



Medical Emergencies in Dental Clinics

Saba Zuhair Hussien^{1*}, Aola Zuhair Abdul-Husein²

1College of dentistry , University of Baghdad, saba.ali1986ali.saba@gmail.com, Hilla, Babil, Iraq.

2 College of dentistry , University of Baghdad, aolazuhair@gmail.com , Hilla, Babil, Iraq.

*Corresponding author email: saba.ali1986ali.saba@gmail.com; mobile: 07812720021

حالات الطوارئ الطبية في عيادات الأسنان

صبا زهير حسين^{1*}، علا زهير عبد الحسين²

1كلية طب الاسنان، جامعة بغداد، pdopriv@codental.uobaghdad.edu.iq، باب المعظم، بغداد، العراق.

2كلية طب الاسنان، جامعة بغداد، pdopriv@codental.uobaghdad.edu.iq، باب المعظم، بغداد، العراق.

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ABSTRACT

Medical emergencies in dental clinics can occur unexpectedly and encompass a range of conditions, from respiratory and cardiovascular issues to allergic reactions and neurological disorders. Dentists must be well prepared through training and continuous education to handle these emergencies promptly.

Most emergencies were prevented via ideal examination of the patient and analysis of past medical history. With careful planning of emergency protocol with team approach and specialized theoretical and practical training, and many emergency conditions can be prevented; can help mitigate risks, ensuring a swift and efficient response to safeguard patient health.

Medical emergencies can be happening unsuspectedly during dental treatment so patient's life may depend on the readiness, good staff-skill training and accessibility of suitable emergency medication and tools all of which are vital for the emergency management. Most emergencies are prevented via ideal examination of the patient and analysis of past medical history.

Key words: Emergency management, first aid, dental clinics.

INTRODUCTION

Emergency is a (medical status) which need rapid intervention and correct management and its considered as a (life-threatening condition) so all the medical staff must be alert and ready [1]. The phrase emergency mean (unexpected serious and often crisis need rapid intervention treat any emergency which may happen within dental-clinics. These include: Syncope (fainting), anaphylaxis (an acute allergic reaction), acute asthma, angina (chest pain which can lead to a myocardial infarction), hypotension and hypertension (low and high blood pressure), diabetic – hypo and hyperglycemia (low and high blood sugar) and an acute epileptic seizure [2]. Before doing any type of dental work on a patient, it is important that they provide the dental team with a thorough medical history and update information regularly and review it before each visit. The additional information or vital signs may be important so consult the patient's medical doctor before beginning dental treatment. Physical examination is the next step in prevention and most important part of the physical exam not only (the monitoring of blood pressure, pulse, and heart rhythm) but all findings. The dentist should modify the dental treatment to decrease the potential risk to the patient [3]. When the dentists treat any medical emergency they should be start with assessing the (ABC'S). Then O₂ is usually administered. Generally, after the ABCs are dealt with we can make an assessment for the symptoms and an appropriate treatment can be employed and the emergency drugs dentist can give by dentist. SO the emergency kit with essential drugs should be available in dental clinics [4].

LITERATURE REVIEW

1. Medical emergencies

Medical emergencies that can occur in the dental office may be unexpected events, which can include accidental or willful bodily injury, central nervous system stimulation depression, and respiratory and circulatory disturbances, as well as allergic reactions. Dentists, through their academic, clinical and continuing education, should be familiar with the prevention, diagnosis, and management of the common emergencies. In addition, they should provide appropriate training to their staff so that each person knows what to do and can act promptly [5].

1.2. Specific medical emergencies in dental clinics

Medical emergencies can happen in any environment and the occurrence of tragedy inside the dental office is not a surprising event. There are different ways to classify medical-emergencies. The standard one depends on the system and discuss life-threaten situation associated with those systems such as respiratory, cardiovascular, nervous metered dose inhaler with volumetric spacer – one puff and allow six breaths [11].

1.2.1. Hyperventilation

It is most frequently seen. Hyperventilation it might be incredibly disturbing to the patient. Hyperventilation is rapid and deep respiration which is normally 11-18/min in adult also anxiety may result [12]. Signs and symptoms of hyperventilation are (Anxiety, paresthesia of the fingers or lips, tetanic muscle spasm, weakness, chest pain and/or palpitations, and breathlessness). Cerebral hypoxia may lead to unconsciousness [13]. Calm the patients and instruct them to do simple breathing-exercises. Former recommendations such as paper-bag rebreathing for hyperventilation are no longer advised due to safety concerns. Current management focuses on calming the patient and controlled breathing techniques. In unconscious patient, we should ensure airway patency and put them in the recovery-position [14]. Concerning the treatment of hyperventilation, a calm and sympathetic approach from the practitioner is important. Encourage the patient to re-breathe his or her own exhaled air [15].

