EPILEPSY AND SEIZURE DISORDERS

INTRODUCTION

Seizure disorders are very common, and there many different types of seizure disorders and many causes of seizure disorders. Seizures, which are also called convulsions, can be caused by drugs or alcohol and they can be caused by withdrawal from drugs or alcohol. They can also be caused by head injury (acute), as a long-term complication of traumatic brain injury, infection, pregnancy, low blood sugar or low blood calcium, fever, lack of oxygen to the brain, damage to the brain by a stroke, a brain tumor, or certain psychiatric disorders.

In all of the situations described above there is a clearly identifiable cause for the seizures and in many of them the seizures are not recurrent. For example, low blood sugar or exposure to a drug can easily be confirmed and would usually cause only one seizure. However, one of the commonest types of seizure disorder and the one that will discussed here is quite different in those respects: epilepsy.

Epilepsy is perhaps the most well-known seizure disorder: when people think of seizures epilepsy is typically what they are referring to. Epilepsy is a disease of the brain and the nervous system and it is described as a chronic medical condition in which the patient has recurrent seizures: this last point is an important part of the definition of epilepsy. The underlying cause of epilepsy may be identified but in many cases cannot be, and the disease is called idiopathic epilepsy. The seizures are caused a part of the brain called a seizure focus that sends out erratic and uncoordinated electrical signals and in response a seizure occurs.

Learning Break: A seizure is defined as uncontrolled electrical activity in the brain. This can cause at can cause: 1) sudden, involuntary movements which may be mild and subtle or intense and violent and are accompanied with changes in, or loss of consciousness; 2) minor physical signs, or; 3) changes in consciousness, emotional state, and speech.

This definition is complicated because seizures are complicated. This module however will limit the discussion to idiopathic epilepsy and to a specific type of generalized seizures called tonic-clonic seizures or occasionally grand mal seizures.

Epilepsy is common and there are actually many types of epilepsy that produce very different signs and symptoms. Approximately 1% of the population - approximately 300,000 people - has epilepsy and in most cases the exact cause of the epilepsy is not known. There are some surgical and invasive procedures that can help if seizures are not controlled with conventional treatment. However, most people with epilepsy must take anti-seizure medications to control the disease and although the drugs are effective, they are cannot cure epilepsy.
OBJECTIVES

When the student has finished this module, he/she will be able to:

1. Identify three causes of seizure disorders.
2. Identify the most common cause of seizures.
3. Identify the correct definition of an epileptic seizure.
4. Identify the correct names of an epileptic seizure.
5. Identify the three stages of an epileptic seizure.
6. Identify the correct name for the signs/symptoms that immediately precede a seizure.
7. Identify signs and symptoms of a seizure.
8. Identify the two biggest risks to a patient during an epileptic seizure.
9. Identify the three basic treatments for epilepsy.
10. Identify two goals to remember when someone is having a seizure.

The Structure and Organization of the Nervous System

Understanding epilepsy and seizures requires a basic familiarity with the anatomy and physiology of the nervous system.

The basic anatomy of the nervous system is simple. The nervous system is divided into two parts, the central nervous system and the peripheral nervous system. The central nervous is comprised of the brain and the spinal cord, and the peripheral nervous system is comprised of the nerve fibers and nerves that are outside of the brain and spinal cords. These structures are anatomically distinct, but they are physically connected and their functions are tightly coordinated.

The brain is contained in the skull. It is a highly specialized organ that is divided into sections (eg, the cerebral cortex) and each of these sections is responsible for initiating and controlling specific activities and functions. For example, the frontal lobe of the cerebral cortex is the part of the brain that processes and retains short-term memory and the temporal lobe helps us process visual and auditory input. Some parts of the brain control voluntary, conscious functions such as speech and movement, and other parts control involuntary, unconscious functions such as breath, circulation, and digestion. But everything do, all of our conscious and unconscious activity is initiated and controlled by the brain.

