National Hospital for Neurology and Neurosurgery

Flow-diverting stents (in the Treatment of intracranial aneurysms)

Lysholm Department of Neuroradiology
If you would like this document in another language or format or if you require the services of an interpreter contact us the Clinical Nurse Specialists directly.

We will do our best to meet your needs.

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This booklet has been written by the Lysholm Department of Neuroradiology at the National Hospital for Neurology and Neurosurgery (NHNN). Our aim is to provide you with information about flow-diverting stents and how they are used to treat cerebral (brain) aneurysms.

It is intended for use by patients (or their families and carers) in whom treatment with a flow-diverting stent has been proposed. It is not intended to replace discussion with your consultant.

If you have any questions about flow-diverting stents, or would like further information about cerebral aneurysms, please do not hesitate to contact a member of the team caring for you. They will be happy to answer any question you may have.

**What is a flow-diverting stent?**

A flow-diverting stent is a small tube, made of very fine wire mesh. These tubes act like a ‘patch’ within the blood vessel to stop the blood supply to the aneurysm and prevent any further bleeding (see Figure 1. over page). We have been using stents to treat cerebral aneurysms for nearly ten years. Older stents were made of wider mesh and were designed to hold fine metal coils within the aneurysm.

The coils were used to pack the aneurysm rather than directly diverting blood flow away from the aneurysm.

Flow-diverting stents are similar, but are designed to disrupt the blood flow into the aneurysm, allowing it to clot off without the need for coils. We have been using flow-diverting stents at NHNN since early in 2008 and have the greatest experience of their use in the United Kingdom.
How can flow-diverting stent treatment help?

The aim of flow-diverting stent treatment is to prevent blood from entering the aneurysm and therefore prevent the risk of it bursting. The stent covers the abnormality in the blood vessel (see above) and we believe it is likely to provide a more permanent cure of the aneurysm. Flow-diverting stents also allow us to successfully treat large, wide-necked or sausage-shaped (fusiform) aneurysms. These particular types of aneurysms have been difficult or impossible to treat in the past. As they are still quite new, we do not yet know how these stents
will perform in the long term. However, many other types of (non-flow diverting) stents used for some time in the treatment of aneurysms, do not seem to cause long-term problems.

**What are the risks of flow-diverting stent treatment?**

All treatments and procedures carry risks and we will talk to you about the risks of flow-diverting stents. Each case carries a different risk and we will try to estimate your personal risk in our discussions with you. The procedure will take place under a general anaesthetic. Your anaesthetist will discuss the risks of general anaesthesia with you. It is important to tell your doctor if there is a possibility you may be pregnant. Risks associated with this procedure include:

- **Exposure to X-rays:** The use of X-rays during the procedure presents a very small risk of temporary hair loss. Our state of the art imaging equipment ensures the radiation dose is as low as possible.

- **Adverse reaction to contrast dye:** A contrast dye is a drug which is injected into the arteries during the procedure. It allows the radiologist to see the blood vessels when an X-ray is taken. There is a small risk of an allergic reaction to the dye, or damage to kidneys.

- **Risk of bleeding:** You will need to take tablets to make the blood thinner and less likely to clot in the days leading up to the procedure and for many months afterwards. These
tablets can increase the risk of bleeding in other areas of the body and can irritate the stomach. It is important to tell your consultant if you have had a stomach ulcer in the past.

- **Risk of stroke:** Like all procedures involving the blood vessels of the brain, the placement of a stent carries a small risk of stroke. This can range from a minor problem which gets better to a severe disability involving movement, balance, speech or vision or may even be a threat to life.

  On our current evidence, we would estimate that between three and seven people in one hundred will experience these problems. Any problem is usually apparent during or immediately after the procedure, or during the next few days whilst you are still in hospital.

- **Haematoma, bruising or vessel damage:** Usually a stitch is placed in the femoral artery (in the groin) after the tube has been removed. Often there is bruising and sometimes bleeding in the groin. It is rarely serious but can go on for a few hours. Very occasionally there is damage to the blood vessel in the leg requiring a further surgical operation. You will need to be monitored carefully in hospital for the first few days to control your blood pressure and blood clotting.

- **Headaches:** These are quite common after aneurysm treatments, probably due to clotting inside the aneurysm as part of the healing process and may go on for some time.
Our long experience with other types of stents suggests delayed problems are very unusual.

What will happen if I choose not to have flow-diverting stent treatment?

Your case will have been discussed by a multidisciplinary team of neuro-radiologists, neurosurgeons and neurologists. The treatment offered is based on the agreement of the team as to what is the best course of action. It is important that you fully understand the procedure, what it means for you and any alternative treatments available. You are under no obligation to follow the advice given. If you are unhappy about the treatment being offered, a full discussion with members of the team can be arranged. It is entirely reasonable to seek a second opinion if you still have concerns. Whatever decision you reach it will not affect the standard of care you receive. We will continue to offer you the best care possible, based on the best current evidence we have available.
What alternatives are available?

