Vascular malformations of the brain

A guide for patients and carers

A Brain and Spine Disorders Booklet

Brain & Spine Foundation

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The Brain and Spine Foundation aims to improve the quality of life for people with neurological disorders and to reduce neurological disability by providing a national focus for research, education and information.

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Brain and Spine Foundation, 2001

Introduction

This booklet gives general information about the most common vascular malformations of the brain apart from aneurysms, which are covered in another Brain and Spine Foundation booklet: *Sub-arachnoid haemorrhage – a guide for patients and carers*. It has been written to answer some of the questions asked by people who have a vascular malformation, as well as their families and carers. The medical information in this booklet is evidence-based and draws on current best practice guidelines.

Because each person is affected differently, it is important that you also speak to your own general practitioner (GP), or to the hospital doctor who is looking after you. They are in a position to offer advice and information that is specific to you.

Words that are printed in **bold** are explained in the glossary.

What is a vascular malformation of the brain?

Vascular malformations of the brain are abnormal arrangements of some of the blood vessels in your head. There are several types, each affecting a different part of this network of arteries, capillaries and veins.

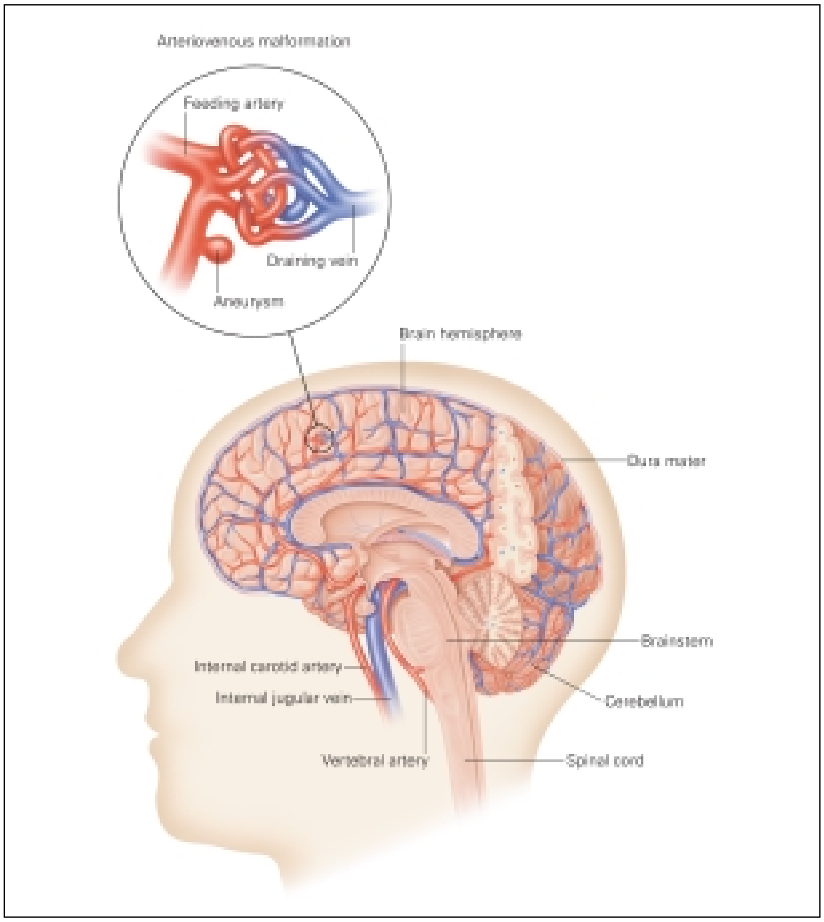


Figure 1: Side view of the brain showing the normal blood vessels and an enlarged section (circled) showing an arteriovenous malformation and an aneurysm

The main different types of vascular malformation are:

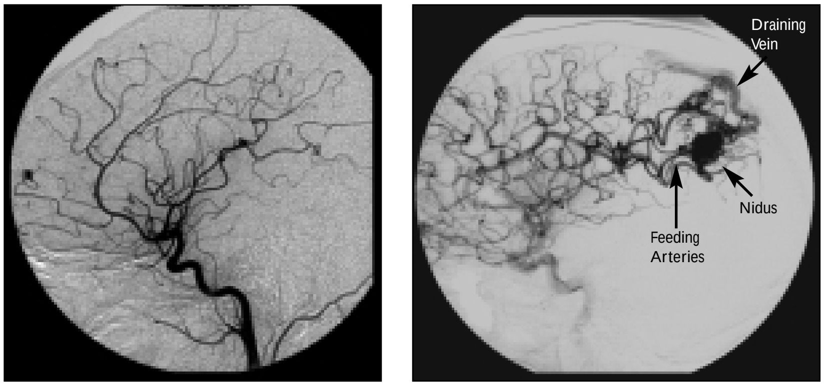
- Arteriovenous malformation of the brain
- Arteriovenous malformation of the dura
- Cavernous malformation
- Venous malformation

