

Cerebral palsy

Introduction

Cerebral palsy is a general term covering a number of neurological conditions that affect a child's movement and coordination.

Neurological conditions affect the brain and nervous system.

Cerebral palsy is caused by damage to the brain, which normally occurs before, during or soon after birth. Known possible causes of cerebral palsy include:

infection in early pregnancy

a difficult or premature birth

bleeding in the baby's brain

abnormal brain development in the baby

Symptoms of cerebral palsy

The symptoms of cerebral palsy vary greatly from child to child and depend on the type of cerebral palsy your child has (see box, left). Some children have problems walking, while others are profoundly disabled and require lifelong care. Read more about the symptoms of cerebral palsy.

Children with cerebral palsy often have other related conditions or problems, including:

epilepsy

learning difficulties

incontinence

visual impairment

hearing impairment

difficulties speaking or understanding other people speak

delayed growth

curved spine (scoliosis)

drooling

Outlook

Cerebral palsy is not a progressive condition. This means it will not get worse as your child gets older. However, it can put a great deal of strain on the body, which can cause problems in later life.

There is no cure for cerebral palsy, but a range of treatments can help relieve symptoms and increase a child's sense of independence and self-esteem. These include physiotherapy, occupational therapy and medication to relieve muscle stiffness and spasms. Find out more about treatments for cerebral palsy.

Symptoms of cerebral palsy

The symptoms of cerebral palsy normally become apparent during the first three years of your child's life.

Your child may be slower in achieving important developmental goals, such as learning to crawl, walk or speak.

Children with cerebral palsy also tend to have problems with their muscle tone (the unconscious ability to contract or relax muscles as needed). Your child may have:

hypertonia: increased muscle tone, which can make them appear stiff or rigid

hypotonia: decreased muscle tone, which makes them appear floppy

In some cases, your child may experience an early period of hypotonia for the first two or three months of their life, before progressing to hypertonia.

Children with cerebral palsy also tend to favour one side of the body over the other, which can make their posture appear unusual.

Symptoms of spastic hemiplegia

If your child has spastic hemiplegia, they will have muscle stiffness (spasticity) on one side of their body. This is normally limited to the hand and arm, but sometimes also affects their leg.

Spastic hemiplegia may also cause your child to develop an abnormal curvature of the spine (scoliosis). They may have problems speaking, but their intelligence should not be affected by the condition.

Some children with spastic hemiplegia also experience epileptic seizures.

Symptoms of spastic diplegia

In this type of cerebral palsy, your child will experience muscle stiffness in their legs. This may cause difficulty walking, and they may need aids such as leg braces or a walking frame.

Communication skills and intelligence should be unaffected.

Symptoms of ataxic cerebral palsy

In ataxic cerebral palsy, your child's balance and depth perception will be affected. Depth perception is the ability to judge where objects are in relation to your position.

Your child may appear clumsy and uncoordinated and have problems with activities that require precise movement, such as writing or tying a shoelace. They may also experience tremors in their hands (involuntary shaking), especially when they are trying to reach for an object.

Your child's communication skills and intelligence should be unaffected.

Symptoms of athetoid or dyskinetic cerebral palsy

If your child has athetoid cerebral palsy (also known as dyskinetic cerebral palsy), they will experience both increased and decreased muscle tone. This means they often make apparently random and uncontrolled body movements. They will probably have problems maintaining their posture.

Their speech will be affected as they have difficulty controlling their tongue and vocal cords. Your child may also have problems with eating and drooling.

Intelligence is not normally affected in children with athetoid cerebral palsy.

Symptoms of spastic quadriplegia

Spastic quadriplegia is the most severe type of cerebral palsy, caused by extensive damage to the brain. Your child will have a high degree of stiffness in all their limbs, and may be unable to walk. At the same time, their neck muscles will be very loose and they may have problems supporting their head.

They will find speaking difficult, and may have moderate to severe learning difficulties.

Frequent epileptic seizures are common in children living with spastic quadriplegia.

