

Oral Health Considerations and Dental Management for Epileptic Children in Pediatric Dental Care

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ABSTRACT

Epilepsy is a chronic neurological disorder characterized by recurrent seizures. Epilepsy generally begins in childhood, potentially impeding education, employment, social relationships, and the development of a sense of self-worth. The number of decayed and missing teeth, the degree of abrasion, and periodontal indices are significantly worse in patients with epilepsy. Epileptic patients require special care during dental treatment. A seizure episode in a dental clinic is a medical emergency, and it is imperative as an oral health care provider to have adequate knowledge about this condition in order to render safer dental care to epileptic patients. There is a paucity of information in the medical literature on the dental management of epileptic patients. The purpose of this case series is to elaborate on the oral health considerations in epileptic patients and educate oral healthcare providers on the diagnosis, treatment, and emergency management of epilepsy, along with special dental treatment needs in epileptic patients. The case series is a compilation of two cases of petit mal epilepsy and one case of generalized tonic-clonic seizure with detailed descriptions of preventive seizure measures and dental management undertaken during the treatment of patients.

Keywords: Dental care, Epilepsy, Medical emergency, Seizure.

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INTRODUCTION

According to World Health Organization (WHO), epilepsy is defined as a chronic association of multiple etiologies which involves recurring episodes of paroxysmal brain dysfunction, which occur due to sudden disorder and excessive neuronal discharge.¹ Epilepsy is characterized by seizures along with certain features such as altered perception, behavior, and mental activities, involuntary muscle contractions, transient loss of consciousness, and chronic changes in neurological functions. Epileptic seizures are reversible and have a tendency to recur.²⁻⁴

Seizures can be defined as the discontinuation of normal brain functions due to excessive or inadequate electrical discharges, which occur suddenly and result in episodic convulsions with certain other features, such as involuntary movements, altered consciousness, or disturbed perception.^{5,6} The occurrence of at least two or more seizure episodes is necessary for the diagnosis of epilepsy.⁷

A total of 50 million people worldwide are suffering from epilepsy (WHO).¹ The incidence of epilepsy in the pediatric population varies from 41 to 187 cases/100,000 children. The prevalence of epilepsy in children ranges from 3.2 to 5.5/1,000 in developed countries and 3.6–44/1,000 in underdeveloped countries.⁸

About 25% of cases of epilepsy occur due to brain damage caused by infection, injury, cerebrovascular accident, or birth trauma. Idiopathic epilepsy involves the remaining 75% of cases for which there are no identifiable causes (Table 1).³

The etiology of epileptic seizures depends upon the individual seizure threshold, which is genetically determined and it interacts with the precipitating factors or triggers (Table 2).

Seizures are classified into three categories—focal (formerly called partial), followed by lethargy and confusion. Aberrant neuronal activity is more widespread in generalized seizures. In 30% of patients with generalized and unclassified (Table 3). Focal/partial seizures are further of two types—simple and complex. Simple partial seizures are divided into motor seizures, sensory seizures,

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psychic seizures, and autonomic seizures. Complex partial seizures are of two types—seizure with simple partial-onset, after which awareness is impaired, and seizure in which awareness is impaired at the onset of a seizure. In simple partial seizures, consciousness is not impaired, and only part of the cortex is disrupted by the seizure. In complex partial seizures, the memory associated with partial seizures is lost, and the partial seizure develops into a secondary generalized seizure later on.

Generalized seizures usually lead to loss of consciousness, and convulsions can or might not occur. Generalized seizures have the following subtypes—absence, generalized myoclonic tonic-clonic, and atonic. Absence seizures, also known as petit mal seizures, are characterized by staring without any reaction to an external verbal stimulus with the blinking of eyes or nodding of the head. Generalized tonic-clonic seizures [formerly called grand mal (GTCS)] involve bilateral symmetric convulsive movements in which muscles stiffen, followed by jerking of all limbs along with impaired consciousness.

The duration of convulsions is usually 2–3 minutes and ends with a gurgling sound. After the seizure, the patient may experience convulsions or disorientation. Myoclonic seizures are associated with sudden, brief lightning-fast movements without any obvious disturbance of consciousness. In atonic seizures, the body tone is lost, which often results in a head drop or fall (Flowchart 1).

The probability of a seizure attack in the dental chair in epileptic patients necessitates the need for all dental professionals to be well-trained in managing such emergencies. The management strategy for the epileptic attack in a dental chair is mentioned in Table 4.

