

PART TWO

Seizures and Teens: Sorting Out Seizures

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Introduction

In adolescents, diagnosing seizures can be challenging and can lead to many pitfalls. Because seizures are episodic and unpredictable events, they usually do not occur in the doctor's office. Thus, a diagnosis of epilepsy is usually based on information presented by the person with seizures and their family. Together with results of diagnostic tests, doctors determine if the events are seizures and what type. Once a diagnosis of epilepsy is made, sorting out whether the patient's disorder can be classified into a defined group, or an epilepsy syndrome, is done. Knowing the specific epilepsy syndrome can help people understand the cause(s) of the epilepsy, what other problems may be associated with the seizures and what the prognosis or future may be like. For example, some types of epilepsy respond better to medicines than others. Some epilepsy syndromes may be considered 'benign' and tend to go away at a certain age, while others are often difficult to control or require life-long treatment. This article discusses the challenges of sorting out seizures, common seizure types and syndromes, and ways families and caregivers can observe and record seizures.

Challenges and dilemmas

How often do doctors make errors diagnosing seizures? Since there is no single test to diagnose epilepsy, exact answers are not known. Yet clinical experience suggests that misdiagnosis is more common than one might imagine. Consider the following situations:

Bob was 17 years old when he developed episodes of staring, non-responsiveness and slight shaking movements of the body. He was diagnosed with complex partial epilepsy and was treated with carbamazepine and phenytoin for years before obtaining another opin-

ion at an epilepsy center years later. VideoEEG monitoring recorded one of his typical seizures in which his heart stopped for 15 seconds; a heart problem was triggering the seizures. Antiepileptic medicines were stopped and a heart pacemaker was implanted. Bob has been completely free of episodes for 15 years. A videotape of his spell was shown at a medical meeting during a lecture on diagnosing epilepsy. The EEG and one channel of EKG were also shown. The audience had five choices: complex partial seizure, tonic clonic seizure, nonepileptic psychogenic seizure and cardiac syncope. By chance, 20 percent should have guessed the correct answer, but less than 5 percent made the correct diagnosis—even witnessing the episode.

Case 2 is Jennifer, 14 years old, who was seen by a pediatric neurologist after having two tonic-clonic seizures in six months. The EEG showed spike activity on both sides, more in the right frontal area, consistent with partial epilepsy. She was started on carbamazepine and had the doses increased each time she had another seizure. She was seen at an epilepsy center and her history revealed that all seizures occurred within an hour after awakening. She also had brief jerking movements of both shoulders while awake. Another EEG showed generalized spike-and-wave discharges. The diagnosis was changed to juvenile myoclonic epilepsy, a form of generalized epilepsy that causes absence, myoclonic and tonic-clonic seizures. Carbamazepine can make this type of epilepsy worse. She was changed to lamotrigine and has been seizure free for five years.

All epilepsy means is that a person has had two or more seizures that are not provoked by a medical problem. Once epilepsy is diagnosed, the next steps are to identify the seizure types and epilepsy syndrome. Clinicians

should be very humble and not be "married" to their first diagnosis. If a person is not doing well or as expected, one of the first questions should be "is the diagnosis correct?" Too often, once a diagnosis is made, people focus on the information that supports the diagnosis and don't look carefully at information that may lead to a different answer. This aspect of human nature can be dangerous, as mistaken diagnoses tend to persist under the care of different doctors. There are many other health problems that can masquerade as epilepsy. Table 1 summarizes some of the most common conditions mistaken for epilepsy.

Table 1:
Common Imitators of Epilepsy

- Fainting spells or syncope
- Migraines
- Movement disorders
- Heart rhythm disorders
- Sleep disturbances
- Staring spells, daydreaming
- Attention problems
- Rage attacks
- Other behavior problems
- Anxiety or panic attacks

Correct classification is critical to know what diagnostic tests may be needed and establish an appropriate treatment plan. Just as historical information can be misleading, diagnostic studies can also lead to wrong diagnoses, as shown in case 2 (see above). If the seizure type is incorrectly classified, the underlying cause of epilepsy may not be recognized or an inappropriate medication may be selected. This could lead to unnecessary side effects, incomplete control, or in some cases, worsening of seizure control.

Types of Seizures

Seizures can be broadly separated into two

groups: (1) primary generalized seizures and (2) partial seizures (Table 2).

Table 2: Classifying Epileptic Seizures

Primary Generalized Seizures

- Absence
- Myoclonic
- Atonic
- Clonic
- Tonic
- Tonic-clonic

PARTIAL SEIZURES

- Simple Partial
- Complex Partial
- Partial seizures that
secondary generalize

Primary generalized seizures begin with a widespread, excessive electrical discharge that involves both sides of the brain at the same time. In contrast, partial seizures begin with an abnormal electrical discharge that begins in one area of the brain. Diagnostic tests and therapies can vary for these disorders, making correct diagnosis essential. A description of what happened before, during and after the seizure, as well as recordings of the brain waves, help the doctor to determine the type of seizure.

