NHS
University Hospital Southampton
NHS Foundation Trust

Adult hydrocephalus and shunts

Information for patients

Contents

What is hydrocephalus?

Hydrocephalus is a condition in which cerebrospinal fluid (CSF) builds up within the brain. CSF is needed to provide protection for the brain, much like the fluid in the womb protects a growing baby. The brain makes CSF in special fluid-spaces called ventricles. CSF flows through the ventricles and around the brain and is then reabsorbed into the body. Hydrocephalus occurs when there is a blockage which prevents excess CSF from draining away.

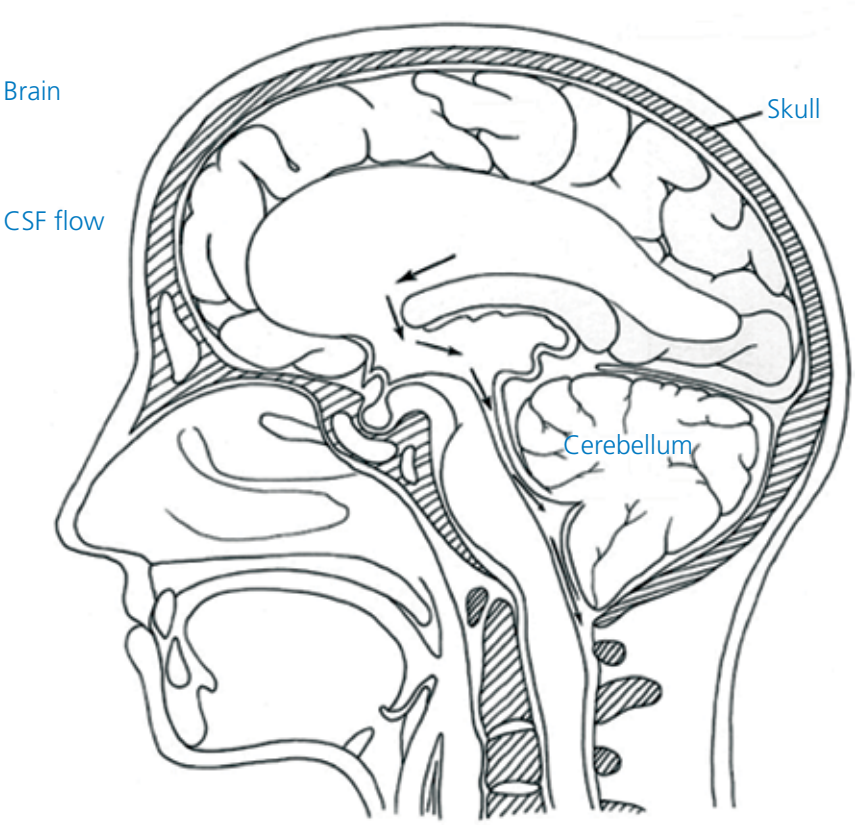

Diagram of the brain showing the normal CSF fluid pathways

What causes hydrocephalus?

There are two main causes of hydrocephalus:

- The fluid pathways may be blocked or narrowed so that fluid cannot flow properly. The main causes of this are either scarring of the fluid pathways or blockage by a tumour.

- Sometimes the fluid collection channels can become blocked and stop working - in a similar manner to how leaves can block a drain. This commonly happens after infection or a haemorrhage (bleed). It also appears to happen in older adults where problems with absorption lead to a condition known as 'normal pressure hydrocephalus'.

What are the symptoms?

Typical symptoms include headaches, nausea and vomiting. Older patients may experience problems with balance, walking difficulties, short-term memory difficulties and urinary incontinence (being unable to control when you pass urine).

However, there is a small group of patients who do not fit into the patterns described above. If this applies to you your doctor will be able to advise you further.

What investigations are required?

CT brain scan

Normally a CT brain scan will be performed. This is a special x-ray based scan that will help determine the best treatment to offer.

MRI brain scan

If more information is required an MRI (magnetic resonance imaging) scan can be done. This is a more detailed scan of the brain that involves an extremely strong magnet and does not involve x-rays. It is a noisy scan which requires you to lie very still while it is being performed.

What are the treatment options?

Your doctors will recommend the best treatment based on the cause of the hydrocephalus and other factors, such as the scan findings. All treatments aim to reduce pressure within the head, either by diverting CSF flow from the brain or by restoring normal flow.

The two main treatment methods are:

- Insertion of a 'shunt'
- Endoscopic third ventriculostomy (see page 8)

Treatment option 1 - Insertion of a 'shunt'

A shunt is a thin tube that is permanently implanted to allow excess fluid to drain away to another part of the body, where it can be absorbed. Depending upon the cause of the hydrocephalus, fluid can either be drained away from the ventricles of the brain (ventricular shunt) or from around the spinal cord in the lower back (lumbar shunt).