Sometimes, a vascular malformation may not fit into one of these categories, but overlaps them. These malformations usually occur on their own, although people sometimes have more than one. Occasionally an **aneurysm** may accompany one of these types of vascular malformation.

Arteriovenous malformation (AVM)

Normally, there is a fine network of **capillaries** running between the arteries and veins throughout your brain. When the capillaries in one area are missing, a complex tangle of arteries and veins develops, resembling a knotted rope, called an arteriovenous malformation *(see Figures 1 and 2)*. The knotted tangle of blood vessels is known as a **nidus**. Occasionally, only a single artery and vein are involved, forming a particular type of arteriovenous malformation, called an arteriovenous "fistula". In both cases, blood flows at high pressure from muscular arteries into thin-walled veins because of the absence of capillaries to slow it down. This is like an electrical short circuit, and is known as a shunt.

Figure 2: Angiograms showing (1) normal vessels and (2) an AVM



1. An angiogram showing the normal arrangement of blood vessels supplying the left-hand side of your brain

2. An angiogram showing an arteriovenous malformation of the brain and the blood vessels involved (arrowed)

An arteriovenous malformation is also known as an AVM, and an arteriovenous fistula is known as an AVF. Some doctors may use the more old-fashioned term "angioma" or "arteriovenous anomaly".

AVMs range in size from only a few millimetres to several centimetres across. They may occur in any part of your brain, or they may develop within its fibrous outer covering, called the **dura mater**, or dura for short. AVMs are rare, affecting less than 1% of the population, and they do not appear to be more common in certain countries or races. Men and women are affected equally.

What causes arteriovenous malformations of the brain and dura?

We do not know the cause of brain AVMs, but we do know that they are not cancerous, nor are they infectious. AVMs are thought to be due to a problem with the normal growth of capillaries during early development in the womb. Even though the AVM may have been present before birth, it usually takes some time for it to produce symptoms. Although AVMs of the brain very occasionally run in families, a gene for them is not known. They are only inherited in a condition known as **hereditary haemorrhagic telangiectasia**, or HHT for short, in which AVMs also occur in the lungs, and people with this condition may experience bleeding from their nose and gut.

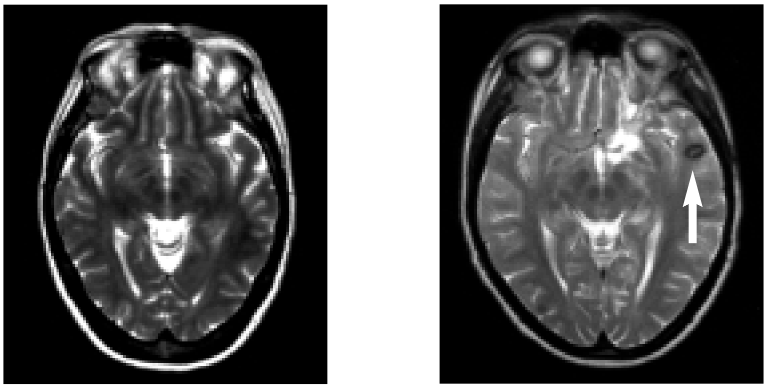
Dural AVMs can be caused by knocks to the head, brain surgery, infections of the brain, or **thrombosis** of blood in the large veins that drain the brain. Sometimes, there is no obvious cause.

Cavernous malformation

A cavernous malformation is a small, round, cluster of abnormal, enlarged blood vessels, without any brain tissue between them. It is purple in colour and resembles a raspberry.

Although the correct term is cavernous malformation, some doctors may call it a "cavernoma", "cavernous angioma", or "cavernous haemangioma". Cavernous malformations vary in size from a few millimetres to a few centimetres across, and can be found anywhere within the brain. Sometimes, they are associated with a nearby venous malformation (see below). Cavernous malformations are uncommon and affect less than 1% of the population, although they are being recognised more often with modern brain scanning techniques. They do not appear to be more common in certain countries or races, apart from Hispanic Americans. Men and women are affected equally.

