

# Sudden episodes of loss of consciousness in dental practice

## Nagłe przypadki w praktyce stomatologicznej przebiegające z utratą przytomności

Magdalena Cholewa<sup>1,2</sup>, Stefan Sobaniec<sup>2</sup>, Piotr Sobaniec<sup>1</sup>, Krzysztof Sendrowski<sup>1</sup>, Milena Żochowska<sup>1</sup>

<sup>1</sup>Department of Pediatric Neurology and Rehabilitation, Medical University of Białystok, University Children's Hospital, Białystok, Poland

<sup>2</sup>Department of Periodontal and Oral Mucosa Diseases, Medical University of Białystok, Białystok, Poland

### ABSTRACT

A visit to the dentist is a highly stressful event for many people. Emotions that accompany dental treatment often lead to loss of consciousness. About 2% of all patients undergoing dental procedures suffer from syncope. Pain and fear are most often the causative factor. When the cause of syncope is trivial, the patient returns to full health after a temporary loss of consciousness, and the procedure can be continued. The problem is when loss of consciousness is the first sign of exacerbation of systemic diseases such as: epileptic seizure, myocardial infarction, hyper- or hypoglycemia. Therefore, the dentist should pay specific attention to the benefit that comes from a properly conducted subjective examination and have the expertise to facilitate the diagnosis, differentiation and treatment of the patient experiencing syncope.

**Key words:** syncope, epileptic seizure, subjective examination/medical history, procedure

### STRESZCZENIE

Wizyta w gabinecie stomatologicznym jest czynnikiem silnie stresogennym dla wielu osób. Emocje, jakie towarzyszą leczeniu niejednokrotnie doprowadzają do utraty przytomności. Około 2% wszystkich pacjentów poddawanych zabiegom w gabinecie stomatologicznym ulega omdleniom. Czynnikiem go wywołującym jest najczęściej ból i strach. Gdy przyczyna omdlenia jest błaha, pacjent po krótkotrwałej utracie przytomności wraca do pełni zdrowia, a rozpoczęty zabieg można kontynuować. Problem pojawia się wówczas, gdy utrata przytomności jest pierwszym objawem zaostrzenia chorób ogólnoustrojowych, takich jak: napad padaczki, zawał mięśnia sercowego, hiper- lub hipoglikemia. Dlatego też lekarz stomatolog powinien zwrócić szczególną uwagę na korzyść, jaka płynie z odpowiednio przeprowadzonego badania podmiotowego oraz posiadać wiedzę ułatwiającą rozpoznanie, różnicowanie oraz postępowanie z chorym, który uległ omdleniu.

**Słowa kluczowe:** omdlenie, napad padaczki, badanie podmiotowe, postępowanie

### INTRODUCTION

Syncope is a sudden, short-term, temporary loss of consciousness (usually 5–15 seconds), after which the patient spontaneously recovers. It is associated with a temporary decrease in oxygen supply to the brain, reduced muscle tension and an inability to remain upright.

The incidence of syncope in young subjects coming to medical attention varies from approximately 0.5 to 3 cases per 1000 (0.05–0.3%) [1, 2]. Syncope events which do not reach medical attention occur much more frequently. In fact, the recently published results of a survey of students averaging 20 years of age demonstrated that about 20% of males and 50% of females report to have experienced at least one syncope episode [3]. The most common emergency seen in the dental setting is vasovagal syncope [4].

Epilepsy is a medical condition that is manifested by recurrent disturbances of brain function in the form of various types of seizures. These seizures are often, but not exclusively, accompanied by loss of consciousness, and are caused by excessive, violent, pathological discharges of groups of neurons which occur with excessively high frequency and abnormal synchronization.

According to Shneker [5], epilepsy affects about 1–3% of the population. Prusiński [6] reports that in Poland every two-hundredth person suffers from this condition, and epileptics are often found among dental patients. Absence seizures occur in 25% of all epilepsy patients and 5% of pediatric epilepsy patients (are most common between 3–15 years of age) [7].

Although uncommon, pediatric medical emergencies can occur in the dental office. When they do happen, they happen quickly without warning and with possible dire consequences. A child's under-developed physiology coupled with small oxygen reserves requires early recognition of the problem and swift definitive treatment.

Since adults accompany the pediatric patient to the dental office there is a strong possibility, although the child is the one receiving dental treatment, it's the accompanying adult that presents the emergency. The dentist's successful management of medical emergencies requires preparation, prevention and knowledge of definitive management not just by the dentist but by all dental staff [7].

## SYNCOPE AND EPILEPTIC SEIZURE IN THE DENTAL PRACTICE

Syncope is a short-term, temporary loss of consciousness, after which the patient regains consciousness spontaneously. There are six basic groups of syncope: cerebral (neurogenic), cardiac (cardiogenic), neurocardiogenic, vascular, metabolic, drug-induced.