Ventricular shunts

There are three main types of ventricular shunt used:

- Ventriculo-peritoneal (VP) shunt - CSF is drained into the abdominal cavity where it is taken back into the bloodstream.
- Ventriculo-atrial (VA) shunt - CSF is drained directly into one of the blood vessels going to the heart.
- Ventriculo-pleural (V-Pleural) shunt - CSF is drained into the space beside the lung where it is taken back into the bloodstream.

Ventricular shunts include a valve that regulates the flow of CSF along it. Two types of valve can be used: one with a fixed pressure setting, or a variable valve. The variable valve allows the setting to be adjusted after surgery (using a special magnet) to change the amount of CSF being drained.

How is the ventricular shunt inserted?

Inserting a ventricular shunt involves an operation under general anaesthetic (medicine given to make you go to sleep) and will include the following stages:

- Usually two cuts to the skin - one in the head, usually above and behind the ear. The second cut is either made in the abdomen (VP shunt), the side of the neck (VA shunt) or the side of the chest (V-pleural shunt).
- A hole is made through the skull and a tube is inserted into the ventricle.
- The shunt is 'tunnelled' under the skin between the two cuts and connected to the tube in the ventricle. The flow of CSF is confirmed before both wounds are closed.

Lumbar shunts

A lumbar shunt involves a tube draining CSF away from around the spinal cord in the lower back. It drains the fluid to the abdominal cavity (most commonly).

- Lumbo-peritoneal (or LP) shunt - CSF is drained into the abdominal cavity where it is taken back into the bloodstream.

This type of shunt tends to drain more fluid when you are sitting or standing and less when you lie down. The shunt tube has a slit-valve at the end of it.

For some patients additional valves are used to help regulate flow.

How is the lumbar shunt inserted?

Inserting a lumber shunt also involves an operation under general anaesthetic. It includes the following stages:

- Two cuts to the skin - one in the lower back over the spine, and the second in either the abdomen (LP shunt), or the side of the chest (L-pleural shunt).
- A lumbar puncture (spinal tap) is performed through the cut in the back.
- The shunt tube is then passed down through the needle into the fluid space around the spine.
- The shunt is then 'tunnelled' under the skin to the other cut, and the flow of CSF along it is confirmed before the other end is inserted and both wounds are then closed.

Treatment option 2 - Endoscopic third ventriculostomy

In some cases of hydrocephalus the brain's internal fluid channels may be blocked, either from birth, or due to a tumour or as a result of a number of other causes. If this is the case, it may be possible to make a new pathway (ventriculostomy) for the CSF. The operation is called an 'endoscopic third ventriculostomy'. It is done with a special fine telescope-tube called a neuro-endoscope that enables the neurosurgeon (specialist doctor) to look inside the ventricles.

