

Introduction

Build up of fluid in the brain is called “hydrocephalus”. This can occur at birth or later in life. This reference summary deals with hydrocephalus seen in children. If not treated, hydrocephalus can lead to headaches and other symptoms, severe brain damage, and even death.

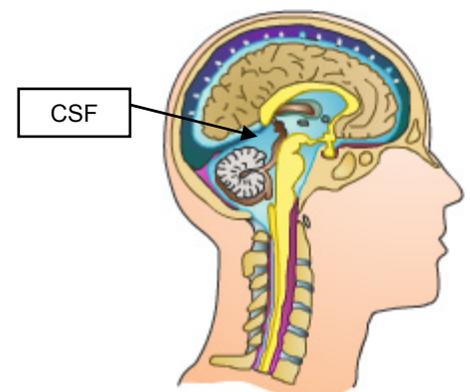
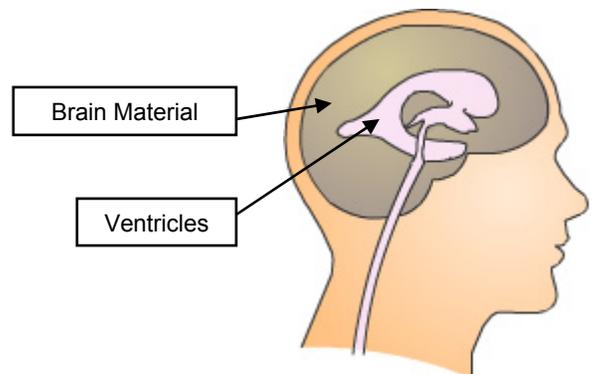
Doctors usually recommend surgery for hydrocephalus. If your doctor recommends surgery for your child, they will discuss the surgery with you. This reference summary helps you better understand the benefits and risks of this surgery.

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 by acting like a shock absorber.

The CSF fluid is made by specialized tissue in the ventricles. The fluid circulates in the ventricles, flows down and around the spinal cord, and flows around the brain. The fluid is then absorbed back into the bloodstream by special drains. The 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.



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To the right is an MRI of a normal brain. Below it is an MRI of a patient with hydrocephalus. You can see the enlarged ventricles from hydrocephalus.

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

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.

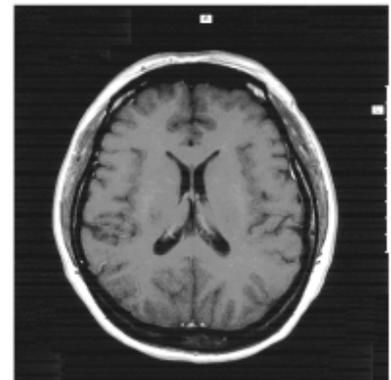
Your surgeon will determine whether this alternative procedure or a VP shunt is best for you.

Surgical Treatment

The purpose of this operation called ventriculo-peritoneal, or VP shunt, is to redirect the excess fluid from the brain into the abdomen, where it is absorbed.

The shunt consists of three main parts:

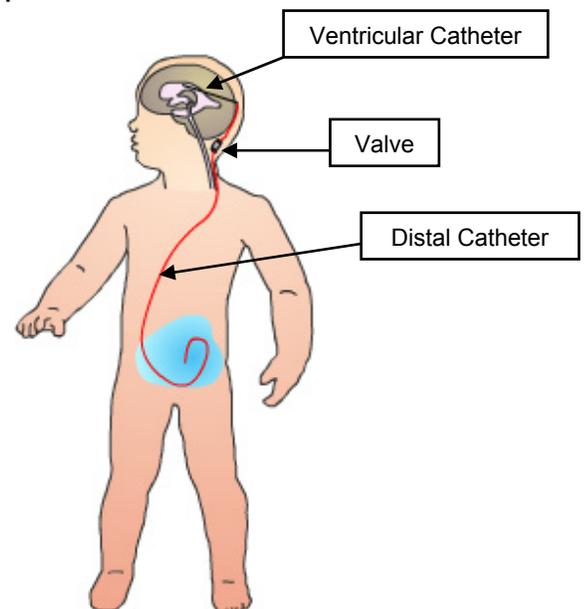
- The ventricular catheter
- The valve
- The distal catheter



MRI of Normal Brain



MRI of Brain with Hydrocephalus



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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. Then it is connected to the valve. The valve allows the CSF to flow to the abdomen, but does not allow it to return to the brain.

Some valves can be programmed through the skin using special magnets and computers. They can be programmed to let more or less CSF drain depending on the patient's condition. Patients who have programmable valves need to have them reprogrammed every time they have an MRI.

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. You need to know about them just in case they happen.

The risks and complications include those related to anesthesia and those related to any type of surgery. Risks related to anesthesia will be discussed with you in detail by your anesthesiologist. These risks are very rare in children.



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

- Infection, deep or at the skin level, including spinal meningitis.
- Bleeding.
- Skin scars.

Other risks and complications are related specifically to this surgery and to the fact that 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.



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Blood clots in the brain can cause strokes and possible permanent brain damage. 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. 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. 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 abdomen could make a hole in the stomach or intestines, resulting in infection and malfunction.

Because of these potential complications of shunt placement, patients or their parents/legal guardians 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 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, the patient will probably spend a few days in the hospital. The length of stay depends on how well the patient is doing. They will stay in the Pediatric Intensive Care Unit for the first day or two so they can be watched closely by the nurses and doctors.

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The patient may receive physical therapy, occupational therapy, and other therapies to aid in the recovery. Remember if your child had a programmable valve placed it may need to be reprogrammed every time he or she has an MRI. Make sure to ask your doctor about the type of valve placed.

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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