Because the brain initiates and controls all of our activities and body functions it is a very active organ that has high metabolic demands and it needs large amounts of blood, oxygen, and nutrients. The brain represents only 2.5% of total body weight but it requires about 15% of the amount of blood that is pumped from the heart each minute, and the brain cannot survive for long without an adequate supply of blood and the oxygen that is carried by the blood. As with any organ the brain also needs nutrients but the brain is unique in its need for food in two ways. First, the brain is always active. Even when we are sleeping our brains
are working hard. Second, although many of the organs and tissues of the body can use different energy sources the brain uses only glucose (more commonly known as blood sugar) for its energy and cannot use fats or protein except under very unusual circumstances.

The spinal cord is the next section of the nervous system. The spinal cord is a long bundle of tissue contained inside the spine that begins at the base of the brain and continues to approximately the level of what is typically called the small of the back or the beginning of the buttocks. The spinal cord has many functions, but its primary role is to act as a pathway that connects the brain with the peripheral nervous system, and connects the peripheral nervous system to the brain.

The peripheral nervous system is comprised of the nerve fibers that begin in the spinal cord, and the peripheral nerves. The nerve fibers are long, thin strands of nervous tissue that start at the spinal cord and travel to heart, lungs, liver, kidneys, glands, the muscles, and to every part of the body. The peripheral nervous system connects the brain to all of the organs, tissues, and muscles in the body. The peripheral nervous system is further divided into two branches, the autonomic nervous system and the somatic nervous system. The autonomic nervous system is essentially the nerve fibers and nerves that regulate involuntary body functions such as breathing, circulation, and digestion, functions that we cannot consciously control. The somatic nervous system is the part of the peripheral nervous system that connects the brain with the skeletal muscles, the muscles that we use for walking, eating, etc., activities that we can consciously control. The nerves are the terminal part of the nervous system and the nerves connect the nervous system to all of the organs and tissues of the body.

How the Nervous System Works

It is clear from the previous descriptions that the nervous system controls and regulates everything we do, all of our conscious, voluntary activities and functions and all of our unconscious, involuntary activities and functions. The brain can be considered the “command center” of the nervous system. The brain both initiates and regulates involuntary and voluntary behavior by sending out nerve impulses that are essentially messages. The nerve impulses travel from the brain through the spinal cord and the peripheral nerve fibers and eventually they reach the peripheral nerves that are located in the organs, tissues, and muscles. At that point, depending on what part of the brain the nerve impulse came from, the organs and muscles can be stimulated, inhibited, or instructed to perform a specific activity.

It is important to remember that the peripheral nerves also send information back to the brain. In this respect the peripheral nerves function as receptors that provide the brain vital information about the external and internal environment. Receptors for temperature, pain, and touch are something we are well aware of, but the internal environment must be monitored as well. Maintaining a normal, healthy internal environment is essential for the proper functioning and health, and the peripheral nerves
Example: When you move from sitting to standing your blood pressure will drop because of the change in position. This can cause poor perfusion and even syncope but there are receptors in the blood vessels that sense changes in blood pressure. These receptors send a message to the brain that the blood pressure is too low and in response the brain sends out nerve impulses to the arteries and veins that causes them to contract, thus maintaining a normal blood pressure.

Example: Someone is running to catch to catch a bus. The muscles are working harder and faster and because of that they need more blood and oxygen. The brain receives this data and in response, nerve impulses are transmitted that "tell" the lungs to increase the rate and depth of breathing, the heart to beat faster, and the blood vessels in the legs to dilate. No conscious control is need; all of these changes happen automatically.

Example: The temperature outside is 98° and you are sitting in direct sunlight so it feels much hotter. You begin to sweat, your blood vessels dilate so you lose body heat, and your sense of thirst is stimulated. All of these occur because the heat receptors sent a message to the brain that your body was beginning to get too hot for optimal functioning and in response the brain initiated activities that are intended to cool you down.

