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Epilepsy and the Dental Management of the Epileptic Patient

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Abstract

Aim: The aim of this article is to educate oral healthcare providers on the diagnosis and treatment of epilepsy and seizure disorders. It also shows the impact of epilepsy on the oral cavity and provides suggestions on the dental management of epileptic patients.

Review: Epilepsy and seizure disorders affect 1.5 million Americans. The disease is caused by a number of genetic, physiologic, and infectious disorders as well as trauma. Treatment is primarily pharmaceutical but can also be surgical. The disease itself and the pharmaceutical management often have an impact on the oral cavity. Primary management considerations are the provision of good periodontal care and the restoration of the teeth with stable, strong restorations.

Conclusions: With proper understanding of patients with epilepsy and seizure disorders and their medical treatment, the dental care team can safely and effectively render dental care that will benefit the patient and minimize the risk of oral health problems in the future.

Keywords: Epilepsy, seizure, gingival hyperplasia, oral medicine, dilantin, treatment planning, medically complex patients, special needs patients, status epilepticus, antiepileptic drugs

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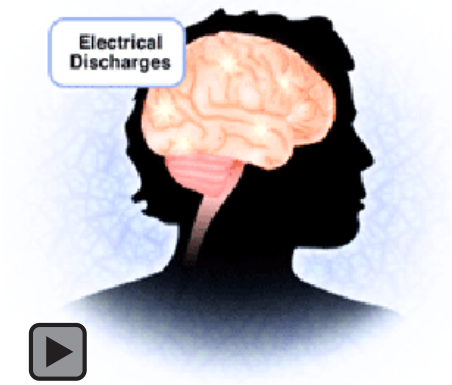
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Introduction

The word "epilepsy" is derived from the Greek word "epilambanein" meaning to take or to seize. Between 400 BC and 200 AD Hippocrates, Aretaeus, Celsus, and Plinius all provided careful descriptions of major and minor seizures. Hippocrates even recognized that seizures originated in the brain.[1]

Modern medicine defines epilepsy as a chronic neurological disorder characterized by frequently recurrent seizures. A seizure is a sign of a disease, which manifests as an episodic disturbance of movement, feeling, or consciousness caused by sudden synchronous, inappropriate, and excessive electrical discharges that interfere with the normal functioning of the brain.[2]

More than 1.5 million Americans have active epilepsy.[3] Initial cases are most common in children with another peak occurring in elderly patients. The increased incidence in the elderly is associated with brain related trauma such as stroke, brain tumors, and Alzheimer's disease.



Etiology and Pathogenesis

In approximately 70% of all cases the specific cause of seizures cannot be determined.[4] These cases are classified as idiopathic or primary epilepsy. When the cause of the seizure is known, the terms used are either acquired or secondary epilepsy. The reason for secondary epilepsy can be metabolic, structural, and functional abnormalities including seizures secondary to head trauma, especially if consciousness was lost for more than 30 minutes. The most common cause of adult epilepsy is cerebrovascular disease (stroke, brain attack) followed by primary and metastatic brain tumors. Systemic disorders that can cause epilepsy include infections, hypertension, and diabetes as well as electrolyte imbalances, dehydration, and lack of oxygen. High doses and withdrawal from chronic use of drugs such as heroin, cocaine, barbiturates, amphetamines, and alcohol can also lead to seizures. There appears to be a genetic predisposition to epilepsy associated with chromosome 12 anomalies. These anomalies increase the risk of epilepsy in children of epileptic women.[5-6]

Epilepsy pathogenesis, at the cellular level, relates to systems that maintain the balance between excitation and inhibition of brain electrical activity. There is a loss of inhibitory activity or an overproduction of excitatory activity. The imbalance appears to occur in abnormal cells or injured cells, which become the foci of the seizure. Those cells create a burst of abnormal electrical signals that spread to adjacent cells creating a "storm" of electrical activity. As the storm progresses, the seizure becomes apparent.