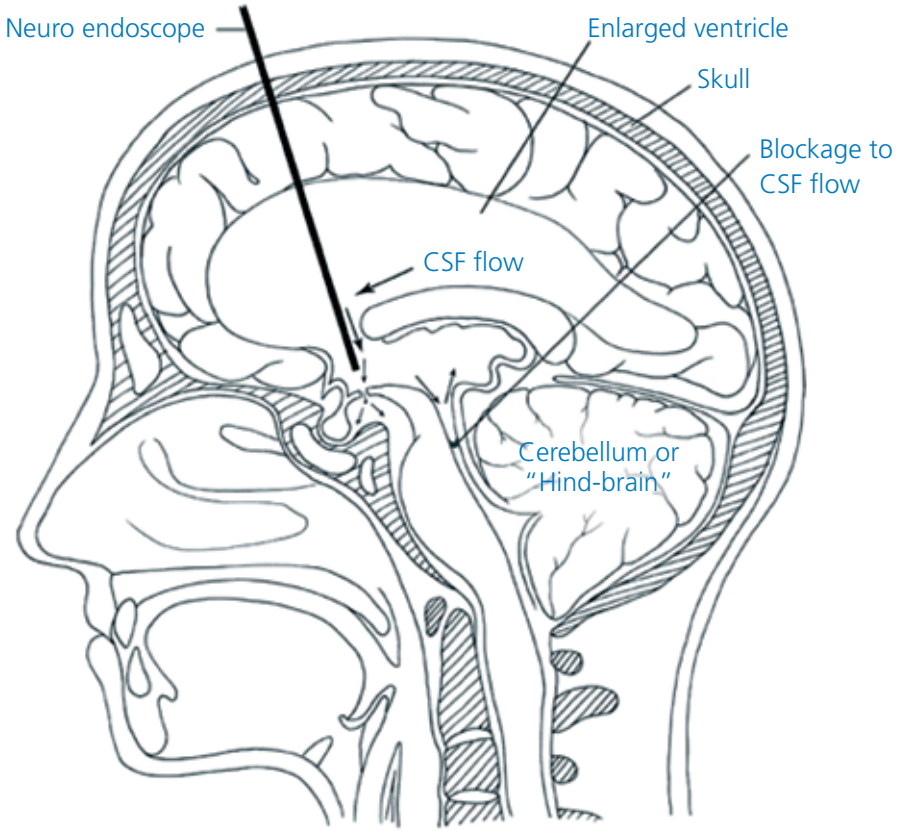

Diagram showing third ventriculostomy with the neuro-endoscope in place and the hole (ventriculostomy) also demonstrated.

What are the advantages of this operation?

The advantage of this operation over a shunt is that it can provide a permanent solution. Shunts can fail over time and need to be replaced. The decision as to whether or not this operation is possible is made by the neurosurgeon following careful examination of your scans. It is important to be clear, however, that even if a scan shows this operation may be possible or should work, we cannot guarantee that it will be successful and a shunt may still be required.

What does the operation involve?

The operation is carried out under general anaesthetic and involves the following steps:

- A 2-3cm cut is made, usually at the top of the head towards the front, behind the hairline. This is most often on the right hand side, but may be made on the left depending on the scan findings.
- A 1-1.5cm hole is made through the skull.
- The neuro-endoscope is inserted and the ventriculostomy (hole) is made.
- Finally, the neurosurgeon checks that the ventriculostomy is fully open before removing the endoscope and finishing the operation.

Follow-up after third ventriculostomy

Some patients who have undergone a third ventriculostomy experience a reoccurrence of their pre-surgery symptoms and an MRI scan shows that the exit hole has closed. If this is the case, the neurosurgeons will consider whether it is possible to re-do a third ventriculostomy or whether to implant a shunt.

What are the risks of treatment?

The specific risks associated with surgery to implant a shunt or carry out an endoscopic third ventriculostomy are as follows:

Infection - Due to the skin being cut, there is a risk of infection. This may be a superficial wound infection. However, it may spread deeper and the shunt itself can get infected. This is discussed below.

Bleeding/bruising - Some bruising may occur around the surgical wounds but may also occur along the path of the shunt. There is always some risk of bleeding inside the brain from the operation as well. This risk is small but if a blood clot occurred it could be potentially serious.

Pain - Some pain may be present along the path of the shunt or from the surgical wounds. This is usually controlled by simple painkillers such as paracetamol. The operations themselves are not particularly painful procedures. Some people may experience headache after a shunt because of a change in the pressure inside their head. This usually settles with fluids, rest and simple painkillers.

Brain injury - The risk of this is extremely small, but nevertheless important to understand. It could be seen in the form of a weakness or paralysis like a stroke and could be temporary or permanent. If something like this were to occur the neurosurgeon would investigate to find out why it has happened and explain this to you.

Fits/epilepsy - With any neurosurgical operation these can occur, simply because an operation has been carried out. Fits are, however, uncommon after shunts or third ventriculostomy surgery. Long-term treatment may or may not be required depending on the circumstances. Due to the small risk of fits after either shunt insertion or endoscopic surgery you will be unable to drive for six months.

Risk to life - With any neurosurgery or procedure under general anaesthetic there is always a risk to life. This is usually extremely small but is partially dependent on your age, weight and general health. It will also depend upon your condition and the surgery you are having.

Consent

We must seek your consent for any procedure or treatment before it can go ahead. Your medical team will explain the risks, benefits and alternatives where relevant before they ask for your consent. If you are unsure about any aspect of the procedure or treatment proposed, please do not hesitate to ask for more information.

After surgery

How do I know if the shunt has blocked?

The signs and symptoms of shunt block may vary depending on the reason for the shunt and how suddenly the blockage occurs. If blockage is slow the symptoms may be gradual. Symptoms may include:

- headaches
- nausea and vomiting
- drowsiness, sleepiness, hard-to-wake
- bulging around the shunt valve
- if you have epilepsy, there may be a change in the number or pattern of seizures
- return of pre-shunt problems
- balance problems or unsteadiness on feet
- worsening memory
- restriction in upgaze/looking downwards constantly

What should I do if I think my shunt is blocked?