IDIOPATHIC (PRIMARY) GENERALIZED SEIZURES. The cause of most generalized seizures is unknown (also called idiopathic), although genetic factors are suspected. The three most common types are absence, myoclonic and tonic-clonic.

ABSENCE SEIZURES (often called petit mal) are brief episodes of staring; the person is not aware of what is going on and cannot respond. The episode begins and ends suddenly, usually lasting less than 10 seconds, but may last 20 seconds or longer. There is no warning and immediately afterward the person is alert and able to pay attention. The teenager may or may not be aware that a seizure has occurred. Sometimes the person is thought to be daydreaming, confused or

have attention problems. Simple absence seizures are just “stares.” Complex absence seizures mean that there may also be some change in muscle activity (e.g., eye blinking or automatic hand movements), especially if the seizure lasts more than 10 seconds.

There are two main syndromes of absence epilepsy. Childhood absence epilepsy begins between the ages of four and eight years old with most children outgrowing the seizures in their teenage years; very few will have tonic-clonic seizures. Juvenile absence epilepsy begins in the early teen years (10-14 years old); seizures often persist into adulthood and many develop tonic-clonic seizures. Children with absence seizures have normal development and intelligence, but may have higher rates of behavioral, educational and social problems than other children. The EEG is extremely helpful in diagnosing absence seizures. In most cases, generalized spike-and-wave discharges at three-per-second or faster are recorded, especially during hyperventilation. Brain MRI is normal. Absence seizures may be confused with complex partial seizures (see below), however, absence seizures are usually shorter and are not associated with a warning (aura) or after effects such as tiredness or confusion.

MYOCLONIC SEIZURES are the most under-diagnosed seizure type in my experience. Myoclonic seizures occur as brief, shock-like jerks of a muscle or group of muscles. Myoclonus may occur in people who do not have epilepsy (e.g., sudden jerks when a person is falling asleep or benign nocturnal myoclonus) and in these situations is not considered epilepsy. Epileptic myoclonus usually causes abnormal movements that involve both sides of the body (e.g., neck, shoulders, and upper arms) at the same time. Myoclonic seizures are the main seizure type in teenagers with juvenile myoclonic epilepsy. In this syndrome, seizures most commonly occur within one hour after awakening. The attacks are usually well controlled with medication, which often needs to be continued throughout the person’s life.

TONIC-CLONIC (grand mal) seizures are convulsive seizures. The person briefly stiffens on both sides, loses consciousness and falls if standing. The stiffening (tonic phase) is followed by jerking (clonic phase) of the arms and legs. The seizures usually last one to three minutes. There may be excessive saliva pro-

duction, sometimes incorrectly described as “foaming” at the mouth. The tongue or cheek may be bitten. Loss of urine or, rarely, a bowel movement may occur. After the convulsion, the person is usually tired and confused for minutes to hours and often sleeps. At times the person can be agitated.

PARTIAL SEIZURES. Partial seizures begin with an abnormal burst of electrical activity from a restricted brain area. Most partial seizures arise from the temporal or frontal lobes. Head injury, brain infections and problems in the way the brain developed are common causes of partial seizures in childhood and adolescence. Often, no cause or family history of epilepsy can be identified.

Partial seizures are divided into two main types, depending on whether consciousness is fully preserved. During simple partial seizures the person is alert, able to respond to questions or commands, and can remember what occurred during the seizure. During complex partial seizures, the ability to pay attention or to respond to questions or commands is impaired to some degree. Often, there is no memory of what happened during all or part of the seizure.

SIMPLE PARTIAL SEIZURES can cause incredibly diverse symptoms and can be difficult to diagnose unless they also affect a person’s awareness or include convulsive movements. For example, isolated abdominal (stomach) discomfort from a partial seizure is likely to be attributed to a gastrointestinal or anxiety disorder. Tingling in the little finger that spreads to the forearm may come from a seizure, migraine or nerve disorder. Motor seizures that cause jerking or stiffness are most likely to be recognized. Some partial motor seizures cause weakness of one or more body parts, including the vocal apparatus, which affects the ability to speak.

SENSORY SEIZURES most often cause hallucinations, or episodes that are not really happening. The hallucinations may affect only one area of the body or environment, or spread to other areas. There also may be an illusion or the distortion of a true sensation. Hallucinations and illusions can involve all types of sensations—touch, smell, taste, vision, hearing and vestibular (floating or spinning feeling).