Causes of cerebral palsy

Although cerebral palsy appears to involve the muscles, it is caused by damage to the part of the brain that controls these muscles, called the cerebrum.

The cerebrum is also responsible for other important brain functions, such as communication skills, memory and the ability to learn. This is why some children with cerebral palsy also have learning and communication difficulties.

Damage to the cerebrum can also cause problems with vision and hearing.

How does brain damage occur?

In the past, doctors believed that the damage to the brain occurred during birth as a result of the baby being temporarily deprived of oxygen (asphyxia). Asphyxia can sometimes occur during a difficult or complicated birth.

However, a major research project carried out in the 1980s showed that asphyxia was only responsible for an estimated 5-10% of cases of cerebral palsy. Most cases occurred as a result of damage to the brain that happened before the child was born.

The adult brain is fairly adaptable and can recover from quite serious damage. But the brains of children, especially during the first six months of development, are particularly vulnerable. Any damage that occurs during this time can have serious and lifelong consequences.

Researchers believe there are three ways the brain can be damaged before birth. These are discussed below.

Periventricular leukomalacia (PVL)

Periventricular leukomalacia (PVL) refers to damage of the white matter of the brain. This part of the brain is made up of many nerve fibres that are protected by a white fatty protein, known as myelin. The white

matter of the brain is responsible for directing communication between the thought-processing sections of the brain (known as grey matter) and the rest of the body.

It is thought the damage to the brain is caused by a reduction in the child's blood supply. This reduced blood supply deprives the child's brain of oxygen, damaging the brain cells. This damage has serious consequences in later life, as the white matter of the brain is responsible for transmitting signals to the muscles.

PVL can be caused by:

an infection caught by the mother, such as rubella (German measles)

the mother having abnormally low blood pressure

premature birth, especially if a child is born at six months of age or earlier

the mother using cocaine during her pregnancy

Abnormal development of the brain

Anything that changes or affects the normal development of the brain can lead to problems with the way it transmits information to the muscles, and therefore can cause cerebral palsy. The brain is particularly vulnerable during the first 20 weeks of a child's development.

The development of the brain can be affected by:

mutations (alterations) in the genes that help the brain to develop

infection such as herpes, toxoplasmosis (an infection caused by a parasite) and cytomegalovirus (a herpes-type virus that most people have immunity to)

trauma or injury to the unborn baby's head

Intracranial haemorrhage

Intracranial haemorrhage is bleeding in the brain. This can be dangerous because:

the brain can be deprived of blood, which can kill tissue

the blood itself can damage brain tissue

Intracranial haemorrhage normally occurs in unborn babies when they have a stroke. Strokes can be caused by:

pre-existing weaknesses or abnormalities in the baby's blood vessels

the mother having high blood pressure

an infection during pregnancy, particularly pelvic inflammatory disease (an infection of the upper female reproductive organs)

Damage after birth

A few cases of cerebral palsy are caused by damage to the brain that occurs after birth.

The damage normally occurs during the first few months of a baby's life, before the brain develops its ability to withstand and adapt to a moderate degree of damage.

Damage can be caused by an infection of the brain, such as meningitis, or as the result of a traumatic head injury.

Diagnosing cerebral palsy

If you are concerned about your child's development, see your DOCTOR, who can refer you to a paediatrician (a doctor who specialises in the treatment of children).

The paediatrician will ask you about your child's history and their pattern of development. They will also study your child's reflexes, posture, motor skills and muscle tone.

Depending on your child's age, you may also be referred to an educational psychologist so your child's intellectual development can be assessed.

Testing

Further tests may be recommended to rule out other conditions which cause similar symptoms to cerebral palsy, such as a tumour or muscular dystrophy (a genetic condition affecting the development of the muscles).

In some cases, further testing will also be able to confirm a diagnosis of cerebral palsy. This is because the condition can cause changes to the structure of the brain, which can be detected by the tests.

