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ALL INDIA INSTITUTE OF MEDICAL SCIENCES
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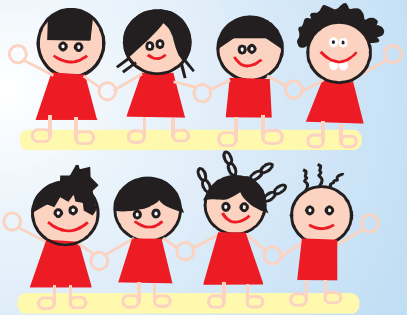
All you need to know about Cerebral Palsy!

Parents/Patient Education Guide



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Cerebral palsy describes various forms of disabilities, affecting the tone and posture of the body, with different causes affecting individuals in many ways. Early identification helps in early intervention which is very important for the overall development potential of the patient.

What is cerebral palsy?

Cerebral refers to the brain and palsy means a complete or partial loss of the ability to move a body part. It is an umbrella term used to describe a group of conditions that cause abnormalities of movement, posture and feel of the body (tight or loose) with or without accompanying fits, problems in speech, intelligence, vision and hearing. It results from damage to the developing brain. The damage or faulty development in the brain usually occurs as a baby is developing in the womb. Sometimes it occurs during birth, or shortly after birth.

This damage to the brain is a one time insult and so more commonly the symptoms won't get worse with time. The symptoms may seem to progress in children with uncontrolled fits, worsening spasticity or tightness with development of stiff joints or new onset of abnormal body movements.

Is Mental retardation different from cerebral palsy?

Yes, they are different. Mental retardation (now called intellectual disability) means a subnormal intelligence, inability to do daily activities and limited skills to function in a given society normally. On the other hand, cerebral palsy refers to impaired motor function i.e use of the muscles in the arms or legs is impaired. Someone can have CP and have normal intelligence, and someone can have mental retardation (or intellectual disability) but have no motor impairment. However, approximately two-thirds of children with cerebral palsy have mental retardation (or intellectual disability) and those with spastic quadriplegia (all four limbs are stiff) are more likely to have mental retardation (or intellectual disability).

What are the symptoms of cerebral palsy?

Most children with cerebral palsy are diagnosed between the ages of six months and two years. The first thing that is usually noticed is that a child is not developing at the normal rate. Also, the muscles tone may feel abnormal, or the baby may start to have abnormal movements.

Child can also have associated decreased intelligence, fits, speech and language problems, hearing problems, visual problems and squint and behavioral problems.

Why it is important to know about cerebral palsy?

- Ignorance about the problem will cause delay in seeking medical care preventing the child in reaching his/her full potential.

- Cerebral palsy although is not completely curable but institution of early rehabilitative measures can improve the quality of life to a significant extent.
- It is not always associated with decreased intelligence.
- With timely and appropriate intervention many patients can lead active, self supporting and long lives.
- It is not a contagious or hereditary state.

What are the causes of cerebral palsy?

Cerebral palsy can be due to numerous causes. The developing brain may be damaged before birth, during delivery or during early life.

Causes before birth

- Poor maternal nutrition
- Infection in the first 3 months manifesting in the mother as viral infection
- Infection of the baby sac and the fluid it contains in the mother's womb
- Multiple pregnancy
- Exposure to smoking, alcohol, radiation, drugs
- Maternal diabetes, thyroid disease , Increased blood pressure
- Genetic disorders, inborn disorders of metabolism
- Abnormal structure of the developing brain
- Poverty and poor antenatal care

Around the time of delivery

- Prematurity
- Difficult delivery
- Weak babies
- Failure to establish breathing at birth manifesting as weak cry
- Jaundice after birth
- Infections of the brain
- Low blood sugar levels of the baby
- Prolonged fits

Early childhood

- Brain infections
- Brain hemorrhage
- Head injury
- Drowning
- Prolonged fits

What are the types of cerebral palsy?

The classification of cerebral palsy is based on the feel of the body, the pattern of the involvement of limbs and type of movement disorder present.

