CONDITION

Hydrocephalus

Hydrocephalus is a buildup of cerebrospinal fluid in the brain's fluid spaces that can raise pressure and affect brain function.

WHAT IT IS
Excess cerebrospinal fluid within the brain's fluid spaces

BODY SYSTEM
Brain and nervous system

MAIN SYMPTOMS
Headache, vomiting, developmental changes, walking difficulty

WHAT CAUSES IT
Blocked fluid flow, poor absorption, rarely overproduction

HOW IT IS DIAGNOSED
Brain ultrasound, MRI, or CT with clinical assessment

MAIN TREATMENT
Surgery to redirect or restore cerebrospinal fluid flow

CAN IT BE CURED?
Sometimes - cause treated, but continued monitoring may be needed

IS IT AN EMERGENCY?
Sometimes - sudden headache, vomiting, or reduced alertness

LONG-TERM OUTLOOK
Often manageable; outcomes reflect cause, timing, and complications

Overview

Hydrocephalus is an abnormal buildup of cerebrospinal fluid, or CSF, inside the brain. CSF is a clear fluid that cushions the brain and spinal cord. It also carries nutrients and helps remove waste.

Most CSF sits in connected spaces called ventricles. It normally flows through these spaces and is absorbed into the bloodstream. Hydrocephalus develops when the fluid cannot flow normally, is not absorbed properly, or, rarely, is produced in excess. The ventricles enlarge and may press on nearby brain tissue.

The older name "water on the brain" is misleading because the fluid is CSF, not water.

Hydrocephalus can begin before birth or develop at any age. Its effects are different in babies,

older children, and adults. Some forms raise pressure quickly. Others develop gradually, including normal pressure hydrocephalus, which mainly affects older adults.

Without suitable treatment, pressure or stretching can affect movement, vision, learning, bladder control, and other brain functions. Treatment often controls the fluid buildup, but many people need long-term monitoring.

Symptoms

Symptoms depend on age, how quickly the fluid builds up, and which parts of the brain are affected.

A baby's skull bones have not fully joined, so increasing fluid may make the head grow faster than expected. Possible signs include:

A bulging soft spot is more concerning when a baby is calm and upright. Crying or lying flat can make it appear temporarily fuller.

Older children and adults may develop headaches, nausea, vomiting, blurred or double vision, unusual tiredness, balance problems, or changes in thinking. Children may have declining school performance, personality changes, or loss of previously learned abilities.

Normal pressure hydrocephalus can cause a slow change in walking, thinking, and bladder control. Walking may become short-stepped, slow, or unsteady, as if the feet are difficult to lift. Memory and planning may worsen. Urinary urgency or loss of bladder control can occur. These symptoms also have many other possible causes, so they require careful assessment.

Someone with a hydrocephalus shunt may develop similar symptoms if the device becomes blocked, infected, disconnected, or drains too much fluid. Symptoms are not always the same each time a problem occurs.

- Rapidly increasing head size
- A firm or bulging soft spot on the head
- Vomiting, poor feeding, or unusual sleepiness
- Irritability or a high-pitched cry
- Eyes that appear to look downward
- Seizures or delayed development

Causes and risk factors

Hydrocephalus may be congenital, meaning it is present at birth, or acquired later.

Congenital hydrocephalus can be linked to changes in brain development, narrowing of a CSF channel, spina bifida, certain genetic conditions, or an infection during pregnancy. Sometimes no single cause is found.

Acquired hydrocephalus can follow:

In some people, CSF flow is physically blocked. This is called obstructive hydrocephalus. In others, fluid reaches the outside of the brain but is not absorbed normally. This is called communicating hydrocephalus.

The cause of idiopathic normal pressure hydrocephalus is unknown. "Idiopathic" means that no specific cause has been identified. Previous bleeding, infection, or surgery can sometimes lead to a similar pattern.

- Bleeding in or around the brain, including bleeding related to premature birth
- Meningitis or another infection affecting the brain
- A brain tumour, cyst, or other growth blocking fluid flow
- Head injury
- Stroke or brain surgery

Diagnosis

Diagnosis begins with the symptoms, medical history, and a neurological examination. A neurological examination checks functions such as movement, balance, reflexes, vision, and alertness.

In babies, head circumference is measured and compared with earlier measurements. Ultrasound can show the ventricles through the soft spot before the skull bones close. Hydrocephalus may also be noticed during a pregnancy ultrasound.

MRI provides detailed images of the brain and CSF pathways without using X-rays. CT is faster and may be used when symptoms are urgent, although it involves radiation. Imaging can show enlarged ventricles, a blockage, or another possible cause.

Enlarged ventricles do not always mean hydrocephalus. They can also occur when brain tissue has shrunk. Diagnosis therefore combines imaging with symptoms and examination findings.

When normal pressure hydrocephalus is suspected, walking and thinking may be assessed before and after removing a small amount of CSF through a lumbar puncture, sometimes called a spinal tap. Some centres use longer drainage tests or measurements of CSF pressure.

Improvement after drainage may help predict whether surgery could be useful, but no single test gives a certain answer.

Treatment and management

Treatment aims to improve CSF movement, reduce harmful pressure, and address the underlying cause when possible. The appropriate approach depends on age, symptoms, anatomy, and why the fluid is building up.

The most common treatment is a shunt. This is a flexible tube placed during surgery. It carries CSF from the brain to another part of the body, usually the abdomen, where the fluid can be absorbed. A valve controls flow. The shunt remains under the skin.

