CONDITION

Intraventricular hemorrhage of the newborn

Intraventricular hemorrhage is bleeding into fluid-filled spaces within a newborn baby's brain.

WHAT IT IS
Bleeding into fluid-filled spaces within a newborn's brain

BODY SYSTEM
Brain and nervous system

MAIN SYMPTOMS
Often none, breathing pauses, seizures, reduced alertness

WHAT CAUSES IT
Fragile premature brain vessels, sometimes blood-flow or clotting problems

HOW IT IS DIAGNOSED
Cranial ultrasound, with MRI for selected babies

MAIN TREATMENT
Neonatal supportive care, monitoring, and hydrocephalus treatment

CAN IT BE CURED?
Sometimes - bleeding stops; established injury may remain

IS IT AN EMERGENCY?
Yes - new seizures, breathing changes, or sudden deterioration

LONG-TERM OUTLOOK
Often favorable after mild bleeding; severe injury can cause disability

Overview

Intraventricular hemorrhage, or IVH, is bleeding into the ventricles of a newborn's brain. Ventricles are spaces that contain cerebrospinal fluid, the clear fluid that cushions the brain and spinal cord.

IVH mainly affects babies born very prematurely or with a very low birth weight. Their brains contain a temporary area called the germinal matrix. Its small blood vessels are fragile and can break when blood flow or pressure changes. Most IVH begins during the first few days after birth.

The condition ranges from a small bleed that causes no lasting problems to a larger bleed that injures nearby brain tissue or blocks normal fluid flow. A baby's likely outcome cannot be judged from the diagnosis alone. The amount and location of bleeding, other complications of

premature birth, and development over time all matter.

IVH is less common in babies born at or near full term. When it occurs in these babies, clinicians may look for a different cause, such as a clotting problem, reduced oxygen or blood flow, a blood-vessel abnormality, or a clot in a brain vein.

Symptoms

Many babies with IVH have no outward symptoms. The bleeding may be found during a routine brain ultrasound in the neonatal intensive care unit, or NICU.

When symptoms occur, they may be subtle and can overlap with other problems of prematurity. Possible signs include:

A large bleed can cause a baby to become unstable over a short period. However, symptoms do not reliably show how severe the bleeding is. Imaging is needed to understand its extent.

- Pauses in breathing, called apnea, or a slow heart rate
- Reduced alertness, weak sucking, or difficulty feeding
- Unusual limpness, stiffness, or movement
- Seizures, which may appear as repeated twitching or staring
- Pale skin, low blood pressure, or an unexplained drop in red blood cells
- A tense or bulging soft spot on the head

Causes and risk factors

Prematurity is the main risk factor. The earlier a baby is born, the more fragile the germinal matrix vessels are and the less able the brain may be to keep blood flow steady.

Changes in blood pressure, oxygen, carbon dioxide, or blood flow can place stress on these vessels. This does not mean that one event or one person's actions caused the bleeding. IVH often develops through several factors linked to premature birth and critical illness.

Factors associated with a higher risk include:

In a full-term baby, possible causes include birth-related injury, oxygen deprivation, clotting disorders, cerebral sinovenous thrombosis-a clot in a vein draining the brain-or an abnormal blood vessel. Sometimes no single cause is found.

IVH is not usually an inherited condition. Rare inherited clotting disorders may contribute in some families, but they are not the usual cause in premature babies.

- Very early birth or very low birth weight
- Breathing or circulation problems after birth
- Infection or inflammation
- Problems with blood clotting or low platelet levels
- Major swings in blood pressure or brain blood flow

Diagnosis

A cranial ultrasound is the main test for IVH in premature babies. A small ultrasound probe is placed over the fontanelle, or soft spot, where sound waves can pass through. The test does not use radiation and can usually be done beside the incubator.

Babies at higher risk may have ultrasound scans on a schedule set by the neonatal unit, even when they have no symptoms. Repeat scans show whether bleeding has changed and whether the ventricles are becoming enlarged.

IVH is commonly described by grade:

These categories help describe the scan, but they cannot predict one child's future with certainty.

MRI gives more detailed pictures of brain tissue and may be used for selected babies, often near the time they would originally have been due to be born. MRI is not always necessary. CT scanning is used less often because it exposes the baby to radiation and usually offers no advantage over ultrasound for routine screening.

Blood tests may check for anemia, infection, or a clotting problem, especially if the bleeding is unexpected or occurs in a full-term baby.

- Grade 1: bleeding limited to the germinal matrix
- Grade 2: blood inside the ventricles without enlargement
- Grade 3: blood inside the ventricles with enlargement
- Periventricular hemorrhagic infarction: injury and bleeding in nearby brain tissue, historically called grade 4

Treatment and management

There is no medicine or procedure that can remove the blood or reverse brain tissue already injured by IVH. Treatment focuses on keeping the baby stable, managing related problems, and

watching for complications.

Neonatal care may include breathing support, careful control of fluids and circulation, treatment of anemia, and treatment of seizures when needed. The team also tries to avoid large changes in oxygen levels, carbon dioxide levels, blood pressure, and temperature.

Small bleeds often need monitoring rather than a specific procedure. Follow-up usually includes repeat cranial ultrasounds, measurements of head growth, and neurological examinations.