- **Spastic:** It is the most common type. Spastic means that the affected muscles are more stiff than normal. Some muscles may become permanently contracted. There can be associated bone and joint deformities. It is further divided into 3 types:
  - ***Quadriplegic:*** All 4 limbs are involved and the arms are more/equally involved than the legs.
  - ***Hemiplegic:*** The leg and arm of one side of the body are affected.
  - ***Diplegic:*** Both legs are affected. Arms are not affected or are only mildly affected.
- **Dyskinetic / Dystonic:** It is associated with abnormal twisting postures or abnormal movements of the trunk and limbs which disappear or decrease significantly during sleep. Sometimes the tongue or face muscles are affected. The tone (stiffness) of the muscles can vary from too high to too low. There are various terms used in context of this type of cerebral palsy:
  - ***Dystonic:*** Presence of abnormal twisting postures of the trunk and limbs
  - ***Athetoid:*** Presence of slow writhing movements of usually hands and feet.
  - ***Chorea:*** Presence of jerky, dancing, flowing movements involving both proximal and distal extremities
- **Ataxic:** Children with ataxic cerebral palsy have difficulties with balance and fine movement. So, this can mean loss of balance and being unsteady when walking, and difficulty with doing fine tasks with their hands such as writing. The muscle tone is usually decreased.
- **Mixed:** It is characterized by combination of various types, most common being spastic with dystonic/ dyskinetic type.

Are any investigations required?

The diagnosis of cerebral palsy is essentially clinical, which means it can be reasonably diagnosed by proper history and good clinical examination by your doctor.

Laboratory investigations are not necessary to diagnose cerebral palsy. Brain imaging (preferably MRI Brain or otherwise a CT Head) should be done to find out the extent of damage to the brain.

If some specific type of fits are suspected or there is some doubt about the presence/absence of fits or decision regarding discontinuation of

drug against fits is to be taken, an Electroencephalogram (EEG) is performed which is essentially the recording of electrical activity in the brain.

Baseline visual and hearing evaluation is done when indicated. A GER (gastroesophageal reflux) scan is sometimes performed if there are choking episodes and associated regurgitation of feeds to rule out any muscular abnormality in the upper part of food pipe.

How is cerebral palsy managed?

There is no cure for cerebral palsy but much can be done to limit the degree of disability that may have occurred if treatment had not been given. It requires a multidisciplinary approach involving pediatrician, neurologist, psychologist, physiotherapist, occupational therapist, special educators, speech therapists, dietician, social worker, ophthalmologist, ENT specialist and orthopedician.

Physical/Occupational therapy

Physical therapy: It aims at achieving physical independence and mobility for patients. It includes exercises, correct positioning and teaching alternate ways of movement such as walkers, bracing and use of wheelchair.

Occupational therapy: It aims at designing purposeful activities to increase independence in activities of daily living like feeding, seating and toilet.

Principles of physiotherapy/occupational therapy

- Prevention of tightness and restricted movement of joints by passive movements and other mechanical devices like splints, calipers or braces as and when required
- Reduction of tightness of muscles by passive movement and increasing strength of weak muscles by active movements
- Training the child in activities of daily living, this should be done in the same sequence a child would normally do
- In both stiff as well as loose child encourage good postures which minimizes these effects

In patients with dyskinetic/dystonic cerebral palsy holding on with hands should be taught to steady uncontrollable movements. If abnormal twisting postures are significant manage like a stiff child and provide postural adjustments.

Few guiding rules:

- ✓ Be patient and observant.
- ✓ Praise the child a lot.
- ✓ Talk a lot to the child.
- ✓ When you are helping a child learn a new skill, guide his/her movements with your hands.
- ✓ Use a mirror to help the child learn about his/her body and to use his/her hands.
- ✓ Use imitation (copying).
- ✓ Encourage the child to reach out or go for what he wants.

CORRECT LYING AND SLEEPING POSTURES

Try to find positions that are correct and opposite to abnormal ones

Bad Postures

Legs crossing like scissors

Good Postures

Baby's legs can be held apart by putting a small pillow or using a thick nappy.