Epileptic patients have a significantly higher number of carious and missing teeth as compared to the general population as epileptic people generally experience difficulty with motor skills, which includes issues with fine motor skills, gross motor skills, and coordination which negatively influences the tooth brushing ability.⁹ Gingival hyperplasia is seen in 50% of the patients taking the antiepileptic drug Phenytoin within 12–24 months after the treatment starts. Epileptic seizures usually lead to minor oral injuries, such as tongue biting,

and also frequently lead to tooth injuries or, in some cases, cause maxillofacial trauma, especially in patients who suffer from poorly controlled generalized tonic-clonic seizures. Hence, dentists need to have adequate knowledge about epilepsy and its impact on the oral and dental health of epileptic patients to manage such conditions.

An attack of epilepsy during dental treatment constitutes a medical emergency, and additional precautions must be taken to avoid such attacks in the dental chair. Epileptic patients require additional considerations for behavior guidance which include cognitive and behavioral intervention in which an attempt is made to establish a good relationship with the child using effective communication. The dentist should know about the patient's education level, cognitive ability, cooperation in dental settings, factors that trigger uncooperative behavior, pacifying strategies, details about routine or schedule, current therapies, and other useful provisions, as these might have an impact on the dental care to be delivered. Understanding these factors will help improve the delivery of care and communication. To gain the child's cooperation in the provision of oral healthcare, the dentist needs to establish a trusting relationship with the child patient, which depends on the establishment of effective communication. The dentist should be loving, tender, and caring to the child.

Table 1: Etiology of epilepsy based on age groups

<i>Etiology of epilepsy based on age groups</i>
Young infants
• Metabolic disturbances
• Congenital brain malformations
• Infection
• Perinatal intracranial trauma
• Hypoxia or birth asphyxia
Children and adolescents
• Idiopathic
• Infection
• Trauma
Adults
• Cerebrovascular disease
• Alcohol abuse
• Brain tumors
• Idiopathic
• Head injury

Table 2: Precipitating/triggering factors for seizure

<i>Precipitating/triggering factors for seizure</i>
Hunger
• Stress
• Fever
• Hormonal disturbance
• Photosensitivity
• Sleep deprivation Infection
• Metabolic disturbance

Table 3: Classification of seizures according to the ILAE

Focal/partial seizures
Simple partial seizures (awareness not impaired)
• With minor signs (focal motor, versive, phonatory)
• With somatosensory or special sensory symptoms (somatosensory, visual, auditory, olfactory, gustatory)
• With autonomic symptoms
• With psychic symptoms (déjà vu, illusions, hallucinations)
Complex partial seizures
• With a simple partial-onset followed by impairment of awareness
• With impairment of awareness at the onset
Partial seizures evolving to secondarily generalized seizures
• Simple partial seizures evolve into generalized seizures
• Complex partial seizures evolve into generalized seizures
• Simple partial seizures evolve into complex partial and then generalized seizures
Generalized seizures
• Absence seizures
• Myoclonic seizures
• Clonic seizures
• Tonic seizures
• Tonic-clonic seizures
• Atonic seizures
Unclassified seizures

Flowchart 1: Classification of seizures

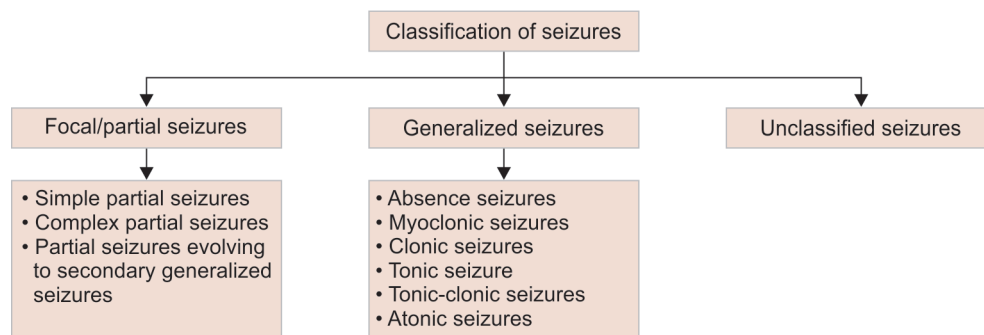


Table 4: Measures to minimize injury when a child patient has an attack of epilepsy in the dental setup