Classification of Seizures

An epileptic seizure classification has been developed by the Task Force on Classification and Terminology of the International League against Epilepsy (ILAE). The initial classification was created in 1970, then revised in 1981.[8] The classification of seizures is based on clinical history and manifestations as well as laboratory, neurophysiologic, and radiographic studies. The currently used classification of seizures is in Table 1.

In addition to classifying seizures, in 1989 the ILAE also classified the different epilepsies listed in Table 2. Researchers and physicians use the International Classification of Seizures and Epilepsies to identify seizure types and specific epilepsies, make a diagnosis, and to decide on treatment.

Clinical Presentation of Different Seizure Types

All seizures can be broadly separated into two categories: partial or generalized seizures. Partial seizures are further divided into simple and complex. Simple partial seizures manifest

Table 1. International Classification of Epileptic Seizures.[7]

1. **Partial seizures**
   - A. Simple partial seizures
     - i. With motor signs
     - ii. With somatosensory or special sensory symptoms
     - iii. With autonomic symptoms or signs
     - iv. With psychic symptoms
   - B. Complex partial seizures
     - i. Simple partial onset followed by impairment of consciousness
     - ii. With impairment of consciousness at onset ıset
   - C. Partial seizures evolving to secondarily generalized seizures
     - i. Simple partial seizures evolving to generalized seizures
     - ii. Complex partial seizures evolving to generalized seizures
     - iii. Simple partial seizures evolving to complex partial seizures evolving to generalized seizures
2. **Generalized seizures**
   - A. Absence seizures
     - i. Typical absence
     - ii. Atypical absence
   - B. Myoclonic seizures
   - C. Clonic seizures
   - D. Tonic seizures
   - E. Tonic-clonic seizures
   - F. Atonic seizures
   - G. Unclassified epileptic seizures

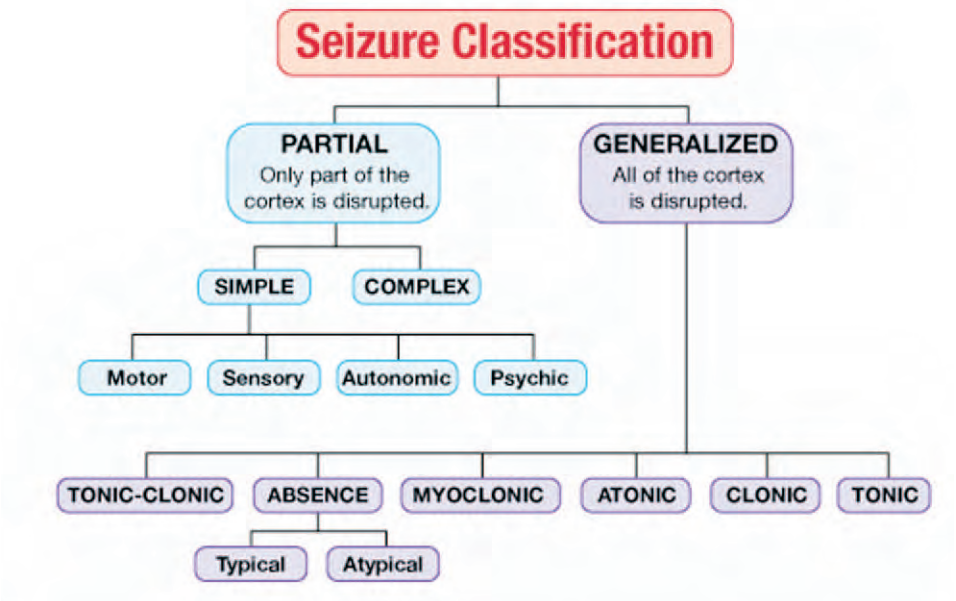


Table 2. International Classification of the Epilepsies.[9]