Child's body often arches backward

1
Position him to lie on a side

2
Or in a hammock

3
Or over a big barrel, ball etc.

Child does not have enough control to reach out in this position

Position him so he can lift his head using his arms.

CORRECT CARRYING POSITIONS

Abnormal Postures **Good Postures**

Child lies with arms straight

Do not carry him like this

1. Teach mother to carry the bend and legs like this.
2. Keep his legs apart and hips and knees Bent

Child with spasticity who is usually curled up

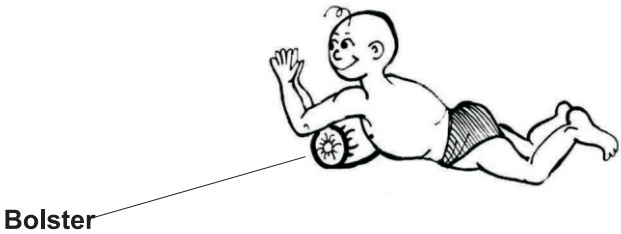
can be carried like this

The child with severe spasticity who tends to straighten and arch backwards

Holding the child by his inner thighs help turn legs out as they separate

can be carried like this

POSITION TO ACHIEVE NECK CONTROL



1. Make the child lie over a bolster.
2. Put his arms in front over the bolster.
3. Make the child hold his head up by showing him a toy etc.

4. In place of bolster mother can also use her lap for same.

5. Or mother can make the child lie on her abdomen. child's shoulder.

TO ACHIEVE ROLLING AND TWISTING

1. If the child is very stiff , first help her loosen up.
2. Swing her legs back and forth .

3. Then help her learn to twist her body and roll.

GOOD SITTING POSTURE

When to train sitting ?

1. Child has partial to good neck control
2. Has good trunk muscles so that he can lift his trunk up partially to fully while sitting.

Bad posture

1. Legs push together and turn in.
2. Shoulders press down and arms turn in.

Good Postures

1. A bolster can be used to separate legs and turn them out

1. Make him sit with his legs apart and turned outwards

1. For a child with spasticity who has trouble sitting, you can control his legs like this.
2. With your hands you can help him control and use his arms and hands.

1. Sit the child on your belly with his legs spread and feet flat
2. Give support with your knees as needed.
3. Encourage his arms and hands movements.

Bad Postures

W-Posture

Children who have trouble with balance often sit with their legs in a 'W' in order not to fall over.

Good Postures

1. Sitting in 'W' should be discouraged.
2. But , if deformities have set in and if it is the only way a child can sit and use her hands, it should be allowed.
3. For a very young child we must look for alternatives.

1. Child's legs stay apart.
2. Bottom sticks out
3. Shoulders are pulled back

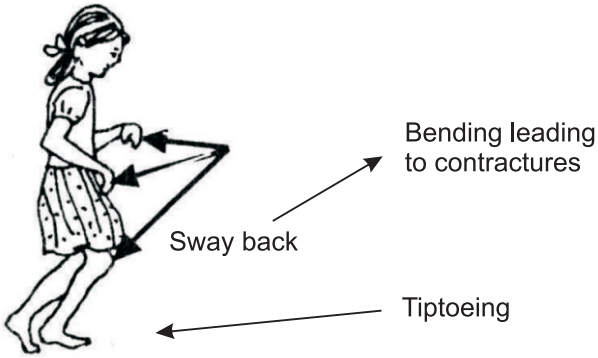
1. Sit him with his body bent forward and legs together.
2. Bend his shoulders forward.

STANDING

When to train standing ?

1. Child has good neck and trunk control.
2. Able to sit independently.
3. Lower limbs muscle power is average to good.

Bad Postures



Improving Postures

1. By providing support, you can help the child keep her balance.
2. She is less tense and can stand straighter.

1. Look for ways to provide similar assistance.
2. Here a cart provides easier balance and keeps the arms straighter.

The child who cannot yet stand alone can be placed in standing frame/deep mud hole for an hour or two each day.

AIDS FOR MOVING ABOUT

Wheelcart

Walker

Some children will need wheelboards and wheel chairs.