- The attendant should stay calm and remain with the patient.
- The area around the patient should be cleared of anything hard or sharp to prevent injury.
- If the patient has any fluid or dental instrument/material in their mouth, he should be rolled onto their side immediately. This will help the patient breathe and prevent the aspiration of foreign objects.
- The dentist should place the dental chair in a supported, supine position as near to the floor as possible.
- If the patient is not on the chair, he/she should be eased onto the floor, and their head should be protected by placing something soft and flat, like a foldable jacket, shirt, towel etc., under the head.
- The patient should not be restrained during the convulsions as it might cause difficulty in breathing.
- Fingers should not be placed in his or her mouth because of the risk of being bitten.
- Eyeglasses must be removed
- Anything around the neck, like a necktie, scarf etc., that may make it hard to breathe should be loosened.
- Time the seizure. Call the medical emergency team, or dial 101 (the medical emergency helpline number in India). Call the emergency team or dial 101 (medical emergency helpline number in India) if the seizure lasts longer than 5 minutes.

Table 4 measures to minimize injury when a child patient has an attack of epilepsy in the dental setup.

The aim of this case series is to discuss the oral health considerations in epileptic children and describe the oral rehabilitation strategies for these patients using suitable behavior management techniques.

CASE DESCRIPTION

The present case series is a compilation of three cases, two cases of absence seizure and one case of a generalized tonic-clonic seizure. The patients reported to the Department of Pedodontics and Preventive Dentistry. A detailed case history, including demographic details and previous relevant medical and dental history, followed by a thorough clinical examination, was performed for each patient. The treating Neurologist's consent was obtained, and the blood reports were screened to assess the overall health and identify conditions such as infections, iron deficiency anemia, or diabetes that may trigger the seizures. The treatment was scheduled under the same antiepileptic drug regime as suggested by the Neurologist.

General Preparations for the Cases

The appointment was scheduled in the morning hours. At the initial visit, the patients were quite concerned and anxious about the dental clinical environment. As stress is a crucial factor that provokes seizures, it was ensured that stress-causing factors were eliminated before the start of treatment. It was planned to keep the treatment session short, and sudden stimulants such as shimmering bright lights and extreme noise were removed from the environment. The patients were relaxed by the treating dentist and taken to a separate operatory away from the general clinic. They were familiarized with the operatory and introduced to the dental equipment in a stepwise manner with tender love care (TLC). The tell-show-do approach was very helpful for these

patients. Each procedure was explained to the children slowly, simply, and repetitively. Appropriate management strategies were used to prevent seizure attacks in the dental chair and for emergency management of seizures.

Case 1

A 4.5-year-old child reported to the department with a complaint of pain on chewing in the upper back teeth region. There was no history of spontaneous pain or nocturnal pain. During history taking, the mother reported that the patient's first seizure attack was at 1 year of age. The patient stared in blankness during the seizure episode and seemed lost, with persistent eye blinking for 8–10 seconds. Such episodes occurred 10–15 times a day. The parents made attempts to arouse the child, but it was of no use. The parents consulted a neurologist, and hence the diagnosis of petit mal epilepsy was made. The patient was on the tablet ethosuximide, and the last seizure had occurred 1.5 years back. Before the examination, the patient was taken to a separate dental operatory with no bright lights or loud noises.

On oral examination, dental caries was recorded with respect to deciduous right and left maxillary second molars (55, 65) and deciduous right and left mandibular second molars (75, 85). Overall, the patient had relatively average oral hygiene. The patient's parents were informed about the diagnosis and explained the treatment plan.

The carious teeth were restored using glass ionomer cement (Fig. 1). The restorations were completed uneventfully. The parents of the child were counseled and motivated about the need to maintain good oral hygiene, reduce the sugary substrates from diet and keep regular follow-ups with the dentist every 6 months.

Case 2

A 5-year-old child was reported to the department with a complaint of brownish discoloration on the upper right back region of the jaw for 1 year. There was no history of pain or any discomfort during chewing. On history taking, it was found that the child suffered from periodic attacks of violent seizures since 3 years of age. The patient would roll back his eyes, clench his teeth, and become stiff prior to falling onto the ground. The parents did not have knowledge about the disease prior to visiting the doctor, so they tried local means like inhalation of burnt chili fumes, but it was of no use. There was one episode of tongue biting during the seizure attack. He was taken to a pediatrician and a neurologist, where he was identified as having a case of generalized right and left focal epileptic seizures associated with language and learning difficulties. The last seizure had occurred 6 months ago. The frequency of seizures was almost once every week. The patient was currently placed on tablet carbamazepine and tablet risperidone.