Tests your child may require include:

blood tests

cranial ultrasound, which uses sound waves to build up a picture of your child's brain tissue

MRI scan, which uses radio and magnetic waves to study the brain in more detail

CT scan, which uses a series of X-rays that are then assembled by a computer to create a detailed 3-D model of your child's brain

While a confident diagnosis of cerebral palsy can usually be made when your child is two or three years old, the type and severity of your child's cerebral palsy may not be determined until they reach four or five years of age.

Treating cerebral palsy

You and your child will be introduced to a team of many different health professionals who will be involved in your child's care.

The team may include:

- a paediatrician

- a health visitor

- a physiotherapist, who improves a person's range of movement and coordination

- a speech and language therapist

- an occupational therapist, who helps with the skills and abilities needed for daily activities, such as washing or dressing

- an incontinence advisor

- an educational psychologist, who specialises in helping people with learning difficulties

An individual care plan will be drawn up to address any needs or problems that your child has. The plan will be continually reassessed as your child gets older and their needs and situation change.

You and your child will also be assigned a key worker, who will be the first point of contact between you and the various support services available. While your child is young, the key worker is likely to be a health visitor. As your child gets older and their needs become more complex, it is likely the key worker will be a social worker.

There is no single treatment plan for a child with cerebral palsy. Instead, there is a wide range of treatments, which are all designed to help your child achieve as much independence as possible. Some of these treatments are outlined below.

Physiotherapy

Physiotherapy is normally started as soon as your child has been diagnosed with cerebral palsy. It is one of the most important ways of helping your child to manage their condition.

There are two main goals of physiotherapy:

to prevent the weakening of muscles that are not normally used by your child

to prevent muscles getting stuck in a rigid position, known as contracture

Contracture is a risk in children who have problems stretching their muscles because of muscle stiffness. If the muscles cannot stretch, they do not grow as fast as the bones. This can lead to deformities, causing your child pain and discomfort.

A physiotherapist will teach your child a number of physical exercises that they can carry out every day to strengthen and stretch their muscles. Special arm or leg braces may also be used to help stretch their muscles.

Speech therapy

Speech therapy can help children with communication difficulties by teaching them a series of exercises that can improve their ability to speak clearly.

If their communication difficulties are severe, the therapist may be able to teach them an alternative method of communication, such as sign language.

Special equipment to help your child communicate may also be available, such as a computer connected to a voice synthesizer.

Younger children can be given a device similar to a laptop that is covered with symbols of everyday objects and activities. The child then presses a combination of symbols to make themselves understood.

Occupational therapy

Occupational therapy is designed to improve your child's posture and to make the most of what mobility they already have.

They will be given advice on the best way to carry out daily tasks that require movement skills, such as going to the toilet or getting dressed.

Occupational therapy can be extremely useful in boosting your child's self-esteem and independence, especially as they get older.

Medicines

If your child's muscles are particularly stiff and overactive, it can cause them frustration and pain. If your child experiences these problems, they may require medication to help relax their muscles.

Intrathecal baclofen therapy

Intrathecal baclofen therapy involves surgically implanting a small pump on the outside of the body that is connected to the spinal cord. The pump delivers regular doses of a medicine, known as baclofen, directly into the nervous system. Baclofen blocks some of the nerve signals that cause muscle stiffness.

Muscle relaxants

Your child may be prescribed muscle relaxant medicine such as diazepam, which is usually taken in tablet form.

Side effects of diazepam include:

drowsiness

slurred speech

constipation

nausea

incontinence

If diazepam is not effective, a number of alternative muscle relaxants can be used, such as dantrolene or tizanidine. These have similar side effects to diazepam.

Botulinum toxin

If muscle relaxants are not effective, an injection of botulinum toxin may be given. Botulinum toxin works by blocking the signals from the brain to the affected muscles.

The effects of the injection normally last for up to three months. The treatment is most effective when a programme of stretching and physical therapy follows the injections.

Treating feeding and drooling problems

Children who have problems controlling their mouth will often have problems swallowing food, as well as difficulty controlling their production of saliva. Both of these problems can be potentially serious and require treatment.