ORTHOSIS

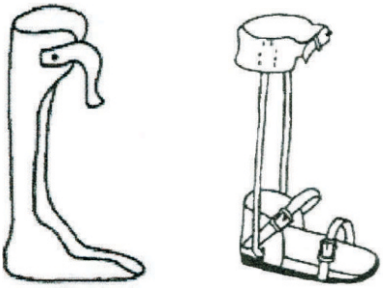
Orthosis are aids that help to hold legs or other parts of the body in useful positions. Main indications are to provide support or firmness to a weak joint or joints or to help prevent or correct deformity or contracture. Orthosis should be used only if they will help the child move better and become more independent.

COMMONLY USED ORTHOSIS

Foot Orthosis

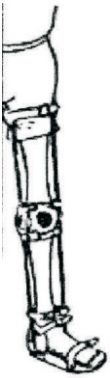
Usually made of molded plastic for lower leg, deformity in the foot, such as flat foot

Below Knee Orthosis



For weakness or deformities in ankle and foot

Above Knee Orthosis



For weakness in the upper leg and knee. Possibly also for ankle and foot

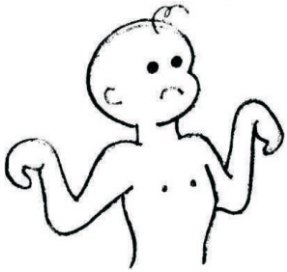
Above Knee Orthosis with a Hip Band

For severe weakness in hips and legs

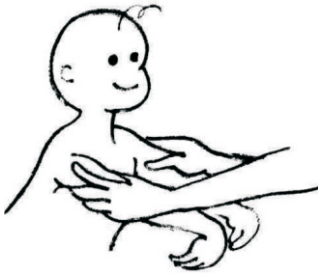
HANDLING A CEREBRAL PALSY CHILD

How to position arms for movement

Abnormal positions



How to hold



1. Hold child's arms over the elbows.
2. Turn the arms in at the shoulder.
3. Slowly lift them up.
4. Keep the head and body forward.

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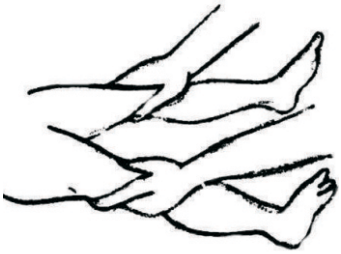
How to hold legs for movements



1. Hold the legs over the knees.
2. Turn the legs out at the hips.
3. Move the legs slowly outside.

How to hold hands for movements

Abnormal position

1. The thumb should be from the palm.
2. Can use a ball or cylindrical toy to do the same .

1. Hold over the child's elbow with one thumb- in hand.
2. With your other hand straighten his palm.
3. Turn the arms out at the shoulders keeping them straight.
4. Bend the wrist back.
5. Open the fingers last.

How to support head in lying

Abnormal position

1. Place your hand on each side of the child's head.
2. Pull his head up.
3. Push the shoulders down with your forearms.
4. Ask the child to try and lift head.

How to support head in sitting

Abnormal position

Put your hand and forearm over the

Why cannot my child feed properly?

Feeding difficulties in cerebral palsy can be due to

- Sucking and swallowing problems
- Coordination problem of muscles in the upper food pipe (gastroesophageal reflux) manifesting as regurgitation of food material
- Abnormal or decreased movements of tongue

All these factors can lead to longer feeding time, tiredness and less intake. This may lead to poor weight gain and many nutritional deficiencies.

How can I feed my child more effectively?