In the dental practice the most common are neurocardiogenic syncopes defined as sudden loss of consciousness caused by reflexive reaction of the autonomous nervous system [5]. Among them, we distinguish: vasovagal syndrome, postural syncope, carotid sinus hypersensitivity, hyperventilation-induced syncope.

**Vasovagal syndrome** is reflective bradycardia and hypotension caused by the erect position, which leads to syncope. As a result of being in an erect position, after about 10 seconds 0.5–1 liter of blood shifts to the veins below the diaphragm. This leads to a drop in blood pressure, lower heart ejection fraction resulting in cerebral hypoxia with subsequent loss of consciousness.

The vasovagal syncope arising in situations of high emotional stress caused by pain and/or fear (feelings often associated with dental treatment) is described as „syncope due to pain” [8, 9]. It occurs primarily in adolescents, and therefore sometimes is referred to as fainting caused by the immaturity of the vegetative system. It may be preceded by nausea, vomiting, heat sensation and vertigo.

**Postural syncope** occurs when one quickly changes body position to standing after being in a recumbent or sitting position for a long time. This causes a sudden drop in hydrostatic blood pressure in the brain as a result of absence or insufficient activity of neurohumoral mechanisms, which maintains proper circulation when changing body position.

In recent years, as a result of dental treatment conducted in patients in recumbent position and undergoing one-session endodontic treatment of the molars, the frequency of postural syncope has increased. Patients at risk for postural syncope include those taking antihypertensive drugs, beta-blockers decelerating the heart rate, antidepressants, sedatives, hypnotics – mainly the elderly.

All the patients with a history of postural blood pressure drops should be treated with special care and allowed to take their time to return to the sitting position by proper adjustment of the dental chair.

**Carotid sinus hypersensitivity** is characterized by reflexive bradycardia or a drop in blood pressure leading to syncope due to hypersensitivity of carotid sinus baroreceptors. This type of syncope is a result of carotid sinus compression caused by a tight collar or tie or after a suddenly turning the head to the side [8, 9]. For this reason, the dentist should ensure a comfortable position for the patient.

**Hyperventilation-induced syncope** usually occurs in minors, who are generally healthy, and is caused by hysterical fear. The dentist's appropriate attitude towards the patient and observation of the patient's behavior are crucial. A calming conversation explaining the treatment diminishes nervousness and may prevent a hyperventilation-induced syncope. In extreme cases, it is advisable to administer sedatives before an appointment.

Often the first symptom of hyperventilation is the inability to take a deep and slow breath. Apart from anxiety, the patient may present with an increased respiration rate and deeper respiration leading to respiratory alkalosis, vertigo, xerostomia, tingling and numb sensations in the lips and fingers, palpitations, tachycardia, muscle tremor and pains.

Treatment of hyperventilation is based on discontinuing the procedure, positioning the patient in a semirecumbent position, and providing a sense of security by a calm conversation. The dentist may advise a patient unable to control respiration to breathe into a paper bag [8, 10]. Further treatment should be postponed to the next appointment, prior to which the patient should take sedatives. According to some authors, hyperventilation-induced syncope is a classic example of metabolic origin syncopes.

Syncope must be differentiated from: hypoglycemia, epileptic seizure, hypersensitivity to a drug, myocardial infarction, local anesthetic overdose.

### Management of syncope [8, 11]

1. Discontinue treatment.
2. Unfold the dental chair, lift the lower limbs (the structure and mechanics of each dental chair allows positioning the patient in the Trendelenburg position).
3. Administer oxygen – 2–5 l/min (at least open the window).
4. Loosen tight clothing, take the glasses off.
5. Assess the pulse, arterial blood pressure, state of consciousness.
6. If the patient does not regain consciousness:
  - apply basic resuscitation procedures;
  - call an ambulance.

History taking plays an important part in the diagnosis of syncope. It is essential to observe the prodromal symptoms (if present). It should be kept in mind that a stop in blood supply to the brain longer than 5–15 seconds causes convulsions, regardless of etiology. It should also be noted that disturbances of consciousness or awareness with simultaneous loss of muscle tension and an accompanying fall usually suggest epilepsy.

**Epilepsy** is a condition that is manifested by recurrent disturbances of brain function in the form of various types of seizures. These seizures are often, but not exclusively, accompanied by loss of consciousness, and are caused by excessive, violent, pathological discharges of groups of neurons [9, 12, 13]. Epilepsy is a disease that involves seizures which are characterized by an alternation of perception, behavior and mental activities, as well as by involuntary muscle contractions, temporary loss of consciousness and chronic changes in neurological functions that result from abnormal electrical activity in the brain [14]. Epileptic seizures are reversible and recur frequently [15].

Statistics show that about 0.5–1.5% of the world population suffers from epilepsy [12], in Poland every two-hundredth person suffers from this disease [6]. It is thought to affect millions of people worldwide, and has a prevalence of 0.5–0.9% in the general population [14]. Chapman et al. [16] have reported that, epileptic seizures are second most

common medical incident in dental surgeries. Every year, 50 to 120 people out of 1 000 000 experience their first epileptic seizure and in as many as 20% of those diagnosed with epilepsy – despite therapy – symptoms persist and are resistant to any pharmacological treatment [12, 13].