Figure 3: MRI scans showing (1) normal brain (2) a cavernous malformation



1. An MRI scan showing a normal brain (as if viewed from the feet)

2. An MRI scan showing a cavernous malformation (arrowed) in the left temporal lobe of the brain

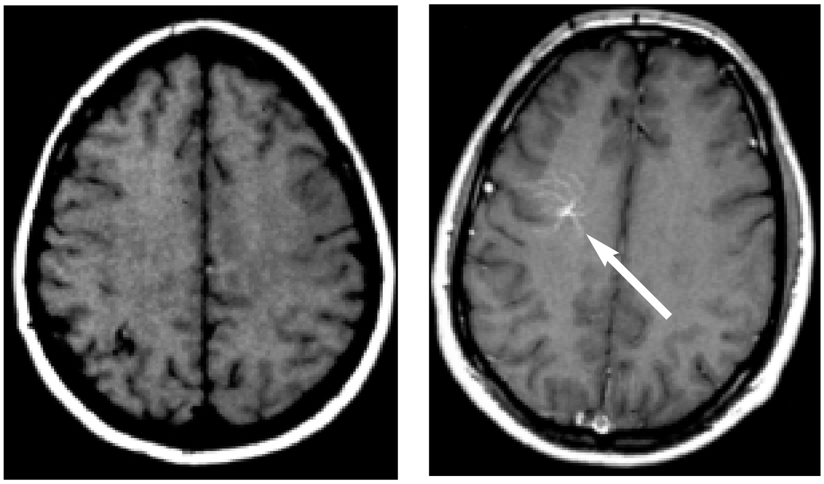
What causes cavernous malformations?

In some families with relatives affected by cavernous malformations in different generations, a genetic cause has been identified: a mutation in a gene on the seventh chromosome. Although a cavernous malformation usually occurs on its own, in these families they are often multiple. It is not yet known why cavernous malformations affect people who do not have any affected relatives, but they are not cancerous, nor are they infectious.

Venous malformation

A venous malformation is a dilated vein in the brain, or a cluster of dilated veins. Some doctors may call them "venous angiomas", or "developmental venous anomalies".

Figure 4: MRI scans showing (1) normal brain and (2) a venous malformation



1. An MRI scan showing a normal brain (as if viewed from the feet)

2. An MRI scan showing a venous malformation (arrowed) in the right frontal lobe of the brain

We do not know what causes venous malformations, or exactly how common they are, partly because they very rarely seem to cause any problems. They are sometimes associated with a cavernous malformation.

What tests will the doctors do?

Computed tomography (CT) brain scan

This is a special type of x-ray of your brain, which involves you lying still for a few minutes on a couch inside a hollow tube. Sometimes, a **neuroradiologist** may give an injection of **contrast** into one of the veins in your arm to make the appearances on the scan clearer. The CT scanner produces one or two sheets of x-ray film with pictures of your brain shown in horizontal slices. A CT scan may be the first test used to diagnose a vascular malformation, but often one or more of the other tests described below is also required to be sure. CT scanning may also be used after you are diagnosed with a vascular malformation to investigate suspected bleeding in the brain.

Magnetic resonance imaging (MRI) brain scan

Your doctors may recommend that you have an MRI scan, if it is available in your hospital, instead of or as well as a CT scan. An MRI scan involves lying still on your back for several minutes, whilst you are moved into a hollow tube. Some people find it rather noisy and claustrophobic. The main advantage of an MRI scan is that it provides more detailed pictures, especially of the back and base of the brain, and it uses magnetism rather than radiation. It usually gives more information than a CT about brain AVMs, and it is the most accurate test for a cavernous malformation. MRI examination may include magnetic resonance angiography (MRA), which gives detailed information about blood vessels.

Angiogram

Unlike the other tests, an angiogram requires some preparation. The doctors looking after you will take a few blood tests beforehand. A neuroradiologist will explain the risks and benefits of the procedure to you, and you will be asked to sign a "consent form". The angiogram is performed in a suite in the x-ray department of your hospital. You will be attached to various monitoring leads, and an intravenous line will be placed in your arm. You may be asked to keep still in certain positions during the procedure and you may also be asked to hold your breath or avoid swallowing for a short period of time.

