CONDITION

Brachial plexus injury in newborns

Learn how brachial plexus injuries affect a newborn's arm, how they are evaluated, and how therapy, follow-up, and surgery may support recovery.

WHAT IT IS
Injury to a newborn's arm nerves

BODY SYSTEM
Nervous system

MAIN SYMPTOMS
Reduced arm movement, shoulder weakness, weak elbow bending, weak grip

WHAT CAUSES IT
Nerve stretching during or before birth

HOW IT IS DIAGNOSED
Physical examination and repeated assessments

MAIN TREATMENT
Physical or occupational therapy, sometimes surgery

CAN IT BE CURED?
Sometimes - mild injuries may recover

IS IT AN EMERGENCY?
Sometimes - if the baby has trouble breathing

LONG-TERM OUTLOOK
Variable recovery with possible lasting weakness

Overview

The brachial plexus is a network of nerves that runs from the spinal cord in the neck to the shoulder, arm, and hand. These nerves control movement and carry sensations such as touch. A brachial plexus injury in a newborn can make one arm weaker or harder to move.

This condition is also called neonatal brachial plexus palsy or brachial plexus birth palsy. It is usually noticed shortly after birth because the baby moves one arm less than the other. The injury often occurs when the nerves are stretched during birth, but it can also develop before delivery. It does not necessarily mean that anyone caused the injury.

The amount of nerve damage can vary. A mild stretch injury may recover as the nerve begins working again. A more serious injury may involve torn nerves or, rarely, nerves pulled away from the spinal cord. These injuries are less likely to recover without specialized treatment.

Many babies improve with time and therapy. However, early assessment matters because limited movement can affect joint development and lead to stiffness. Babies who have not started recovering as expected should be referred promptly to a team experienced in brachial plexus injuries.

Symptoms

The main sign is reduced movement in one arm. The arm may rest against the baby's side, and the elbow may remain straight. Movement may be absent or weaker at the shoulder, elbow, wrist, hand, or a combination of these areas.

Possible signs include:

The pattern depends on which nerves are involved. An upper brachial plexus injury, sometimes called Erb palsy, mainly affects shoulder movement and elbow bending. Hand movement and grip may remain strong. A total plexus injury affects the shoulder, elbow, wrist, and hand.

Rarely, a baby may have a drooping eyelid and a smaller pupil on the affected side. This is called Horner syndrome and can suggest a more extensive nerve injury. Weakness of the diaphragm, the main muscle used for breathing, may also occur with a severe injury.

A baby may avoid moving an arm for reasons other than nerve damage. A broken collarbone or upper arm bone, infection, or another painful condition can cause similar behavior. A medical examination is needed to find the cause.

- Moving one arm less than the other
- Difficulty lifting or turning the shoulder
- Weak bending of the elbow
- A wrist that hangs downward
- Weak finger movement or grip
- An uneven startle response, also called the Moro reflex
- Less response to touch in the affected arm

Causes and risk factors

Brachial plexus injury may happen when a baby's head and neck move away from the shoulder, stretching the nerves. This can occur during a difficult delivery, particularly if the baby's shoulder becomes stuck behind the mother's pelvic bone. That emergency is called shoulder

dystocia.

Factors associated with a higher chance of injury include:

These factors do not always cause a nerve injury. Many babies with one or more risk factors are born without this condition. Some brachial plexus injuries occur during uncomplicated deliveries or cesarean births, and some may develop before labor begins.

The nerves can be affected at different levels:

It is not always possible to determine the exact type of nerve damage immediately after birth.

- Shoulder dystocia
- A larger baby
- Maternal diabetes, which can increase the chance of a larger baby
- A long or difficult labor
- Breech birth, in which the baby is positioned bottom- or feet-first
- Use of forceps or a vacuum during an assisted delivery
- A previous delivery involving shoulder dystocia
- Neurapraxia: The nerve has been stretched but is still connected. This is generally the mildest type.
- Rupture: Part of the nerve has torn away from the spinal cord.
- Avulsion: A nerve root has been pulled away from the spinal cord. This is the most severe type and does not heal on its own.
- Neuroma: Scar tissue forms as an injured nerve tries to heal, which may interfere with nerve signals.

Diagnosis

A clinician usually begins by asking about the pregnancy, birth, and the baby's arm movements. The examination compares both arms and checks movement at the shoulder, elbow, wrist, fingers, and thumb. The clinician may also assess grip, reflexes, muscle tone, and response to touch.

The location and degree of weakness can help identify which parts of the brachial plexus may be affected. Repeated examinations are important because early recovery provides useful information about the injury.

The baby may also be checked for conditions that can occur with or resemble a brachial plexus

injury. These include a collarbone or upper arm fracture, a shoulder joint problem, infection, and injury to the spinal cord or brain.

An X-ray may be ordered if a fracture is suspected. Chest imaging or an ultrasound may be used if there are concerns about movement of the diaphragm. Ultrasound or MRI may sometimes help evaluate the shoulder joint, nerves, or nearby tissues, but imaging is not required for every baby.

Nerve conduction studies and electromyography measure electrical activity in nerves and muscles. Specialists may use these tests in selected cases, although the results must be interpreted together with the baby's physical examinations and recovery over time.