It has been reported that the disease occurs independent of race, age and gender [15, 17]. However, epilepsy has occurred more frequently in men than in women [14].

Epilepsy has been observed most frequently in children under 1 year of age and in people over the age of 75 [15, 17, 18].

In addition, the clinical symptoms may be triggered by a stressogenic factor, such as a dental appointment, sudden pain, or even the light used during the procedure. Therefore, the dentist must be familiar with the clinical symptoms of epilepsy, as well as to be able to recognize and differentiate life threatening states and cope with them effectively.

Medical history is the foundation of diagnosis of the epilepsy. It is extremely important to obtain detailed information on seizure provoking factors (tab. I.), their nature and duration. The doctor needs to be informed of patient's state before, during and after the seizures occurred (tab. II). Witnesses may be consulted to obtain more information about patient's state in case of patient's inability to recall his or her state regarding the seizures [19, 20].

**Tab. I.** Factors provoking seizures [14, 15] *Czynniki prowokujące wystąpienie napadów [14, 15]*

Incorrect use of medication
Sleep deprivation
Drug abuse
Excessive use of alcohol
Use of medication that reduces the effectiveness of antiepileptic medicines
Excessive use of caffeine
Stress
Illness or injury
Hormonal changes
Low blood sugar level (hypoglycemia)
Deficiency of vitamin B6
Electrolyte imbalance in the blood
Congenital diseases: neurofibromatosis, tuberous sclerosis, phenylketonuria

**Tab. II.** Questions to be asked of dental patients with epilepsy [19, 20] *Pytania niezbędne do oceny pacjenta z padaczką przed wizytą u stomatologa [19, 20]*

<b>Background information questions:</b>
1. How long have you had epilepsy?
2. What type of seizures do you have?
3. How frequently do your seizures occur?
4. Do the seizures occur at a certain time of day?
5. What type of medication, if any, do you take to control the seizures?
6. Does anything seem to trigger the seizures?

7. How do your seizures begin?
8. Is there a warning at the beginning of the seizure?  
Do you notice a strange smell or taste, flashing lights or hallucinations, or an unexplained feeling of fear or anxiety before the seizures begin?
9. Can you talk and respond appropriately during a seizure?
10. What physical changes take place during the seizures? Do the seizures affect your entire body? Only one side of the body? Only the face muscles?
11. Do you get confused or tired after seizures?
12. When was your last (or most recent) seizure?
13. How long do the seizures last?

#### 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?

Based on the patient's history, the dentist must decide whether the scheduled procedure can be performed in the dental surgery, in the presence of an anesthesiologist or in hospital conditions only. If in doubt, it is necessary to consult a GP or neurologist. Moreover, when preparing for a procedure, it is recommended to ask the patient in advance to bring the medications he or she is on.

Due to the diversity of clinical forms of epileptic seizures, it is sometimes difficult to differentiate them from seizures caused by other diseases or clinical symptoms (hypoxia, hypoglycemia).

#### ETIOLOGY

In 70% of epilepsy cases, the specific etiology is not certain. These cases are defined as idiopathic (genetic) or cryptogenic. When the etiology of seizures is known, the established condition is known as symptomatic epilepsy [14].

Symptomatic epilepsies are result of metabolic, structural or functional anomalies of the brain [15]. Examples of metabolic disorders related to epilepsy are electrolyte imbalance, acidosis, hyperglycemia, hypoglycemia, hypoxia, dehydration, water intoxication [15, 17, 18].

The etiology of secondary epilepsy can be determined only in one-third to one-half of the cases diagnosed when patients are adult. Cerebrovascular diseases are the most frequently encountered causes of epilepsy (40% of cases). The second most frequently encountered cause of epilepsy is brain tumor [15, 17].

Epilepsy genes are related to mutations which cause abnormal brain ontogenesis, neurodegeneration and abnormal functioning. There are five focal epilepsy syndromes which show autosomal transmission [21]:

- Benign familial neonatal seizures.
- Benign familial infantile seizures.
- Autosomal dominant natural frontal lobe epilepsy.
- Familial temporal lobe epilepsy.
- Familial focal epilepsy with variable foci.

## CLASSIFICATION

Epilepsy is classified according to seizures type: generalized type, partial type and status epilepticus [14]. Based on the cause, it can be symptomatic (caused by a developmental malformation), idiopathic (when a genetic condition is responsible) or cryptogenic (when the cause is unknown). According the last ILAE classification we avoid to diagnose cryptogenic epilepsy rather probably symptomatic.

## DIFFERENTIAL DIAGNOSIS

Syncope, which is characterized by loss of consciousness without any premonitory signs and symptoms, can mimic a seizure. Other conditions included in the differential diagnosis are migraine headaches, strokes or transient ischemic attacks and nonepileptic psychogenic events (for pseudoseizures), seen in association with such psychiatric conditions as conversion disorder, anxiety and depression [22].

