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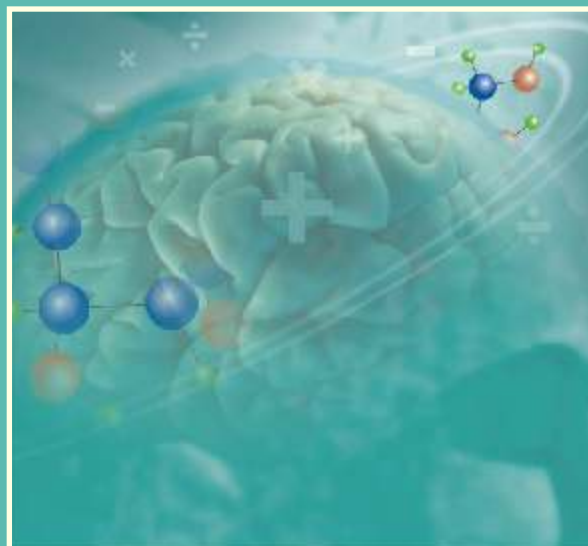
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# Hydrocephalus



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## What is Hydrocephalus ?

It is an excessive accumulation of fluid in the head. The fluid is called Cerebrospinal Fluid commonly referred to as CSF. The CSF is located and produced within cavities of brain called ventricles. It acts as a cushion for the delicate brain and spinal cord tissue, protects them from injuries and maintains proper balance of the nutrients around the central nervous system. Normally , most of the CSF produced on a daily basis is absorbed by the bloodstream. Everyday our body produces a certain amount of CSF and the same amount is absorbed in the brain. In case of an imbalance, an excessive amount of CSF fluid builds up resulting in the condition known as Hydrocephalus.

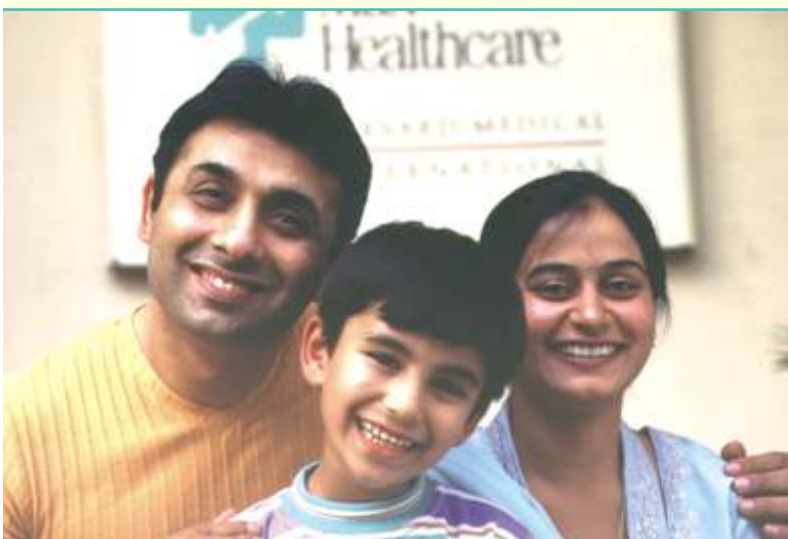


## Causes of Hydrocephalus :

It may be caused by one or more of the following :

- Interference with normal CSF flow due to an obstruction or blockage in the CSF fluid pathways
- Over production of CSF
- Under absorption of CSF into the bloodstream

In most cases the circumstances contributing to Hydrocephalus are beyond our control.



## Glossary

1. **Acquired Hydrocephalus** – Hydrocephalus occurring after birth.
2. **Atrium** – One of the two upper chambers of the heart.
3. **Catheter** – A silicon tube used to divert and drain CSF.
4. **Cerebrospinal Fluid (CSF)** – The watery fluid bathing the brain and the spinal cord.
5. **Communicating Hydrocephalus** – Hydrocephalus caused by an over production or reduced absorption of CSF in the presence of unobstructed ventricular pathways.
6. **Congenital Hydrocephalus** – Hydrocephalus caused by conditions existing at birth.
7. **CSF** – see Cerebrospinal Fluid.
8. **Hydrocephalus** – A condition in which an increased amount of CSF exists in the ventricles and along the CSF pathways. This condition may occur when the rate of CSF production exceeds the rate of absorption, or when pathways of CSF flow are blocked. The result is excess fluid and pressure in the skull.
9. **Intra-cranial Pressure** – Pressure within the skull.
10. **Meningitis** – An infection of the protective membranes covering the spinal cord.
11. **Non communicating Hydrocephalus** – Hydrocephalus caused by an obstruction in the ventricles or along the CSF pathway, causing a backup of fluid into the brain.
12. **Peritoneal Cavity** – The cavity containing the abdominal organs; the belly.
13. **Shunt (n)** – An implanted system used to direct fluid from one part of the body to another. A shunt usually contains catheters, valve and reservoir.
14. **Skull** – The bony structure surrounding the brain.
15. **To shunt (v)** – To divert fluid from one part of the body to another.
16. **Valve** – A one way pressure or flow resistance device used to control the drainage of excess fluid from the brain.
17. **Ventricle** – One of the four cavities found within the brain where CSF can be accessed.

*This is only for the purpose of information and can not be substituted for medical advice.*

*In case of a query, discuss it with your doctor.*

*Content : Courtesy Codman.*

## Management of Hydrocephalus :

- A surgical procedure may be performed to divert the CSF from the ventricles to either the abdominal cavity or to a chamber in the heart known as the right atrium.
- By removing the CSF from the brain, the pressure in the skull may return to normal.
- To remove the CSF the surgeon implants a flexible tube with a valve mechanism called Shunt System. A shunt may help control the Hydrocephalus, but is not a cure.

