

Tonic-clonic seizures are a type of generalized seizure. They have been recognized for a very long time; they are described in Egyptian hieroglyphics that date back to 700 BC.

Tonic seizures involve sudden stiffening and contraction of the muscles. Clonic seizures involve rhythmic twitching or jerking of one or several muscles. Tonic-clonic seizures are a combination of these two types in a specific pattern. This page discusses tonic, clonic, and tonic-clonic seizures and their variations.

What are other terms for tonic-clonic seizures?

Other terms for tonic-clonic seizures that you may come across include:

- grand mal
- generalized convulsion
- major motor seizure

How can you tell if your child has tonic, clonic, or tonic-clonic seizures?

Tonic-Clonic Seizures

Tonic seizures

Tonic seizures involve increased muscle tone or stiffness. Depending on how quickly the seizure starts and how long it lasts, tonic seizures may be a gradual movement or a massive jerk. The child may be pushed forward or backward and even fall down as a result of the muscle stiffening. The child may turn blue and appear to stop breathing because his chest muscles have also stiffened. Tonic seizures usually last for 10 to 15 seconds, but may last for up to a minute. They often occur during sleep or just after a

child wakes up. The child is only confused for a short time after the seizure.

Clonic seizures

Clonic seizures involve rhythmic jerking, unlike myoclonic seizures, which involve only one or a few twitches or jerks without any particular rhythm.

Tonic-clonic seizures

The first sign of a tonic-clonic seizure is that the child cries out or groans loudly, then falls down. The child may lose consciousness at this point or later in the seizure.

In the tonic phase of the seizure, the child is rigid, his teeth clench, he may stop breathing and turn blue, and saliva or foam may drip from his mouth. His heart rate and blood pressure rise, and he may sweat or tremble.

In the clonic phase of the seizure, the child's arms and legs jerk quickly and rhythmically; his pupils contract and dilate. At the end of this phase, the child relaxes and may lose control of his bowel or bladder.

After the seizure, the child regains consciousness slowly. He may seem sleepy, confused, anxious, or depressed. This post-ictal phase may last for several hours.

Tonic-clonic seizures last for about a minute on average, but they can last far longer. The length and severity of a tonic-clonic seizure, the muscles involved, and the amount of autonomic involvement (flushing, sweating, heart rate changes) can all vary from person to person.

During the seizure, the child's EEG shows a generalized, symmetric pattern. The details of the EEG can help to identify a particular syndrome or determine whether the seizures are symptomatic.

Variations of these seizure types may appear. For instance, a partial seizure may become secondarily generalized, or a myoclonic seizure may develop into a tonic-clonic seizure. When the seizures begin fast, it can be hard to tell the difference between a seizure that is generalized to begin with and one that is secondarily generalized.

Tonic-clonic seizures rarely happen in the first six months of a child's life, although tonic and clonic movements can be seen separately.

Are tonic-clonic seizures dangerous?

It is possible, but uncommon, for children to be injured during a tonic-clonic seizure.

The most common injury is from the child biting his lip, tongue, or cheek during the seizure. Unfortunately it is not possible to prevent this, as forcing an object into his mouth can break the child's teeth or cause choking.

Children may also get minor scrapes and cuts or hit their heads if they fall suddenly or hit a piece of furniture during the seizure.

Occasionally, a child may get a stress fracture. This is a broken bone that is caused by excessive activity or stress on the bone, not from a specific injury.

Other rare complications include aspiration pneumonia or pulmonary edema, if a child chokes or inhales saliva or vomit during a seizure. It is not possible for a child to swallow his tongue during a tonic-clonic seizure.

Your child may briefly stop breathing

Sometimes your child may stop breathing during the tonic (stiff) phase of the seizure. This happens because all his muscles become stiff, including the breathing muscles in the chest.

At the same time, your child's face may become dusky or blue, especially around the mouth. This is because more blood is being pumped to protect the vital organs, with less blood to the surface blood vessels of the body, including the face. You may notice a similar colour change when a small child jumps into cold water.

This period is usually brief and does not require CPR. The child will start breathing again, albeit shallowly, during the clonic (muscle spasm) phase of the seizure.

How many other children have tonic-clonic seizures?

Tonic-clonic seizures are the most common type of generalized seizure. Studies have seen tonic-clonic seizures in up to 27% of children with epilepsy.

What causes tonic-clonic seizures?