- Give soft/pureed foods
- Place food on the middle of the tongue
- Provide solid food in small pieces
- Appropriate feeding positions (see below).
- If help is required for closing mouth when food is inside apply pressure on the jaw
- In case the in coordination at the level of upper food pipe is very significant and not responding to medications, then the child may require surgical intervention where food is directly administered to the stomach and middle part of food pipe using external devices
- Selection of food
  - ***First 4 to 6 months of life:*** Exclusive breast feeding, if child can't suck then mother can take out her milk and give it to the child with katori and long diya.
  - ***6 to 8 months:*** Continue breast feeding, begin weaning with semisolid diet, mashed vegetables and fruits, etc.
  - ***8 to 18 months:*** Slowly decrease and stop breast feeding over 4-5 months, continue weaning further and encourage feeding the child from family pot.
  - ***Beyond 18 monhts:*** child should have the same food as rest of the family.
  - If there is difficulty in taking solid foods they can be formed into a mash/gruel or drink and then given.
- Dietary requirements: They are same as any other normal child of same age.

- Concentrating the calories in the foods a child will eat is a good way to increase the calories and protein in his or her diet. As long as your child can tolerate them, you can add any of the following foods to your child's diet to increase the calorie and protein intake: butter, oil, rice, pasta, cooked cereal, soyabean in different forms (nuggets, mashed dal), custard, honey, milkshakes, ice creams, dahi, cheese,etc. Special formulas are also available in the market (ask the dietician for details).

Why does my child cough while feeding?

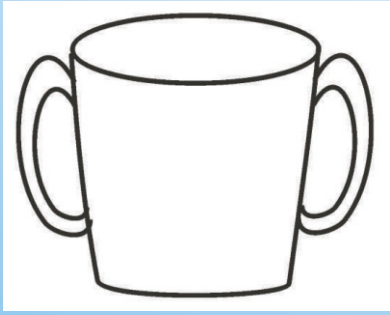
Coughing or choking while eating or difficulty in breathing while eating may signify aspiration. Aspiration is the process whereby food or secretions that are swallowed get into the lungs. This happens due to a lack of coordination in swallowing and lack of a protective body reflexes (like gag or cough). He/she may have recurrent pneumonias due to aspiration.

Parents need to be patient while feeding. Small amounts of food should be given at once. Appropriate feeding position is a must (see below). If he/she is not able to tolerate liquids, give him/her thickened liquids or pureed foods. If these do not work, then few investigations may be required (as advised by your doctor). Sometimes, alternate ways of feeding like a gastrostomy tube may be required. It is a tube that goes directly into the stomach through the skin, allowing the child to be fed without having to swallow. The food goes directly into the stomach and then is digested normally through the in-testinal system. Ask your doctor for further details.

Are any feeding aids available for my child?

Older children can be taught to self feed with the help of modified utensils

Mug with handle on both sides



Spoon with a long handle

Spoon handles for easy gripping

What is the right way of feeding my baby?

Wrong

Child has a tendency to regurgitate

Right

Feed baby in a half sitting position with her head bent slightly forward, shoulders pushed forward and hips bent

Wrong

Pushing the head forward like this will cause the baby to push her head back more forcefully

Wrong

This may choke the baby

Right

Place food below and in front of the baby

Why my child does not pass stools regularly?

Constipation is not an uncommon problem in any child with CP. It is commonly seen in those who either are confined to bed or are not taking sufficient liquids or both. Constipation is easier to prevent than to treat. The Wrst step in doing either one is usually dietary changes. In particular, an increase in fluids and

fiber in the diet should help prevent or treat mild constipation. In severe cases, few medications may be used (as advised by your doctor). Avoid regular use of these medications.

What can I do for drooling?

Lack of coordination of the muscles in the face, head, and neck can result in a significant amount of drooling. To some extent, drooling can be improved by modifying the child's position so that the head does not fall forward. Other measures that may help include regular toothbrushing to help fight dental disease, correction of orthodontic (teeth) problems that may interfere with the ability to close the mouth, and managing enlarged tonsils or adenoids that may be obstructing the mouth or nose. Rarely drugs, regular suctioning or surgery may be required.

Should I brush my child's teeth?

Start oral hygiene in the first year even before the child has teeth. Begin by just wiping the inside of the child's mouth with a moist cloththis will get him used to having his mouth cleaned. Toothbrushing should start by age 18 months and can be initiated with soft brushes. Brushing should include the gums and tongue as well as the teeth. Find a time of day when the child is usually in a good mood, and try to do brushing at the same time every day. If the child does not tolerate a toothbrush, use a cotton-tipped swab or a soft wash-cloth that has been soaked with a mildly abrasive toothpaste or with an antiseptic solution. Always avoid gagging.