The first test will be to differentiate seizures from other events. A differential diagnosis of seizures is presented in table III [23]. Pseudoseizures represent a much more difficult problem.

**Tab. III.** Differential diagnosis of epilepsy [23] *Diagnostyka różnicowa padaczki [23]*

---

Syncope
Reflex syncope
Postural
"Psychogenic"
Micturition syncope
Valsalva
Cardiac syncope
Dysrhythmias (heart block, tachycardias, etc.)
Valvular disease (especially aortic stenosis)
Cardiomyopathies
Shunts
Perfusion failure
Hypovolaemia
Syndromes of autonomic failure
Psychogenic attacks
Pseudoseizures
Panic attacks
Hyperventilation
Transient ischaemic attacks
Migraine
Narcolepsy
Hypoglycaemia

---

After a partial and generalized epileptic fit, always observe the patient as another attack may follow, leading in consequence to a secondarily generalized (tonic-clonic) seizure, e.g. on the street, after the patient leaves the dental practice. In this situation, the patient should not leave the dental practice alone without adequate help and assistance. Failure to observe this principle, may be considered medical malpractice [12].

The dentist should be able to identify the type of seizure. Partial and absence seizures are not life threatening, and dental treatment may be continued, whereas the tonic-clonic and cluster seizures or status epilepticus require immediate professional epilepsy treatment.

If a seizure occurs while a patient is in the dental chair [12, 22]:

1. Discontinue the procedure immediately.
2. Clear all instruments away from the patient.
3. Place the dental chair in a supported, supine position as near to the floor as possible.
4. Place the patient on his or her side (to decrease the chance of aspiration of secretions or dental materials in the patient's mouth).
5. Do not restrain the patient.
6. Do not put your fingers into his or her mouth (you might be bitten).
7. Time the seizures (the duration of the event may seem longer than it actually is).
8. Call an ambulance if the seizures last longer than 3 minutes; measure the pulse and arterial blood pressure.
9. Call an ambulance if the patient becomes cyanotic from onset.
10. Administer oxygen at rate of 6–8 L/minute.
11. If seizure lasts longer than 1 minute or for repeated seizures, administer a 10 mg dose of diazepam rectal (0,5 mg/kg) or intravenously (IV), or 5 mg of midazolam, IM, IV, or buccal.
12. Be aware of the possibility of compromised airway or uncontrollable seizure.
13. When the patient regains consciousness, administer glucose or a sweetened liquid. The use of oxygen and glucose prevents subsequent convulsions.
- 14.

It should be kept in mind that a stop in blood supply to the brain longer than 5–15 seconds causes tonic-clonic convulsions, regardless of etiology. Therefore, convulsions are a necessary, though insufficient, symptom to diagnose epilepsy. Loss of consciousness without any movements makes the diagnosis of epilepsy less probable, although the occurrence of convulsions does not preclude other causes of syncope. In simple syncope (neurocardiogenic), clonic movements are the result of cerebral ischemia. How, then, to distinguish a simple syncope from an epileptic seizure? The differential diagnosis must take into account the symptoms that are observed before, after and during the incident [24] (tab. IV).

**Tab. IV.** Comparison of the symptomatologies of epilepsy and neurocardiogenic syncope [15] *Porównanie symptomatologii padaczki i omdlenia neurokardiogenego [15]*

Symptoms	Epilepsy	Neurocardiogenic syncope
During the incident	Tonic-clonic movements are usually prolonged and initially coincide with fainting, skin reddening or cyanosis	Tonic-clonic movements are never prolonged (< 15 s) and begin after loss of consciousness, paleness
Prior to the incident	Aura (e.g. strange smell)	Nausea, vomiting, abdominal discomfort, cold sensation, sweating
Following the incident	prolonged disorientation, muscle pain	Short-term nausea, vomiting, paleness

Loss of consciousness is a medical emergency and requires a well-developed emergency kit, with good equipment and the most important medications; it also requires a comprehensively prepared doctor who can administer first aid at the dentist's office. Proceedings with a patient whose life is at risk should be orderly, planned and practiced. The dentist's office should be well equipped, and the staff should be appropriately prepared. This will determine efficient and effective first aid administration [25].

It should be noted that seizures are common in children with mental disabilities and are characteristic for diseases such as autism, cerebral palsy, ADHD. Treating an autistic child is a particular challenge for the dentist. In addition to the aforementioned mental disabilities and epilepsy, the following are also observed: hyperactivity, behavioral and emotional disorders, outbursts of anger, anxiety and phobias [26]. Children with autism have a reduced pain threshold, and therefore have a tendency to self-harm [27]. Studies found that children with autism and ADHD are more prone to violent behaviors such as kicking or hitting other children, caretakers or objects [28]. It is suspected that mercury vapors from amalgam fillings can pass through the blood-brain barrier, and its deposits in the brain may be an etiological factor in autism. But research has yet to confirm this hypothesis [29].