There are several options available for the treatment of aneurysms. However the location, size and shape of the aneurysm can dictate which treatment is the safest. It is likely that these other treatments will be considered as higher risk than the treatment offered. Your consultant or a senior member of their team will talk through all options with you. Alternative treatments for cerebral aneurysms include:

**Conservative treatment**

On occasion, treatment consists of clinical follow-up and Magnetic Resonance Imaging (MRI) or Computerised Tomography (CT) scans. This is done in conjunction with blood pressure control and advising on any appropriate lifestyle changes (such as giving up smoking). This option carries a risk of the aneurysm bleeding or causing other problems in the future.

**Surgical treatment**

Some aneurysms can be treated surgically by placing a metal clip across the neck of the aneurysm (narrow part of the aneurysm), this is called ‘clipping’. This procedure is performed under a general anaesthetic and involves opening the skull to reach the aneurysm.

**Other radiological techniques**
More commonly, aneurysms are treated by passing a catheter (fine tube) through the blood vessels and ‘packing’ the aneurysm from the inside with very fine metal coils (coiling). This is more likely to result in a recurrence of the aneurysm requiring further treatment(s). This may also prevent the use of a flow-diverting stent in the future.

How should I prepare for this treatment?

You will need to take tablets to thin the blood for a number of days before the procedure. You will receive advice about this. You should take all your other medications as normal.

You will be brought into hospital the day before or on the morning of your procedure.

The procedure is performed under a general anaesthetic (this means you will be unconscious or ‘asleep’ throughout). Your anaesthetist will talk to you about the anaesthetic, pain relief and what you can expect when having a general anaesthetic. You will need to fast for some hours before your procedure. Your anaesthetist will confirm with you what time you must stop eating and drinking. You should still take all of your medications at the normal times throughout this period with a sip of water.

A member of staff, usually the nurse caring for you, will accompany you to the radiology department.
Asking for your consent

We want to involve you in all the decisions about your care and treatment. If you decide to go ahead with treatment, by law we must ask for your consent and will ask you to sign a consent form. This confirms that you agree to have the procedure and understand what it involves. Staff will explain all the risks, benefits and alternatives before they ask you to sign a consent form. If you are unsure about any aspect of your proposed treatment, please don’t hesitate to speak with a senior member of staff again.

What happens during flow-diverting stent treatment?

The procedure is performed by a neuro-radiologist in an operating theatre located in the radiology department. It usually takes between one and three hours. A dedicated team of radiologists, radiographers, anaesthetists and nurses will be in the operating theatre. They will be monitoring you closely throughout the procedure.

Once the anaesthetic has commenced, the neuroradiologist uses X-ray camera guidance to place a thin, flexible plastic tube (catheter) into the femoral artery. This is the large artery in the groin. The catheter passes through the main artery in the body called the aorta and finally into an artery supplying the brain.

A second smaller catheter is inserted inside the first. The second catheter goes past the ‘neck’ of the aneurysm to the
normal blood vessel on the far side. The collapsed stent is pushed to the tip through the smaller catheter. The smaller catheter is then pulled back to allow the stent to expand in the vessel across the neck of the aneurysm. This usually immediately reduces the amount of blood getting into the aneurysm. Sometimes it is necessary to place two or more stents inside one another to get the best result. Once the radiologists are satisfied with the result, the catheters are removed and the blood vessel in the groin is sealed with a stitch.

What should I expect after this treatment?

After the procedure you will spend some time in the high dependency unit (HDU) before being transferred back to your ward. This unit provides a high level of monitoring.

You can expect to remain in hospital for a minimum of four to five days after the procedure, until you are walking around and feeling back to normal. You should plan to take some time off work, at least a week or two and you should arrange to have someone to stay with when you first return home. Everyone is different and people recover from these procedures at different rates.

It is common to experience headaches in the days or weeks following the procedure. This is related to the aneurysm shrinking. You will be given pain killing drugs to help.
If this headache becomes severe or you experience nausea, vomiting, drowsiness or severe stiffness in your neck go immediately to your nearest Accident and Emergency Department (A & E, Casualty) where a CT scan will be performed.

For any non-urgent questions or concerns you may have following your procedure, please contact the Neurovascular Nurse Specialists.
Where can I get more information?

The Brain and Spine Foundation

Telephone: 0808 808 100
http://www.brainandspine.org.uk/helpline/

UCL Hospitals cannot accept responsibility for information provided by other organisations.
References

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