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Invited Review

Dental Health Issues in Persons with Epilepsy

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Abstract

Epilepsy is a neurological disorder with significant disabilities. Persons with epilepsy (PWE) often need special care and attention. A PWE can have multiple dental health issues in them. It can be due to poor oral hygiene, socioeconomic factors, neglect from the caregiver's end, antiepileptic medications or due to the attitude by dentists towards them. Seizures by itself can lead on to bone fracture/tooth loss. Antiseizure medications can cause gingival hyperplasia, osteopenia, gum bleeding etc. While giving medications by dentists, undue care should be given to avoid prescribing drugs that lowers seizure threshold. Also in the dental care setting, education of dental hygiene is important. Also it is better to avoid removable dentures. While doing dental surgical procedures, the time duration should be made short as far as possible. Dentists should be made aware that they shouldn't neglect the care they are supposed to give for PWE.

Keywords: Dental Health; PWE; Antiseizure Drugs; Management; First Aid

Introduction

Around 70 million, persons with epilepsy (PWE) are there worldwide. Out of this, 12 million PWE are from India [1]. Epilepsy is the second most neurological disorder with significant disabilities. Epilepsy patients are generally considered to have poor dental hygiene. It leads to an increase in the periodontal illness, dental caries and various other complications [2].

PWE may be mentally retarded. Hence they need special care and attention including dental hygiene. Oral health is an important aspect of general health and wellbeing of an individual [3]. Even though, oral diseases affect all the age groups, it is more common among children and elderly [4]. Persons with epilepsy has multiple dental health issues, which may be due to antiepileptic medications, trauma due to seizures, mental sub normality, poor socioeconomic status etc. Among the dental diseases; dental plaques, caries, fracture due to seizures are more common [5,6].

The other side of the spectrum is the dilemma a dentist faces in the dental treatment of PWE. Persons with epilepsy are prone to develop seizures due to local anaesthetics/antibiotics used [7]. Also there is chance of gum bleeding also due to certain antiseizure drugs (ASDs) [8]. Dentists prefer to avoid procedures on PWE as much as possible fearing that a seizure can be triggered at any time and also any untoward complications of ASDs can happen any time during or after the procedure.This adds to the burden of poor dental health, in persons with epilepsy.

Until now, the studies in this topic are limited, especially from India. Few studies stated that dental caries are more in persons with epilepsy while few others opted against [9,10].

Factors influencing dental hygiene in PWE

Epilepsy has been considered as having a negative impact on the overall dental health of a person. A person with epilepsy faces many challenges; physical, social and emotional [9]. This may depend on the type of epilepsy that the person suffers from. People who are diagnosed with generalized seizures, experiences frequent seizure attacks that can have a more profound impact of this disease in their lives. Whereas, focal seizures, though equally harming, does not cause loss of consciousness thus causing less injury to the oro-facial structuresa. One of the many challenges that a person with epilepsy faces is their deteriorating oral health. They may display a variety of oral conditions depending upon their affinity to maintain oral and general health. A PWE may have a number of factors that may affect their life in general. The recurrent seizures especially if associated with impairment of consciousness and injuries due to it becoming bilateral and tonic-clonic can cause self-doubt in the person which further decreases their interest in maintaining both physical and dental health. Financial stability is one of the most important reasons to avoid dental therapy. He/she may not be financially adept to undergo a number of dental procedures that sometimes require multiple visits to the dental clinician [9]. Anticipation of seizure in a social environment or seizure phobia forces them to question their inability to control seizures which dissuades them from visiting clinical settings. Difficulties encountered by people with epilepsy may be the result of their seizure type, seizure frequency or medication [11]. It is possible that the physical disabilities and the various limitations that seizures cause are so demanding that oral health is not considered as a major concern.

On an average, people who notice minor dental problems cease to get professional opinions as they consider them to be trivial; and once aggravated it creates a sense of ignominy in the patient's mind that make the patient hesitant to visit a dentist. This emotion is two-fold in a PWE.

However, a more common reason is hesitation from the dentist's part to conduct dental treatments on a PWE. Dental clinicians in general find it terrifying to treat them due to the general notion that such people have frequent and uncontrolled seizures and it is beyond a dentist's control to handle such cases. Fear of precipitating a seizure prevents the dentist from scheduling more advanced procedures that may require longer hours on the dental chair. This can be caused due to lack of expertise or knowledge about handling a person with epilepsy and can deter the dentist's resolve to treat PWE [12].