1.2.2. Cardiac disorders

Cardiac disorder is a class of diseases that involve the heart or its blood vessels. Cardiovascular disease includes coronary artery diseases such as angina and myocardial infarction (commonly known as a heart attack), gastrointestinal reflux disease, anxiety, and tachycardia. The most common cardiac problems that occur in conscious patients are (angina pectoris and acute myocardial infarction). Medical history is the cornerstone to avoid complications. If chest pain happens for the first time ever the dentist should deal with the patient as the patient has acute myocardial infarction and transfer them to the hospital immediately. If not for the first time an angina pectoris is expected [16].

1.2.2.1. Angina(chest pain)

Angina is a disorder that is caused when the O_2 of blood-flow to the heart is constrained. which is frequently due to narrowing, and hardening of blood arteries and this influences the blood-flow and disproportion between what the myocardial needs of O_2 + blood and what is supplied [17]. It is commonly induced by physical exertion, emotional stress, eating, and even cold. It can be categorized into (stable and unstable). Stable is triggered by exertion and alleviated by rest. Unstable is takes place when frequency or intensity rises and even at rest. It endures about 1 to 5 min. and characterized by (chest pain, a sensation of pressure (heaviness) in the chest, and pain that may radiate to the stomach, jaw or back, along with breathlessness, nausea, and sweating) and it is relieved by rest or glyceryltrinitrate (GTN) [18]. To manage these situations, the history is evidently crucial and if a patients has a therapy to manage the known one they ought to carry it along with them or from emergency-kit uses. Drug of choice is GTN which is commonly used and offer prompt alleviation of angina symptoms. Patients who suffer from angina need to ensure that there is medication always with them and can use it to 3 sprays. The ambulance should be called If the patient fails to completely recover. If the patient deteriorates the dentist need to access the ABCDE since (patient suffering from serve angina attack may evolve into a heart attack) [19].

1.2.2.2. Myocardial Infarction

Myocardial infarction is the permanent damage of muscle cells of the heart because of extended ischemia. Commonly happens due to a disproportion between what the myocardial needs and supply of O₂. About 90% of it happen due to (obstruction in an atherosclerosis coronary artery by an acute clot) leading to total blockage of the vessel [20]. The pain of MI usually the same as but more intense than that of angina and couldn't be alleviated by GTN. Patient might indicate crushing pain centered in the chest that may spread to (jaw, neck, shoulders, epigastrium, left arm and back), skin may look pale and sweaty, pulse may be weak, nausea and possibly vomiting, sweating, pallor, cold sweaty skin, dyspnea, blood pressure may fall, shortness of breath, and signs of pump failure: hypotension, tachycardia [21]. Dental treatment is better to delay to if patient has attack. Usually severe chest-pain alarm to delayed treatment and calling EMSs. The primary management if you speculate that the patient with heart-attack EMSs called, ABCDE procedure then set the patient in a sitting-position. Oxygen 10 – 15 liters (L)/ minute must given and their GTN Spray must be taken. We can give them 300 mg aspirin (chewed or crushed), and reassure during EMSs waiting. Management of expected acute myocardial infarction patient are (MONA) which consists of morphine administration, oxygen, nitroglycerine, aspirin and emergency medical service. Nitrous oxide/oxygen in a 50:50 can be used if morphine is not found. Alert EMS if Patient with shortness of breath and set them in an upright sitting; if they are with fainting put them flat and prepare to initiate basic life support [22].

1.2.2.3. Vasovagal syncope (simple fainting)

The most frequent medical-emergency in dental treatment is simple-faint. Fainting is results from an interim reduce of BP. of the brain this implies the brain-cell are unable to take enough O₂ from the blood so they can't function appropriately and the human may loss their consciousness. Many causes may lead to fainting like: low BP., hypohydration or orthostatic hypotension, fear, anxiety, and causes of sudden and transient loss of consciousness [23]. The first line of manifestations includes nausea and or vomiting, warmth, perspiration, baseline blood pressure, tachycardia, the pulse in the wrist is quick and weak, and a ringing sound in the ears in most instances. The second line of manifestations is bradycardia, hypotension, yawning, hyperpnoea, dilation of pupil, dizziness, cold extremities, vision disturbance, loss of consciousness [24]. Syncope attacks mostly could be avoided when controlling predisposing factors and making sure the meal was taken before treatment, work in a comfortable environmental temperature and humidity in the office, reducing anxiety stress, and proper positioning and receiving supplementary oxygen [25]. Management: at first set patient in supine-position with slightly elevate legs (10-15) degree. Simple fainting is often recover instantaneously. Then pulse checking because the cardiac arrest indicates when its silent, airway maintaining, and begin with cardiopulmonary resuscitation directly. 4 sugar lumps can be orally given or 20 ml of 20-50% sterile glucose IV given if the patient is still conscious and pulse is felt, and provide definitive management (clothes loosening, stimulant the



respiration by aromatic ammonia for example, cooling the patient forehead, hydrocortisone sodium succinate 200 mg IV must be given and seek on other reasons for lost consciousness [26].