A visit to the dentist's office should be preceded by a neurological examination, in which the child's mental development is evaluated. The neurologist should share this information with the dentist.

The literature stipulates the creation of dental care programs and even clinics specialized in the treatment of people with autism [30].

Treating patients with mental disabilities is a challenge for dentists. During the first visit, the dentist should evaluate the patient's ability to communicate and also consult the child's medical history, especially medications taken.

The dentist will find information about medications the patient takes, so as to avoid interaction with drugs used in dental treatment. The patient's medical history also contains information about the degree of mental development, which in turn will help the dentist „connect” with the patient. Children with mental disabilities should be informed about the planned dental treatment in a way they can understand, which usually is done visually [26].

If the dentist succeeds in establishing good cooperation, then at the first visit the dentist will be able to assess the condition of the oral cavity. A clinical study of oral

cavities found tartar deposits, abundant plaque, caries, and gingivitis in most cases. Dental treatment usually consists of removing teeth that are irreversibly damaged by decay, professional tooth cleaning to remove tartar and plaque deposits, and treatment of various stages of tooth decay.

Dental procedures should be carried out in the presence of parents or guardians, to whom the young patient is accustomed. The presence of people close to the child makes the doctor-patient collaboration more efficient. Treating mentally disabled children is an extremely difficult challenge for dentists. In some countries, such as the U.S., dental office staff participates in special training courses where they are taught a specialized approach to patients [31]. A greater understanding of the disease and the patient's possible behavior at the dentist's office enable the dentist to use appropriate therapeutic procedures to ensure professional care.

Often, patients with seizures require treatment under general anesthesia. It has been said to be the right choice if epileptic seizures are difficult to bring under control [32]. Significant mental disability, difficult contact with the patient, and lack of cooperation necessitate the use of general anesthesia, which may only be used:

- in offices adapted to this type of treatment, with the required medical facilities as in the operating room, regardless of whether anesthesia is administered in a private office or hospital;
- under the control and in the presence of an anesthesiologist and a dentist, authorized to use this method of anesthesia;
- after becoming familiarized with the patient's medical test results – the patient's health should not raise any doubts.

It has been reported that no complications have been encountered under general anesthesia during the treatment of patients who use anti-convulsive medications regularly [32]. However, local anesthesia should be preferred to general anesthesia as far as possible during the treatment of epileptic patients. This is because the brain may suffer from temporary anoxia during general anesthesia, which may initiate epileptic seizures [33].

General anesthesia used in dentistry:

- general anesthesia with endotracheal intubation;
- general anesthesia intravenously in patients over 12 years of age;
- the most recommended in children sedation through N<sub>2</sub>O/O<sub>2</sub> inhalation.

General anesthesia requires the presence of an anesthesiologist, and can be applied only in the facilities equipped with live monitoring and supporting equipment. Anesthesiologist decides about the type and dose of anesthesia, following a thorough investigation and preparation of the patient.

After the treatment patient, may be released home only after stabilization of all vital functions.

Recommendations for parents and physicians: dentist, neurologist and anesthesiologist for preparation of a child with epilepsy for dental treatment are shown in table V.

To sedate patients, individual medical practices and health care institutions should have a separate treatment room of at least a 16 m<sup>2</sup> area, a source of oxygen of at least 250 liters with a reducer, mechanical ventilation, a suction device, bag-valve and oropharyngeal tubes, endotracheal intubation kit with intubation tubes and two laryngoscopes, intravenous drug administration equipment, stethoscope and precordial stethoscope, blood pressure meters, and ECG monitor [34–36].

In addition, only health care institutions are required to equip operating rooms and other areas where „anesthetic gases” will be used with air supply from above and ventilation of 20% from above and 80% from below. Arrangement of air supply points cannot cause air flow from the patient’s head through the operative area. Another very big problem is that in rooms in which medical gas will be used, the electrical equipment should be installed at a height of 1.6 m above the floor. Office space requirements imposed by regulations are difficult to comply with, especially for existing health care institutions. To perform general anesthesia, the dentist’s office should have an operating room with a 3 m high ceiling, and a recovery room. According to the regulation „On standards of management and medical procedures during administration of anesthesiology and intensive therapy services in health care institutions” (Ordinance of the Minister of Health and Social Welfare of February 27, 1998), the presence of an anesthesiologist and anesthesia nurse is required to perform general anesthesia [34].