On oral examination, dental caries was diagnosed with respect to the maxillary right primary molar (54). The parents of the child were informed about the diagnosis and explained the treatment plan. Since the last seizure had occurred 6 months ago, intravenous midazolam (0.15 mg/kg) was kept ready in the emergency tray. In addition to that, a plastic spatula wrapped in cotton was kept ready to avoid accidental tongue biting in case of seizure.

The dental restorations were carried out using glass ionomer cement in the affected tooth (Fig. 2). These restorations prevented accidental fracture in case of a seizure due to clenching of teeth. The parents were counseled and motivated about the need to maintain oral hygiene and make regular follow-ups with the dentist every 6 months.





Figs 1A to E: (A) Frontal view; (B and C) Maxillary occlusal and mandibular occlusal view depicting carious deciduous, maxillary second molars, and deciduous mandibular second molar on right and left sides of the jaw. Postoperative pictures—(D and E) Maxillary occlusal and mandibular occlusal view depicting Cermet restoration wrt to carious teeth



Figs 2A to D: (A) Frontal view; (B and C) Maxillary occlusal and mandibular occlusal view depicting carious maxillary deciduous first molar. Postoperative view—(D) Maxillary occlusal view depicting glass ionomer restoration wrt to carious tooth

Case 3

A 7-year-old female reported to the department with a complaint of pain in her lower right back teeth region for 1 month. The pain was spontaneous and nocturnal. The patient had a medical history of petit mal epilepsy since 2 years of age. During the seizure attack, she stared in blankness and did not blink her eyes for 15–20 seconds. Such episodes occurred 20–30 times a day. Her parents were from lower socioeconomic backgrounds, and she was taken to local unqualified doctors for her condition, and she did not improve. Thereafter, she was taken to a government hospital where she was diagnosed with petit mal epilepsy. She was placed on the tablet of ethosuximide. The patient showed gradual improvement and was free of seizures for 1.5 years.

On oral examination, the patient was diagnosed with carious deciduous mandibular right and left second molar (75, 85) and maxillary deciduous first molar on the right side (54). The radiograph revealed irreversible pulpitis concerning the mandibular right second molar (85). The parents were informed about the diagnosis and explained the treatment plan.

A pulpectomy followed by a crown placement was carried out on the involved mandibular molar on the right side, and the other two teeth were restored with cermet cement (Fig. 3). The treatment was completed uneventfully. The parents were counseled and motivated regarding the need to maintain oral hygiene and commit to regular follow-ups with a dentist every 6 months.