The nervous system is frequently compared to an electrical system and there are similarities. The brain is the command center that "generates" nerve impulses and the nerve impulses travel through nerve fibers that can be thought of as 'electrical wires." In addition, although a complete explanation is beyond the scope of this module, nerve impulses are essentially electrical currents. Nerves and nerve fibers have an electrical charge, and the nerve impulses move and they affect the organs, etc. by a sudden and rapid change in this charge. However, there is one important difference between the nervous system and an electrical system; the nervous system is not continuous.

At certain points where nerve fibers connect with one another and at the junction of a nerve and an organ and/or muscle, there is a space called a synapse. When the nerve impulse reaches a synapse, the nerve impulse will stimulate the release of a chemical called a neurotransmitter. There are many neurotransmitters; epinephrine, commonly called adrenalin is probably the most well known. Once a neurotransmitter is released into the synapse, it moves to the adjacent part of the nerve fiber or to the organ and or muscle, binds with a receptor and by this the nerve impulse is successfully transmitted.

**How does a Tonic-Clonic Seizure Happen?**

Normally, the nerve impulses the brain and nervous system use to control and coordinate involuntary and voluntary activities are organized and purposeful. However, as mentioned in the introduction people who have epilepsy often have an area or areas in their brain called a seizure focus that sends out violent and
uncoordinated electrical signals and in response, we see the intense, erratic, and characteristic movements of a tonic-clonic seizure.

The term tonic-clonic refers to the two phases of a tonic-clonic seizure. **Tonic** is a medical term that means continuous tension and **clonic** is derived from the medical term **clonus**, which means alternating muscle contractions and relaxation. A tonic-clonic seizure then is characterized by periods of intense muscle contraction and then muscle contraction-relaxation. These types of seizures are also often called grand mal seizures, a French term which is literally translated as “very bad.”

The cause of idiopathic epilepsy is not known. However, researchers do know what is happening in the brain during a tonic-clonic seizure. In the normal brain (and in the brain of someone who has epilepsy, as well) there is a constant flow of nerve impulses to the organs, tissues, and muscles and these impulses both stimulate and inhibit. For example, the arteries and capillaries that control blood pressure are supplied with nerve fibers that can dilate or constrict them - the stimulatory impulses constrict the arteries and capillaries and the inhibitory impulses dilate them. Having these “opposing” nerve impulses may seem contradictory but it is not - they maintain blood pressure within a normal range and to lower it or raise it as needed.

An epileptic seizure occurs when there is an imbalance between the stimulating brain signals and the inhibiting brain signals. There is an area or areas of the brain that suddenly and unpredictably sends out stimulating signals that are extremely powerful and disorganized; another way to view this is as an electrical “storm.” The inhibiting signals are simply not strong enough to balance them out, and the body responds with an epileptic seizure.

**Learning Break:** If you have ever touched a live electrical wire, then you have an approximate idea of what an epileptic seizure is like. The strong, sudden, and unexpected electrical current - which is very much like the strong, sudden electrical stimulus of an epileptic seizure - can knock you down and it will certainly cause you to move in a very erratic and uncontrolled manner.

Patients who have epilepsy may have seizures frequently or only quite rarely. Some people, after starting medications that control seizures, will be seizure-free for years. Each case is different and these issues will be discussed later in the module. It can be difficult to use the word **cure** when discussing idiopathic epilepsy, as the cause of the disease is not known. However, many patients who have idiopathic epilepsy can live free of seizures and it is a disease that should not prevent someone from leading a normal life.

