



REFLEX EPILEPSY TRIGGERED BY DENTAL TREATMENT: A CASE REPORT

DENTAL TEDAVİ İLE TETİKLENEN REFLEKS EPİLEPSİ: BİR OLGU BİLDİRİMİ

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ABSTRACT

Loss of consciousness is one of the most common medical emergencies during dental interventions. Syncope, transient ischemic attacks, epileptic seizures and nonepileptic psychogenic events can induce loss of consciousness. Reflex epilepsy is characterized by seizures accompanied by loss of consciousness that are triggered in response to a specific external or internal stimulus. Our aim was to report of a reflex epilepsy case triggered by dental treatment.

In this paper, a 22-year-old ASA I male patient developing loss of consciousness with generalised tonic-clonic seizures, severe bradycardia and asystole during dental treatment is presented. He was diagnosed with reflex epilepsy. The reflex epilepsy was thought to have been triggered by hyperventilation resulting from dental anxiety and fear.

Special consideration must be given to the differential diagnosis for conditions leading to loss of consciousness. Reflex epilepsy should be considered in cases during which loss of consciousness accompanied by/followed by convulsive seizures has occurred while the patient was exposed to specific external and internal stimulus.

Key words: Dentistry; emergency treatment; epilepsy, reflex

ÖZET

Bilinç kaybı diş hekimliği işlemleri esnasında sıklıkla oluşabilen acil tıbbi durumlardan biridir. Senkop, geçici iskemik ataklar, epileptik nöbetler ve epileptik olmayan psikojenik olaylar nedeniyle bilinç kaybı oluşabilmektedir. Refleks epilepsi belirli eksternal veya internal uyarılara bağlı olarak oluşan bilinç kaybının eşlik ettiği nöbetlerle karakterizedir. Amacımız dental tedavi ile tetiklenen refleks epilepsi vakasını bildirmektir.

Bu makalede 22 yaşında ASA I erkek hastada diş tedavisi esnasında tonik-klonik jeneralize nöbet, ciddi bradikardi ve asistol oluşumu ile birlikte gelişen bilinç kaybı olgusu sunulmaktadır. Hasta refleks epilepsi olarak teşhis edilmiştir. Refleks epilepsinin dental kaygı ve korkudan kaynaklanan hiperventilasyon nedeniyle tetiklendiği düşünülmektedir.

Bilinç kaybına yol açan durumların ayırıcı tanılarında özel dikkat gösterilmelidir. Hastaların belirli eksternal ve internal uyarılara maruz kaldığı durumlarda bilinç kaybı eşliğinde/takibinde oluşan konvülsif nöbet olgularında refleks epilepsi göz önünde bulundurulmalıdır.

Anahtar kelimeler: Acil tedavi; diş hekimliği; epilepsi, refleks

INTRODUCTION

The occurrence of medical emergencies is not uncommon in the practice of dentistry. In surveys of dental practices conducted over a broad spectrum of series, syncope accounts for the majority of medical emergencies encountered in dental offices.¹⁻³

Inadequate delivery of blood to the brain stem results with loss of consciousness within 10 seconds. The factors that can precipitate loss of consciousness include vasovagal reflex, cardiac dysrhythmias, deficiencies of the autonomic system and certain biochemical and metabolic conditions disrupting cerebral circulation and oxygenation. Syncope and epileptic seizures are possibly involved in the diagnosis

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of cases in which the primary cause related to loss of consciousness cannot be elucidated.⁴

Syncope can be described as the transient loss of consciousness, usually occurring secondary to a period of cerebral ischemia. Complaints of feeling faint, dizziness, pale skin tone arising from peripheral vasoconstriction, tachycardia, sweating and nausea are the well-known prodromal manifestations of syncope. Hypocapnia develops in some patients owing to the increase in respiratory rate, causing a decrease in cerebral blood flow through cerebral vasoconstriction. The patient experiences visual disturbances and confusion prior to syncope. Syncope attacks are likely to occur when patients are standing or sitting upright during dental treatment. Attacks can be prevented by placing the patient in supine position with the legs elevated slightly. In situations where the attack cannot be prevented, loss of consciousness together with the loss of tonicity develops. The duration of the process is brief, usually ranging from several seconds to some minutes. Mild tonic posture and convulsive movements such as tonic or clonic contractions may occur with the onset of syncope in the presence of severe cerebral hypoxia. Syncope may arise from a condition of neurocardiogenic, vasomotor or cardiac origin. Syncope is only a symptom; however a syncopal episode may be indicative of a life-threatening condition representing a serious medical disorder. Among the pathologies that should be considered for the differential diagnosis of syncope transient ischemic attack, episodic vertigo, hypoglycemia and epileptic seizures take a special part.⁵⁻⁷