1. **Localization related (focal, partial)**
   - A. Idiopathic
     - i. Benign childhood epilepsy with centrotemporal spikes
     - ii. Childhood epilepsy with occipital paroxysms
     - iii. Primary reading epilepsy
   - B. Symptomatic
     - i. Temporal lobe epilepsy
     - ii. Frontal lobe epilepsy
     - iii. Parietal lobe epilepsy
     - iv. Occipital lobe epilepsy
     - v. Chronic progressive epilepsia partialis continua of childhood
   - C. Cryptogenic defined by
     - i. Seizure type
     - ii. Clinical features
     - iii. Etiology
     - iv. Anatomic localization
2. **Generalized**
   - A. Idiopathic
     - i. Benign neonatal familial convulsions
     - ii. Benign neonatal convulsions
     - iii. Benign myoclonic epilepsy in infancy
     - iv. Childhood absence epilepsy
     - v. Juvenile myoclonic epilepsy
     - vi. Epilepsies with grand mal
     - vii. Seizures on awakening
     - viii. Other generalized idiopathic epilepsies
   - B. Cryptogenic or symptomatic
     - i. West syndrome
     - ii. Lennox-Gastaut syndrome
     - iii. Epilepsy with myoclonic-astatic seizures
     - iv. Epilepsy with myoclonic absences
   - C. Symptomatic
     - i. Nonspecific etiology
     - ii. Early myoclonic encephalopathy
     - iii. Early infantile epileptic encephalopathy with suppression bursts
     - iv. Other symptomatic generalized epilepsies
3. **Undetermined epilepsies**
   - A. Generalized and focal features
     - i. Neonatal seizures
     - ii. Severe myoclonic epilepsy in infancy
     - iii. Epilepsy with continuous spike wave during slow-wave sleep
     - iv. Acquired epileptic aphasia
4. **Special syndromes**
   - A. Situation-related seizures
     - i. Febrile convulsions
     - ii. Isolated seizures or isolated status epilepticus
     - iii. Seizures occurring only when there is an acute or toxic event due to factors such as alcohol, drugs, eclampsia, nonketotic hyperglycemia

as auras or symptoms a patient experiences at the beginning of the seizure. Such symptoms may be the only manifestation of the seizure or it may progress. “Simple” means consciousness is not impaired and “partial” means only part of the cortex is disrupted by the seizure.

There are several types of simple partial seizures: motor seizures, sensory seizures, autonomic seizures, and psychic seizures.

Motor seizures involve a change in muscle activity. Most often, the body stiffens or the muscles begin to jerk in one area of the body such as a finger or wrist. Some partial seizures cause weakness of one or more body parts, including the respiratory tract and vocal apparatus, which affect the ability to breathe and speak. Motor seizures may also include coordinated actions such as hand waving, eyelid fluttering, eyes rolling up, foot stomping, or teeth clenching/grinding.

Sensory seizures cause changes in sensation. These sensory hallucinations or illusions can involve all types of sensations such as the following:

- Touch (e.g., tingling feeling or electric shock feeling)
- Smell (often an unpleasant odor)
- Taste (tasting things that are not present in the mouth)
- Vision (e.g., a spot of light or blurring)
- Hearing (e.g., a click, ringing, or a person's voice)
- Orientation in space (e.g., spacing out or spinning feeling)

Autonomic seizures cause changes in the autonomic nervous system. This may manifest as a change in the heart and breathing rates, cause sweating, or an unpleasant sensation in the abdomen, chest, or head.

Psychic seizures manifest as sudden emotions such as fear, anxiety, depression, or happiness. This type of seizure can also make patients feel as if they have lived through this moment before (deja-vu), familiar things seem foreign to them (jamais vu), or the world is not real.

During complex partial seizures, consciousness is impaired to some degree. There is no memory of what happened during such seizures. Lethargy and confusion often occur after the seizure. Partial seizures usually last from 30 seconds to two minutes. In 30% of patients with partial seizures, the partial seizure evolves into a secondary generalized seizure.[3] In such cases the excessive electrical activity that starts in a limited area spreads to involve both sides of the brain.

Generalized seizures such as tonic-clonic (grand mal) originate in all regions of the cortex. They begin with an abrupt loss of consciousness, often in association with a cry. It is not a cry from pain but rather from air being forced through the contracting vocal cords. All arm, leg, chest and back muscles become rigid. The person will fall and their back may arch, then their muscles begin to jerk and twitch. During this clonic phase the tongue or cheek can be bitten, and frothy and bloody saliva may be expectorated from the mouth. Bowel and bladder control may also be lost. The seizures usually last from one to three minutes. The phase following the seizure is called the postictal period in which the patient is tired and confused for a few minutes and then falls asleep.