**What are the Signs and Symptoms of an Epileptic Seizure?**

A tonic-clonic, grand mal seizure is a very dramatic event and can be very frightening to observe. A tonic-clonic seizure can appear to be a continuous event, but these episodes have three parts: 1) the aura; 2) the seizure, and; 3) the postictal period.
The aura is defined as the period of time immediately before the seizure that is accompanied by a group of signs and symptoms that are a warning or a premonition that indicates a seizure is going to occur very soon. Many people who have epilepsy have an aura, although some do not. The aura is different for each person but it is typically the same for each person - that is, each person has the same signs and symptoms occur before the seizure and the person who has epilepsy can recognize that the aura is happening. The seizure can occur seconds after the aura or the seizure may be delayed by a period of time up to an hour. At times the aura can occur but will not be followed by a seizure.

Learning Break: The aura is the period immediately prior to a seizure and it is considered a warning that seizure is going to occur. However, many people who have epilepsy also have a premonition, a “sense” that seizure is likely and these premonitions can happen hours or day before the seizure.

The signs and symptoms of an aura are often visual and auditory, but alterations in other senses and emotional and psychological aberrations can happen as well.

Table 1: Signs and Symptoms of an Aura

| Bright lights in the field of vision | The appearance of zig-zag lines in the field of vision |
| Distortion of objects in the visual field | Dizziness |
| Lightheaded | Blind spots |
| Déjà vu, the feeling that the person has been in this situation before | Spots in the field of vision |
| | Hearing voices or sounds |
| | Changes in smell or taste |
| Numbness or tingling is specific areas of the body | Anxiety |
| | Nausea |

These signs and symptoms can be very subtle. Some times the person will simply become very quiet and stare blankly; he/she looks as if they are thinking very deeply. Some times you might notice that the person begins to tremble and lose some coordination. Although it can be helpful to review the signs and symptoms of typical auras that are listed in Table 1 you should remember that the aura is different for everyone.

Following the aura the tonic-clonic seizure will begin and witnessing a tonic-clonic seizure is dramatic and unforgettable. The patient will have short periods of intense muscle contraction (tonic) alternating with short periods of muscle contraction-relaxation (clonic) during which the arms, legs, or other parts of the body will be observed to be moving uncontrollably. The person is unconscious
and thrashing violently. The back will be arched and the arms and legs will move back and forth, rapidly and out of control; this is the clonic period. If the person is standing, he/she will lose balance and fall. The patient will be unconscious during a tonic-clonic seizure, and may be incontinent of stool or urine. Most seizures will are very brief in duration and end spontaneously.

Tonic-clonic seizures do not last long. Most tonic-clonic seizures will resolve without treatment in 30-60 seconds or a few minutes at most and once the seizure has ended the patient enters the third stage of a seizure episode, the postictal period. The postictal period is the recovery phase that begins immediately after the tonic-clonic seizure has ended and lasts until the patient is fully awake and has returned to his/her pre-seizure level of consciousness and behavior. The postictal phase may last from several minutes to several hours. Many people during the postictal period sleep very deeply and cannot be roused. When the patient does wake up she/he may be confused and disoriented and will not remember the events of the seizure. Complaints of headache, nausea, and fatigue during the postictal period are common, and many patients will have feelings of anxiety, fear, or depression and have difficulty talking.

Some people have tonic-clonic seizures that appear to occur at random, with no connection to time of day, environmental influences, or the patient’s emotional state. However, other people say that they have tonic-clonic seizure “triggers,” specific events or emotional conditions that seem to precipitate a seizure. Some of the commonly reported seizure triggers are listed in Table 2.

### Table 2: Commonly Reported Seizure Triggers

<table>
<thead>
<tr>
<th>Trigger</th>
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<tbody>
<tr>
<td>Alcohol or drug use</td>
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<tr>
<td>Caffeine</td>
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<tr>
<td>Certain medications</td>
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<tr>
<td>Fever</td>
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<tr>
<td>Flashing lights</td>
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<tr>
<td>Lack of sleep</td>
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<tr>
<td>Low blood sugar</td>
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<tr>
<td>Menstrual cycle</td>
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<tr>
<td>Physical stress</td>
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<tr>
<td>Psychological stress</td>
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<tr>
<td>Specific foods</td>
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**ARE EPILEPTIC SEIZURES DANGEROUS?**

For the most part, a single epileptic seizure in and of itself is not highly dangerous. There is some evidence that people with epilepsy have a shortened life expectancy. There is also some evidence that people with epilepsy have a higher risk of sudden death, death that is not related to a seizure.

