

### Introduction

Build up of fluid in the brain is called “hydrocephalus”. This can occur at birth or later in life.

If not treated, hydrocephalus can lead to headaches and other symptoms, severe brain damage, and even death. Doctors usually recommend surgery for hydrocephalus. If your doctor recommends surgery for you, the decision whether or not to have surgery is also yours.



This reference summary will help you understand better the benefits and risks of this surgery.

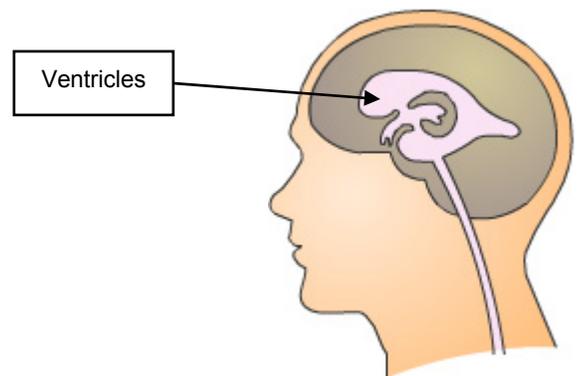
### Anatomy

Inside the brain are spaces filled with a fluid. These spaces are called “ventricles”.

The fluid in and around the brain is called “cerebrospinal fluid” or CSF. This fluid helps protect the brain and spinal cord from outer shocks by acting like a shock absorber.

The CFS fluid is made by special glands in the ventricles.

The fluid circulates in the ventricles, flows down around the spinal cord, and flows around the brain. The fluid is then absorbed back into the blood stream by special drains.



Your body makes and absorbs about 12 ounces of this fluid every day. If the fluid is not absorbed as quickly as it is made, CSF builds up in the brain. This causes the ventricles to grow in size and press on the brain.

## Symptoms and Their Causes

The symptoms of hydrocephalus include:

- Increased head size and bulging soft spot in infants
- Headache
- Sleepiness
- Confusion and memory problems
- Inability to walk
- Incontinence



Hydrocephalus may happen at birth or may be caused later in life by bleeding in the brain, brain tumors, or other factors. If not treated, hydrocephalus can lead to severe brain damage and even death.

## Alternative Treatments

Some cases of hydrocephalus can be treated by opening one of the ventricles to the surface of the brain. This does not require the placement of a shunt. Your surgeon will determine whether this alternative procedure or a VP shunt is best for you.

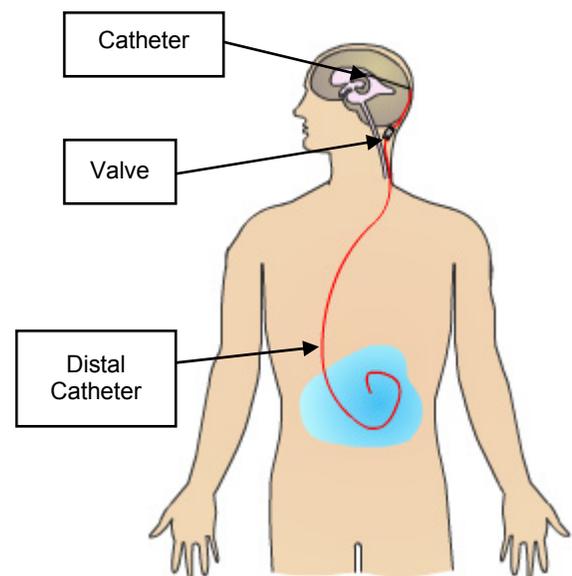
## Surgical Treatment

The purpose of this operation called ventriculo-peritoneal, or VP shunting, is to divert the excess fluid from the brain and put it in the abdomen, where it is absorbed.

The shunt consists of three main parts:

1. The ventricular catheter
2. The valve
3. The distal catheter

The ventricular catheter is placed in the front, back, or side of the head. This catheter has holes at the end to allow the CSF to flow through it. It is then connected to the valve.



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The valve allows the CSF to flow to the abdomen, but does not allow it to return to the brain. This valve is connected to the distal catheter in the abdomen. This catheter has holes at the end of it to allow the fluid to flow into the abdomen.