Can my child be vaccinated?

Child with cerebral palsy can be vaccinated just like any other normal child. However if he/she has a disease which is progressively causing brain damage then instead of normal pertussis vaccine, acellular pertussis vaccine may be given.

What is early developmental stimulation? How is it done?

Various perceptory units of the body are stimulated like vision, touch, auditory, etc. Talk to the baby. Talk or sing while giving a bath or dressing the baby. Also sing a poem or nursery rhymes during the activity. Play soothing music around the child. Give him colored toys/toys with lights/sounds to play. Hang a mobile toy on the right and left side of the crib so the child can move/turn accordingly. Show the child his/her hands

and feet and move them together. Hold a mirror in front of the child. Use a toy or a bell to make a sound in front and back of the child to facilitate head movements. Hold the baby while feeding. Touch and handle in a loving gentle manner. Hold the baby in your arms and walk around the room. Gently rub on the head. Encourage the child to play with siblings or children in the neighbourhood.

Training made easy!

- ✓ Exercise patience and do not get disheartened by child's failure.
- ✓ Child can be trained any time but a well fed baby in right mood would respond better.
- ✓ Any thing appropriate and attractive at home can be used as training material.
- ✓ Involve normal children of same age while training the child.
- ✓ Every child has certain potentials which have to be explored. Start the training with what the child knows so that your baby has the feeling of success.
- ✓ Proceed to the skills in which the child needs to be trained.
- ✓ Appreciate the child for even little efforts.
- ✓ Reward is a must once the child masters the skills.

Are any drugs needed?

Epilepsy/Fits: Appropriate drugs are used for treating fits in cerebral palsy patients. The parents should strictly adhere to the medications prescribed by the doctor for their child. But remember, sometimes, children with cerebral palsy may have fits which are difficult to control even with optimum dosage of appropriate drugs.

What should I do when my child has seizure? Stay calm. Loosen tight clothing. Roll your child onto his side into the recovery position. Wipe off any secretions from nose and mouth. Do not put anything in your child's mouth.

Remember, most seizures will stop within seconds or a couple of minutes without any medical treatment. Medications may need to be given if the seizure persists > 4-5 minutes. These medications can be given by the caregiver orally/nasally or rectally as advised by your doctor.

Other drugs: Sometimes other drugs might be prescribed by the doctor. Drugs to relax the stiff muscles (eg baclofen, tizanidine) may be used if stiffness persists despite adequate physiotherapy. Botulinum toxin

injections may be prescribed in extreme cases. Drugs may also be prescribed to reduce abnormal posturing or other abnormal body movements.

What should I do when my child has seizure?

Some Do's and Donts are given below:

Do's	Dont's
• Stay calm. • Stay with your child. • If possible, note the time the seizure starts and ends. • Loosen tight clothing. • Roll your child onto his side into the recovery position.(see figure 1) • Move your child away from potentially harmful objects eg. furniture with sharp corners,water/fire sources. • Place something soft under your child's head to stop their head hitting the floor. • Wipe off any secretions from nose and mouth.	• Do not panic. • Do not try to hold or restrain your child. • Do not put anything in your child's mouth. • Do not try to put your child into cool or lukewarm water to cool off.

Figure 1: Recovery position

What should be done at home to stop a seizure?

Remember, most seizures will stop within seconds or a couple of minutes without any medical treatment. Medications may need to be given if the seizure persists > 4-5 minutes. Commonly medications like midazolam or diazepam are used for this purpose. They can be given through various routes. You can use any of the following two ways to stop a seizure:

Steps to give Intranasal midazolam

1. Put the child in recovery position as demonstrated in figure 1.
2. Gently insert the nozzle of the spray bottle into one of the nostrils of the child.
3. Press down on the nozzle to deliver the required number of puffs (as advised by the doctor) to each nostril.