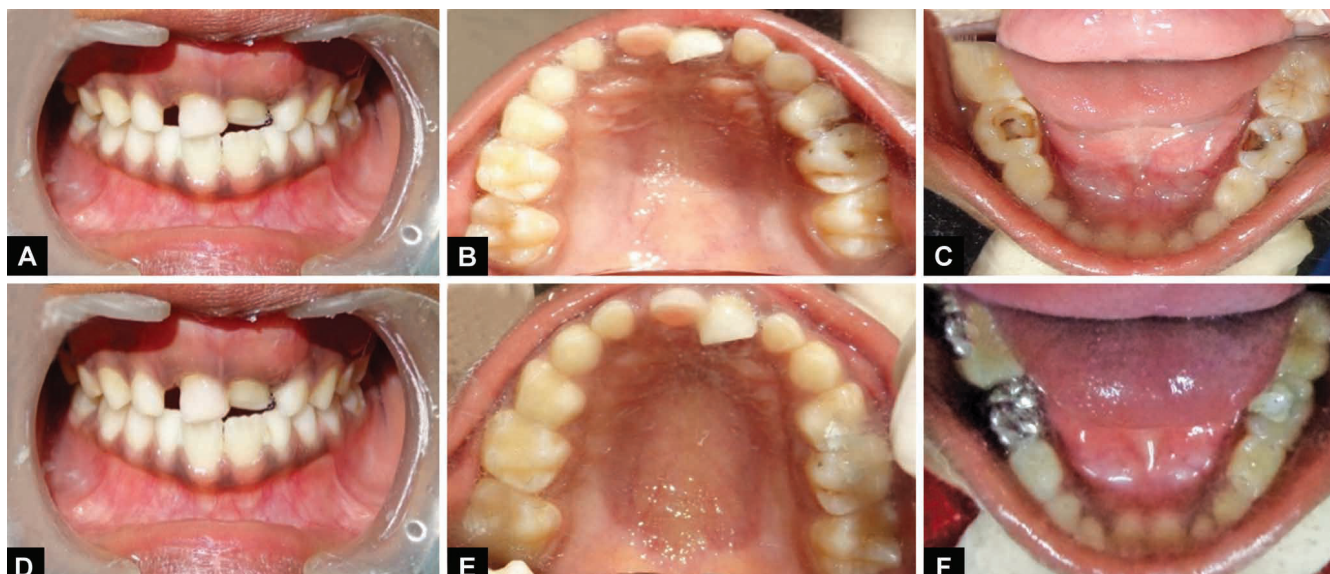
DISCUSSION

World Health Organization (WHO) data suggests that epilepsy is one of the most significant contributors among neuronal and psychiatric diseases toward the global burden of human suffering.¹ Epilepsy adversely affects the education and social skills in a child. Epilepsy elevates a child's risk of developing mental health and behavioral problems by a factor of five, which include hyperactivity, anxiety, depression, attention deficit, aggression, and an autism spectrum disorder.¹⁰

Wang et al. state that carious and missing teeth and periodontal indexes are significantly worse in patients with epilepsy.¹¹ In a study by Percival et al., it was found that epileptic children had more plaque on permanent teeth, increased gingivitis, and increased anterior-tooth trauma, yet fewer dental caries compared to controls.¹² In an epidemiologic study, Karolyhazy et al.¹³ found that patients with epilepsy showed significantly worse oral hygiene status compared to healthy subjects. These authors state the higher index of dental disease—including caries, injury, and periodontal disease—is a consequence of the combined effect of neglected oral hygiene, poor socioeconomic background, and injuries in the oral cavity. Epileptic seizures lead to minor oral injuries, such as accidental tongue biting, but also frequently lead to tooth injuries and, in some cases, maxillofacial trauma. Around 50% of patients taking the antiepileptic drug phenytoin develop gingival hyperplasia within 12–24 months of initiation of treatment.¹⁴

In 1989, the International League Against Epilepsy (ILAE) divided epilepsy based on its etiology into idiopathic, cryptogenic, and symptomatic groups, as described in Table 2. Idiopathic epilepsies were presumed genetic, cryptogenic epilepsies were likely to have a cause, and symptomatic epilepsies had an identifiable cause (Table 5).

The epileptic children are more anxious about dental care than their normal healthy counterparts, which may lead to decreased frequency of dental visits and, subsequently, poor oral health. The most effective treatments for epilepsy-related behavioral issues often involve a combination of medication and cognitive and behavioral intervention. Along with the child's name, age, and chief complaint, the dentist should determine the presence and type of epilepsy and, when appropriate, the name(s) of the child's medical care provider(s) and also ask the parent how long it has been since the time of onset of last seizure and what are the trigger factors. This helps in predicting the chances of the occurrence of a seizure on the day of surgery. A dentist must obtain clearance from the treating neurologist prior to treating an epileptic child. The child should be



Figs 3A to F: (A) Frontal view; (B and C) Maxillary occlusal and mandibular occlusal view depicting carious deciduous mandibular second molar on both sides and maxillary deciduous first molar on the left side; (D) Postoperative frontal view; (E) Maxillary occlusal depicting Cermet restoration with respect to maxillary left first molar; (F) Mandibular occlusal view Cermet restoration with respect to the mandibular right first molar and stainless steel crown with respect to mandibular left first molar