Dental diseases in persons with epilepsy

A person with epilepsy may be dealing with the aftermath of a seizure, which forces them to ignore other parts of the body, including their oral cavity. Hence, the number of missing and decayed teeth, the degree of abrasion and attrition followed by periodontal diseases are significantly higher. Patient may also show various traumatic injuries such as soft tissue lacerations, tongue biting and the more frequently observed; fractures of anterior teeth [13].

Common oral side-effects of antiseizure drugs

One of the most commonly observed side effects of ASDs is gingival enlargement (Table 1). This is mostly seen in patients on phenytoin. It has no gender predilection [14]. It occurs more often in younger patients. Almost 50% of PWE on long term phenytoin therapy tend to show gingival enlargement. The gingiva shows aesthetic changes due to its size and shows clinical symptoms of redness, spontaneous bleeding and tenderness [15]. It appears as a painless swelling with a beaded appearance which is mostly seen in the marginal gingiva and interdental papilla that may extend to the attached gingiva as it progresses. This may hinder mastication, speech and swallowing making it difficult for the patient to continue with daily life. Gingival enlargement is clinically discernible after 2-3 months of administration and reaches its maximum after 1 year. As the gingiva enlarges, it becomes difficult for the person to maintain oral hygiene due to the increasing size of the gingiva which may cause secondary inflammation of the gingiva. In a contradicting point of view, inflammation can be a prerequisite for gingival enlargement. Drugs such as carbamazepine can cause xerostomia, stomatitis and rashes in the oral cavity. Carbamazepine, Valproic acid and Phenytoin can cause spontaneous gingival bleeding and osteopenia/osteomalacia and therefore, the patient must be supplemented with calcium and vitamin D to prevent deficiency [13].

Pathogenesis of gingival enlargement

There are mainly four principal structures that surround the teeth. They are the gingiva, the periodontal ligament, cementum and the alveolar bone. The gingiva is composed of epithelium, connective tissue that consists fibroblasts and extracellular matrix

Antiseizure drugs	Oral side effects and dental considerations
Phenytoin	Gingival hyperplasia, gingival bleeding, osteomalacia/ osteopenia
Phenobarbital	Drowsiness, sedation, osteomalacia/osteopenia
Carbamazepine	Xerostomia, stomatitis, gingival bleeding, osteomalacia/ osteopenia, rash
Valproate	Gingival bleeding, petechiae, decreased platelet aggregation
Clobazam, Primidone, Ethosuximide, Lorazepam, Gabapentin	Drowsiness/sedation
Topiramate	Mild cognitive impairment
Lamotrigine	Rash
Levetiracetam	Behavioral problems

Table 1: Oral side effects and dental considerations of antiseizure medications.

(that contains a large amount of collagen fibres [8].

The pathological cause of enlargement can be associated with proliferation of these fibroblasts and epithelial cells when they are stimulated by phenytoin. Phenytoin and its metabolites act on fibroblast cells and the epithelium, alters the sodium-calcium channels causing decreased calcium influx which in turn causes an increase in collagen production due to decreased production of collagenase activating enzymes and a resultant decrease in collagen degradation [8,14]. Fibroblasts obtained from a phenytoin induced overgrowth have shown the increased synthesis of sulfated glycosaminoglycans. The enlargement begins as hyperplasia of the marginal gingiva's connective tissue core which then increases by proliferation and causes vascular changes expanding beyond the crest of the gingival margin [14]. Saliva and gingival crevicular fluid have shown the presence of phenytoin. It has been speculated that there is a relationship between the drug dosage, drug threshold and the concentration of the drug in the saliva and gingival crevicular fluid [8].

Treatment of dental health issues in person with epilepsy

It is vital to obtain the complete medical history before performing any dental procedure on any PWE. Prior to performing any dental procedure, the dentist must inform the person and their concerned neurologist/ general practitioner about the various procedures that have been planned and obtain consent from the medical practitioner. The patient should be questioned on [15]:

- The frequency and duration of the episode
- Whether the patient feels any aura before the seizure
- Time elapsed after the last seizure
- Medication consumed and dosage
- Current treatment in a PWE
- Trigger(s) if any.

Obtaining the medical history helps us analyze the patient's present condition and act accordingly [15]. If sufficient time has elapsed from the last seizure, then the procedure will be less risky to perform as the patient is less likely to experience a seizure.