Figure 2: Intranasal midazolam

Steps to give Buccal Midazolam

1. The appropriate dose of the drug will be advised to you by the doctor. Take a 2 ml syringe with needle attached. Insert the needle (with syringe attached) into the vial/ ampoule. Turn the bottle upside down and draw out the amount prescribed by your doctor. Turn the bottle upright and remove the syringe. Remove any air bubbles. Remove the needle.
2. Put the child on his side (as in recovery position-figure1).
3. Gently place the syringe (without the needle) into the space between the child's teeth and their cheek (Fig 2). Use the side closest to the floor. Once the syringe is in place slowly push the plunger down to squeeze out the medicine.
4. Hold the child's lips together on that side for a minute or two to prevent leakage.

It will take between 3-5 minutes to work because it has to be absorbed into the bloodstream.

Figure 3: Buccal Midazolam

Steps to give per rectal Diazepam suppository

1. The appropriate dose of the suppository will be advised to you by the doctor.
2. Carefully take the suppository out of the wrapper.(Figure 4)
3. Put the child on his side (as in recovery position-figure1). Bend the knees onto the chest. (Figure 5)
4. Insert the suppository into anus.
5. Hold buttocks together for 2 minutes.

It will take between five and eight minutes to work because it has to be absorbed into the bloodstream.

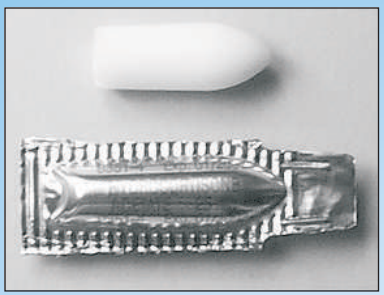


Figure 4: A rectal suppository

Figure 5: A mother giving rectal suppository to her child

Does my child need to undergo any surgery?

Depending on the type and degree of muscle contracture, an operation may help in some cases at some stage. For example, an operation to loosen tight muscles or to correct a joint deformity. The aim of these operations is to give more flexibility and control of the affected limbs and joints. Most operations are performed on the muscles around the hips, knees, and ankles.

What else I need to do for my child?

Visual problems: Visual problems like squint (cross-eye), refractory errors, jerking of the eyes (nystagmus) or optic atrophy (shrinkage of the nerve of the eye) are common in children with CP. These should not be ignored and early help of an eye specialist should be sought.

Hearing problems: Children with cerebral palsy should routinely undergo ear evaluation and hearing assessment by an ENT specialist. Early interventions (like hearing aids or treatmentof various ear diseases) helps the brain of the child to grow normally. Speech problems can be reduced. Interventions from speech therapist can help in improving speech of the child.

Education: Children with cerebral palsy may have to go to special schools in view of associated with intellectual impairment. However patients with normal or near normal intelligence can however go to mainstream school.

The child's rehabilitation should be carried out at his home in surroundings that he/she is familiar with, not in institutions. Good family support is the key in helping the child realize his/her full potential. They shouldn't be treated as burdens as they can also contribute actively to the society.

Will my child walk?

This may be difficult to answer when the child is very young. The severity of cerebral palsy can range from mild to severe. It is difficult predict the future for each individual case. But as a very general guide, almost all children with hemiplegia will walk, around 75% children with diplegic CP will walk and around 25% children with quadriplegic CP will walk. If the child starts sitting by 2 years of age, then he has high probability of unaided walking in future.

Does the law provide any security for my child? Is there any legislation related to cerebral palsy present?

The Person with Disabilities Act was passed in 1995. The important components of this act are:

- Every child with disability has access to free and adequate education till 18 years
- Student with disabilities can be integrated into normal school
- Special school should be set up for those in need of education
- Posts are identified for disabled persons
- No discrimination should be done for patients with disabilities
- Within economic constraints government should undertake rehabilitation programs for patients with disability

Can Cerebral palsy be prevented?

