

# Hydrocephalus

Hydrocephalus is a condition in which excess fluid builds up within the brain. Hydrocephalus is not a single disease—rather, it results from problems with the normal cerebrospinal fluid flowing within and around the brain and spinal cord. Excess fluid can cause increased pressure within the brain. This can damage the brain, leading to developmental disabilities, reduced intelligence, and other complications. Prompt diagnosis and treatment are essential to lessen the impact of hydrocephalus.

## What is hydrocephalus?

Hydrocephalus (“hydro” = water, “cephalus” = head) is excessive buildup of cerebrospinal fluid (CSF) within the skull. The CSF is a normally clear fluid that carries important chemicals to the brain, removes wastes, and helps cushion the brain.

Hydrocephalus has many possible causes. Often it is a congenital condition (present from birth), but it can develop in older children and adults as well. Any condition that interferes with the normal flow of CSF can cause hydrocephalus.

The excess fluid causes the normal spaces (ventricles) within the brain to become too large. In infants, the first sign of hydrocephalus is usually enlargement or too rapid growth of the head. This happens because a baby’s growing skull can still easily increase in size. Since the skull cannot expand in older children, the first symptoms of excessive pressure in these children may include vomiting, vision changes, or balance problems.

Treatment to remove the excess CSF must begin as soon as possible. This is usually done by placing a device called a shunt, which drains the fluid from the brain. These shunts carry a risk of infection and other complications. Children with hydrocephalus may develop mental and physical disabilities. These risks are related to the cause and severity of the disease.

## What does it look like?

*In infants:*

- The first sign of hydrocephalus is that the baby’s head is growing faster than normal and may appear big. The doctor often discovers this when the head is measured at well baby visits.
- The “soft spot” (fontanelle) on top of your baby’s head may be wide or bulging. The forehead may be wider than normal.
- Your baby’s normal development, such as rolling over or crawling, may be slow.

- Many other symptoms are possible, including vomiting, sleepiness, and fussiness.

*In older children:*

- Enlargement of the head cannot occur.
- Symptoms are more general, including mood changes, extreme tiredness, poor appetite, and vomiting.
- Headaches.
- Over time, personality changes, falling grades, doing poorly at school.
- Balance problems, loss of control over leg muscles.

Symptoms of hydrocephalus vary a lot, depending on cause, severity, and other factors. Your child may have some, all, or none of these symptoms.

## What causes hydrocephalus?

Anything that interferes with the normal cycle of cerebrospinal fluid:

- Some patients have blockage of the normal flow of CSF within the brain. This is called “obstructive” hydrocephalus and is most often caused by a defect or abnormality that the baby was born with (congenital).
- Other patients have problems with the normal absorption of CSF within the brain. This is called “non-obstructive” hydrocephalus. It is most commonly caused by bleeding inside the brain (intraventricular hemorrhage) in a premature infant.
- Others causes result from later illness or injury, such as meningitis, head injury, or brain tumors.

## What are some possible complications of hydrocephalus?

- Children with hydrocephalus often have some degree of mental and physical disability. These symptoms are affected by the cause and severity of the hydrocephalus, other birth defects or injuries, and how quickly treatment is started to relieve pressure on the brain.
- The shunts used to treat hydrocephalus carry a risk of infection and other serious complications. Patients with shunts need close medical follow-up.

## What puts your child at risk of hydrocephalus?

- Hydrocephalus is relatively common; it may affect 1 out of 500 infants at birth.
- Some of the abnormalities that cause hydrocephalus are genetic (inherited) disorders.

- Premature infants are at higher risk, especially those with bleeding inside the brain (intraventricular hemorrhage).
- Hydrocephalus may occur after other diseases involving the brain and nervous system, such as meningitis, head injuries, or brain tumors.

### How is hydrocephalus diagnosed?

- In infants, hydrocephalus is usually recognized by the abnormal enlargement of the baby's head. Infants with hydrocephalus may be diagnosed before birth by routine ultrasound scans.
- In older children, because the head cannot expand, hydrocephalus may be more difficult to recognize. However, it may be suspected based on your child's symptoms and what the doctor finds on physical examination.
- Once the problem is suspected, the doctor will recommend tests, such as ultrasound, magnetic resonance imaging (MRI), or computed tomography (CT), that can take pictures of the brain. These tests will confirm the excess fluid buildup in your child's brain. They will also help to determine the cause and severity of your child's hydrocephalus.

### How is hydrocephalus treated?

*Shunt placement.* The main treatment is placement of a device called a *shunt*. An operation is required to place the shunt system.

- The shunt is basically a long tube with one end placed in the space inside the brain where fluid is building up (called the *ventricle*). The other end of the tube is placed in the abdominal space (called the *peritoneum*). This device is called a "ventriculoperitoneal (VP) shunt."
- The VP shunt works by draining excess fluid from the brain into the abdomen, where it is harmlessly absorbed. When working properly, shunts are very effective in reducing the pressure on your child's brain.
- Shunts are complex devices that are prone to several types of problems. They may break down or become blocked, interrupting fluid drainage. Another potentially serious problem is infection, causing symptoms of fever, sore neck, and redness of the skin over the shunt.

 *All of these problems are emergencies requiring immediate medical attention.*

*Follow-up care.* Hydrocephalus is a serious and complex medical condition. Your child will need close medical follow-up. A surgeon specializing in the brain (a neurosurgeon) will be the doctor in charge of placing and taking care of the VP shunt. Our office will play an important role in providing follow-up care and in deciding when you need to see the neurosurgeon.

- Many children with hydrocephalus need special education or other special services to address their mental and/or physical disabilities. Early intervention should start as soon as your child's disability is diagnosed.
- Having a child with hydrocephalus can be very stressful for your family. Counseling, support groups, and other forms of therapy may be helpful.
- With close medical follow-up and other necessary services or support, many children with hydrocephalus go on to live normal, active lives.

### When should I call your office?

Learning to recognize the warning signs of shunt problems and complications is an important part of caring for a child with hydrocephalus. Get medical attention immediately if your child develops any of the following:

- Rapid head enlargement (in an infant), vomiting, sleepiness, behavior changes.
- Severe headache or new headache.
- Signs of shunt infection: fever, sore neck or shoulders, redness of the skin over the shunt.
- Any change in vision.
- Any neurologic abnormality (for example, weakness or loss of muscle control, loss of bladder control).

### Where can I get more information?

The National Institute of Neurological Disorders and Stroke. Information and publications are available on the Internet at [www.ninds.nih.gov](http://www.ninds.nih.gov).