Although with the increasing advances that are being made both in the medical and dental world, dental clinicians are less hesitant to provide efficient treatment to people with various systemic illnesses.

People with epilepsy are no different, here is taking a look at how people with epilepsy can be managed in a dental environment.

Drug interactions and substitutions

Many ASDs can cause possible drug interactions with the various anti-inflammatory, anti-fungal medications and antibiotics that are prescribed by a dental clinician [7]. Drugs such as metronidazole, fluconazole and erythromycin can interact with certain ASDs. The co-administration of these drugs can cause an elevation or depletion in the plasma concentration of the ASDs. Combined administration of fluconazole and phenytoin can cause an increase in the concentration of phenytoin whereas a combination of clarithromycin and carbamazepine can cause elevated levels of carbamazepine. Increased concentrations of either drug may cause toxicity [7]. Hence, the dosage of the ASDs must be considered and adjustments made to balance the drug concentration.

Dental management of person with epilepsy

Surgery

A surgical procedure can be both major and minor depending on the diagnosis of the concerned patient. Dental procedures, when performed with maximum efficiency can alleviate any concerns the patient may have about experiencing pain, which can cause anxiety and precipitate a seizure episode. In the case of major surgeries such as third molar extractions or maxillo-facial surgeries, it may

be more time consuming and may increase the patient's anxiety while on the dental chair. It is of utmost importance to therefore talk to the patient prior to the procedure so that he/she may feel comfortable and relaxed. The patient can be explained about the procedures that will be conducted on him/her so that the patient knows what is happening during the surgical procedure [16]. The dental staff must be made aware of the person suffering from epilepsy and trained for the same.

The duration of the procedure should be short and most preferably in the early hours when the patient is feeling pleasant and looking forward to the day ahead. Avoid making any sudden movements or shining bright light or sudden harsh noises on the patient. Patient should be at ease and completely relaxed.

If it is an extended procedure, the patient must be given breaks in between to compose themselves to prevent light headedness. Post extraction steps and instructions must be completed so that we can ensure complete healing of the wound. It is important to check the blood pressure and blood glucose in patients with hypertension and diabetes before and after surgical procedures. In such cases, surgical extractions cannot be performed if the blood pressure and blood glucose levels are above normal. Hence, the patient is asked to undergo medication and stabilize his/her condition before taking any appointments [17].

Orthodontics

Orthodontic treatment can be performed with much ease in PWE. For performing any orthodontic treatment, the first step is obtaining an impression of the upper and lower arch. Dental impressions form the backbone of any orthodontic treatment that aids in accurate study and diagnosis. While the traditional method of obtaining an impression was by using impression materials such as alginate, newer methods such as dental chairside scanners can be used to obtain digital models [18]. Though it is much more time consuming than an alginate impression, the person may feel comfortable with the use of a scanner than an impression which may induce gag reflex when the impression is placed inside the mouth. It is advisable to undergo fixed orthodontic treatments, not only for the safety of the patient, but to enable retraction of the anterior teeth which may prevent injury to the anterior teeth.

Periodontics

The most commonly observed periodontal condition is gingival enlargement. The treatment for gingival enlargement can be both non-surgical and surgical [14].

Non-surgical method

Any risk factors that can cause enlargement and inflammation must be removed. Prolonged adherence of food in the oral cavity can lead to the formation of plaque which is an etiological factor for gingivitis. The plaque can later mineralize to form calculus and can aggravate to result in periodontitis. Hence, plaque and calculus are major risk factors that can form on the tooth surface. Moreover, the pseudo-pockets that are formed during gingival enlargement acts a niche for accumulation of plaque and calculus. This makes it difficult for the patient to perform any cleansing action with a toothbrush.

Initial periodontal therapy must be aimed at scaling and root planing, oral hygiene reinforcement such as the use of chlorhexidine gluconate rinse [14]. Non-surgical therapy can be done as adjunct to possible drug substitution after consulting the medical practitioner. This is followed by regular professional recalls.

Surgical method

If gingival enlargement persists despite medical treatment, then the surgical method is adopted. Depending on the areas of enlargement, gingivectomy or periodontal flap may be performed. If the areas are small i.e. six or less teeth, then gingivectomy is the choice of surgery. If more than six teeth are involved, a periodontal flap surgery is performed [14].