But although the seizure itself is not particularly dangerous a seizure causes a sudden, unpredictable loss of consciousness and violent, uncontrollable muscle contractions and movements. The physical safety of the patient is definitely at
risk. The patient is unconscious and thrashing violently. It is not unusual for someone to fall and strike his/her head, break bones, and become bruised and cut. In addition, although some people have recognizable seizure triggers and have a seizure aura some people have neither having a seizure at certain times could be life-threatening.

**Learning Break:** Is someone who has epilepsy allowed to drive? The answer is yes and no. The laws regarding driving and epilepsy differ in each state but there is an initial period after the diagnosis of epilepsy has been made during which driving is not allowed. Driving is allowed after a physician has determined that the person who has epilepsy has been seizure free and notified the Department of Motor Vehicles of this, but the required period of time defined as seizure free varies: it can be six months or as long as two years. In addition, the responsibility for reporting someone’s epilepsy to the Department of Motor Vehicles also differs from state to state. Although in some states a physician is the person who is responsible for reporting cases of epilepsy to the Department of Motor Vehicles, the physician is not the person who decides driving issues.

Aside from the physical safety of the patient, the other significant risk associated with a tonic-clonic seizure is the lack of oxygen. During a tonic-clonic seizure, the rapid, intense muscular contractions and the intense muscular tension prevent the chest from expanding and contracting, and the person having a tonic-clonic seizure essentially stops breathing. For young, healthy individuals, this can be tolerated. But for older people or people who have cardiac or respiratory problems, the lack of oxygen can be dangerous.

Many people with idiopathic epilepsy have single seizures. However, some people with idiopathic epilepsy have a condition called status epilepticus. In status epilepticus, there are multiple tonic-clonic seizures, one after another. At times, someone with status epilepticus can have periods of seizure activity that can last for many hours. This is very dangerous and requires aggressive treatment.

**WHAT ARE THE TREATMENTS FOR EPILEPSY?**

Idiopathic epilepsy must be treated. It is not a condition that will resolve and having recurrent seizures is dangerous. After the medical work-up has been completed and the diagnosis has been made, idiopathic epilepsy is treated using medications, surgery, different types of brain stimulation techniques and for some patients, a special diet. Medications are the cornerstone of treating idiopathic epilepsy and these will be discussed first. The other treatment options will be briefly covered at the end of this section.

Some of the drugs that are commonly used to treat epilepsy are listed below in Table 3. The generic name is followed by the trade name in parentheses. Common side effects for each drug are listed, as well.

**Table 3: Commonly Used Anti-Convulsants**
- Phenytoin (Dilantin): Ataxia, drowsiness, and oral rashes, especially of the gums
- Valproic acid (Depakote): Dizziness, tremor, weight gain
- Carbamazapine (Tegretol): Ataxia, drowsiness, dizziness, nausea, and vomiting.
- Levetiracetam (Keppra): Agitation, anxiety, drowsiness, and headache
- Lamotrigine (Lamictal): Blurred vision, dizziness, and nausea.
- Gabapentin (Neurontin): Ataxia, dizziness, drowsiness
- Topirimate (Topamax): Dizziness, drowsiness, numbness/tingling of the extremities
- Oxcarbazepine (Trileptal): Ataxia, dizziness, drowsiness, headache

These are all oral medications, although some are available in the IV form, and most are taken by mouth two or three times a day. As with any medication it can take time to find the proper dose or the proper medication, but many people are have success with the first anti-convulsant medication they are prescribed. There are several more anti-convulsants that can be used aside from the ones listed above, and at times a patient will need two or even three drugs to control seizures. Some of these medications such as phenytoin, carbamazepine, and valproic acid are adjusted by periodically checking the level of the drug in the blood. The general rule when prescribing anticonvulsants is to start at a low dose and gradually increase the dose as needed - start low, go slow. The choice of which drug to use will depend on cost, tolerability, and side effects.

