

Spinal Cord Embolisation (AVM/DAVF)

Consumer Information

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What is a Spinal Cord Embolisation (AVM/DAVF)?

The spinal cord is an extension of the brain that is situated inside the spinal column (or backbone), which connects the nerves from the brain to the rest of the body. This enables the brain to control movements of limbs and internal organs, such as the urinary bladder or bowel, and also to receive sensory information such as pain or touch sensation from the limbs.

In both arteriovenous malformation (AVM) and dural arteriovenous fistula (DAVF), an abnormality occurs in the connection(s) between arteries and veins on or inside the spinal cord.

It is not known why these abnormalities happen or what causes them. It is believed some people are probably born (i.e. it is congenital or inherited) with a predisposition or tendency to form this abnormality and at some stage in life it develops. It is not known what triggers this.

Treatment consists of embolisation by itself or combined with open surgery. Embolisation is a "key hole" surgical technique (surgery through a small cut or incision) which enables the injection of medical grade "glue", special tiny coils, or sand like particles directly into the abnormal connection or 'site' to block off the abnormal blood vessel connection.

The procedure is performed through a tiny plastic tube placed into the blood vessels, using X-ray images or pictures to guide insertion of the tube to make sure it is in the right position before an AVM or DAVF is treated with the glue, particles, or coils.

Spinal Cord AVM (arteriovenous malformation) is an abnormal connection between arteries and veins on or inside the spinal cord.

AVM usually occurs in older children and younger adults (less than 50 years).

An AVM causes abnormal blood flow within the spinal cord and this can result in a number of problems, including haemorrhage (internal bleeding) and/or a stroke in the spinal cord. This can in turn result in a sudden or gradual loss of movement of limbs, such as temporary or permanent paralysis, abnormal sensations such as tingling, "pins and needles", or a complete loss of feeling in the limbs.

There may also be a loss of urinary bladder or bowel control.

If untreated, AVM can progress to a severe disability and although rare, can result in death.

Spinal Cord DAVF (dural arteriovenous fistula) is an abnormal connection between arteries and veins on the covering (dura) of the spinal cord. DAVF occurs in older people, usually after 50 years of age.

DAVF causes abnormal blood flow within the spinal cord and can result in severe spinal disease. There is usually a gradual loss of function of limbs, such as temporary or permanent paralysis of one or more limbs. There may also be the experience of abnormal sensation or loss of sensation from the limbs, such as tingling or "pins and needles". There may also be loss of urinary bladder or bowel control.

If untreated, DAVF can progress to become a severe disability.

How do I prepare for a Spinal Cord Embolisation (AVM/DAVF)?

PRIOR TO YOUR APPOINTMENT DAY:

Prior to the procedure, a nurse or doctor will contact you and advise you on what preparation is necessary for the procedure. You will be admitted to hospital for the procedure.

The procedure **WILL MOST LIKELY** be performed under general anaesthetic (so you are asleep). You will need to fast overnight or for at least 4 to 6 hours.

If you are on medication, your doctor or nurse will discuss with you whether to continue with your medication and give you full instructions. In particular, if you have diabetes, kidney or thyroid diseases, or if you are on blood thinning (anticoagulant) medication, special instructions will be provided to you. You will also be advised whether you need to attend a pre-admission clinic.

If you need to attend a pre-admission clinic, this will be a few days or weeks before the procedure. You will have a medical check up to ensure that you are fit for the operation and for the anaesthetic, to have any necessary blood tests performed, and to give you any information or any special medication that you may need to take before the embolisation procedure. You will also need to sign a consent form to give permission to treat you.

The doctor performing the procedure will have received your medical history from your referring doctor and will decide whether you need to go to the pre-admission clinic and/or whether a pre-assessment from an anaesthetist is also required.

If, apart from the AVM/DAVF, you are otherwise healthy, your referring doctor may have already arranged for blood tests and assessed that you are suitable to have the procedure. If so, you may not need to attend a pre-admission clinic.

ON THE DAY OF YOUR APPOINTMENT:

On the day of the embolisation procedure, the anaesthetist will check you to ensure that you are fit for the anaesthetic. You can also be assessed as fit for the procedure by your referring doctor and may also have already seen an anaesthetist if you attended the pre-admission clinic.