The radiologist passes a fine flexible tube, called a **catheter**, into an artery in your groin after first numbing the overlying skin with a local anaesthetic. This catheter is guided towards the arteries in your neck, after which the radiologist injects a liquid that can be seen on x-rays, called contrast. The radiologist then takes several x-ray pictures of the blood vessels in your brain as the contrast passes through them. The whole procedure takes 30 to 45 minutes, after which you will need to lie still with pressure firmly applied to the area where the catheter entered your groin.

An angiogram is usually the most accurate test for vascular malformations, although it does not show cavernous malformations at all. Once you have been diagnosed, a "super-selective" angiogram using finer catheters may be required to show the precise structure of an AVM of the brain or dura, and to help plan your treatment.

What are the symptoms of a vascular malformation?

The symptoms you experience depend on the type of vascular malformation you have, its size and where it is located in your head. Sometimes, vascular malformations cause no symptoms at all.

Brain AVMs can cause strokes, epileptic seizures, headaches, enlarged blood vessels on the scalp and can sometimes lead to symptoms such as memory problems and anxiety or depression. In addition to these symptoms, dural AVMs may also cause problems with vision and pulsing noises in the head, although it is unusual for them to cause epilepsy. Cavernous malformations cause strokes, headaches and epilepsy. It is unusual for venous malformations to cause any symptoms at all.

Strokes

Strokes affecting people with vascular malformations are usually due to bleeding (also called **haemorrhage**) from the thin vessel walls of a vascular malformation. The symptoms of a stroke usually come on suddenly and may be accompanied by headache, nausea, vomiting and loss of consciousness.

Bleeding is the most serious complication of a vascular malformation, because of the risk of brain damage and so it is treated as an emergency. Sometimes a bleed may be small and produce no symptoms at all.

Stroke-like symptoms can sometimes occur with no sign of bleeding on a brain scan, perhaps due to pressure changes in the blood vessels, in which case your symptoms may disappear, persist or gradually get worse with time. The main stroke-like symptoms that people experience are weakness or paralysis, loss of feeling or numbness, tingling down one side, difficulty with speech, and problems with balance.

Epileptic seizures

Epileptic seizures can be caused by a vascular malformation pressing on the brain, which causes excessive electrical activity. This makes the part of your brain close to the vascular malformation overactive. You may experience unusual feelings and your muscles may move uncontrollably in the parts of your body controlled by that area of your brain, in which case the seizures are said to be "focal", or "partial". The seizure is "generalised" if it spreads to involve the whole of your body. You may or may not become unconscious during these seizures.

Your doctor may prescribe **anticonvulsant** medication to try to control the seizures. These tablets need to be taken regularly and you should avoid missing a dose. The dose may be changed according to how frequent your attacks are, and some people will need to take more than one type of drug. More detailed information on epilepsy is available in the Brain and Spine booklet: *Epilepsy – A guide for patients and carers*.

Headache

Headaches are a common problem for a large proportion of the population, so it is sometimes difficult to tell whether headaches are related to a vascular malformation or not. People with vascular malformations have headaches that can be similar to migraine, and may respond to the same treatments. People with dural AVMs can get other types of headache due to irritation of pain fibres in the dura mater. When drowsiness, unconsciousness or other stroke-like symptoms accompany a headache you should seek medical attention, because of the possibility of a brain haemorrhage.

Problems with vision

Loss of vision on one side of your field of vision can be a consequence of a stroke. People with a particular type of dural AVM called a **carotid-cavernous fistula** or "CCF" for short, experience swelling or redness of an eye, in which case the eye may also protrude out of its socket more than normal.

Noises in the head

A dural AVM can cause a noise in your head, called a "bruit", due to the blood flowing through it. Some people may hear this as a distinctive type of ringing in their ears, called "pulsatile tinnitus" – which beats in time with your pulse.

Enlarged blood vessels

People affected by AVMs of the brain or dura may develop prominent veins on their scalp. These are due to the changes in blood flow, caused by the AVM, in the arteries that supply the head and neck.

Memory problems

If you have had a brain haemorrhage, this may leave you with some brain damage that often causes problems with short-term memory, attention and concentration. Even in the absence of bleeding, people with AVMs may report problems with their memory, possibly due to blood flow changes in the brain.