When tonic-clonic seizures last more than five minutes or recur in a series of three or more seizures without return to consciousness between attacks, a serious neurological emergency called convulsive status epilepticus has developed. This requires immediate medical attention.

Absence (petit mal) seizures are the most common type of generalized seizures occurring in children between four and 14 years of age. This type of seizure starts with no warning. They typically last from ten to 25 seconds. Petit mal seizures frequently occur in clusters and may take place up to hundreds of times a day.[2]

There are two types of absence seizures: typical and atypical. Typical absence seizures are associated with a variety of signs and symptoms such as symmetric clonic movements (rapid blinking), postural changes (e.g., truncal arching or head drop), automatisms signs (often facial movements), and autonomic changes (e.g., pallor, pupil dilatation, flushing, piloerection, tachycardia, or salivation). Typical petit mal seizures don't have a postictal period, and they are induced by hyperventilation.

Atypical petit mal seizures are also characterized by motor signs and changes in muscle tone. They may be followed by postictal confusion. They often occur on awakening or during episodes of drowsiness, but they are not provoked by hyperventilation. Typical absence seizures are characteristic of idiopathic generalized epilepsies and atypical absence seizures occur in symptomatic generalized epilepsies.

Other subtypes of generalized seizures are myoclonic, atonic, clonic, and tonic seizures.

Myoclonic seizures are shock-like muscle contractions that usually involved both sides of the body at the same time. Myoclonic seizures can occur in some healthy people as they fall asleep at night. This is called benign nocturnal myoclonus or sleep jerks. This form of a seizure is considered a nonepileptic type of seizure in spite of the fact

similar movements occur in myoclonic seizures. Epileptic myoclonic seizures have a short duration and typically have no postictal phase. They can occur in both primary and secondary generalized epilepsies.

Atonic seizures or drop attacks manifest as a sudden loss of muscle strength. As a result, the person collapses to the ground. Such seizures are associated with an increased risk of head or jaw injury. Generally these seizures begin in childhood and typically last less than five seconds. They are associated with change of consciousness. Usually there are no postictal symptoms. Atonic seizures are a defining feature of symptomatic generalized epilepsies.

Clonic seizures usually begin before three years of age. They are characterized by rhythmic jerking movements of the extremities as a result of quick repeating, non-complete muscle contraction, and relaxation. Generalized clonic seizures are essentially tonic-clonic seizures without the tonic component. During clonic seizures consciousness may be impaired and postictal confusion occurs.

Generally tonic seizures, like clonic seizures, also begin in the first few years of life. During tonic seizures truncal and facial muscles suddenly become stiff. The person will fall if the seizure occurs while they are standing. These seizures have the highest risk of traumatic injury to the head, oral, and dental structures, secondary to falling and forced contraction of the jaw muscles. Tonic seizures usually last five to 20 seconds, and they are followed by postictal confusion.

Many people have more than one type of seizure. The features of each type of seizure may change from seizure to seizure or over time.

Diagnosing Epilepsy

The need for a diagnosis of epilepsy is usually precipitated by a first seizure. The physician must decide whether a seizure is in fact a real seizure or another condition such as fainting.

There are three primary steps in the diagnosis of epilepsy: health history taking, neurological examination, and laboratory testing.

A health history will include information about the facts surrounding the seizure. Sometimes the person has no memory of the event, therefore, eyewitness observation is very helpful. Family history, social history, and past medical history are also important in making a correct diagnosis.

A neurological examination will be done to identify areas of abnormal brain electrical activity, as well as assess the patient's motor and sensory skills, the functioning cranial nerves, hearing and speech, vision, coordination and balance, mental status, and changes in mood or behavior.

Depending on the heath history and examination findings, laboratory work may be ordered. This might include blood studies and special testing such as EEG, CT, MRI, PET, neurosonography, and lumbar puncture (Table 3). Because the EEG procedure is usually performed between seizures, a person with epilepsy may have a normal reading. To increase the chances of finding an abnormality on the EEG the clinician may manipulate patient-related variables such as medication reduction, sleep deprivation, hyperventilation, exercise, or alcohol intake.