The reader will probably notice that the side effects for most of the anti-convulsants are ataxia, dizziness, drowsiness, and these will occur in approximately 30%-40% of patients taking these drugs. These side effects can be very unpleasant and many people will need to be on anticonvulsant therapy for a long time, if not forever. Once good control of the seizures has been achieved and someone has not had a seizure for months or years, it can be very tempting to skip doses or even stop taking the anticonvulsants, and poor compliance with an anti-convulsant medication regimen is a serious problem.

Learning Break: It has been estimated that up to 50% of all people who have epilepsy do not take their anti-convulsants as directed. Failing to comply with the medication regimen increases the risk of seizures, hospitalization, and injury. One of the most common causes of seizures in a patient who has epilepsy is non-compliance with the medication therapy.

Approximately 25%-30% of all people with idiopathic epilepsy will not respond to medications. If multiple anti-convulsants have been tried without success the next step is to determine how bad the epilepsy is. If the patient is having very occasional seizures - a condition commonly called breakthrough seizures - then it may be preferable to simply maintain the current medication regimen and make life style adjustments so that the patient’s safety is ensured. However, if the seizures are happening very frequently, cause injury, or prevent someone from
working and maintaining normal social relationships then either surgery or nerve stimulation should be considered.

**Epilepsy surgery** involves identifying the seizure focus and surgically removing it. This is obviously a procedure that cannot be reversed and careful targeting and removal of the area is critical so that other areas of the brain are not affected. **Nerve stimulation** for the treatment of epilepsy is quite similar to implantation of a cardiac pacemaker. A pulse generator is placed in a small pocket of fat beneath the skin, and a wire from the pulse generator is inserted into a specific area of the brain. The pulse generator sends electrical impulse to the brain and “overrides” the area of the brain that causes seizures. This procedure has the advantage of being reversible (the wire and pulse generator can be removed at any time); it can be used if epilepsy surgery has failed, and many patients have a significant reduction the number of seizures they experience.

For a few people - mostly children - a special diet called the ketogenic diet may be very helpful. This diet contains a lot of fat and very few carbohydrates (e.g., breads, starches, etc). When fats are digested, one of the breakdown products is ketones. No one is sure why but when someone with epilepsy uses ketones for energy, the incidence of seizures can be dramatically reduced.

**What is the Prognosis for A Patient Who has Epilepsy?**

Epilepsy is not considered to be a curable disease, only a disease that can be managed. However, when thought of in that way the outlook for a patient who has epilepsy would seem to be very discouraging. Yet although epilepsy is incurable many people who have the disease are indistinguishable from those who do not and epilepsy can be controlled and managed. The following information is from the Epilepsy Foundation (www.epilepsy.com) and it provides a realistic assessment of what patients who have epilepsy can expect.

- In the first year after someone has been diagnosed with epilepsy approximately ½ of all patients will be free of seizures using only one anti-convulsant. If someone responds to just one anti-convulsant there is a good chance that he/she will become seizure free.
- Approximately 70% of all people who have epilepsy will have what is considered to be good control of their seizures.
- Many patients - approximately 50% - report that they have side effects from their anti-convulsant medications.
- The longer someone is free of seizures the more optimistic the outlook. If someone who has epilepsy has not had a seizure for 2-5 years then it may be possible to stop anti-convulsant therapy after the risks and benefits of doing so have been assessed.
- If a patient develops epilepsy during childhood then there is a very good chance that he/she will be seizure free later in life.