Blood can sometimes interfere with the normal movement or absorption of cerebrospinal fluid. This may enlarge the ventricles, a condition called post-hemorrhagic ventricular dilatation. If fluid continues to build up, specialists may use procedures to drain it temporarily. Some babies later need a ventriculoperitoneal shunt, a tube that moves excess fluid from the brain to the abdomen.

Treatment decisions are based on ultrasound measurements, the baby's condition, head growth, and whether pressure is affecting the brain. Ventricular enlargement does not automatically mean that a permanent shunt will be needed.

Complications

The risk of complications is generally higher with larger bleeds, injury to nearby brain tissue, or progressive ventricular enlargement.

Possible complications include hydrocephalus, in which excess cerebrospinal fluid builds up under pressure. Some babies develop movement difficulties, cerebral palsy, epilepsy, or problems with learning, language, vision, hearing, attention, or behavior.

These outcomes are not inevitable. Many babies with a small grade 1 or grade 2 bleed develop without major disability. Even a scan showing more severe injury cannot define exactly what an individual child will be able to do. Developmental assessment over months and years gives more useful information.

Severe IVH can contribute to life-threatening illness, especially in a baby who also has serious complications of extreme prematurity.

Prevention

IVH cannot always be prevented. Premature birth and the immaturity of brain blood vessels cannot be fully controlled after labor has begun.

When premature birth is expected, care before and around delivery can reduce risk. This may include corticosteroid treatment before birth to help the baby's organs mature, delivery in a hospital with suitable neonatal care, and delayed umbilical cord clamping when it is considered safe.

In the NICU, careful breathing and circulation support aims to keep blood flow as steady as possible. Some neonatal units use preventive medicines for selected extremely premature babies, but practices differ because benefits and risks must be considered for each baby.

Routine vitamin K given after birth prevents vitamin K deficiency bleeding. That is a different condition, and vitamin K does not prevent most IVH caused by fragile vessels in the premature brain.

Living with it and what to expect

The bleeding itself usually happens over a short period rather than continuing as a lifelong condition. Repeat imaging during the first weeks shows whether it has stabilized and whether the ventricles are enlarging.

After a small bleed, ongoing care may look similar to follow-up for other premature babies. A larger bleed, brain tissue injury, or hydrocephalus usually leads to closer monitoring by neonatal, neurology, neurosurgery, or developmental teams.

Follow-up may assess movement, muscle tone, feeding, speech, learning, hearing, and vision. Some difficulties become clear in infancy, while subtler language, attention, or learning differences may not appear until preschool or school age.

Early support can help a child build skills. Depending on their needs, this may include physical therapy, occupational therapy, feeding support, speech and language therapy, or early childhood developmental services.

The scan grade is important, but it is not the whole story. Some children with mild bleeding need extra support, while some with significant early findings make more progress than expected. Regular follow-up allows support to change as the child grows.

When to get medical help

A newborn with suspected IVH needs prompt assessment in a neonatal setting. If your baby is already in the NICU, tell the bedside team immediately about any new movement, color, breathing, or alertness change.

Seek emergency help after discharge if your baby:

Contact your baby's follow-up team promptly, but not necessarily as an emergency, if you notice increasing feeding difficulty, unusual stiffness or floppiness, loss of a skill, or concerns about vision, hearing, movement, or development. Keep routine appointments for head measurements, developmental checks, hearing tests, eye examinations, and imaging when arranged.

- Stops breathing, turns blue or gray, or is very difficult to wake
- Has a seizure or repeated unexplained jerking
- Suddenly becomes limp, unresponsive, or markedly less alert
- Has repeated vomiting with a bulging soft spot or unusual sleepiness

Common questions

Is intraventricular hemorrhage the same as a stroke?

Not exactly. IVH means bleeding into the brain's ventricles. A stroke is brain injury caused by either blocked blood flow or bleeding. Severe IVH can injure surrounding tissue, and periventricular hemorrhagic infarction involves impaired venous blood flow, but clinicians usually describe these findings separately.

Can a small brain bleed heal on its own?

The active bleeding often stops, and the body gradually clears the blood. Many small grade 1 or grade 2 bleeds do not require a procedure. "Healing" does not guarantee that there will be no developmental effects, so follow-up remains important.

Does IVH always cause cerebral palsy?

No. The risk is higher after severe bleeding, injury to nearby brain tissue, or hydrocephalus, but IVH does not always lead to cerebral palsy. Many babies with mild IVH do not develop major movement problems.

Will my baby need brain surgery?

Most babies with mild IVH do not need surgery. A procedure may be considered if cerebrospinal fluid continues to build up and enlarge the ventricles. Temporary drainage is sometimes enough; some babies need a permanent shunt.

Can intraventricular hemorrhage get worse?

It can enlarge during the first days after it begins, which is why repeat ultrasound scans are used. Once the bleeding has stabilized, clinicians continue to watch for ventricular enlargement

and other effects rather than assuming the problem is over.

Will IVH affect intelligence or learning?

It may, particularly when bleeding is severe or nearby brain tissue is injured. Mild IVH often has a favorable outlook, but no scan can predict an individual child's learning abilities precisely. Developmental follow-up through early childhood and school age can identify needs as they emerge.

Sources

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