Other Medical Conditions Resembling Epilepsy

Several disorders can often be mistaken for an epileptic seizure: hyperventilation, hypoglycemia, migraine, transient ischemic attacks, syncope, pseudoseizure, transient global amnesia, and sleep disorders. Of these, the most common conditions confused with epilepsy are syncope, pseudoseizure, and panic attacks.

Table 4 differentiates pseudoseizure, panic attack, and syncope from a true epileptic seizure.

Management

Pharmacotherapy

About 80% of patients with epilepsy are controlled with medication. Antiepileptic drugs (AEDs) are used to treat or prevent seizures. Prior to 1993, the choice of AEDs was limited to traditional drugs, such as phenobarbital, primidone, phenytoin, carbamazepine, and valproate. Over the past eight years, several new medications have been approved by the United States Food and Drug Administration (FDA). Antiepileptic drugs are selected based on the type of seizure, age of the patient, side effects, cost of the medication, and adherence to the

Table 3. Laboratory tests for diagnosing epilepsy.

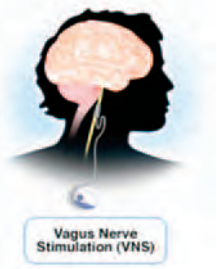
Test	Purpose
Blood Tests	Use to assess abnormal level of blood sugar and electrolytes (sodium, calcium, magnesium, or potassium). Helps to look for diseases or conditions causing the seizures.
Electroencephalography (EEG)	Provides information concerning the location and nature of any abnormal electrical activities in the brain such as a series of spikes and sharp waves*.
Computerized tomography (CT)	A CT scan uses X-rays to assess brain structure. It can detect sizable tumors, malformations involving blood vessels, birth-related malformations, strokes, and brain abscesses.
Magnetic Resonance Imaging (MRI)	An MRI scan uses magnetic fields to create an extremely precise image of the brain. MRI helps to detect small vascular malformations and scar tissue.
Positron-emission tomography (PET)	This method uses radioactive compounds (such as glucose) to locate the area of the brain that is causing the seizure.
Neurosonography (ultrasonography)	This method helps to identify brain abnormalities by using high frequency sound waves. Ultrasound can detect excessive spinal fluid (hydrocephalus) or blood (hemorrhage) in the brain.
Lumbar puncture	This test may be done, if fever is present, to determine if an infection is present in the fluid surrounding the brain (meningitis or encephalitis).

use of the AED. If the seizure is not controlled with one medication, an alternate drug is tried. If monotherapy is unsuccessful, a second drug can be added for polytherapy. Monotherapy is preferable, since polytherapy increases the incidence of adverse effects.

The most common adverse effects of therapy with AEDs are drowsiness, dizziness, ataxia, and gastrointestinal upset. Anticonvulsants can also cause pathological changes in the mouth. The patient may have the following signs and symptoms: dry mouth; irritation or soreness of tongue and mouth; red, irritated, or bleeding gums; and swelling of the face, lips, or tongue. Other possible side effects of medication may include bone loss, which can lead to osteoporosis over the long-term of use.[2] Some AEDs cause enlargement of the gums as a result of gingival hyperplasia.[10] Common drugs used to treat epilepsy and their intraoral side effects are listed in Table 5.

Nonpharmacological Therapies

Vagus Nerve Stimulation (VNS)



Some people whose seizures are unmanageable with AEDs may benefit from vagus nerve stimulation with a Neurocybernetic Prosthesis (NCP). The FDA approved the use of VNS in 1997. It is approved as an adjunct therapy for refractory partial seizures in adults and adolescents who are over 12 years old.[12] The NCP is a small pacemaker-like electric pulse generating device surgically placed subcutaneously over the left chest wall or under the left pectoralis muscle. Small wires placed under the skin attach the device to the left vagus nerve. The left nerve is always used because the right one is more likely to cause cardiac complications.

Table 4. Differences between true epileptic seizure, pseudoseizure, panic attack, and syncope (fainting).