A small catheter (thin plastic tube) will be inserted into a vein in your arm so that you can be put to sleep and to give you any necessary medication. The nurse will shave your groin so that there will be clear access to the artery in your groin, which is part of the embolisation procedure. After you have gone to sleep, you may have a catheter inserted into your bladder to drain away urine and prevent the bladder from getting too full.

What happens during a Spinal Cord Embolisation (AVM/DAVF)?

Spinal Cord AVM and DAVF are abnormalities concerning the blood vessels (arteries and veins) in and around the spinal cord. The treatment is performed under general anaesthetic (so you are asleep) and you will not feel anything.

A small cut (less than 1 centimetre) is made in the skin of your groin. Through this cut, the artery in the groin is punctured with a small needle and a catheter (long thin hollow plastic tube) is inserted into the artery in the groin (the femoral artery).

This catheter is then moved forward from this artery, inside your blood vessels, by an interventional neuroradiologist or neurosurgeon (specialist doctors), using X-ray imaging to guide the insertion. The catheter is moved and positioned within the vessels very carefully until it is in or very near to the abnormal vessels that are to be treated. All of this is done without having to make any additional incisions (cuts in the skin) apart from the small puncture in your groin where the catheter has entered your blood vessel system.

Through this catheter, an angiogram is performed. This is where an iodine containing substance, known as "iodinated contrast medium" (see *Iodine-containing contrast medium (ICCM)*) or just "contrast", is injected into the blood stream to make the blood vessels more clearly visible on the X-ray images.

Without contrast, X-ray pictures would not show the inside of the blood vessels. The embolisation, or blocking of the abnormal collection of blood vessels around your spinal cord, is planned after the angiogram pictures are taken and examined. The radiologist uses the pictures to work out what kind of small particles or glue to block the vessels with and how to do this most effectively. The initial planning of the procedure takes place before you are admitted to hospital by the radiologist, in consultation with your neurosurgeon and neurologist, but the final steps in the planning process are done after seeing the images from the angiogram.

Several "embolic" agents are then injected through the catheter, into the abnormal connection(s). The

"embolic" agents block off the abnormal connection(s) in the vessels. These may be special medical grade "glue", special tiny coils or sand like particles. If only some of the abnormal connections can be embolised, it will reduce the severity of the AVM/DAVF (and probably also your symptoms) and it may be that this will also prevent or reduce worsening of your current problems. If all the abnormal connections can be embolised, then this can result in a cure.

At the end of the procedure, an internal suture or stitch may be used to close off the puncture hole of the artery in the groin.

Sometimes, when it is not possible to embolise all the abnormal connections, open surgery may also be required to block off the rest of the abnormal connections. The embolisation procedures already performed will make the subsequent operation safer and result in less blood loss during the open surgery.

Sometimes, one session of embolisation treatment may not be enough and 2 or 3 more sessions may be required to finish the treatment.

Occasionally, the treatment cannot be performed without making your symptoms much worse, and the procedure will be stopped at that point because the radiologist or neurosurgeon has decided the risks outweigh the potential benefits.

Are there any after effects of a Spinal Cord Embolisation (AVM/DAVF)?

If the procedure goes well, the immediate after effects are minor. After effects are generally related to the general anaesthetic where you may have temporary nausea or vomiting, but this can be controlled with medication.

You may also have a minor bruise, in the groin, but this will usually heal within days. If you experience a deeper bruise it may take several weeks to heal.

Very rarely, there may be internal blood loss and you may need open surgery to stitch up the puncture hole. However, the risk of puncture site haematoma (a semi-solid mass of blood in the tissue) requiring transfusion, surgery or delayed discharge is less than 3%.

The rest of the after effects will be discussed in the section, "What are the risks of Spinal Cord Embolisation (AVM/ DAVF)", below.

How long does a Spinal Cord Embolisation (AVM/DAVF) take?

The entire procedure from the time of having the general anaesthetic, to performing the procedure and to waking you up at the end of the procedure, is variable and unpredictable. Typically it takes 3 to 6 hours. Usually you will be told that it will take either a whole morning or afternoon.

AVM: The length of stay in hospital varies from 1 day and 1 night to about a week.

DAVF: The length of stay in hospital varies from 1 to 2 days.

What are the risks of a Spinal Cord Embolisation (AVM/DAVF)?

There is an extremely small risk of serious allergic reaction, death, or brain damage from the general anaesthesia. The anaesthetist will discuss this with you.

