CONDITION

Craniosynostosis

Craniosynostosis is the early joining of one or more skull seams before a baby's brain has finished growing.

WHAT IT IS
Early fusion of one or more skull seams

BODY SYSTEM
Skull, brain, and facial growth

MAIN SYMPTOMS
Unusual head shape, skull ridge, facial asymmetry, slow head growth

WHAT CAUSES IT
Usually unknown; sometimes genetic or syndrome-related

HOW IT IS DIAGNOSED
Specialist examination, sometimes ultrasound or three-dimensional CT

MAIN TREATMENT
Craniofacial surgery, sometimes followed by helmet therapy

CAN IT BE CURED?
Sometimes - surgery restores room for skull growth

IS IT AN EMERGENCY?
Sometimes - seizures or reduced responsiveness need emergency care

LONG-TERM OUTLOOK
Usually good; complex forms need longer follow-up

Overview

A baby's skull is made of several bones separated by flexible seams called sutures . These allow the skull to expand as the brain grows.

Craniosynostosis happens when one or more sutures fuse too early. Growth is restricted across the fused seam, so the skull grows more in other directions and develops a characteristic shape.

The condition is usually present at birth or becomes noticeable during the first few months. It differs from positional flattening, which develops when a baby repeatedly rests on the same part of the head and does not involve a fused suture.

Many babies have one affected suture and no other health condition. This is called

nonsyndromic craniosynostosis . Others have several fused sutures or a genetic syndrome that may also affect the face, limbs, hearing, or breathing. This is called syndromic craniosynostosis .

An unusual head shape is often the main concern, but restricted skull growth can sometimes raise pressure around the brain. Early specialist assessment helps determine whether and when treatment is needed.

Symptoms

The appearance depends on which suture has fused. Unlike positional flattening, the shape is usually consistent when the baby's position changes.

Possible signs include:

Sagittal craniosynostosis causes a long, narrow skull, sometimes with a prominent forehead or back of the head.

Coronal craniosynostosis may flatten one side of the forehead and raise that eye socket. If both coronal sutures are affected, the skull may look short and wide.

Metopic craniosynostosis can cause a triangular forehead, sometimes with the eyes appearing closer together. A ridge without a triangular shape may be a normal variation.

Lambdoid craniosynostosis can flatten one side of the back of the skull. It is uncommon and may resemble positional flattening.

Raised pressure inside the skull may not cause obvious symptoms in a baby. Possible symptoms include persistent headache in an older child, repeated vomiting, unusual irritability, worsening vision, or reduced alertness. Developmental differences can occur, although many children with single-suture craniosynostosis develop typically.

- An unusual or uneven head shape present at birth or developing early
- A firm ridge over a skull suture
- Little growth in part of the skull
- Facial, forehead, or eye-socket asymmetry
- Head circumference growing more slowly than expected

Causes and risk factors

In many babies, there is no clear reason why a suture fused early. Craniosynostosis is not

usually caused by sleep position, delivery, or anything a parent did during pregnancy.

Some cases involve a change in a gene that controls skull growth. The change may be inherited or arise for the first time in the child.

Craniosynostosis can be part of a genetic syndrome, including Apert, Crouzon, Muenke, or Pfeiffer syndrome. These conditions may affect several sutures and other parts of the body.

A genetic cause is more likely when several sutures are affected, other physical differences are present, or relatives have had a similar condition. Having one affected child does not automatically mean future children will have craniosynostosis.

Diagnosis

Craniosynostosis is usually assessed by a specialist craniofacial team, which may include plastic surgeons, neurosurgeons, pediatricians, genetic specialists, and eye specialists.

The assessment starts with the baby's medical history and an examination. The specialist views the head from several angles, feels the sutures, measures head circumference, and checks facial features and development.

Imaging is not always needed when the head shape clearly matches a fused suture. If the diagnosis is uncertain, ultrasound may show whether a suture remains open in a young baby. A low-dose CT scan with three-dimensional images may confirm complex cases or help plan surgery. Because CT uses radiation, the team considers whether its detail is necessary.

Genetic testing using blood or saliva may be offered if several sutures are fused, a syndrome is suspected, or there is a relevant family history.

Depending on the type, a child may also need eye, hearing, breathing, and developmental assessments. These identify related concerns and provide a baseline for follow-up.

Treatment and management

Treatment depends on the affected suture, the child's age, the degree of skull restriction, and whether a syndrome is present. Most children with confirmed craniosynostosis are monitored by a specialist team.

Surgery is the main treatment when a fused suture restricts growth or significantly changes skull shape. Its goals are to create room for growth, reduce or prevent pressure on the brain, and improve skull and facial shape.

Open cranial remodeling reshapes sections of skull through an incision across the scalp. It may

be used for several types of craniosynostosis and for children diagnosed when older.