	TRUE EPILEPTIC SEISURE	PSEUDO-SEIZURE	PANIC ATTACK	SYNCOPE
Precipitant	Commonly not obvious	Obvious emotional precipitant	Occur suddenly, without any apparent reason	Emotional precipitant or sudden pain
Duration	1-3 minutes	Longer than 10-15 minutes	Less than a minute	A few seconds
Movements	Generalized tonic-clonic movements starting with fast small amplitude movements to slower larger movements. Briefer rigidity	Nonsynchronous out of phase movements (may be jerky, side-to-side head movements, pelvic thrusting, limping). Opisthotonic posturing or rigidity for prolong periods	Diffuse trembling and a sense of inability to move, accompanied by intense anxiety and fear of imminent death	Generalized jerks or irregular shaking movements. The muscle tone is flaccid
Vocalization at onset	Monotonous epileptic cry	Weeping, crying, or screaming	Panting	Uncommon
Amnesia	Yes	No	No	Sometimes
Injury	Common. Especially head, oral structures and neck	Uncommon. Self protection before falling	Uncommon. Falling seldom occurs	Uncommon. Self protection before falling

An electrical generator is programmed to send energy impulses to the brain. When the person feels a seizure is starting, she/he activates the device using a small magnet. The device sends electric impulses through the vagus nerve to the brain to help interupt the seizure. During stimulation the patient may experience the following side effects: coughing, hoarseness, throat pain, numbness of the throat or chin, and, in some cases, increased salivation and dysphagia.

Surgery



Surgery is another treatment option for patients who are refractory to AEDs or have seizures or side effects that significantly impair their quality of life. They must also be between 12 and 50 years old.[13] Previous studies have shown 75% of patients become seizure free within the first postoperative year.[14,15] Several studies document the longer the patient has epilepsy prior to surgery the greater the relapse risk and they are more likely to have postsurgical auras.[16] There are four widely accepted surgical procedures: focal resection, corpus collosotomy, hemispherectomy, and the multiple subpial transaction.[13]

Ketogenic Diet (KD)



After the mid-1990s the ketogenic diet was developed as an effective treatment for epilepsy. A recent study shows the ketogenic diet may decrease seizure frequency up to 50%.[17] The study also shows the ketogenic diet to be most effective in children younger then ten years of age who do not respond to or cannot tolerate the side effects of AEDs. This high-fat and low-carbohydrate diet changes the body's metabolism from using glucose as a primary energy source to using ketones. But a physician

Table 5. Side effects of anti-epileptic drugs (AED) on oral/dental structures.

Antiepileptic drags		Adverse orofacial reactions*						
		Xerostomia	Stomatitis	Gingivitis	Glossitis	Orofacial Edema	Dysgeusia	Miscellaneous
Older AEDs	Carbomazepine (Tegretol, Carbitrol)	+	+	0	+	+	0	0
	Phenobarbital	+	+	0	0	+	+	0
	Phenytoin (Dilantin, Phenytek)	0	0	+	0	+	+	Gingival hyperplasia
	Primidone (Mysolin)	0	+	0	0	0	0	0
	Ethosuximide (Zarontin)	0	0	+	0	+	+	0
	Valproic acid (Depakene, Depakote)	+	+	+	+	+	+	Gingival hyperplasia
Newer AEDs	Gabapentin (Neurontin)	+	+	+	+	+	+	0
	Felbamate (Felbatol)	+	+	0	0	+	+	0
	Lamotrigine (Lamictal)	+	+	+	+	+	+	0
	Levetiracetam (Keppra)	+	+	+	0	+	0	0
	Oxcarbazepine (Trileptal)	+	+	+	0	+	+	0
	Tiagabine (Gabitril)	+	+	+	+	0	0	0
	Topiramate (Topamax)	+	0	+	0	+	+	0
	Zonisamide (Zonegran)	+	+	+	+	+	+	0
	*Plus sign indicates "yes", zero, "no"							

has to take into consideration this type of therapy has limited use because it has various complications including dehydration, gastrointestinal disturbances, hypertriglyceridemia, hypercholesterolemia, hypoproteinemia, infectious diseases, hepatitis, acute pancreatitis, persistent metabolic acidosis, osteopenia, renal stones, poor growth, and weight loss.[18] Therefore, this diet should be followed only under medical supervision.