**Tab. V.** Recommendations for parents and physicians: dentist, neurologist and anesthesiologist for preparation of a child with epilepsy for dental treatment *Propozycje zaleceń dla rodziców i lekarzy: stomatologa, neurologa i anezjologa niezbędne w przygotowaniu dziecka z padaczką do leczenia stomatologicznego*

Parents	Dentist	Neurologist	Anesthesiologist
- Should ensure the child's comfort and safety	- At the very least should have basic understanding of the patients' disorders	- Should have the latest knowledge in the field of epilepsy, and procedure standards	- Should cooperate with the neurologist and the dentist
- Take care of every day oral hygiene and prevention	- Should demonstrate knowledge of	- Limit to a minimum the possibility of a seizure occurring	- Proceed in accordance with the latest knowledge on general anesthesia
- Their behavior shouldn't promote "dentophobia", but rather they should explain the reasons for the visit and treatment at the dentist's office	a) the specifics of working with children	- Pharmacologically prepare the patient for the dentist appointment	- Know how to provide first aid in life-threatening situations, such as a seizure
- Prior to the dentist appointment, comply with any doctors' recommendations	b) the difference in the construction of the masticatory system in children	- Work with the dentist	- Know how to control, stop or decrease the frequency of the seizures without interfering with the normal activities of daily living (ADLs)
- Make sure the child takes any additional prescribed medications prior to dental treatment	c) side effects of the administered drugs within the oral cavity	- Know how to control, stop or decrease the frequency of the seizures without interfering with the normal activities of daily living (ADLs)	- Being able to recognize the type of seizure
- Ensure the child is rested, relaxed, and in case of planned general anesthesia does not ingest food 5–6 h before the procedure	- Have theoretical and practical knowledge in dealing with children in the course of seizure or fainting	- Being able to recognize the type of seizure	
- Make sure the child visits the dentist regularly, and not only when there is pain	- Not make the decision on their own to treat patients with epilepsy, but in close cooperation with the patient's neurologist		
	- In case of the need to use general anesthesia, work closely with the anesthesiologist		
	- Being able to recognize the type of seizure		

### AN EPILEPTIC AT THE DENTIST'S

Although an epileptic seizure is a relatively rare event in the dental surgery, it can happen. In the vast majority of cases, it occurs in patients who can be identified via accurate history taking [12]. As fear associated with dental procedure may induce an epileptic attack, the patient should be administered an antiepileptic drug before treatment. Diazepam or another benzodiazepine can be administered only orally 20–30 minutes prior to the procedure. Hydroxysinum rather not. Before the procedure, the dentist should allow time for the patient to calm down by engaging him/her in a conversation. The patient's position should be comfortable. The head should not be tilted back too much, for this position may induce neurological symptoms due to decreased blood flow to the brain caused by excessive bending of the blood vessels and narrowing of the vascular lumen. The procedure should be performed using a shadowless lamp, directed straight onto the oral cavity [37, 38].

Manipulating with the lamp can induce seizure only in a patient with photosensitive epilepsy. The dentist's movements should be gentle and the patient should be informed of every stage of the ongoing procedure. In this way, the doctor maintains contact with the patient, which reduces nervous tension. Extraction and cavity preparation should be atraumatic, with the application of a local anesthesia but not vasoconstricting drugs. Impressions should be taken using elastic materials with a short bonding time. During lengthy procedures, several minute breaks are obligatory.

Dental treatment of patients with epilepsy requires not only thorough knowledge of the matter, but also a great deal of patience, empathy and the proper attitude. An essential element of the dental treatment of patients with epilepsy is for the dentist to be in constant contact with the patient's neurologist, and adjust the phases of treatment to the recommendations of the neurologist. Proceeding according to these recommendations will reduce the risk of epileptic seizure.

A properly conducted subjective examination is a major prerequisite for effective dental treatment. During the history taking, the dentist should take into account the patient's psychoemotional state, since more than 50% of epileptic patients suffer from permanent psychological disturbances associated with brain injury, including personality disorders, dysphoria and epileptic dementia.

Epileptic characteropathy is characterized by irritability, pedantry, tendency to aggressive behavior, reduced intellectual ability, and impaired memory. Thinking is not very concrete. Those characteristics have to be taken into consideration by an alert doctor during the intraoral examination, as the patient may not always admit to having epilepsy. Any tongue and oral mucosa injury, fractured and damaged teeth, especially the front ones, should arouse suspicion [39, 40].

In a study conducted by Aragon et al., 46.4% of epileptic patients showed a traumatic damage to the front teeth (chipped enamel and dentin). Hence the observation of the aforementioned changes in a patient should be a signal for a dentist to inquire the patient about epilepsy.

Furthermore, prolonged use of antiepileptic drugs can lead to gingival hypertrophy, xerostomia and oral mycotic

infection. It has been shown that gingival hypertrophy affects 50–60% of patients taking Phenytoin and that its intensity increases along with an increase in the Phenytoin dose and intake duration [39]. Gingival hypertrophy promotes dental plaque formation, which causes difficulties in cleansing and in consequence leads to secondary infections and gingivorrhoea [39, 41–43]. Gingivitis may turn into periodontitis. Gingival hypertrophy is painless, chronic, increases slowly and may involve the gingival papilla, which look coral-like. It can be so massive that it covers dental crowns. To prevent gingival hypertrophy alternative medications are administered, supplemented with folic acid and vitamin C. When the pharmacological treatment is unsuccessful, gingivoplasty is performed.