Epilepsy, which is a chronic disease representing a primary form of brain dysfunction, is characterized by discrete episodes which tend to be recurrent regardless of precipitating factors. The clinical manifestations of epilepsy span a wide range of sensory and motor activities. Epileptic seizures are the warning symptoms of epilepsy and arise from excessive, disorderly neuronal discharge activity. Seizure episodes are characterized by transient alterations in brain functions exhibiting clinically a rapid onset of motor, sensory or psychic symptoms. Epileptic seizures can also be triggered by the factors affecting the central nervous system such as high fever, hypoglycemia, arterial hypertension, or prolonged syncope. However, some specific stimuli such as hot water, flickering lights and specific

activities like food intake/eating, reading or listening to music can provoke epileptic seizures. The seizures that can be triggered by an external stimulus or internal mental process are termed as reflex epilepsy. The differential diagnosis of epilepsy and epileptic seizures should be made when epilepsy is considered for the suspected diagnosis.⁸⁻¹⁰

The aim of this paper is to present a patient developing loss of consciousness with convulsive movements during dental treatment. The patient had a history of syncope attacks during venipuncture for blood sampling. Further consultations were undertaken with cardiology and neurology departments and the diagnosis of reflex epilepsy was made. The syncope attacks were found to have been triggered by hyperventilation resulting from fear and anxiety.

CASE REPORT

A 22-year-old male patient was referred to Gazi University Faculty of Dentistry Department of Oral and Maxillofacial Surgery Clinic for dental treatment including surgical removal of the impacted left lower third molar and restoration of caries. His medical history was unremarkable except that he had developed several fainting episodes during venipuncture for blood sampling. The patient complained that he felt anxious about the dental procedure. According to the Modified Dental Anxiety Scale the patient was determined as highly anxious. Therefore he was scheduled to undergo the third molar surgery under N₂O/O₂ sedation. Informed consent was obtained before dental intervention. A vital sign monitor was used for routine monitoring, including blood pressure (BP), heart rate (HR), peripheral saturation of oxygen (SpO₂) and electrocardiography (ECG). N₂O/O₂ sedation was administered gradually by nasal hood inhalation and continued to be administered at a ratio of 40% N₂O to 60% O₂. Vital signs were stable and the cooperation was maintained. Pupillary dilatation, paleness, hyperventilation and bradycardia were accompanied concurrently by generalised tonic-clonic seizures which developed after two minutes following the injection of local anesthesia and the clinical course progressed to loss of consciousness. The nitrous oxide flow was stopped and the dental chair was returned to the supine position immediately while the patient was receiving 100% oxygen by inhalation. The patient



regained consciousness after one minute. As metabolic disorders such as hypoglycemia may produce loss of consciousness accompanied by seizures, the blood glucose level was found to be 108 mg/dL in the blood sample taken from the finger tip (Accu Check Go Roche®, Germany). The patient told that he could not remember the seizure episode. The dental procedure was completed since his vital signs were normal and stable. He was monitored for two hours. No abnormal findings were observed during the monitorization period. He was discharged and scheduled for routine control and removal of sutures after one week. The patient developed loss of consciousness again during removal of sutures. After having placed in the supine position he regained consciousness within one minute. Further consultations describing the patient's clinical history were undertaken with internal medicine, neurology and cardiology departments. Tilt testing, electrocardiogram (ECG), echocardiogram, blood biochemistry, complete blood count, cranial magnetic resonance imaging (MRI) and electroencephalography (EEG) studies were performed. These studies revealed no abnormal results.

The remaining dental treatments were planned to be carried out under close monitorization. The patient was scheduled for the restoration of the caries in the right upper first premolar tooth. Local anesthesia was administered in the supine position under oxygen inhalation via a nasal hood. Pupillary dilation and loss of consciousness accompanied concurrently by severe bradycardia progressed and cardiac arrest lasting about 10 seconds occurred during the 20th minute of the dental procedure. The dental procedure was interrupted. 0.5 mg atropine was administered intravenously while applying the positive pressure oxygen mask. Muscular twitching and generalised tonic-clonic seizures were observed in this period. The patient had recovered from the attack after the atropine injection. Regarding the patient's condition the neurology department was reconsulted for evaluation and the patient was given the diagnosis of reflex epilepsy. Intravenous midazolam sedation under N₂O/O₂ inhalation was planned for the forthcoming dental treatment.

The last treatment of the patient involved the restoration of the remaining caries. The patient was placed in the supine position. He was monitored and venous access was obtained. Pale skin tone and bradycardia (44-59 pulse/min) were observed prior to

the beginning of the procedure. The patient was warned against hyperventilating. 1 mg midazolam was administered intravenously under N₂O/O₂ inhalation. The dental treatment was started after reaching the adequate sedation level. The dental treatment lasted 40 minutes. The vital signs of the patient were normal and stable. No abnormal findings were observed after the completion of the treatment.

DISCUSSION

Loss of consciousness is the most frequently encountered medical emergency during dental treatments. A number of causes can precipitate loss of consciousness. Stress is usually the main primary cause for unconsciousness.² High anxiety and fear are usually associated with stress, especially for patients undergoing oral surgical interventions.