Anxiety and depression

Last, but not least, if you are experiencing anxiety or depression in relation to your vascular malformation, you are not alone. Although these conditions probably do not directly cause changes in how you feel, mood changes are quite common amongst people with vascular malformations. People often find these feelings are difficult or embarrassing to talk about, but your doctor, as well as some of the organisations listed on page 25, may be able to help.

What are the risks for the future?

The particular risks of bleeding, epilepsy, and disability depend on the type of vascular malformation you have and its location in your head. Your investigations may show up other features suggesting a higher or lower risk of these complications. Because further research into prognosis is needed, the following figures are only estimates.

The risk of bleeding from an AVM of the brain for the first time is approximately 1 in 50 (2%) every year, and the risk of another bleed following a previous one is probably somewhat higher. The risk of dying from a bleed can be as high as 1 in 5 (20%), and the risk of disability afterwards may be as high as 1 in 3 (30%). For people with an AVM of the brain, each year there is a 1 in 100 risk of developing epileptic seizures for the first time, although they can often be controlled with anticonvulsants.

The risk of bleeding from cavernous malformations and dural AVMs is lower, probably around 1 in 100 every year, and it is lower still for venous malformations. The risk of developing epileptic seizures for the first time due to a cavernous malformation is approximately 1 in 50 (2%) each year.

We are unsure whether there is a greater risk of bleeding from any of the vascular malformations during pregnancy, either due to the increased blood circulation during pregnancy or pressure changes during labour.

How can vascular malformations be treated?

Whilst taking into account your personal preferences, the risks of leaving your vascular malformation alone need to be weighed up against the risks and benefits of treatment. If you attend a specialist clinic, a team of doctors may be involved in making this decision with you. The aim of treatment is to protect you from developing any future problems related to your vascular malformation by getting rid of it completely. Treatment cannot undo any damage that has already been done to your brain. Sometimes, the best policy may be to have no treatment at all. There is a need for more research into the treatment of vascular malformations.

The three main methods of treating vascular malformations are embolisation, stereotactic radiosurgery and neurosurgery. Embolisation involves the injection of particles to block off the blood vessels of AVMs of the brain and dura. Stereotactic radiosurgery uses radiation to treat small vascular malformations, mainly AVMs less than three centimetres across and is very occasionally also used to treat cavernous malformations. Neurosurgery is another name for a surgical operation on your brain to disconnect an AVM of the brain or dura from the arteries that supply it and the veins that drain it, or to remove a cavernous malformation.

You may have one treatment only, a combination of different treatments, or in the case of embolisation, several separate treatments.

What is embolisation?

Embolisation is one of the more recent treatments for AVMs. A highly trained neuroradiologist, who has considerable experience with the technique, should perform it. Embolisation involves injecting liquid glue or coils into an AVM of the brain or the dura, using a long catheter similar to the one used for an angiogram. In most circumstances, embolisation is used to shrink an AVM so that it is suitable for radiosurgery or neurosurgery. The technique can also reduce the risk of bleeding during subsequent neurosurgery. Occasionally, embolisation can block off the blood supply to an AVM and get rid of it completely. Embolisation usually succeeds in at least reducing the size of the AVM, and can sometimes reduce symptoms such as noises in the head, or headaches.

What happens before embolisation?

Unless embolisation is performed as an emergency, you will be admitted to hospital the night beforehand, so that routine blood tests can be carried out and you can be prepared for the procedure. You will not be allowed to eat from midnight before the embolisation. On the day of the procedure, you will be taken to the Radiology department. One or both of your groins will be shaved, and you will be given a local anaesthetic before threading a catheter up a blood vessel to the AVM. Occasionally light sedation (a calming drug) or a general anaesthetic is used, if you find the procedure hard to cope with.

What happens during the embolisation?

The procedure takes a variable period of time, usually a matter of hours, according to the complexity of the tangle of vessels. Before injecting any glue, the radiologist may inject a small amount of a drug into the vessels supplying your AVM to test the function of the area of your brain supplied by these vessels. The glue hardens rapidly as it is injected into your AVM. This blocks off the blood flow through the AVM.

What will happen after embolisation?

You will need to keep your legs straight to allow a blood clot to form at the point where the catheter punctured the blood vessel in your groin. You will be observed closely after the embolisation. Because there is a small risk of stroke afterwards, you should mention any unusual symptoms if you develop them, although they are likely to be only short-lived. Many people experience a headache for a little while after the treatment. Normally, people go home within 24 to 48 hours of the procedure.