AUTONOMIC SEIZURES cause changes in

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nervous centers that automatically controls bodily functions (e.g., strange or unpleasant abdominal sensation, increased heart rate). The area of the brain that controls emotions (limbic region) strongly influences autonomic activity. This is why strong emotions are associated with changes in heart rate and breathing, feelings in the stomach or chest and why we say things such as, “I just have this feeling in my gut.” When partial seizures arise from limbic areas of the temporal or frontal lobe, autonomic changes are common.

PSYCHIC SEIZURES cause changes in the brain that affect how we think, feel and experience things. They can affect language function, perception and memory (e.g., *deja vu*) or cause sudden emotional feelings (e.g., fear or sadness). Other symptoms may include feeling as if one is not one's self (depersonalization) or feeling as if the world is not real, or as if one is in a dream (derealization).

During **COMPLEX PARTIAL SEIZURES**, the person typically stares and is either unable to respond or responds incompletely. Automatic movements (automatisms) occur in most complex partial seizures and can involve the mouth and face (lip smacking, chewing, tasting and swallowing movements), hands and arms (fumbling, claspings movements), vocalizations (grunts, repetition of words or phrases), or more complex acts (walking, running). These seizures usually last from 30 seconds to two minutes. Auras (simple partial seizures) often occur in the beginning and are actually the start of the seizure. After the seizure, people are usually tired and confused for 15 minutes or so and may not remember what happened during the event.

SECONDARILY GENERALIZED SEIZURES begin in one area but spread to become a tonic-clonic seizure. Secondarily generalized seizures occur in more than 30% of children and adults with partial epilepsy. People may or may not recall an aura, and witnesses may first observe a complex partial seizure that goes into the tonic-clonic seizure. A secondarily generalized tonic-clonic seizure may be difficult to distinguish from a primary generalized one, especially if it is not witnessed or occurs during sleep (most convulsive seizures in sleep begin as partial seizures). The EEG is very helpful in determin-

ing the type of seizure, while the MRI or other brain scans can help look for possible causes.

What Happens When Seizures Are Not Easily Controlled

Approximately 30% of people with epilepsy have seizures that are difficult to control despite one or more medications. These are referred to as refractory seizures. In these situations, the first step is to make sure the diagnosis is right and that medications were used appropriately. For example, if the medication was started at a high dose and side effects were troublesome, it is possible that slower increases would be better tolerated. If seizures only occur within an hour of awakening, then a higher dose of medicine at bedtime may be more effective. Unfortunately, despite the best medical care, seizures cannot be controlled in many people and other options such as brain surgery or the vagus nerve stimulator may be worthwhile considerations.

Observing and Recording Seizures

The first seizures can be a very scary time for teens and their families. People don't know what is happening, who to see and may not even know what information to share with the doctor. Or maybe events have been going on for a long time, but parents didn't know they were seizures? When people don't understand what they are facing, expectations about seizures, treatment options and the future may not be realistic. Thus, the first steps in learning to manage seizures should focus on observation and recording of seizures and associated symptoms. What is seen or experienced by the teen, family members and caregivers on the front line (e.g. school nurse, pediatrician, coaches or camp counselors) may affect all other decisions made. Table 3 offers examples of what to look for during a seizure.

How seizures are written down is often a matter of personal preference. Some people like to write full descriptions, others like to use calendars or checklists. Recording can be done on paper or using technology such as personal digital assistants or computer calendars. When the diagnosis is not clear, whichever system can give the most detailed information is usually best. Once the seizure type is known, a simplified version can be used to count how frequently seizures occur, if any changes have happened,

Tips for Observing Seizure

PERSON'S BEHAVIOR BEFORE EVENT

- When event occurs
- Possible triggers

WHAT HAPPENS DURING EVENT

- Level of awareness, alertness
- Speech and understanding
- Thinking, remembering, feeling, perceiving
- Sensations – see, hear, taste, smell, feel
- Facial expression
- Muscle tone
- Movements – jerking, twitching
- Automatic or repeated movements
- Walking, wandering, running
- Falling
- Color of skin, sweating, breathing
- Loss of urine or bowel control

WHAT PART OF BODY INVOLVED


WHAT HAPPENS AFTER EVENT

LENGTH OF EVENT

- When returns to normal activity

and whether any factors make the seizures better or worse. For example, people whose seizures occur more frequently at times of stress would want to record periods of stress along with times of seizures. Teens whose seizures occur at a specific time of day or month should note if seizures start occurring at different times than usual.

Next Steps

This article provides an overview of diagnosing seizures in adolescents and stresses the importance of first hand information from others. Visit the Exceptional Parent magazine website (www.eparent.org) and Epilepsy.com (www.epilepsy.com) for helpful links and resources, more detailed information on seizure types and syndromes, as well as downloadable tips for seizure observation and seizure calendars. 

Coming next – Seizure Emergencies—What to do?