1.2.3. Neurological disorders

A neurological disorder is any disorder of the neural system (structural, biochemical or electrical abnormalities) in the brain, spinal cord or other nerves that may result in a range of symptoms. Examples of symptoms include paralysis, muscle weakness, poor coordination, loss of sensation, seizures, confusion, and pain altering levels of consciousness. The most common neurological disorders that may be faced in dental clinics are epileptic seizures and strokes [27].

1.2.3.1. Epileptic seizures

Epilepsy is a neurological disorder leading to the experience of a seizure by physical health and brain affected. It is demonstrated as an inclination to experience recurrent seizures, which begin in the brain, and it is typically diagnosed only following multiple seizures [28]. If patients look like jerky in dental clinics most commonly they have a seizure history and they are epileptic patients. Signs and symptoms of seizure: early one occur within hours to days prior to seizure onset like (emotional changes, anxiety, dizziness, and concentration problems, sleep disrupt, frustration, abdominal pain). The seizure might start with muscle tremor or head and eyes movement, déjà vu, or strange smell, and sudden loss of consciousness. The patient becomes unconscious and may have noisy or spasmodic breathing, salivation and urinary incontinence, patient may bite their tongue. Unconsciousness and weakness might follow the seizure. The patient recovers during different times or is still confused for a while. [29]. Management: the patients first placed in the supine position and the chin is lifted if has seizure experience and are unconscious. All instruments must be removed from patient's mouth and patient protected. The ABCDE procedure must be done for patient assessment. The patient must not be restrained and clothes loosened and maintain breathing. Oxygen is administered if necessary. The condition is called epileptic status if seizures continue for a long time and it is a life-threatening condition and is better to be given a midazolam (buccal or intra-nasal) from the drug kit (10 mg for adults) and for maintaining the basic life support (BLS) till patient is shifted to emergency medical care. As soon as the jerking has ceased, the patient is set in recovery-position. If the patient goes through a long seizure or the dentist can't counter the patient or it is the first seizure for the patient an EMS should be called [30].

1.2.3.2. Stroke

Serious neurological status resulting from an expected interruption or significant flow reduction of the cerebral blood, caused by pathological sustain as a first management and calling EMSs. High conc. oxygen (15 L/min) must be supplied. Monitoring is important for any further deterioration. In dental management of the stroke patient should take special consideration in dental treatment: appointments should be scheduled in the morning and should be as short as possible and comfortable. Clinical protocol should take multiple factors into consideration [34]. Urgent dental treatment is permitted 6 months after stroke. If needed dental treatment produces bleeding and systemic anticoagulant drugs may lead to significant hemorrhage, so any anticoagulant treatment for example heparin must discontinue not less than 6-12 hours before procedures. Heparin can resume 6 hours after bleeding cessation, once clot formation is confirmed, depending on the International Clotting Rate and the decision to resume it depends on the patient's neurologists [35].

1.2.4. Endocrine disorders

The endocrine system is a network of glands which that produce and excrete hormones. These hormones do many functions in human body heartbeat, tissue growth and creation of new life. Each gland in the endocrine system releases specific hormones into your bloodstream. These hormones travel through blood to other cells and help control or coordinate many body processes and serve a specific purpose. Endocrine disorders happen when one or more of these glands can interrupt the careful balance the body strikes with these hormones. Diabetes and adrenal insufficiency are the most common endocrine disorders diagnosed in the dental offices [1].

1.2.4.1. Diabetic Crisis

Diabetes is a long-term (chronic) condition also known as hypoglycemia and hyperglycemia also called diabetes mellitus. If patient a hyperglycemic the symptoms develop gradually like (warmth and flushing, thirsty with a fruity mouth-odor, seems unwell with possibility of vomiting. The hypoglycemic patient has a possibility to rapid graduated symptoms (confusion or intoxicated, anger and be hungry unexpectedly. This is the most common form of diabetic crisis manifested. Hypoglycemia Normal level of plasma glucose 3.6-5.8 millimol [36]. The history of frequent hypoglycemia and different levels of blood glucose are warning of happening hypoglycemia if dental treatment is done. Appointment of diabetic patients is best to get an early morning visit, their medication is with them and it is better to take a meal before it. Lie the patient flat and apply ABC. In the beginning if patient conscious, co-operative and can take glucose orally (3 pieces of sugar or 2-4 tsp of sugar), a glucose tab. or drink and if need can have repeated in (10 -15) minutes [37]. If the patient loses conscious, being disorientated and if they can't swallow, glucagon which is a pancreas hormone elevate level of blood-glucose and it decreases blood-glucose opposite of insulin. Glucagon should be given orally or IM. Give 1 mg IM or IV 5-10 min for unconscious patient and ought to protect the airway [38]. Food with high carbohydrate and glucose is given orally when the patient be consciousness [1].