The conditions exhibiting loss of consciousness can be classified into the two categories of syncope and non-syncopal causes. The causes of syncope include reflex syncope, orthostatic hypotension and cardiac syncope. The non-syncopal causes include cerebrovascular disease, epilepsy, metabolic and psychiatric disorders. Regardless of the underlying factor, the initial steps for the management of unconsciousness are the same and include basic life-sustaining procedures.^{2,11}

The management of the patient with loss of consciousness begins with obtaining a meticulous medical history and physical examination. The determination of causative factors helps to establish the diagnosis. The clinical tests are also required for the confirmation of the possible diagnosis following the initial evaluation of the patient. These clinical tests include measurement of orthostatic blood pressure and blood glucose level, blood biochemistry, complete blood count, serum electrolytes, liver and kidney function tests, tilt table testing, ECG, echocardiography, exertion ECG, holter monitoring, EEG, implantable loop recorder, cranial computed tomography (CT), MRI, carotid angiography and coronary angiography.^{2,7}

Some causes of unconsciousness require specific evaluation once the basic steps have been applied. Epilepsy is a typical example of these causes and represents a potentially life-threatening situation. The clinical presentation of epilepsy and syncope can be quite similar. Therefore differential diagnosis is of



special concern for the prompt recognition of the situation and effective management, thereby increasing the likelihood of a satisfactory outcome. However establishing the definitive diagnosis of epilepsy may be a challenge owing to the fact that epilepsy has a wide range of symptoms including abnormal motor movements, changes in mental activity and alterations in consciousness. Indeed, the lack of a specific diagnostic method for the confirmation of a definitive diagnosis of epilepsy increases the likelihood of a misdiagnosis.^{2,11,12}

In the present case the patient was diagnosed with reflex epilepsy. The medical history of the patient was uneventful except that he had experienced several syncope attacks during venipuncture. The previous episodes were thought to be vasovagal syncope, having been triggered by anxiety and fear. The patient had also no information about the clinical course of the syncope attacks he experienced. He complained that he had felt uncomfortable prior to the onset of the attacks. After the patient had experienced loss of consciousness while sitting on the dental chair for the removal of sutures he was referred to the faculty of medicine and consultations were undertaken with internal medicine, neurology and cardiology departments. The results revealed no abnormality. However the last attack progressed to loss of consciousness accompanied by tonic-clonic convulsive generalised seizures, severe bradycardia and asystole. Therefore neurology department was reconsulted over the patient's condition. The diagnosis of reflex epilepsy was established based on the nature of the current attacks.

Reflex epilepsies are characterized by the epileptic seizures evoked by a specific stimulus or activity. All reflex epilepsies are precipitated by sensori stimuli and the precipitating factor is specific for each patient. A wide range of precipitating factors have been identified including somatosensory, visual, auditory, vestibular and olfactory stimuli and high level processes such as cognitive, emotional, decision making tasks and other complex stimuli.^{9,13} Reflex epilepsy seizures precipitated by usage of a powered toothbrush and tooth brushing were have been reported at previous literature.¹⁴

It has been estimated that epilepsy prevalence for developed countries as % 0.6.^{15,16} Reflex epilepsy is reported to be cause for 5-6 percent of all seizures.⁹ Although reflex epilepsy constitutes a small part of

epilepsy cases, it should be taken into consideration; hence it represents an important part of the treatment plan. In the present case symptoms including the patient's complaint of feeling uncomfortable, progression to loss of consciousness following pupillary dilation, severe bradycardia, convulsive movements and amnesia are not the obvious criteria to differentiate between vasovagal syncope and epileptic seizures with reasonable certainty. Furthermore the postictal phase, which is a well known manifestation for the epileptic seizures, was not observed for this case. Progression of seizures following hyperventilation associated with fear and anxiety, occurrence of generalised tonic-clonic contractions, recurrence of seizures triggered by specific stimuli comply with epileptic seizures. Effective management is directed towards the elimination of triggering factors. It was concluded that epileptic seizure progressed following hyperventilation associated with fear and anxiety. A low dose (1 mg) of midazolam was administered intravenously in the last dental treatment session with the aim of reducing anxiety and fear. The patient had been warned against hyperventilating. The treatment was completed uneventfully.

The administration of sedation agents makes up an important part among the procedures performed for reducing fear and anxiety. Midazolam is a benzodiazepine being used primarily as a premedicant, sedative and anesthetic agent. The antiepileptic effects of midazolam have been demonstrated in various animal and human studies.¹⁷⁻¹⁹ Midazolam has a significant anticonvulsant property and is an effective treatment option in the management of status epilepticus. Various clinical reports have mentioned the successful use of midazolam for refractory status epilepticus without any adverse effects in infants and children.²⁰⁻²²

We are of the opinion that the sedative and anticonvulsive properties of midazolam probably prevented the progression of a possible seizure attack and provided a comfortable treatment in the present case. The positioning of the patient in the supine position, close monitorization, administration of midazolam in anxiolytic dosages accompanied by inhalation sedation with N₂O/O₂ and avoidance of hyperventilation probably contributed to the prevention of seizures.



CONCLUSION

Dental practitioners should have knowledge regarding the clinical course and prompt management of the conditions associated with loss of consciousness and is prepared for a possible medical emergency. The diagnosis of reflex epilepsy should be considered in similar conditions progressing to recurrent loss of consciousness with convulsive seizures, where a specific external or internal stimulus is present.

Conflict of interest disclosure

The authors declare no conflict of interest related to this study.

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