In addition, yoga, acupuncture, aromatherapy, and behavior psychotherapy improve the quality of life and help to reduce seizure activity for some patients.

Considerations for the Dental Management of the Epileptic Patient

Epilepsy occurs in people who have a wide range of socio-economic, educational, environmental, and other factors impacting their healthcare. Unlike non-epileptic patients, specific considerations for epileptic patients include the treatment of oral soft tissue side effects of their medication and correcting damage to their teeth that has occurred secondary to seizure trauma. Dental treatment planning must consider the fabrication of a dental prosthesis designed to minimize risk of future damage or displacement of teeth. The epileptic patient should also be properly educated and instructed in oral hygiene and provided an understanding of how their oral health impacts their general health.

The two primary problems compromising the ability to maintain good oral health for patients with epilepsy are the financial resources to afford good healthcare and, in some patients, mental or physical handicaps which prevent them from being properly managed or to cooperate in a general dental setting.

Based on the above considerations, it is apparent the dental practitioner may need to appropriately modify the management and treatment planning because of an epileptic patient's unique circumstances (Table 6).

Dental Management

A thorough acquaintance with the patient's health history is the main prerequisite for successful treatment and can prevent many complications.

Most patients with epilepsy know they have the disease and are either on medication or know they are vulnerable to seizures. This information should be elicited during their initial visit when the health history is taken. If the patient acknowledges they have epilepsy, then the questions listed in Table 7 are appropriate. Some epileptic patients may conceal their disorder for

Table 6. The dental management of the Epileptic patient.

1. Take complete health history.
2. List medications patient is taking. Look them up so you know their effects, side effects, potential for drug interaction, and any specific oral effects.
3. Schedule proper frequency of oral hygiene and provide good oral hygiene instruction to ensure healthy periodontal tissue and teeth.
4. Insure proper dental lighting (no light directly in eyes).
5. Insure medications have been taken properly relative to dental appointments to minimize risk of seizure.
6. Perform proper periodontal and surgical treatment of gingival hyperplasia to minimize damage to teeth and supporting structures and to maintain proper aesthetics.
7. Treatment plan and design restorations to minimize risk of damaging or displacing dental restorations or prostheses during an epileptic seizure.
8. Patients should be made aware of local and national resources for information and support relative to their disease. They should contact the Epilepsy Foundation at 1-800-EFA-1000 or to visit their website at www.epilepsyfoundation.org.

Table 7. Questions to be asked of dental patients with epilepsy.

Background information questions:

1. How long have you had epilepsy?
2. What type of seizures do you have?
3. How frequently do your seizures occur?
4. What type of medication, if any, do you take to control the seizures?
5. How do your seizures begin?
6. Is there a warning at the beginning of the seizure?
7. Can you talk and respond appropriately during a seizure?
8. Do you get confused or tired after a seizure?
9. When was your last (or most recent) seizure?

Questions to be asked on the day of the appointment:

1. Have you taken your seizure medication today and have you taken it correctly over the past few days?
2. Have you taken any medications or drugs today including over-the-counter drugs, alcohol, or illegal drugs?
3. Are you tired or do you feel unusually stressed today?
4. Have you had any recent illness or seizures?

fear of being refused dental treatment or they consider epilepsy as an embarrassing disease. In this case the information requested on the health history regarding medications the patient takes should alert the dentist to a possible seizure disorder.

The intention of such questions is to derive a complete picture of the patient's health. This includes evaluating the impact of epilepsy in their lives, identifying any oral problems, and minimizing the risk of their having an epileptic seizure during a dental visit. The information also assists in managing and treatment planning for the patient to minimize any oral or health risks in the future.

As with all patients, the frequency of dental check-ups and prophylaxis appointments should be based on the patient's needs. The goal is to decrease and prevent dental and periodontal disease and diseases of the oral mucosa. The recall and hygiene interval may be more frequent for epileptic patients due to increased risk for gingival hyperplasia secondary to use of an AED such as phenytoin (Dilantin).