Furthermore, patients with epilepsy are prone to dental caries due to taking sleep-inducing drugs and sedatives which inhibit the production of saliva, thus reducing self-purification, creating better conditions for the formation of dental plaque. Patients with epilepsy should be advised to maintain a strict oral hygiene routine to reduce the intensity of gingival hypertrophy symptoms and dental caries. They should brush their teeth regularly, use mouthwash with chlorhexidine, and regularly visit the dentist.

Aware epileptic patients will visit a dentist with significantly less fear, so that stress, one of the factors that trigger an epileptic seizure, will be minimized.

### RECAPITULATION

The specificity of the treatment provided by a dentist and the stress caused by a visit alone may contribute to a number of various potentially life-threatening conditions. The predisposing factors include the type and duration of the procedure, the type of medications taken, the patient's age and general health condition. Although life-threatening reactions may occur in all dental patients, the elderly, the youngest and those disease-burdened are most at risk. Hence, history taking is of utmost importance.

Syncope is the most common medical emergency encountered in the dental practice. Temporary loss of consciousness is not a sign of severe disease overall and is not a danger to the life of the patient. However, in patients burdened by illness, it may suggest exacerbation of the general health condition. Therefore, dentists should not ignore any syncope event and whenever they suspect a systemic disease should institute proper management and call an ambulance.

Patients with epilepsy can be safely managed in a general dental office by an informed practitioner. Seizure history must be taken into account when planning treatment. 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 properly maintained. Dentists with a comprehension of seizure disorders can provide an invaluable service to their patients, providing not only oral health, but also maintain the systemic health of these patients.