Children have tonic-clonic seizures with many different epilepsy syndromes, and other types of seizures can also progress to tonic-clonic seizures. Injury, tumours, or infections involving the cerebral cortex increase the risk of tonic-clonic seizures. Abrupt withdrawal of anti-

epileptic drugs may trigger a tonic-clonic seizure.

Children without epilepsy may also have tonic-clonic seizures as a result of another illness (such as meningitis or diabetes).

Tonic seizures are common with Lennox-Gastaut syndrome.

How are tonic-clonic seizures treated?

The best treatment for tonic-clonic seizures depends on the cause. In some cases, tonic-clonic seizures can be controlled with anti-epileptic drugs. Secondarily generalized seizures are slightly less likely to respond to anti-epileptic drugs. The ketogenic diet, vagus nerve stimulation, or surgery may all be considered in certain cases.

What should I do when my child has a tonic-clonic seizure?

Tonic-clonic seizures are often intense and frightening. With these types of seizures, you should take certain safety measures so that your child is not hurt.

Step 1: Stay calm and reassure others

Many people are scared when they see someone having a seizure. You can help your child by staying calm. Reassure her and others around you that everything is under control.

Step 2: Prevent injury

- Help your child away from sources of danger. If she is near a stairway, a hot stove, a busy street, or other hazards, protect her as much as possible.

- Remove nearby objects that are sharp or hard. Try to put something soft like a folded jacket under her head.
- During the tonic phase of the seizure, she may temporarily stop breathing and her face may become dusky or blue, especially around the mouth. This period is usually brief (usually no more than 30 to 45 seconds) and does not require CPR. She will start breathing again, albeit shallowly, during the clonic (muscle spasm) phase.
- Do not hold her down or try to stop her movements, as this might result in injury.

Step 3: Be aware of the length of the seizure

If possible, note the time that the seizure began, and how long it lasts. If it is the child's first convulsive seizure, or if it lasts more than five minutes, call 911 or emergency services. Pay attention to the nature and the length of the seizure so you can give an accurate report.

Step 4: Make your child as comfortable as possible

- Remove glasses so they do not break.
- If your child has food in her mouth, do not attempt to take the food out as this may actually push it farther in.
- If possible, roll her gently onto her side or roll her head and if possible her upper body to the side so that any fluids can drain out of her mouth. You may need to wait until she has stopped shaking. Make sure that her airway is open.
- Loosen anything around her neck to make breathing easier. Loosen buttons or belts that are tight.

Step 5: Do not put anything in your child's mouth

Putting a finger, a spoon, or any other object in her mouth could result in choking or broken teeth, not to mention a bitten finger. It is a common misconception that people can swallow their tongue during a seizure, but this is not true because the tongue is attached to the back of the throat.

Step 6: Keep bystanders away

Only one or two people are needed for first aid. Your child will feel upset and embarrassed when she becomes conscious if lots of people have been watching.

Step 7: Do not give your child any water, food, or pills until the seizure is over and she is fully alert

This will prevent choking. In some cases, your child's doctor may have prescribed medication to be used at the time of the seizure; use it as directed. An easy way to check if she is alert is by asking simple questions until your child has returned to her usual state.

Step 8: Be sensitive and supportive after the seizure

Children usually recover from seizures on their own.

- If your child is old enough, explain to her exactly what happened, and how long the seizure lasted.
- Your child may be confused, frightened, or embarrassed. She will want to be comforted. Help her to know where she is and what is going on.

- She may have wet her pants or had a bowel movement during a seizure. Help her get clean. Tell her you know that she could not help it.

Step 9: After the seizure

- If your child complains of minor pain from a headache, muscle ache, or bitten tongue, acetaminophen may help.
- If she has severe back pain, or if she was injured during the seizure, take her to see a doctor.
- Your child may develop a fever after the seizure. If it is unusually high, lasts more than six hours, or develops more than three hours after the seizure, see a doctor.

What is the outlook for a child with tonic-clonic seizures?

Some children have only one tonic-clonic seizure provoked by illness, fever, or medication, and never have another. These children are not considered to have epilepsy.

Because tonic-clonic seizures have so many possible causes, it is difficult to discuss the possible outcome. If the seizures are idiopathic, the chance of remission at some point is good. However, the chance that seizures will eventually stop depends on the underlying condition.

The relationship between the number of seizures a child has and the child's prognosis is unclear. Some studies have found a link between the number of tonic-clonic seizures before the seizures were brought under control and the chance of recurrence, while others have found no such relationship.

With tonic seizures, especially those that begin before the child is two years old, the prospects for seizure control are not very good.

Children who have other neurological problems in addition to epilepsy are also less likely to become seizure-free.