If your child has problems swallowing their food (dysphagia), there is a risk that small pieces of food could enter their breathing tubes and lungs. This can damage the lungs and trigger an infection (pneumonia).

If your child's dysphagia is mild, it may be possible to teach them techniques to overcome the problem. A modified diet using soft foods may also be required. If the problem is more serious, a feeding tube may be needed, which can be placed down your child's neck or connected directly to their stomach.

If your child has drooling problems, the excess saliva can irritate the skin around the mouth, chin and neck. It can also cause the top layer of skin to break down, which can lead to an infection.

A number of treatments can help children control their drooling, including:

- anticholinergic drugs, which reduce the body's production of saliva
- surgery to redirect the saliva gland so the saliva runs towards the back of the mouth rather than the front

- intraoral devices placed in the mouth to encourage a better tongue position and regular swallowing

- biofeedback training, where the child is taught to recognise when they are drooling and to swallow accordingly

- Orthopaedic surgery

Orthopaedic surgery is designed to correct problems with bones and joints. It may be recommended if your child's cerebral palsy is causing them pain when they walk or move around. It can also improve their posture and mobility skills, which may improve their confidence and self-esteem.

During surgery, the surgeon will lengthen any muscles and tendons that are too short and are causing problems.

It takes a week or so for the scars to heal, but it can take 12-18 months for your child to be able to walk properly after surgery.

Surgical procedures are normally staggered over your child's life, taking into account their likely physical development.

Selective dorsal rhizotomy (SDR)

Selective dorsal rhizotomy (SDR) is a surgical procedure that is normally only recommended when other treatments for muscle stiffness and overactivity have been tried and failed.

It is a major operation used to treat lower limb spasticity, which involves cutting some of the sensory nerves in the lower spinal column. This can reduce muscle stiffness in the legs, as well as cramps and spasms.

However, children who have SDR will require extensive physiotherapy, lasting three to nine months, to 'relearn' basic motor skills such as walking.

Also, this type of surgery has caused complications in some children, including:

an unpleasant tingling sensation, like pins and needles, in the part of the body that the removed nerves used to be connected to

constipation

problems urinating

Less common complications include:

breathing difficulties

lung infections

You and your child (if they are able to understand the implications of surgery) should discuss the potential benefits and risks of this procedure with your surgeon.

Complications of cerebral palsy

During the transition into adulthood, children with cerebral palsy may experience complications.

Some of these are outlined below.

Post-impairment syndrome

Most adults with cerebral palsy experience post-impairment syndrome. This condition is the result of a combination of factors caused by the stresses that cerebral palsy places on the body.

These factors may include:

fatigue (people with cerebral palsy use up to three times the energy required for walking than able-bodied people)

muscle weakness

pain

arthritis (caused by the increased pressure that the condition puts on the bones and joints)

repetitive strain injury

Further physiotherapy and equipment that can assist walking, such as a wheelchair or walking frame, may help relieve some of these symptoms.

Body organ problems

Most adults with cerebral palsy will experience premature ageing of their body organ systems (such as the heart, veins and arteries) by the time they reach 40. This is partly because of the strain that the condition puts on the body.

Also, many people with cerebral palsy do not have fully developed organs. This means that their organs often have to work harder than normal to compensate for the lack of development.

Adults with cerebral palsy should avoid activities that could further damage their organs, such as smoking, drinking an excessive amount of alcohol and eating a high-fat diet.

Depression

The daily challenges of living with a chronic condition such as cerebral palsy can cause stress and anxiety, which in turn can trigger conditions such as depression.

Cognitive behavioural therapy (CBT) has been shown to be effective in helping people fight their depression and cope better with their condition.

CBT is based on the principle that the way we feel is partly dependent on the way we think about things. People who trained themselves to react differently to their condition, using relaxation techniques and maintaining a positive attitude, reported that their levels of pain, stress and depression went down.

Making contact with other people living with cerebral palsy may help. Scope, a charity for people with cerebral palsy, operates an internet forum for people with the condition. See the Scope forum for more information.

Scope also has more detailed information about ageing and cerebral palsy.