Very rarely, there may be internal blood loss and you may need open surgery to stitch up the puncture hole in the groin. However, the risk of puncture site haematoma (a semi-solid mass of blood in the tissue) requiring transfusion, surgery or delayed discharge is less than 3%.

The risk directly related to the embolisation procedure itself includes stroke and haemorrhage affecting the spinal cord. Very rarely, these can result in death.

The risk of stroke or haemorrhage can vary from low to moderate. The risk can vary from less than 1% to more than 10%. The risk depends on the makeup or configuration (angioarchitecture) of the AVM or DAVF. It also depends on how much embolisation is being done.

Complication rates are different if treatment is intended as a cure instead of being performed to stabilise the disease or help prepare for proposed open surgery to cure the problem. The exact risks cannot be generalised to all patients because AVMs and DAVFs are very different from patient to patient, so all of this will be discussed with you before you consent to the procedure. The risk can only be provided to an individual patient by their treating doctors.

The effects of a stroke or haemorrhage can vary. If they are mild, you could completely recover. If they are moderate or severe, you may be left with ongoing or permanent problems. These can include paralysis and/or incoordination (inability to coordinate normal movements such as picking up a cup, doing up buttons, imbalance when walking etc.) of one or more limbs, loss of feeling in the limbs or body, abnormal sensation in the limbs such as tingling or "pins and needles", or loss of control of the urinary bladder or bowel. If very severe, these can result in death, but this is very rare.

There are some risks about having an injection of iodine contrast medium (see [iodine-containing contrast medium \(ICCM\)](#)). The risk of an allergic reaction is small.

What are the benefits of a Spinal Cord Embolisation (AVM/DAVF)?

The benefits you can gain from the procedure vary from patient to patient. The risks and benefits of the procedure directly related to you will be discussed fully by your treating doctor.

Benefits can include that the AVM/DAVF is cured. Even if it is not cured, embolisation can stabilise the AVM/DAVF to lessen the chances of future stroke or haemorrhage, reduce or reverse (fully or partially) current symptoms such as abnormal sensation, weakness of limbs or incontinence (loss of control of

the urinary bladder or bowel). It can also lessen the risk of subsequent surgery.

Who does the Spinal Cord Embolisation (AVM/DAVF)?

The embolisation procedure is performed by an interventional neuroradiologist or less commonly by a neurosurgeon; both are specialist doctors who have been specially trained to perform this type of treatment. The specialist doctor will also provide a written report to your referring doctor.

Where is a Spinal Cord Embolisation (AVM/DAVF) done?

In the angiographic or interventional suite (theatre) in a radiology or imaging department of a public or private hospital.

When can I expect the results of my Spinal Cord Embolisation (AVM/DAVF)?

The treating doctor will explain to you the results of the procedure once you have properly woken up. The treating doctor will also provide a written report to your referring doctor or other specialist.

The time that it takes your doctor to receive a written report on the test or procedure you have had will vary, depending on:

- the urgency with which the result is needed
- the complexity of the examination
- whether more information is needed from your doctor before the examination can be interpreted by the radiologist
- whether you have had previous X-rays or other medical imaging that needs to be compared with this new test or procedure (this is commonly the case if you have a disease or condition that is being followed to assess your progress)
- how the report is conveyed from the practice or hospital to your doctor (in other words, email, fax or mail)

Please feel free to ask the private practice, clinic, or hospital where you are having your test or procedure when your doctor is likely to have the written report.

It is important that you discuss the results with the doctor who referred you, either in person or on the telephone, so that they can explain what the results mean for you.

Further information about Spinal Cord Embolisation (AVM/DAVF)

In some cases, sometime before the day of the procedure, you may be admitted to have a preliminary angiogram (as explained above).

After the procedure, you will need to have follow up radiology tests such as [computed tomography \(CT\)](#) scans, [magnetic resonance imaging \(MRI\)](#) scans or angiograms to see how effective the procedure has been.

Useful websites about Spinal Cord Embolisation (AVM/DAVF):

- The Toronto Brain Vascular Malformation Study Group:
http://brainavm.oci.utoronto.ca/malformations/embo_treat_avm_index.htm

Please note:

This information is of a general nature only and is not intended as a substitute for medical advice. It is designed to support, not replace, the relationship that exists between a patient and his/her doctor. It is recommended that any specific questions regarding your procedure be discussed with your family doctor or medical specialist

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