During a dental visit it is important to explain to the patient and parents (if applicable) the importance of good oral hygiene and adequate nutrition on their gingival health and general health. It is also a good time to explain why it is important to use toothpaste and any supplemental fluoride preparations for the prevention of dental decay, especially in those patients suffering from xerostomia.

The clinician should keep in mind stress is one of the factors that can trigger a seizure. Appointments should be scheduled during a time of day when seizures are less likely to occur, if predictable, and to minimize stress and anxiety during the appointment. Techniques such as explaining the dental procedures to the patient before starting and offering assurance and support during the procedure are always useful. This interaction allows the clinician to assess the status of the patient during the procedure and can reduce the patient's worry and tension.

Light can be a trigger in inducing an epileptic seizure. Therefore, dark or colored glasses can be used as eye protection and the operating light

must be controlled so it is directed only into the mouth and not flashed into the patient's eyes.

Most patients with epilepsy or a seizure disorder can either be adequately controlled or know whether they are likely to have a seizure during their time in the dental office. If patients are adequately controlled with their medication, routine dental therapy is relatively simple and straightforward. Elaborate precautions by the healthcare provider which require extra time or altering the office schedule provide little additional benefit.

Patients whose seizure activity does not respond to anticonvulsants may have to have a consultation with a neurologist prior to a dental appointment. Such patients may require additional anticonvulsant or sedative medication.

The use of conscious sedation and general anesthesia is not contraindicated in patients with epilepsy. In some situations nitrous oxide or intravenous sedation may be necessary to safely and effectively provide dental care.[12]

If a patient has a seizure during a dental appointment, the only thing to do is to allow them to go through their seizure while minimizing any unintentional injury during the event (Table 8).

Most seizures do not constitute an emergency. But if the seizure has any of the characteristics of those listed in Table 9, then it does constitute an emergency and medical help needs to be rendered and/or summoned.

Treatment Planning Considerations

If the patient with epilepsy is in need of prosthetic treatment, the dentist should consider the fabrication of prosthetic restorations resistant to damage or displacement during an epileptic attack. Displacement of a prosthesis risks possible aspiration of the prosthesis into the upper respiratory tract. Cast gold fixed bridges or implant restorations are ideal. They offer the least chance of displacement or fracture.

All porcelain/ceramic restorations present a high risk of fracture, and removal prostheses run a greater risk of displacement. Hence, they would not be the ideal choice. The patient should be informed of their restorative options and the benefits and risks of each. In most cases personal finances usually dominate any treatment decision, and their choice of restoration

Table 8. Steps to minimize risk of injury during an epileptic seizure.

1. If it can be safely done, quickly remove all foreign material from the patient's mouth.
2. The chair should be placed in a supine position.
3. If possible, turn the patient to their side in order to minimize aspiration of foreign bodies or secretions.
4. Use passive restraint only to prevent injury that may occur by the patient hitting nearby objects or to prevent them from falling out of the chair.

Table 9. Characteristics of a seizure episode which require medical attention.

1. A seizure that continues for more than five minutes without the patient gaining consciousness between attacks (status epilepticus), (call 911).
2. Breathing difficulties after a seizure (call 911).
3. Persistent confusion or unconsciousness for more than five minutes (call 911).
4. Injuries sustained during a seizure (call 911).
5. A first seizure (call 911).

is commonly rendered based on financial restrictions.

Conclusion

Epilepsy affects one out of 200 Americans. The impact is even larger when the impact on the families of epileptic patients is taken into consideration.

The management of epilepsy and the medications available has improved vastly over the last ten years. Still, these patients have a variety of unique medical and dental needs. Patients with epilepsy can be safely managed in a general dental office by an informed practitioner. A good health history to fully understand the patient's disease and the medications they are taking is essential. A proper oral exam to uncover any dental problems and possible oral effects of anti-epileptic drugs is necessary. Some simple and straightforward treatment planning considerations will insure the patient's oral health is properly maintained.

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