Shunts can work for many years, but they do not permanently remove the tendency to develop hydrocephalus. A shunt may become blocked, infected, disconnected, or need adjustment as a child grows. Further surgery is sometimes needed.

Endoscopic third ventriculostomy, or ETV, is another operation. A surgeon makes a small opening inside the brain so CSF can bypass a blockage. It is suitable only for certain causes and patterns of hydrocephalus. The opening can close later, so new symptoms still need prompt assessment.

Temporary external drainage may be used in hospital when hydrocephalus develops suddenly, such as after bleeding, infection, or surgery. If a tumour or cyst is blocking CSF, treating that problem may improve fluid flow.

Medicines are not generally a lasting substitute for surgery. They may have a limited role in selected short-term situations.

After treatment, follow-up may include symptom reviews, examinations, developmental checks, and imaging. People with a shunt are often given information about its type and valve setting. Keeping these details available can help if urgent care is needed elsewhere.

Complications

Untreated or rapidly worsening hydrocephalus can injure brain tissue. Possible effects include problems with movement, vision, learning, memory, development, or bladder control. The outcome is influenced by the cause, how quickly hydrocephalus developed, and whether other brain conditions are present.

Treatment also has possible complications. A shunt can become blocked or infected.

Overdrainage may cause headaches when upright or bleeding around the brain. Underdrainage allows hydrocephalus symptoms to return. An ETV opening can close, occasionally after a long period without problems.

These risks are why ongoing follow-up matters even when treatment has been stable.

Prevention

Many cases of hydrocephalus cannot be prevented. This is especially true when it results from inherited changes, early brain development, or an unknown cause.

Taking folic acid before pregnancy and during early pregnancy reduces the risk of neural tube defects such as spina bifida, which can be associated with hydrocephalus. Preconception and pregnancy care can provide advice suited to local recommendations.

Vaccination can reduce the risk of some infections that may cause meningitis. Seat belts, child car seats, helmets for suitable activities, and measures to prevent falls can lower the risk of serious head injury. These steps reduce certain causes but cannot prevent every case.

Living with it and what to expect

Hydrocephalus is often a long-term condition, even after successful surgery. Some people have few day-to-day limitations. Others need support with movement, learning, vision, memory, or bladder control. This often reflects the original cause and any associated brain injury rather than fluid buildup alone.

Children may need developmental monitoring and support at school. Needs can change as learning becomes more complex. Physical, occupational, speech, or vision therapy may help with specific difficulties.

Adults may benefit from rehabilitation, mobility support, or help managing changes in memory and planning. When normal pressure hydrocephalus responds to shunt surgery, walking often changes more than thinking, but improvement is not guaranteed.

Routine follow-up helps identify gradual changes and device problems. A person with a shunt should know the symptoms that previously occurred when their hydrocephalus worsened, while remembering that later symptoms may not be identical. Certain programmable shunt valves may need checking after an MRI.

Travel, exercise, education, work, and family life are possible for many people. Planning may include carrying shunt information, knowing where to seek care, and discussing contact sports

or activities that could damage the device.

When to get medical help

Call emergency services for a person with hydrocephalus or a shunt who:

These signs can indicate rapidly rising pressure or another neurological emergency.

Seek urgent same-day medical assessment for worsening headache, repeated vomiting, unusual sleepiness, new balance problems, vision changes, or a return of previous hydrocephalus symptoms. With a shunt, fever, redness, swelling, tenderness, or fluid leaking along the device may suggest infection.

A baby needs prompt assessment for a firm bulging soft spot while calm, poor feeding, repeated vomiting, unusual sleepiness, downward-looking eyes, or rapidly increasing head size.

Arrange routine follow-up for gradual changes in walking, memory, bladder control, school progress, development, or recurring mild headaches. These changes are not always caused by hydrocephalus, but they should be reviewed rather than assumed to be part of ageing or the existing condition.

- Is difficult to wake, loses consciousness, or has a seizure
- Develops a sudden severe headache with repeated vomiting
- Has new weakness, trouble speaking, severe confusion, or breathing difficulty
- Deteriorates quickly or appears seriously unwell

Common questions

Is hydrocephalus the same as fluid on the brain?

"Fluid on the brain" or "water on the brain" are informal names for hydrocephalus. The fluid is cerebrospinal fluid, which normally surrounds and protects the brain. The problem is abnormal buildup or movement of that fluid.

Can hydrocephalus go away on its own?

Some mild or temporary fluid enlargement may stabilise, but established hydrocephalus often needs monitoring or surgery. Symptoms should not be watched at home without medical assessment because pressure can sometimes increase before changes are obvious.

Can hydrocephalus be cured?

Sometimes an underlying blockage can be treated or bypassed without a permanent shunt.

However, many people remain at risk of recurrence or shunt problems. Long-term follow-up may still be needed even when symptoms have improved.

How long does a hydrocephalus shunt last?

There is no fixed lifespan. Some shunts work for many years, while others need earlier revision because of blockage, infection, disconnection, growth, or drainage problems. A stable shunt does not usually need replacement simply because it has reached a certain age.

Can you live a normal life with hydrocephalus?

Many people attend school, work, exercise, and live independently. Others need ongoing support because of the cause of hydrocephalus, associated conditions, or previous brain injury. Regular follow-up and prompt attention to new symptoms can help maintain function.

Is normal pressure hydrocephalus dementia?

It can cause problems with memory and thinking that resemble dementia, but it is a distinct condition that also commonly affects walking and bladder control. Other disorders can cause the same symptoms. Careful assessment is needed, and some people improve after shunt surgery.

Sources

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