Some weeks or months after the embolisation, your doctors may want to repeat an angiogram or MRI scan to see how effective the treatment has been. If your AVM is large you may need to return for further embolisation treatments, in stages over weeks or months. If your AVM is not completely sealed off, it probably carries a risk of further bleeding. In this case, your doctors may decide to try one of the other treatments, if they are appropriate, in an attempt to get rid of the AVM.

Like radiosurgery, embolisation does not involve you having a **craniotomy**, and it can be used to treat malformations in deep areas of your brain. However, it is less likely to totally seal off AVMs; it may require several separate sessions of treatment, and involves the use of new materials, some of which are still under investigation.

What is stereotactic radiosurgery?

Stereotactic radiosurgery is a single treatment of invisible, high-energy x-ray radiation, delivered by a machine called a 'linear accelerator' or 'gamma knife'. It is designed to target a high dose of radiation at your vascular malformation, and minimise the amount delivered to the normal brain around it and the rest of your body. Despite its name, it is not a surgical operation, and does not involve any incisions.

What happens before radiosurgery?

A team of professionals from several different departments in the hospital will look after you. The main people involved will be a **radiotherapist, neuroradiologist, radiographer** and **physicist**, and perhaps a **neurologist** or **neurosurgeon**.

Careful planning is needed to aim the narrow x-ray beams precisely. Because your head must be kept very still in a frame during linear accelerator radiosurgery, the staff will need to make an impression of your teeth and the back of your head long before the treatment. You may need to have a dental check-up beforehand.

You may need to have some further scans of your head before the treatment. These will provide detailed computer images of your brain for the radiotherapist and physicist to use to direct the x-ray beams accurately.

What happens during radiosurgery?

When you attend for your treatment, your customised head frame will be fitted. Its measurements will be re-checked and x-ray pictures will be taken again to confirm its exact position. You will then lie on a couch, which supports your head and the frame. The radiographers will set up the positions of the couch and the treatment unit. The radiosurgery will last between 40 minutes and one hour, during which time you should not feel any discomfort, but you will hear the noise of the x-ray unit.

What will happen after radiosurgery?

After the treatment, it can take two years or more for the vascular malformation to seal up and disappear, during which time you are still at risk of the problems that vascular malformations can cause. After this time, your doctors may want to repeat an angiogram or MRI scan to see how effective the treatment has been.

The advantages of radiosurgery are that it does not involve a craniotomy, or a general anaesthetic, and that it can treat some deep malformations. However, it cannot normally be used to treat malformations larger than three centimetres; it can take two years or more for protection from further symptoms; and there is a risk of damage to the surrounding brain, called **radionecrosis**.

What is neurosurgery?

Neurosurgery is the longest established treatment for vascular malformations of the brain. It is usually used to treat AVMs of the brain, and sometimes AVMs of the dura and cavernous malformations. The decision about surgery will be based on the future risks of your condition, and how safe it is to remove the vascular malformation according to its location and size.

What happens before surgery?

You will be admitted to hospital at least one day before your surgery is scheduled. Normally your fitness for an anaesthetic will have been assessed with a thorough examination, blood tests, an x-ray of your chest and perhaps a recording of your heart rhythm. You will not be allowed to eat or drink for several hours before the operation. An anaesthetist will give you a general anaesthetic on the day of surgery, so you will be asleep before you are taken into the operating theatre.

What happens during surgery?

The team looking after you will include one or more surgeons, an anaesthetist and theatre nurses. Some of the hair on your head may need to be shaved. The surgeon will then create an opening in your skull, called a craniotomy, over the AVM. The AVM will then be carefully detached from the surrounding vessels, which may take several hours.

What will happen after surgery?

When the surgeon has finished, the opening made in your skull will be closed and covered with a dressing. You will then be taken to a recovery area, usually in the intensive care unit, where you will be observed closely. Shortly after you have woken up from the anaesthetic, you will be transferred back to the ward, and you can expect to leave the hospital within a week or two if there are no problems.

Epileptic seizures may occur for the first time, and if you have already had them they may get better or worse. Some weeks or months after the operation, your doctors may want to repeat an angiogram or MRI scan to check how effective the surgery has been. You will need to convalesce at home for several weeks, and some people need physiotherapy in a rehabilitation unit. It is likely that you will need to take several weeks, and in some cases, several months off work after the operation.