**Emergency Treatment for the Patient Who is having a Tonic-Clonic Seizure**
Most people with idiopathic epilepsy live a normal life, but for many individual there is always a possibility of a tonic-clonic seizure. As a health care professional, you are responsible for your patient's safety so you need to know what to do if/when someone has a tonic-clonic seizure.

There are few situations that cause as much excitement and provoke as much anxiety as a tonic-clonic seizure. It is a very frightening event to witness, even if you have seen one before. However, there are two points you can remember that will help you to stay calm and focused when someone is having a tonic-clonic seizure.

A tonic-clonic seizure is not dangerous.
There is nothing you can do.

Of course neither of these statements is completely accurate. A tonic-clonic seizure can have serious consequences and there are some practical things you can do during the patient’s tonic-clonic seizure. However, the purpose of these statements is to reinforce the points that a tonic-clonic seizure is not as dangerous as it appears to be and there is nothing that you can do to stop the seizure or to decrease the duration of the seizure.

If someone is having a tonic-clonic seizure the two important points to remember are to stay calm and stay with the patient. Staying calm can be especially difficult to do if there are non-medical people witnessing the seizure; they will almost certainly become excited and can add to the confusion. The simplest way to remain calm and focused is to remember this fact: For the great majority of people, the seizure will only last a minute or so and the patient will not be harmed. Second, stay with the patient unless, in your assessment, there is some very important reason to leave the patient in order to improve the safety of the situation. Occasionally if the seizure is prolonged or if the patient has more than one, the physician may order an intravenous benzodiazepine such as Ativan; these are generally very successful in stopping seizures.

The following flow chart can be studied and referred to so that if a tonic-clonic seizure occurs you will have a plan of action

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Remain calm
↓
Check your watch or a clock and note the time
↓
Call for help but if you cannot do this without leaving the patient, don't leave the patient
↓
Do not try and insert anything into the patient's mouth; he/she is not in danger of swallowing the tongue
↓
Do not try and give the patient anything to eat or drink during the seizure or during the postictal period
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Do not try and restrain the patient. It is impossible to do, it does not serve any useful purpose, and you may injure the patient or yourself.

Make sure the environment is safe. Remove any objects nearby that the patient may hit during the seizure. If need be, move the patient to an area that is safe.

Try and protect the patient’s head. This can be done by placing a pillow, folded blanket, etc. under the head.

During the postictal period, the patient may be confused and disoriented, and the patient should not be left alone until full consciousness and orientation to time, place, and person have been regained.

Summary

Idiopathic epilepsy is a chronic neurological disease that causes tonic-clonic seizures. Tonic-clonic seizures happen when a specific area of the brain called a seizure focus sends out intense, uncoordinated ever impulse to the skeletal muscles. In response to these nerve impulses someone who has epilepsy will have a seizure, and a tonic-clonic seizure is characterized by intense muscle contractions alternating with rapid muscle contraction/relaxation. Although the seizure focus can be identified and the pathophysiology of tonic-clonic seizures is well understood, the cause, or causes of idiopathic epilepsy are not known.

Idiopathic epilepsy can be treated with medications, surgery, or nerve stimulation, but anti-convulsant drug therapy is the most commonly used of these three. Many patients can be successfully treated with one or two anti-convulsant drugs and if the patient is seizure free for some period of time it may be possible to discontinue drug treatment. If the patient does not respond to drug therapy or if the seizures are severely impacting safety and quality of life, surgery or nerve stimulation can be used.

A tonic-clonic seizure is dramatic and frightening but if the situation is handled properly they seldom cause harm to the patient. If you witness a tonic-clonic seizure stay calm; note the time; stay with the patient and call for help; make sure the environment around the patient is safe; do not try and put anything inside the patient’s mouth or try to restrain the patient; protect the patient’s head, and; stay with the patient during the postictal period until full consciousness and orientation to time, place, and person have returned.