Conservative dentistry and endodontics

Majority of PWE may display the existence of traumatic injuries depending on the type of seizure(s). In generalized seizures where there is loss of consciousness, falls during a seizure episode may cause injuries such as fracture, intrusion or avulsion of teeth, particularly the maxillary central incisors.

The patient must be enquired about the time interval between the injury and the treatment as it may affect prognosis specially in injuries like avulsion where immediate treatment and replantation is necessary [19]. In case of fracture of anterior teeth, depending on the extent of fracture, treatment can vary from simple composite restorations to root canal treatments, pulp capping, pulpectomy or apexification. These are dental procedures that are performed for complicated crown fractures. They are performed depending upon the degree of exposure of pulp of the involved tooth. It can range from partial to complete removal of the pulp.

PWE may show a higher incidence of caries. They are treated based on the extent of caries. Initial caries can be treated by minimal invasive techniques. This is a conservative approach which is concerned with early detection of caries and their earliest cure at a micro level which is minimal and patient friendly. Various methods such as Air abrasion or Chemo-mechanical caries removal can be done [20].

Prosthodontics

In a PWE, removable dentures are mostly discouraged to prevent aspiration of the denture. If in case a removable denture is preferred over a fixed denture, the clinician must ensure maximum retention of the denture in the mouth so that dislodgement may not occur. Metal reinforced dentures can be used in place of acrylic to ensure adequate retention and resistance to dislodging forces. The dentures must be radiopaque so that they can be detected if aspirated during a seizure [21]. In case of a removable partial denture, if the person is administered phenytoin, care must be taken to prevent irritation of the gingival tissues. If the teeth and the bone density surrounding a missing tooth are healthy and adequate, dental implants can be considered wherein an abutment is fixed to the underlying bone over which the tooth is replaced. This ensures maximum retention and support and is aesthetically superior.

Pediatric dentistry

Children are more susceptible to dental issues such as caries and various traumatic injuries. Therefore, it is important to maintain oral health from a very early age to prevent the incidence of oral diseases in later life. It is favorable to schedule appointments in the morning when children are more pleasant and alert rather than later in the day [22]. Each procedure can be explained to the child and the parent with a technique known as the "Tell-Show-Do technique" so that the child is prepared for the treatment and is expecting each step. Tell and show every step and instrument before it is performed in the patient's mouth [23]. Many of the ASDs the patient is consuming may be liquid based which may have a high sugar content. The patient's diet chart is recorded to make the necessary changes to create a balance between the drug and diet so that dental health is not compromised [24]. This is done after consulting the patient's concerned medical practitioner and drug substitution is not possible. The ambience and environment of the dental clinic can be designed in such a manner that makes the child feel welcome and comfortable in the presence of the clinician. A positive and colorful environment can be made by designing a colorful and bright clinic, with a designated play area for the child to allay anxiety. The dental staff should be notified about the child's history so that they are able to manage the child in case of a seizure episode. The staff and the clinician can be dressed in normal clothes or in a colorful apron to create a sense of positivity and effectively combat any fear the child may have [23].

Seizure first aid in a dental office

In case a patient experiences a seizure in a dental office, the following methods can be applied (Table 2).

Do not touch or try to hold the person
Move all the instruments away from the person
Do not place your hand inside the patients mouth to prevent any bites
If the patient experiences an aura during treatment, immediately remove the dental instruments from the patient's mouth
Move the dental chair so that the patient is in a supine position
Turn the person to his or her side to make sure the patient's airway is not restricted
Time the seizure
Stay with the patient
Try and protect the head to prevent injury
Call for medical help if: • Another seizure quickly follows • Person has breathing difficulty after seizure • Seizure lasts longer than 5 minutes • The person is non-responsive
Let the person rest and become fully oriented with the surrounding before leaving the dental office
Check for loss of orientation by gently asking the person's name, age etc
Make sure the person comes for the appointments with an attendant
Do not perform further dental treatment
Do an examination for presence of any injuries

Table 2: Seizure first aid in dental office.

Conclusions

Good dental hygiene indicates wellbeing of an individual. Society should be emphasised regarding the need of routine dental health checkups and the treatment of dental illness. Persons with epilepsy have various dental health issues most of which are contributed by patient factors and also the negligence on the part of the treating dentists. Adequate educational sessions should be given to patients and dentists regarding the importance of dental hygiene in persons with epilepsy which is by and large an ignored health care issue in epilepsy.

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