



## HYDROCEPHALUS AND SHUNTS IN CHILDREN

### WHAT IS HYDROCEPHALUS?

The term hydrocephalus comes from two words: “hydro” meaning water, and “cephalus” referring to the head. Hydrocephalus is a condition where fluid known as cerebrospinal fluid (CSF) builds up in the ventricles (fluid containing space) of the brain. CSF is important because it:

- Performs as a “shock absorber” for the brain and spinal cord.
- Acts as a vehicle for delivering nutrients to the brain and removing waste.
- Flows between the head and spine to regulate changes in pressure within the brain.

Hydrocephalus can occur at any age, but is most common in infants and adults age 60 and older. Brain injuries can also cause hydrocephalus to develop. According to the National Institute of Neurological Disorders and Stroke, hydrocephalus is believed to affect approximately one in every 500 children. The majority of these cases are often diagnosed before birth, at the time of delivery, or in early childhood.

### COMMON CAUSES OF HYDROCEPHALUS

Spina Bifida (spinal defect)  
Encephalocele (brain hernia)  
Bleeding within the brain  
Brain tumors  
Head injuries  
Premature births  
Meningitis  
Infections  
Blockage of CSF fluid

### SYMPTOMS OF HYDROCEPHALUS IN INFANTS

Abnormal enlargement of the head  
Soft spot is tense and bulging  
Thin scalp  
Separated bones in baby’s head  
Prominent scalp veins  
Vomiting  
Irritability  
Downward deviation of eyes  
Seizures  
Poor appetite

## **SYMPTOMS OF HYDROCEPHALUS IN TODDLERS/CHILDREN**

Abnormal enlargement of head	Sleepiness
Headache	Delayed walking/talking
Nausea	Poor coordination
Vomiting	Change in personality
Fever	Inability to concentrate
Blurred/double vision	Seizures
Unstable balance	Poor appetite
Irritability	Difficulty in waking up/staying awake

## **DIAGNOSING HYDROCEPHALUS**

Before your doctor can recommend a course of treatment, he or she will:

- Review your child's medical history, and perform a physical examination.
- Perform a complete neurological examination including additional tests if necessary.
- Ask specific questions to determine if symptoms are caused by hydrocephalus.

Additional tests may include: an ultrasound of the head (if the child is an infant), computed technology (CT scan), or magnetic resonance imaging (MRI). The tests may reveal useful information about the severity of the condition and its likely cause.

## **WHEN IS SURGERY NECESSARY?**

Hydrocephalus can be treated in a variety of ways. The problem area may be treated directly (by removing the cause of the CSF blockage), or indirectly by sending the fluid to somewhere else in the body. Indirect treatment is preformed by inserting a device known as a shunt. The shunt is a tube that carries the fluid away from the brain, usually to the abdomen, also known as the peritoneal cavity of the body.

In some cases, two procedures are performed. First, to carry the fluid away from the brain, a tube known as a shunt is used. Another procedure may be required to remove the cause of the blockage (for example, removing a brain tumor). Once the shunt is inserted, the shunt system usually remains in place for the duration of the child's life. The shunt continuously sends fluid away from the brain, thereby keeping the pressures in the brain within normal limits. An alternative operation called endoscopic third ventriculostomy utilizes a tiny camera to look inside the ventricles, allowing the surgeon to create a new pathway through which CSF can flow.

## **RECOVERY**

The child's neurological function will be evaluated after surgery. If any neurological problems still exist, rehabilitation may be required to further the child's improvement. However, recovery may be limited by the extent of the damage already caused by the hydrocephalus and by the brain's ability to heal.



An implanted shunt system is used to redirect fluid from one part of the body to another. The shunt contains catheters, a valve and reservoir.

Hydrocephalus is an ongoing condition. Long-term follow-up by a doctor is required. Follow-up tests including CT scans, MRIs and x-rays are helpful in determining if the shunt is working properly. Do not hesitate to contact your physician if your child experiences symptoms of shunt malfunction.

## **SIGNS OF SHUNT MALFUNCTION**

- Redness, tenderness, pain or swelling of the skin along the length of the tube or incision
- Irritability or drowsiness
- Nausea, vomiting, headache or double vision
- Fever
- Abdominal pain
- Return of the symptoms the child was having before shunt placement

## **WHAT CAN CAUSE A SHUNT TO MALFUNCTION?**

Shunt malfunction or shunt failure may occur. The valve can become clogged or the pressure in the shunt may not match the needs of the patient, requiring additional surgery. In the event of an infection, antibiotic therapy may be needed. Fortunately, most complications can be dealt with successfully. Do not hesitate to see your child's physician if you think your child may be experiencing complications with his or her shunt.

## **PROGNOSIS**

The prognosis of hydrocephalus depends on the cause, the extent of the symptoms, and the timeliness of the diagnosis and treatment. Some patients show dramatic improvement with treatment while others do not. Headaches may disappear almost completely if the symptoms were related to an increase in pressure in the brain.

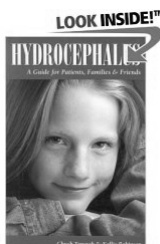
In general, the earlier hydrocephalus is diagnosed, the better the chance for successful treatment. The longer the symptoms have been present, the less likely it is that treatment will be successful. Unfortunately, there is no way to accurately predict how successful surgery will be for each child. Some children will improve dramatically, while other children will reach a plateau or decline after a few months.

## **RESOURCES**

### **Websites:**

Hydrocephalus Association: [www.hydroassoc.org](http://www.hydroassoc.org)  
Hydrocephalus Foundation: [www.hydrocephalus.org](http://www.hydrocephalus.org)  
Hope for Kids with Hydrocephalus: [www.hydro-kids.com](http://www.hydro-kids.com)

### **Books for Children:**



Hydrocephalus: A Guide for Patients, Families and Friends by  
Chuck Toporek & Kellie Robinson

All About Me (and my shunt) by Terri Rice Bellush



**SHUNT INFORMATION:**

Shunt placement date: \_\_\_\_\_

Type of Shunt: \_\_\_\_\_

Magnet Sensitive Shunt: YES or NO

Setting of Shunt: \_\_\_\_\_

Surgeon's Name: \_\_\_\_\_

Surgeon's Phone Number: \_\_\_\_\_

For further questions regarding hydrocephalus or shunts please call the surgeon's office that originally placed the shunt. If after hours, weekends, or holidays; call the UVA Hospital Operator at (434) 924-0000 and ask for the Neurosurgeon Resident on-call.

Resources: UVA Department of Neurosurgery  
[www.neurosurgerytoday.org](http://www.neurosurgerytoday.org)