As with any treatment, there are risks and benefits of surgery. It may be possible to completely remove your vascular malformation, which could protect you from developing other problems in the future. Surgery can sometimes be used to remove larger malformations, which would be too big for radiosurgery, or which could be only partially treated with embolisation. On the other hand, surgery requires a general anaesthetic, which has its own risks, and some deep malformations cannot be reached safely by surgery.

What other treatments might I have?

Drug treatment

It is wise to avoid taking aspirin, or other drugs that prevent your blood from clotting, in case your vascular malformation bleeds. You may be given steroids to reduce any swelling of the brain around your vascular malformation before embolisation or neurosurgery. Steroids should not be stopped suddenly. Anticonvulsant tablets are used to treat epileptic seizures if you experience them.

Rehabilitation

Your recovery from symptoms due to your vascular malformation may be gradual, and rehabilitation can help improve your recovery. If you are admitted to hospital, nurses will be available to help you with your everyday needs. Whether you are in hospital or not, your doctor can refer you for speech and language therapy, physiotherapy for certain problems with weakness and balance, and occupational therapy to help with a variety of functions in your everyday life.

Research

Whilst reading this booklet and talking to your doctors, you may have identified some unanswered questions about your condition. Because vascular malformations are rare conditions, and our understanding of them is incomplete, they are an important subject for medical research. During the course of your treatment, you may be invited to take part in a research study to compare different types of treatment. Any studies that you are approached about should be fully explained to you and have the approval of the appropriate ethics committee. You can, of course, refuse to take part.

How will my lifestyle be affected?

Having a vascular malformation does not necessarily restrict your lifestyle. What you can do depends on how you are affected, whether you have any treatment, and most importantly what you feel able to do. If you have any concerns, you should discuss them with your doctor.

You may need to be careful about sport and exercise if you have epileptic seizures, but otherwise you should do what you feel capable of. Sex presents no risk. If you drink alcohol, it is best to drink in moderation only, and it is always best to avoid recreational drugs. You should let your insurance company know that you have a vascular malformation if you travel, but there are no particular restrictions on flying.

Driving

If you hold a driving licence, in the first instance you should ask your doctor for advice on your fitness to drive. You may need to stop driving if you have epilepsy, or brain haemorrhage, and after some types of treatment. Guidance on fitness to drive may change over time, and your doctor may need to consult the "At a glance" guide published by the Driver and Vehicle Licensing Agency (DVLA), or their Medical Adviser. If there is any doubt about your fitness to drive, you can be referred to a special centre for assessment. If you have to stop driving for a while, you are legally obliged to contact the DVLA (see Other organisations that may be able to help, page 25). If you do not stop driving when you have been advised to do so, nor contact the DVLA, you may put yourself and others at risk, and your insurance company will not cover you in the event of an accident.

Returning to work is often best done gradually. Your GP is probably the best person to discuss this with and, as with other aspects of your life, you yourself are a good judge of what you are able to do.

Glossary

Aneurysm
An abnormal swelling of an artery. Eventually, over several years, this may tear and burst with the sudden escape of blood.

Anticonvulsants
Drugs taken to treat epilepsy. They are usually given every day for years to try to prevent epileptic seizures.

Capillaries
The network of fine blood vessels that carry blood between the smallest arteries and smallest veins throughout the body's tissues and organs.

Carotid-cavernous fistula
An abnormal connection between the main artery supplying your brain and one of the draining veins behind your eyes, which can cause swelling and redness of one eye.

Catheter
This is a thin, flexible tube that is inserted into a blood vessel, commonly in your groin, during an angiogram or embolisation.

Contrast
A liquid containing iodine that is injected into your blood vessels via a catheter, and can be seen on x-ray.

Craniotomy
An opening made in the bones of your skull by a surgeon to get access to your brain. This is carried out under anaesthetic.

Dura mater
The fibrous, outer covering of your brain, known as dura for short.

Haemorrhage
Bleeding, which causes a stroke when it occurs in or around the brain.

Hereditary haemorrhagic telangiectasia
This is a rare inherited condition that runs in families. It is also known as Osler-Weber-Rendu disease, and causes nose bleeds, red spots on your skin, and occasionally bleeding from other parts of your body such as the lungs and bowel.

Neurologist

A medical doctor who is specially trained to diagnose disorders of the brain, spinal cord and nerves, and to treat them with drugs if appropriate.