The ultimate hope for overcoming cerebral palsy lies with prevention. Few preventive measures are enumerated below:

- Proper antenatal check up
- Avoid drugs without medical supervision
- Avoid X-ray exposure
- Proper care of mother's nutrition
- Institutional deliveries
- Seek medical attention if baby appears yellow(having jaundice) after birth

Research

Globally various research programmes are underway to prevent , reduce the effects and improve the quality of life of people with cerebral palsy.

Can cerebral palsy be cured?

Cerebral palsy occurs due to insult in developing immature brain. It cannot be cured but physical rehabilitation will definitely benefit the motor function of the child.

What are the treatment goals in cerebral palsy?

The treatment of cerebral palsy is largely to improve motor function of the child and make the child independent for daily living as far as possible depending upon the extent of brain injury. Certain drugs are used to decrease the muscle tone and hence help in physical rehabilitation.

Another important goal is treatment of the comorbidities like:

- Epilepsy
- Drooling
- Feeding issues
- Squint/ refractive error
- Hearing aid if required

What treatment has shown benefit in cerebral palsy?

The only most effective treatment is physical rehabilitation which improves the motor function. The drugs are used to manage the tone of the child and symptomatic treatment for the comorbidities.

Can any surgical procedure cure the child?

There is no cure for cerebral palsy. The treatment offered improves the locomotor activity of the child. The surgical procedures can be offered on an individual basis depending upon the physical disability and locomotor status.

What are the developments in physical rehabilitation in cerebral palsy?

Recent developments in the field of physical rehabilitation in cerebral palsy are:

- Constraint induced movement therapy (CIMT)- This has shown significant benefit in hemiparetic cerebral palsy patients
- Virtual therapy and biofeedback along with the continued physical and occupational therapy
- Robot assisted neuro rehabilitation has recently been introduced but is still experimental stage

What are the newer therapies in cerebral palsy?

There is lot of research ongoing in this area to improve the physical and cognitive outcome of the child. The therapies are:

- Hyperbaric oxygen therapy
- Stem cell therapy

At present these therapies are still experimental and has shown no significant benefit in clinical practice; hence are not recommended.

What is Modified Constraint induced movement therapy (mCIMT)?

Modified Constraint induced movement therapy (mCIMT) is a proven method of rehabilitation in hemiparetic cerebral palsy.

Principle: Restraining of healthy arm and hand for limited periods in a day helps in encouraging movement in the weak arm and hand. Movement of weak upper limb improves with the help of exercises and task based training.

Procedure:

***Restrainment*:** Healthy arm can be restrained using a shoulder sling. Slings are available in several sizes and can even be made at home using a cloth or a towel. Healthy arm and forearm should be placed in the sling and length of belt of sling should be adjusted. Hand and fingers should be within the sling.

***Exercises*:** Task based training of weak limb is encouraged by various exercises and maneuvers

In the beginning, child may be asked to open and close the hand; move the wrist up and down; and repeatedly straighten the arm at elbow. Subsequently, other exercises like lifting a glass, separating black and white chess pieces, may be helpful. If child performs easier activities, activities with increased level of difficulty should be advised.

These exercises include lifting metallic cylinders of increasing weight from a wooden board with affected hand and then placing them back; placing circular discs of different sizes over a vertical metallic rod; coloring a picture etc. This can improve hand, wrist, elbow and shoulder movements.

Duration of therapy: mCIMT should be done for atleast 4 weeks where healthy arm and hand is restrained for 3 hours a day. It is not necessary to restrain the healthy upper limb for 3 hours continuously. Restrainment may be done for 30 minutes each time, 6-7times/day

Child Neurology OPDs	**Tuesday & Friday 9 a.m. onwards**	**Room No.4, 5, 14**
Development Clinic	**Monday 2 p.m. onwards**	**Room No.5**
Neurocysticercosis Clinic	**Monday 2 p.m. onwards**	**Room No.11**
Pediatric Neurology Clinic	**Wednesday 2 p.m. onwards**	**Room No.3, 4, 5**
Autism Clinic	**Thursday 9 a.m. onwards**	**Room No.12, 13, D**
Neuromuscle Disorders Clinic	**Friday 2 p.m. onwards**	**Room No.3, 4**

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