Endoscopic surgery uses smaller incisions and a camera to remove the fused strip of bone. It is generally limited to younger infants because rapid growth helps reshape the skull afterward. A molding helmet is usually required for several months.

A helmet cannot reopen a fused suture and is not a substitute for craniosynostosis surgery. After endoscopic surgery, it guides growth while the skull expands.

Some children with a mild change, such as an isolated ridge without restricted growth, may not need surgery. The team may instead recommend repeat measurements and examinations.

Around surgery, the team manages pain, wound care, and possible blood loss. Follow-up checks healing, skull growth, head shape, vision, development, and signs of raised pressure.

Complications

Complications depend partly on how many sutures are fused and whether a genetic syndrome is present.

Restricted skull growth can raise pressure inside the skull, potentially affecting vision and brain function. Eye alignment problems, exposure of the eye surface, hearing loss, sleep-related breathing problems, and dental or jaw differences are more common in some syndromic forms.

Children may also have concerns about appearance, teasing, or self-confidence. Emotional and practical support can form part of long-term care.

Surgical risks include bleeding, blood transfusion, infection, reactions to anesthesia, fluid collection, and injury to nearby tissues. Temporary swelling of the scalp and face is common. The surgical team should explain the expected benefits and specific risks.

Skull shape continues to change as a child grows. Some children need another operation because of recurrent restriction, raised pressure, or later facial growth differences. This is more likely with multisuture or syndromic craniosynostosis.

Prevention

Most craniosynostosis cannot be prevented. There is usually no known action during pregnancy or infancy that would have kept the suture open.

Changing sleep position does not prevent craniosynostosis. Babies should still be placed on their backs for every sleep, following safe-sleep guidance. Supervised tummy time while awake may reduce positional flattening but cannot treat a fused suture.

If a genetic cause is found, genetic counseling can explain inheritance and discuss testing options for relatives or future pregnancies. It provides information but cannot always predict what will happen in a particular family.

Living with it and what to expect

Appointments may be frequent during the first year because the skull and brain grow quickly. Children treated endoscopically also need regular helmet fittings. After open surgery, follow-up focuses on healing, skull shape, head growth, and development.

Many children with isolated single-suture craniosynostosis recover well and take part in ordinary school, play, and family life. The skull may not become perfectly symmetrical, but differences often become less noticeable as hair grows and facial features mature.

Follow-up may continue through childhood. Specialists monitor for headaches, vision changes, altered skull growth, learning concerns, and feelings about appearance. Routine eye examinations are important because raised pressure may affect the optic nerves before a child can describe symptoms.

Children with syndromic or multisuture craniosynostosis often need care over many years. They may have several operations as the skull and face grow, along with support for hearing, breathing, speech, teeth, vision, or learning.

Craniosynostosis does not mean a child will have an intellectual disability. If movement, speech, learning, or behavior develops differently from expected, early assessment can identify helpful support.

When to get medical help

Arrange a routine medical assessment if your baby has an unusual head shape that was present at birth, does not improve with repositioning, or becomes more noticeable. A hard ridge, increasing facial asymmetry, or slow head growth also needs assessment.

Contact the craniofacial team promptly if a child with craniosynostosis develops persistent or worsening headaches, repeated unexplained vomiting, new vision problems, increasing sleepiness, or a clear change in behavior or school performance. These symptoms have several possible causes but should not be ignored.

After surgery, follow the team's wound-care and swelling instructions. Seek prompt advice for fever, increasing redness, drainage, worsening swelling, pain that is not settling, or concern that the wound is opening.

Seek emergency care for a seizure, severe breathing difficulty, sudden reduced responsiveness, or difficulty waking the child. These are emergency symptoms whether or not craniosynostosis is present.

Common questions

Is craniosynostosis the same as a flat head?

No. Positional flattening results from repeated pressure while the sutures remain open. Craniosynostosis involves a fused suture. Examination and sometimes imaging can distinguish them.

Can a helmet fix craniosynostosis?

A helmet cannot open a fused suture. A molding helmet may be used after endoscopic surgery to guide skull growth.

Will craniosynostosis affect my baby's brain development?

Many children, particularly those with one affected suture, develop typically. Some have developmental or learning differences, and restricted skull growth can raise pressure around the brain. Regular checks help identify concerns early.

Will my baby definitely need surgery?

Not every unusual ridge or head shape requires surgery. Confirmed craniosynostosis often does, but the decision depends on the suture, skull restriction, age, pressure risk, and expected effects on growth and appearance.

Is craniosynostosis my fault?

No. It is not caused by ordinary handling, sleep positioning, or something a parent did. Most isolated cases have no identifiable cause.

Can craniosynostosis come back after surgery?

The treated suture does not simply return to its original state, but skull growth may remain restricted or change. Some children, especially those with several fused sutures or a syndrome, need further surgery.

Sources

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