Table 5: ILAE, 1989 Classification and etiology of epileptic seizure¹³

<i>Generalized epilepsies and syndromes</i>
Idiopathic (with age-related onset listed in order of age)
<ul style="list-style-type: none"> • Benign neonatal familial convulsions • Benign neonatal convulsions • Benign myoclonic epilepsy in infancy • Childhood absence epilepsy (pyknolepsy) • Juvenile absence epilepsy • Juvenile myoclonic epilepsy (impulsive petit mal) • Epilepsy with GTCS seizures on awakening • Other generalized idiopathic epilepsies not defined above
West syndrome (infantile spasms, Blitz-Nick-Salaam Krjdmmpfe)
Lennox-Gastaut syndrome
Epilepsy with myoclonic-astatic seizures
Epilepsy with myoclonic absences
Symptomatic
Nonspecific etiology
<ul style="list-style-type: none"> • Early myoclonic encephalopathy • Early infantile epileptic encephalopathy • Other symptomatic generalized epilepsy suppression burst epilepsies not defined above
Specific syndromes
<ul style="list-style-type: none"> • Epileptic seizures may complicate many disease states. Under this heading are included diseases in which seizures are a presenting or predominant feature
Epilepsies and syndromes undetermined, whether focal or generalized
With both generalized and focal seizures
<ul style="list-style-type: none"> • Neonatal seizures • Severe myoclonic epilepsy in infancy • Epilepsy with continuous spike-waves • Acquired epileptic aphasia (Landau-Kleffner) without unequivocal generalized or focal features. All cases with generalized tonic-clonic seizures in which clinical and electroencephalogram findings do not permit classification as clearly generalized or localization-related, such as in many cases of sleep GTCS, are considered not to have unequivocal generalized or focal features during slow wave sleepers-syndrome) defined above
Special syndromes
Situation-related seizures (Gelegenheitsan-Falle)
<ul style="list-style-type: none"> • Febrile convulsions • Isolated seizures or isolated status epilepticus • Seizures occur only when there is an acute metabolic or toxic event due to factors such as alcohol, drugs, eclampsia, nonketotic hyperglycemia

well under cover of medicine and must take his/her morning dose of medication prior to a dental operation.

It is important to eliminate stress-causing factors before starting the treatment because stress might provoke seizures. The patient's appointment must be placed in the morning hours of the day, the timing of treatment sessions must be limited, and sudden stimulants such as extremely bright lights and too loud noises should be avoided. Understanding the patient's sensitivities, aversions, cognitive level, and triggers to negative behavior will help improve the delivery of care and communication.

Effective communication is the key to establishing a good relationship with the child, which includes being loving, tender, and caring. The dentist must listen to the patient actively, and dental procedures must be explained slowly, simply, and repetitively

to the patient. Only one instruction should be given at one time.¹⁵ However, an overdose of local anesthetic might lead to generalized tonic-clonic convulsions. The patient must be rewarded after the completion of each procedure (positive reinforcement). After treatment has been completed, the patient should be escorted by a parent/attendant out of the dental operator. The lights should be dimmed until the patient walks out.

General anesthesia should be avoided as far as possible during the treatment of epileptic patients, and only local anesthesia should be administered since it does not interact with standard antiepileptic drugs.

In the present case series, a strong emphasis was placed on taking the history of the disease in an appropriate manner. Before the start of treatment, clearance was obtained from the treating neurologist. The appointments were scheduled in the early hours of the day, and it was ensured that the child had taken his/her morning dose of the antiepileptic medication he/she was currently placed on. The seizure-provoking factors were kept under control by appropriate precautionary measures, such as operating in a separate clinic that was free from loud noises and bright lights. An emergency tray containing all required drugs, including diazepam, midazolam, dobutamine, phenytoin, disposable syringes, a sphygmomanometer, equipment for physical safety like a plastic spatula wrapped in gauze pieces, and a portable oxygen cylinder was kept ready all the times. The epileptic children were successfully managed with a TLC approach and by the use of appropriate behavior management techniques such as desensitization, tell-show-do, modeling, etc., with TLC, which eliminated the need for anesthesia.

CONCLUSION

To safely manage an epileptic child in a dental clinic, it is imperative that the dental practitioner should be aware of the unique medical and dental needs of such children, along with seizure prevention and management strategies. The child should be handled with love and care. It is best to manage the epileptic child using behavior management strategies so that the need for general anesthesia or conscious sedation is avoided. The treatment planning considerations to ensure the patient's oral health are simple and straightforward. Dental procedures have an inherent tendency to cause seizures, and as a result, dentists must possess adequate background knowledge about the patient's medical condition and appropriate management strategies, especially since epilepsy is the commonest medical emergency in dental practice.

Importance of the Case Series

This case series attempts to elaborate on the oral health considerations in epileptic patients and educate oral healthcare providers, including both general dentists and pediatric dentists, on the diagnosis, treatment, and emergency management of epilepsy, along with special dental treatment needs in epileptic patients. The treating dentist ascertained that the children were comfortable and had a sense of security, for which the various behavior management approaches were utilized during the treatment, which established a trusting relationship with the child as well as the parents. It also describes the emergency management protocol for an epileptic attack in the dental chair since it is a medical emergency. During the treatment, it was ensured that the dental clinics were equipped with the required emergency drugs and equipment in case an epileptic seizure occurred during the treatment.

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