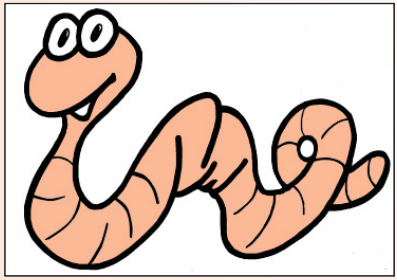
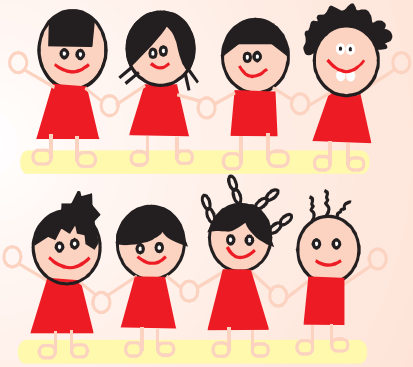
ALL YOU NEED TO KNOW ABOUT NEUROCYSTICERCOSIS !

Child Neurology Division
Department of Pediatrics, AIIMS, New Delhi

Lets fight the worms in the brain

Parents/Patient Education Guide





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What is Neurocysticercosis (NCC)?

It is the infestation of human nervous system (includes brain and spinal cord) by a germ called ***Taenia solium***, commonly called as Pork tape worm. The eggs of this parasite are responsible for causing various symptoms and complication of this disease.

Who gets Cysticercosis?

Anyone who is exposed to tapeworm eggs can be infected. It is common in some parts of the world like India, Mexico, Central and South America. It occurs due to accidental swallowing of pork tapeworm eggs. Tapeworm eggs are normally passed during the defecation of a person who is infected. If this infected material contaminates drinking water or food including vegetables, it can be consumed and this can lead to infection with the pork tapeworm.

How did my child acquire this?

Humans acquire the tape worm by ingestion of inadequately cleaned vegetables like cabbage, cauliflower etc. The eggs of tape worm migrate from the intestine to reach different body parts like brain, eyes, muscles etc. The eggs of the worm are responsible for various symptoms caused by this disease. Autoinfection is another mode.

What are the common symptoms of NCC?

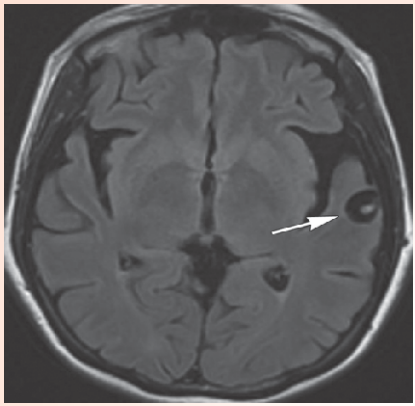
Following are the common symptoms of NCC

- Seizures (convulsions/fits) -Most common presenting symptom in children
- Headache
- Visual disturbances: Blurred vision, decreased vision
- Nausea and vomiting
- Accumulation of fluid or Hydrocephalus may result from obstruction to the flow of the fluid of the brain (cerebrospinal fluid) by the cysticerci
- Sensory disturbances(numbness)

Is there a cure for NCC? What is the treatment?

The treatment for NCC depends on the number of cysticerci in the brain, the location within the brain, and the stage of cysticercus (live, degenerating or calcified) as described below:

- ***Live and dying cysts***: These are treated with drugs to control seizures called anti-epileptic drugs (AEDs), drugs to control swelling in the brain (Corticosteroids), and drugs to kill the worm (Cysticidal drugs) for a specified time.The AEDs are started at the onset of seizures. The corticosteroids and cysticidal drugs are usually started after eye examination to rule out the presence of cysticerci in the eyes.



Degenerating/Dying NCC

Calcified/Dead NCC

- ***Calcified/Dead NCC***: There is no need to give cysticidal drugs (drugs to kill the worm). Corticosteroids (drugs to control swelling in the brain) may sometimes be required if there is significant swelling in the brain resulting in troublesome symptoms like headache, blurred vision, vomiting etc.

What precautions should be followed during the therapy?

- The medication should be given regularly as advised by your Doctor
- Your child should be brought for check-up regularly as advised by the Doctor
- There are no specific restrictions in terms of food

What is the follow-up plan for my child after completing the course of cysticidal treatment?

- After the completion of cysticidal therapy, your child needs to be brought for follow-up at 3 months and then at 6 months

- At 6 months visit, a CT scan will be repeated and further treatment plan will be decided based on CT scan results
- If CT scan is normal and the childs seizures are under control, the seizure medication will be gradually decreased and stopped over 2-3 months
- If CT shows calcified/dead NCC, the seizure medication will be continued to reduce the recurrence of seizures. If your child remains seizure-free for at least 2 years, the medication will be gradually reduced and stopped over 2-3 months
- If CT scan shows live or dying NCC, then your child will require another course of cysticidal therapy; seizure medication will be continued

Is my child epileptic? Or does my child have Epilepsy? Will my child have fits again?

- In majority of children with NCC, NCC resolved completely following cysticidal therapy and the seizures are controlled with medication. In these children, the seizure medication can be successfully stopped. These children will not have Epilepsy
- A minor proportion of children can have repeated seizures: usually due to calcified/dead NCC, sometimes even with normal CT scan. These are treated as having Epilepsy

Can NCC recur again?

- If the exposure to pork tape worm can be avoided (as detailed below), repeat infestation can be prevented

How to prevent infestation with NCC?

- Wash all vegetables 2 to 3 times and scrub them well, especially the ones which are eaten raw
- Always peel carrot, cucumber, radish, etc.
- Wash your hands before eating
- Ensure that children wash their hands before eating, after playing, after coming back from outside, etc.
- Avoid having food off the streets.
- Always have boiled drinking water
- Avoid eating raw pork or undercooked pork

Is there a vaccine for preventing Neurocysticercosis?

No, at present there is no vaccine

What if my child develops fits/convulsion at home?

Some Dos and Donts are given below:

Do's	Don't
• 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 childs head to stop their head hitting the floor.	• Do not panic. • Do not try to hold or restrain your child. • Do not put anything in your childs mouth. • Do not try to put your child into cool or lukewarm water to cool off.

Figure 1 : Recovery position

Can I do something 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

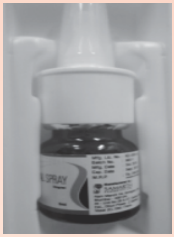


Figure 2a : Nasal Spray

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. (Fig. 2a)
3. Press down on the nozzle to deliver the required number of puffs (as advised by the doctor) to each nostril.
4. If nasal spray is not available, Injection Midazolam (i/v 1mg/ml or 5mg/ml) can be used to administer required dosage through nostril dropwise as per the advice of your doctor. (Fig. 2b)

Figure 2b : Midazolam Injection

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.

Figure 3: Buccal Midazolam

4. Hold the child's lips together on that side for a minute or two to prevent leakage. It will take 3-5 minutes to work because it has to be absorbed into the bloodstream.

Steps to give per rectal Diazepam Suppository

The appropriate dose of the suppository will be advised to you by the doctor.

1. Carefully take the suppository out of the wrapper.(Figure 4)
2. Put the child on his side (as in recovery position-figure1). Bend the knees onto the chest. (Figure 5)
3. Insert the suppository into anus.
4. Hold buttocks together for 2 minutes.

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

Figure 4 : Rectal suppository

Figure 5 : A Mother giving rectal supppsitory to her child

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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