find it beneficial to see a mental health professional such as a psychologist or counsellor. Support groups can also be a source of advice, information and support for you and your loved ones.

## Follow-up

You will have regular follow-up appointments with your specialists to monitor your recovery, manage any complications, and adjust your treatment if needed. Your healthcare team will work with you to develop a plan to help you get back to your usual activities.

Recovery from cerebrovascular disease is a gradual process that can take weeks to a year or more. To help your recovery go smoothly, it's important to follow advice from your health professionals, attend rehabilitation sessions, and let your team know about any concerns.

## Sources

Information provided and reviewed by A/Prof Andrew Davidson, Neurosurgeon at Melbourne Private Hospital.

<https://www.aans.org/en/Patients/Neurosurgical-Conditions-and-Treatments/Cerebrovascular-Disease>

<https://my.clevelandclinic.org/health/diseases/24205-cerebrovascular-disease>

<https://www.betterhealth.vic.gov.au/health/conditionsandtreatments/aneurysm>

<https://www.healthdirect.gov.au/aneurysms>

<https://www.betterhealth.vic.gov.au/health/conditionsandtreatments/stroke>

<https://www.healthdirect.gov.au/stroke>

<https://medlineplus.gov/ency/article/007372.htm>

<https://www.nia.nih.gov/health/stroke>