## Surgical Procedures :

- The surgical procedure to implant a shunt system is relatively short.
- The procedure is performed in the operating room under sterile conditions using general anaesthesia.
- A neurosurgeon, a doctor specially trained to operate on the brain, performs the operation.
- An incision is made on the scalp and a small hole is made in the skull to allow the ventricular catheter or tube to be placed in the ventricles.
- This allows the CSF to drain away from the brain.
- Another incision is made in the abdomen, and the valve unit, and associated tubing is passed under the skin between the scalp and the abdominal incision.
- The surgeon connects the tubing and valve unit to the ventricular catheter and then places (inserts) the end of the tube or peritoneal catheter into the abdominal cavity.
- Alternatively, if the drainage tube or catheter is to be placed in the heart, the surgeon will introduce the tube through an incision in the

neck and pass the tube through various blood vessels until the catheter or tube is positioned in the right atrium of the heart.

- Once the shunt system is in place, the one-way valve will automatically open to drain excess CSF whenever the pressure in the skull exceeds the opening pressure of the valve.

## Complications and Revisions :

Patients or their parents also must be alert for the signs and symptoms resulting from shunt complications. The major complications of shunting are Obstructions, Infection and Over Drainage.

### Obstruction

When a shunt malfunction occurs it is usually due to a partial or complete blockage of the system. The blockage can occur anywhere in the tubing or the valve and prevent the CSF from draining properly. If not corrected, this will cause Hydrocephalus Symptoms.

### Infection

A shunt infection usually is caused by the patient's own bacterial organisms, and is not acquired from exposure to other people. Infection should be suspected if there is any unusual redness or swelling of the wounds or along the course of the shunt system.

### Over Drainage

Over drainage is caused by too much CSF being removed from the ventricles. It causes the ventricles to decrease in size to a point where the brain may pull away from the skull. This may cause bleeding and require further surgery.

Other complications which can lead to the return of the Hydrocephalus symptoms include under drainage, disconnection of the tubing, and mechanical failure of the valve. If any symptoms occur or you suspect any complications, contact your doctor immediately.

## Follow up :

Generally, the patients with an implanted shunt system are not restricted in their daily activities, except those involving great physical exertion.

The doctor will discuss with you any restrictions that may be advisable.

Most patients with Hydrocephalus can look forward to a normal future. Shunts are expected to perform reliably over a long period of time. However, because Hydrocephalus is an on going condition,



patients do require long term follow up care by a doctor. Having regular medical checkups at intervals recommended by the neurosurgeon is sensible. Occasionally, patients with shunt systems require revision. A revision is a surgical procedure to modify, repair or replace a shunt system due to a complication or changing patient conditions.

Regular follow up visit will help the neurosurgeon to identify any subtle changes that may be indicative of a shunt problem. Patient and family members should become familiar with the signs and symptoms of shunt malfunction as described below.

INFANTS	TODDLERS	CHILDREN AND ADULTS
Enlargement of the baby's head	Head Enlargement	Fever
Fontanel is full and tense when the infant is upright and quiet	Fever	Vomiting
Prominent scalp veins	Vomiting	Headache
Swelling or redness along the shunt track	Headache	Vision problem
Fever	Irritability and / or Sleepiness	Irritability and / or Tiredness
Vomiting	Swelling or redness along the shunt track	Personality change
Sleepiness	A loss of previous ability (sensory motor function)	Loss of coordination or balance
Downward deviation of the eyes	Seizures	Seizures
Seizures		Difficulty in waking up or staying awake
		Decline in academic performance
		Swelling or redness along the shunt track (infrequent)

\*This list of symptoms is for your reference only, and is not a diagnostic aid. If you are in doubt of your child's or your own medical condition, consult a physician immediately.

## Types of Hydrocephalus :

There are two types of Hydrocephalus

- 1. Communicating Hydrocephalus :**  
It is caused by the over production or under absorption of CSF.
- 2. Non-communicating or Obstructive Hydrocephalus :** It is caused by a blockage of the CSF pathways.



Hydrocephalus is further termed as :

**Congenital** - If present before or since birth.

**Acquired** - Developed after birth.

A variety of causes can contribute to Acquired Hydrocephalus. Some are Head injuries, Tumours and Meningitis.

## Symptoms of Uncontrolled Hydrocephalus :

- When too much CSF exists within the brain, the pressure within the skull increases causing symptoms such as Headache, Nausea, Vomiting, Sleepiness, Failing Mental Function, Blurred Vision and Loss of Coordination.
- In infants the skull bones are not completely formed and sutures are not closed, so the increased amount of fluid may cause the skull to increase in size (visual sign), but is only noticeable in infants and new-borns.
- Usually, Hydrocephalus causes the ventricles of the brain to enlarge due to increased CSF within the skull.

If a person exhibits symptoms of Hydrocephalus, a physician may perform several tests to confirm if Hydrocephalus exists or not.

Some Diagnostic Tools are :

- **Ultrasound** - A device that uses sound waves to outline the structures within the skulls.
- **CT Scan (Computerised Tomography)** - A technique that uses X-rays to outline the size of the ventricles.
- **MRI (Magnetic Resonance Imaging)** - A technique that uses radio signals and a magnet to form images of the brain so that the ventricles can be visualized.
- **CSF Flow Studies** - Using dyes or other materials to trace the path of CSF.
- **Neuropsychological Tests** - Series of questions and answers used to determine if there is a loss of brain function due to Hydrocephalus.