If you have concerns about possible shunt block, contact your GP and ask for immediate referral to the on-call neurosurgical registrar at University Hospital Southampton (Southampton General). If you have concerns and cannot contact your GP, go to your nearest hospital emergency department (ED). Explain you have a shunt and your concerns over possible shunt block.

If you are becoming drowsy and you or your carer have concerns about your condition and you cannot get to hospital quickly, call 999 for an ambulance. The doctors at the emergency department you are taken to will be able to assess you and contact us as necessary.

What happens if the shunt becomes infected?

Symptoms of a shunt infection include:

- feeling unwell
- high temperature
- neck stiffness
- painful eyes
- clear fluid (CSF) leaking from the wound
- the surgical wound may look swollen and/or broken down and part of the shunt may be visible

The risk of infection is highest during the first 30 days after surgery. If the shunt is found to be infected an operation to remove it will be required. During this operation an external drainage system, called an external ventricular drain is often inserted. This allows the CSF to continue to be drained and also allows antibiotics to be given through it if required. Once the infection has been cleared, a new shunt is inserted.

Frequently asked questions

How long will I have to stay in hospital?

You will usually be discharged within one to three days of surgery. Initially you will need to plan to have two to four weeks off work to recover from the operation.

Will the shunt be visible after the operation?

A bump can be felt under the skin surface behind the ear. This is due to the valve which is an essential part of the shunt system. It is approximately 0.5cm in height, 2-3cm long and 1cm wide. However, it is not usually visible due to the overlying hair. You may be able to feel the shunt under the skin all the way from the head to the abdomen.

Does a shunt last forever?

As a man-made device, a shunt will not last forever. It can last from a few days or weeks to many years. In adults we have seen them last for as long as 35 years. Over time the plastic tube can corrode and disintegrate, requiring a new shunt to be inserted. The valve itself can also block and so can the tube that is in the ventricle of the brain itself.

Will it affect me at work?

The shunt is under the skin and as such there is usually only minimal external evidence that it is there. The shunt itself will not affect academic performance or achievement. As mentioned above, it is usual to have two to four weeks off work to recover from shunt surgery, but this will depend on your occupation.

Can I drive after having the operation?

No, the current DVLA guidance is that you must not drive for six months after a ventricular shunt or third ventriculostomy operation. You must inform them that you have been in hospital and had your operation. They will then contact us for details and inform you when you can drive again.

Can I fly?
There are no reasons why you should not travel by air after treatment for hydrocephalus. There are no cases that we know of where this has been harmful. However, if a shunt has been inserted that has an adjustable valve, we usually recommend avoiding electromagnetic scanning devices such as handheld security scanners because they may change the shunt valve setting.

Are there any limitations on sports?
The only sport we absolutely ban is boxing due to the deliberate repetitive head injury. We also urge caution over scuba diving. This is because of the risk of serious harm should there be a problem whilst deep underwater. Otherwise, there are no reasons why you can't participate in all other sports including swimming and football, though care is advised to avoid repetitive head injury.

Are antibiotics needed for dental treatment?
We do not usually recommend or require this.

What if I have a head injury?
Normal post-head injury procedures should be followed and you should go to the local emergency department if you have concerns. It would be important to mention to the doctors that you have a shunt, however, as this will help them assess and treat you.

Who should I contact if I have any queries?
For general enquiries you can contact the Neurological Regional Transfer Unit at Southampton General Hospital on **023 8120 4844**.

If you think the problem is more serious, please contact your GP or go to your nearest emergency department.

If you are becoming drowsy, call an ambulance or ensure someone takes you to the nearest emergency department.

The doctors there will be able to assess you and contact us as necessary.

Affix patient label

The above named person has a Ventriculo-peritoneal / Ventriculo-atrial / Ventriculo-pleural / Lumbo-peritoneal / Lumbo-pleural shunt for:

.....

.....

Shunt insertion date: .....

Valve manufacturer & Serial No: .....

Valve pressure setting: .....

Fixed/Programmable: .....

If you have concerns, please contact the Neurological Regional Transfer Unit through the University Hospital Southampton switchboard on **023 8077 7222**

Please do not leave a message on an answering machine in case there is a delay in picking it up.

If the patient is drowsy or there are other changes in their condition that are causing concern, please take them to the nearest emergency department and the doctors there will be able to assess them and contact us as required.

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Main switchboard: **023 8077 7222**

Thank you to Sheffield Teaching Hospital NHS Foundation Trust for the use of their patient information leaflet upon which this publication is based.

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For help preparing for your visit, arranging an interpreter or accessing the hospital, please visit **www.uhs.nhs.uk/additionalsupport**

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