If arm movement remains incomplete at about 1 month of age, prompt referral to a multidisciplinary brachial plexus team is generally recommended. Earlier referral may be appropriate when the entire arm is weak, Horner syndrome is present, or there are concerns about breathing.

Treatment and management

Treatment depends on which muscles are affected and how recovery progresses. Care often involves a pediatrician, physical or occupational therapist, and specialists in orthopedic, plastic, or peripheral nerve surgery.

Therapy and care at home

Gentle movement exercises help keep the joints flexible while the nerves recover. A physical or occupational therapist can teach caregivers how to move the shoulder, elbow, wrist, and fingers safely. These exercises may also encourage the baby to notice and use the affected arm.

The timing and type of exercise should be guided by the care team. A baby with a fracture or another painful injury may need a modified plan while that condition heals. Forceful stretching should be avoided.

Caregivers may be advised to:

Tummy time while the baby is awake and closely supervised may support general strength and development. The baby should still be placed on the back for sleep unless a medical professional gives different instructions.

No medicine has been shown to repair an injured brachial plexus nerve. Medicines may occasionally be used for pain or another related problem, but newborns should receive medication only under a clinician's direction.

Nerve surgery

Babies with mild injuries may begin recovering during the first weeks or months. If important movements do not return, the specialty team may discuss surgery. The decision is based on the pattern of injury, serial examinations, muscle recovery, and sometimes imaging or electrical tests.

Nerve surgery may involve removing damaged scar tissue, using a nerve graft to bridge an injured area, or redirecting a working nerve to help a weakened muscle. These procedures are performed in specialized centers. They cannot always restore normal movement, but they may improve useful function in carefully selected babies.

Later orthopedic treatment

Even when nerves recover, muscle imbalance can affect the shoulder as the child grows. Some children later need treatment for tight muscles, joint changes, or a shoulder that is not developing in its usual position.

Options may include splinting, casting, injections to temporarily relax selected muscles, tendon transfer, or bone and joint surgery. These treatments are considered individually and are not needed by every child.

- Support the affected shoulder and arm when lifting or carrying the baby
- Avoid pulling or lifting the baby by the arms
- Follow the therapist's instructions for gentle range-of-motion exercises
- Place toys and other safe objects where they encourage movement toward the affected side
- Include the affected arm during dressing, feeding, and supervised play
- Protect skin that may have reduced sensation from heat, pressure, or injury

Complications

A lasting brachial plexus injury can lead to weakness, reduced sensation, or limited control of the arm and hand. Muscles may remain smaller, and the affected arm may grow slightly differently from the other arm.

Uneven muscle pull can cause tight joints, known as contractures. It can also alter development of the shoulder joint, sometimes leading to partial or complete dislocation. Early therapy and regular shoulder assessment may reduce stiffness and help identify joint changes.

Children with reduced sensation may not notice heat, pressure, or small injuries as easily. Some

develop discomfort or abnormal sensations, although pain is not the main symptom for many infants.

Differences in arm use can affect dressing, feeding, play, school activities, or sports. Therapy and adaptive strategies can help children build independence and use their abilities effectively.

Follow up

Follow-up should begin soon after the injury is recognized. The clinician will track active movement, joint flexibility, sensation, reflexes, and growth of the arm. Families may be asked to continue a home exercise program between therapy visits.

Routine appointments are important even when movement is improving. Recovery may be uneven, and shoulder tightness can develop while nerves and muscles are changing. The care team may adjust exercises, arrange imaging, or refer the baby for a surgical opinion when needed.

Contact the baby's clinician promptly if:

Seek emergency care if the baby has trouble breathing, turns blue or gray, is very difficult to wake, or develops another sign of serious illness. Breathing difficulty can have many causes and should not wait for a routine appointment.

Keep a record of appointments, exercises, and changes in movement. Short videos may help the specialty team compare the baby's arm function over time. Ask the clinician how to position, carry, dress, and play with the baby safely.

- Arm movement decreases after it had been improving
- The arm becomes swollen, unusually painful, pale, cool, or discolored
- A joint becomes difficult to move
- The baby develops a new eyelid droop or unequal pupils
- Home exercises appear to cause pain
- Feeding, growth, or developmental progress becomes a concern

Sources

- Shah V, Coroneos CJ, Ng E. "The evaluation and management of neonatal brachial plexus palsy." Paediatrics & Child Health . 2021;26(8):493-497.

- American College of Obstetricians and Gynecologists. "Practice Bulletin No. 178: Shoulder Dystocia." Obstetrics & Gynecology . 2017;129(5):e123-e133.
- American Academy of Orthopaedic Surgeons. "Erb's Palsy (Brachial Plexus Birth Palsy)." OrthoInfo . Patient education resource.
- Yang LJS. "Neonatal brachial plexus palsy-management and prognostic factors." Seminars in Perinatology . 2014;38(4):222-234.
- Abid A. "Brachial plexus birth palsy: Management during the first year of life." Orthopaedics & Traumatology: Surgery & Research . 2016;102(1 Suppl):S125-S132.
- Frade F, Gómez-Salgado J, Jacobsohn L, Florindo-Silva F. "Rehabilitation of neonatal brachial plexus palsy: Integrative literature review." Journal of Clinical Medicine . 2019;8(7):980.