Neuroradiologist

A doctor who is specially trained to conduct and interpret CT and MRI scans and angiograms. Sometimes, neuroradiologists are not just trained to diagnose, but also to treat using techniques such as embolisation.

Neurosurgeon

A doctor who is specially trained to diagnose and treat people with disorders of the brain, spinal cord and peripheral nerves using surgical techniques.

Nidus

The knotted tangle of blood vessels in an arteriovenous malformation. Nidus is the Latin word for nest.

Physicist

A scientist who has special knowledge about the use of stereotactic machinery and radiation.

Radiographer

A trained person who controls the equipment used to take CT and MRI scans and angiograms.

Radionecrosis

Damage to the brain due to the use of radiation.

Radiotherapist

A doctor who is specially trained to use radiation for the treatment of cancer, and other conditions such as vascular malformations.

Shunt

A direct flow of blood from an artery to a vein.

Thrombosis

The formation of a blood clot within a blood vessel.

Other organisations that may be able to help

Brain and Spine Helpline
Brain and Spine Foundation
7 Winchester House
Kennington Park
Cranmer Road
London SW9 6EJ
Tel: 0808 808 1000
www.brainandspine.org.uk
(Information and support on neurological disorders for patients, carers and health professionals)

Brain and Spinal Injury Charity
(BASIC)
Neurocare Centre
554 Eccles New Road
Salford
Greater Manchester M5 2AL
Tel: 0870 750 0000
www.basiccharity.org.uk
(Information, research and support groups)

British Epilepsy Association
New Anstey House
Gate Way Drive
Yeadon
Leeds LS19 7XY
Tel: 0808 800 5050
www.epilepsy.org.uk
(Information and advice)

Chest, Heart and Stroke Scotland
65 North Castle Street
Edinburgh
Lothian EH2 3LT
Tel: 0345 720720
www.chss.org.uk
(Advice, information, education and research in Scotland)

Crossroads
(Association of Crossroads Care Attendant Schemes)
10 Regent Place
Rugby
Warwickshire CV21 2PN
Tel: 01788 573653
www.crossroads.org.uk
(Practical support for carers; respite care at home)

Different Strokes
162 High Street
Watford
Hertfordshire WD1 2EG
Tel: 01923 240615
www.differentstrokes.co.uk
(Support for younger stroke survivors)

DVLA Drivers' Medical Group
DVLA
Longview Road
Swansea SA99 1TU
Tel: 01792 783686
(Fitness to drive)

Epilepsy Association of Scotland
48 Govan Road
Glasgow G51 1LJ
Tel: 0141 427 4911
www.epilepsyscotland.org.uk
(Information and advice helpline)

Migraine Trust
45 Great Ormond Street
London WC1N 3HZ
Tel: 020 7831 4818
www.migrainetrust.org
(Research, training, information and support)

NHS Direct
Tel: 0845 4647
www.nhsdirect.nhs.uk
(Medical advice and information on NHS services)

National Society for Epilepsy
Chalfont St Peter
Gerrards Cross
Buckinghamshire SL9 ORJ
Tel: 01494 601400
www.epilepsynse.org.uk
(Medical support, counselling and information)

Speakability
(Formerly Action for Dysphasic Adults)
1 Royal Street
London SE1 7LL
Tel: 0808 808 9572
www.speakability.org.uk
(Advice and support for people affected by aphasia)

Stroke Association
Stroke House
1 Whitecross Street
London EC1Y 8JJ
Tel: 0845 303 3100
www.stroke.org.uk
(Information, support and publications)

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Brain and Spine Foundation, 7 Winchester House, Kennington Park,
Cranmer Road, London SW9 6EJ Telephone: 020 7793 5900
Fax: 020 7793 5939 Helpline: 0808 808 1000
Email: info@brainandspine.org.uk Website: www.brainandspine.org.uk
Registered charity no.1010067

Publications from the Brain and Spine Foundation

We can supply one copy of each relevant publication free to patients and carers affected by neurological disorders. However, if you are able to pay for them, it will help us to cover our costs. Additional copies cost £5 each for booklets and £3 each for leaflets. (Price includes £1.00 post and packing). Please make your cheque payable to the Brain and Spine Foundation.

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Brain and Spine Foundation, 7 Winchester House, Kennington Park, Cranmer Road, London SW9 6EJ
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BRAIN & SPINE HELPLINE
0808 808 1000

Email: info@brainandspine.org.uk Website: www.brainandspine.org.uk Registered Charity No. 1010067

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