The whole shunt is placed under the skin and none of it is exposed to the outside of the body.

## **Risks and Complications**

This operation is very safe. There are, however, several possible risks and complications. These are very unlikely but possible. You need to know about them just in case they happen. By being informed, you may be able to help your doctor detect complications early.

The risks and complications include those related to anesthesia and those related to any type of surgery.

Risks of general anesthesia include nausea, vomiting, urinary retention, cut lips, chipped teeth, sore throat, and headache. More serious risks of general anesthesia include heart attacks, strokes, and pneumonia. Your anesthesiologist will discuss these risks with you and ask you if you are allergic to certain medications.



Blood clots in the legs can occur due to inactivity during and after the surgery. These usually show up a few days after surgery. They cause the leg to swell and hurt. Blood clots can become dislodged from the leg and go to the lungs where they will cause shortness of breath, chest pain and possibly death. It is extremely important to let your doctors know if any of these symptoms occur. Sometimes the shortness of breath can happen without warning.

Getting out of bed shortly after surgery may help decrease the risk of blood clots in the legs.

Some of the risks are seen in any type of surgery. These include:

- Infection, deep or at the skin level, including spinal meningitis.
- Bleeding.
- Skin scars that may be painful or ugly.

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Other risks and complications are related specifically to this surgery and to the fact a mechanical device is placed in the body. These again are unlikely. However, it is important to know about them.

Risks specific to this surgery are rare, but they include the risk of blood clots in the brain and damage to the abdomen and lungs. Blood clots in the brain can cause strokes and possible permanent brain damage, such as weakness, strokes, paralysis, blindness, and, possibly death. They may also require another operation to remove the clot.

Weeks and possibly months after the shunt is placed, blood clots could develop in the brain because of rapid shrinkage of the ventricles. Drainage and possible clamping of the shunt can remedy this problem.

Seizures are also possible after a shunt operation because of the catheter irritating the brain.

A shunt is a mechanical device that may develop problems. The holes in the catheters can get clogged. If a part does not work properly, it can be changed. The valve can fail and quit working, or it may over-drain fluid. Another operation may then be needed.



Infection can be detected by removing CSF fluid via a special procedure called a “shunt tap” and testing the fluid for infection. If the shunt becomes infected, antibiotics will be given and the shunt replaced.

Complications of shunt malfunction can be serious and could contribute to significant mental retardation in children. A part may get out of place. For example, the abdominal catheter can pull out from the abdomen and curl under the skin. If this happens, the part can be returned to the right place during another surgery.

In very small infants, there is a rare chance of the shunt tubing or valve eroding through the thin skin. If this happens, the shunt may need to be replaced.

Very rarely, the catheter in the belly could perforate or make a hole in the stomach or intestines, resulting in infection and malfunction.

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Because of these potential complications of shunt placement, patients should call their doctor in case of worsening conditions, such as headache, sleepiness, fever, abdominal pain, disorientation, nausea, vomiting, and any other unusual symptoms.

Shunt failures and infections are not likely, but they should always be checked out. Patients with shunts should be checked periodically by their neurosurgeon. This is especially true of children. As a child grows, the tubing may need to be lengthened.



### **After the Surgery**

After the surgery, you will probably spend a day or two in the hospital. How long you stay depends on how well you are doing. The nurses will carefully watch you. This involves repeated checking of your neurological status, as well as close watch over your heart and blood pressure. Later you may receive physical therapy, occupational therapy, and other therapies to aid your recovery.

Whether or not you will be able to resume your usual activities depends on how well you are doing at the time of your follow-up. Your doctor will tell you how long it will take before you are healed and when you can go back to work. This depends on your age, type of work, medical condition, as well as other factors.

### **Summary**

Build up of fluid in the brain, or hydrocephalus, is a serious condition that can lead to severe brain damage and even death.

Surgery for hydrocephalus can relieve these symptoms and can even be life saving.

This surgery is a relatively safe procedure. However, as you have learned, complications may still happen. Knowing about them will help you detect them early if they happen.



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