## REFERENCES

- [1] Wieling W., Ganzeboom K.S., Saul J.P.: Reflex syncope in children and adolescents. *Heart* 2004; 90: 1094–1100.
- [2] Driscoll D.J., Jacobsen S.J., Porter C.J., et al.: Syncope in children and adolescents. *J Am Coll Cardiol* 1997; 29: 1039–1045.
- [3] Ganzeboom K.S., Colman N., Reitsma J.B., et al.: Prevalence and triggers for syncope in medical students. *Am J Cardiol* 2003; 91: 1006–1008.
- [4] Findler M., Elad S., Garfunkel A., et al.: Syncope in the dental environment. *Refuat Hapeh Vehashinayim* 2002; 19: 27–33, 99.
- [5] Shneker B.F., Fountain N.B.: Epilepsy. *Dis Mon* 2003; 49: 426–478.
- [6] Prusiński A.: Napady padaczkowe (padaczka). *Neurologia Praktyczna, PZWL Warszawa* 1998, 269–296.
- [7] Schwartz S.: Management of Pediatric Medical Emergencies in the Dental Office. *Crest® Oral-B® at dentalcare.com Continuing Education Course* 2012; May 11: 1–21.
- [8] Krasny K., Wanyura H., Mayzner-Zawadzka E., et al.: Nagle przypadki w praktyce stomatologicznej. *Omdlenie. Czas. Stomat.* 2005; 4: 279–283.
- [9] Plantz S.H.: *Medycyna ratunkowa*. Urban & Partner, Wrocław 2000.
- [10] Krasny K., Wanyura H., Mayzner-Zawadzka E., et al.: Nagle przypadki w praktyce stomatologicznej. *Hiperwentylacja. Czas. Stomat.* 2005; 1: 66–70.
- [11] Kołacz M., Mayzner-Zawadzka E., Wanyura H., et al.: Nagle przypadki w praktyce stomatologicznej. *Podstawowe czynności w resuscytacji krążeniowo-oddechowej u dorosłych. Czas. Stomat.* 2004; 7: 475–482.
- [12] Krasny K., Wanyura H., Mayzner-Zawadzka E., et al.: Nagle przypadki w praktyce stomatologicznej. *Padaczka. Czas. Stomat.* 2005; 5: 370–374.
- [13] Kamiński B., Dziak A.: *Doraźna pomoc lekarska*. PZWL, Warszawa 1994.
- [14] Mehmet Y., Senem Ö., Sülün T., Hümeýera K.: Management of epileptic patients in dentistry. *Surgical Science* 2012; 3: 47–52.
- [15] Turner M.D., Glickman R.S.: Epilepsy in the oral and maxillofacial patient: current therapy. *Journal of Oral and Maxillofacial Surgery* 2005; 63: 996–1005.
- [16] Chapman P.J.: Medical emergencies in dental practice and choice of emergency drugs and equipment: a survey of Australian dentists. *Australian Dental Journal* 1997; 42: 103–108.
- [17] Friedlander A.H., Cummings J.L.: Temporal lobe epilepsy: its association with psychiatric impairment and appropriate dental management. *Oral Surgery, Oral Medicine, Oral Pathology* 1989; 68: 288–292.
- [18] Busschots G.V., Mizman B.I.: Dental patients with neurologic and psychiatric concerns. *Dental Clinics of North America* 1999; 43: 471–483.
- [19] Jacobsen P.L., Eden O.: Epilepsy and dental management of the epileptic patient. *The Journal of Contemporary Dental Practice* 2008; 9: 1–14.
- [20] [http://www.epilepsy.com/epilepsy/testing\\_medhistory](http://www.epilepsy.com/epilepsy/testing_medhistory). Healthwise Staff, October 25, 2011.
- [21] Panayitopoulos C.P.: *The Epilepsies: Seizures, Syndromes and Management*. Bladon Med. Publish, Oxfordhire 2005.
- [22] Aragon C.E., Burneo J.G.: Understanding the patient with epilepsy and seizures in dental practice. *J Can Dent Assoc* 2007; 73: 71–76.
- [23] Chadwick D.: How do You diagnose epilepsy?, in: *A practical approach to epilepsy*. Mogens Dam, Pergamon Press INC, Chichester 1991.
- [24] Piątkowska A., Zastawna I., Koźluk E., et al.: Neurologiczne przyczyny utraty przytomności – co powinien wiedzieć kardiolog? *Kardiologia w praktyce*. 2004; 1: 22–25.
- [25] Kowalski K.: Stan zagrożenie życia w gabinecie stomatologicznym. *Twój Przegląd Stomatologiczny* 2011; 7–8: 76–79.
- [26] Chroma S., Iwanicka-Grzegorek E.: Leczenie stomatologiczne pacjentów z autyzmem na podstawie piśmiennictwa. *Nowa Stomatologia* 2009; 1–2: 32–35.
- [27] Ross-Russell M., Sloan P.: Autoextraction in a child with autistic spectrum disorder. *Br Dent J* 2005; 23: 473–474.
- [28] Montes G., Halterman J.S.: Bullying among children with autism and the influence of comorbidity with ADHD: a population – based study. *Ambul Pediatr* 2007; 7: 523.
- [29] Martin M.D., Woods J.S.: The safety of dental amalgam in children. *Expert Opinion* 2006; 5: 773–781.
- [30] Del Machuca Portillo M.C., et al.: General anesthesia: as a challenge and treatment need opinion in pediatric dentistry. *P, R Health Sci J* 2005; 24: 291–296.
- [31] Keselyak N.T., et al.: Evaluation of an academic service – learning course on special needs patients for dental hygiene students: a qualitative study. *J Dent Educ* 2007; 71: 378–80.
- [32] Fiske J., Boyke C.: Epilepsy and oral care. *Dental Update* 2002; 29: 180–187.
- [33] Malamed S.F.: *Handbook of local anesthesia*. 4th Edition, Mosby, St Louis, 1997: 121.
- [34] Kowalski J.: Sedacja wziewna N2O/O2 w stomatologii – fakty i mity. *Poradnik Stomatologiczny* 2009; 10: 378–381.
- [35] „On requirements of facilities, equipment and medical devices used in individual medical practices, specialist individual medical practices and group medical practices” – Ordinance of the Minister of Health of March 9, 2000 – *Journal of Laws* No. 20, item 254.
- [36] „On technical and sanitary requirements of facilities and equipment in health care institutions” – Ordinance of the Minister of Health of June 22, 2005 – *Journal of Laws* No. 116, item 985.
- [37] Sobaniec H.: Chory na padaczkę w gabinecie stomatologicznym. *Mag. Stomat.* 1995; 4: 44–45.
- [38] Pelczewska K., Kopczyński A.: Postępowanie protetyczne u chorych na padaczkę. *Prot. Stomat.* 1963; 15: 58–62.
- [39] Panek H., Sobolewska A., Kleczyk M., et al.: Pacjent z epilepsją w gabinecie stomatologicznym. *Prot. Stomat.* 2007; 3: 171–175.
- [40] Sobaniec H., Sobaniec W.: Stan jamy ustnej u chorych na padaczkę. *Prot. Stomat.* 1996; 5: 289–292.
- [41] Sobaniec H., Sobaniec W.: Przerost dziąseł u chorych na padaczkę. *Mag. Stomat.* 1996; 2: 45–47.
- [42] Majola M.P., McFayden M.L., Connolly C., et al.: Factors influencing phenytoin-induced gingival enlargement. *Journal of Clinical Periodontology* 2000; 27: 506–512.
- [43] Marakoglu I., Gursoy U.K., Cakmak H., Marakoglu K.: Phenytoin-induced gingival overgrowth in uncooperated epilepsy patients. *Yousei Medical Journal* 2004; 45: 337–340.

## Correspondence:

Magdalena Cholewa, Department of Pediatric Neurology and Rehabilitation, Medical University of Białystok, University Children’s Hospital, ul. Waszyngtona 17, 15-274 Białystok, Poland Tel./faks: 85 7450812; e-mail: cholewa.magda@gmail.com