1.2.4.2. Adrenal insufficiency

Adrenal-insufficiency might be caused by adrenal cortex dysfunction leading to insufficiency of hormone production. It may be caused by stress by trauma, infection or surgery. It is rare that this would happen as a result of dental treatment and if a patient collapses other causes are much more likely and should be considered first [39]. Cortisol is the most important human glucocorticoid. It is important to support and regulate (cardiovascular, metabolic, homeostatic, and immunologic functions) of the body essential for life. Adrenal crisis results from acute deterioration of chronic cortisol deficiency and it is predominantly triggered by sepsis or surgical trauma [40]. In response to stress cortisol production is raised; also if the adrenal cortex is unable to produce enough of cortisol, need to increased it. Crisis is a medical emergency that may be life-threatening [41]. There is no danger of adrenal crisis in a simple nonsurgical dental procedure and there is no need for steroid cover. While in a surgical procedure steroid cover is important. Signs and symptoms of adrenal crisis are (sweating, hypotension, confusion, vomiting, diarrhea, lost consciousness, seizure, and vascular collapse). To avoid this risk patients, take early-morning appointments and their steroid is taken before treatment. Place the patient supine, administer hydrocortisone 200mg IV or IM. Should ask if the corticosteroids have recently been used or are currently used by the patient. Acute adrenal insufficiency can often be prevented by the administration of a steroid boost prior to treatment and giving enough analgesia and anxiety-control drugs if needed. Give high flow O₂, and call an ambulance [42].

1.2.5. Anaphylaxis/Allergies (hypersensitivity reactions)

Anaphylactic reaction is that an acute systemic immune reaction; rapidly occurs when in contact with foreign material. In dentistry the most common anaphylaxis occurs after drug administration such as penicillin or allergen contact which can be latex-rubber, mercury, rubber dam, or impression material, there is a hereditary component. Local anesthetics also responsible for anaphylactic reaction and their complications involve hypersensitivity, toxic reactions, and allergy. Allergic reactions can also occur to acrylic resins. Within minutes, symptoms may occur and lifesaving is the first treatment that should be done. Anaphylactic-reaction is a severe life-threatening, generalized or systemic hypersensitivity reaction which featured by accelerate lethal airway, breathing, circulatory dysfunction commonly related to mucosal, and skin alteration. The symptoms mild like blotchy red skin. That dissolve if pressure by finger applied, peripheral cyanosis, abdominal pain, vomiting, nausea, or encounter diarrhea, (heart rhythm may be fast or slow), a severe form of angioedema may happen, itchy rash, facial swelling, bronchospasm and laryngeal edema causing noisy breath (hoarseness, wheeze, stridor), hypotension, tachycardia, potentially progressing to cardiac arrest which is a life-threatening situation [43]. An anaphylactic reaction can be prevented by avoiding latex, especially in patients with known latex sensitivity. Alternative materials, such as silicone, powder-free gloves, vinyl, or nitrile, should be used. Chemicals like devitalizing agents or form cresol should be used cautiously to avoid burns [44]. Precautions include administering prophylactic antihistamines (e.g., diphenhydramine) or

corticosteroids (e.g., prednisone) before dental treatment in at-risk patients. Recognition and management should follow the ABCDE approach. If the airway is clear, the patient should be placed in a supine position with legs elevated, and high-flow oxygen (10–15 L/min) should be administered. The preferred drug is epinephrine (adrenaline) 0.3–0.5 mg IM for adults and 0.01 mg/kg IM for children, repeated every 5–15 minutes if needed, preferably using an auto-injector (EpiPen) [45]. Epinephrine is the only drug that dental staff should administer; other drugs should be given by ambulance personnel. Patients with a previous history of anaphylaxis often carry an EpiPen. After stabilization, patients should be transferred to the hospital for further observation [46].

1.2.6. Airway obstruction (Choking and Aspiration)

Choking typically happens when anyone accidental swallowing or foreign body aspirate, or due to a spasm of the laryngeal. It may be either mild or severe airway obstruction. The mild obstruction occurs when the patient is alert, responsive, and breathing [47]. However, the manifestations of severe obstruction are dyspnea, coughs, wheezing, cyanosis, silentness (inability to speak), the universal choking sign, and unconsciousness all that may cause cardiac arrest within minutes [51]. When foreign body aspiration questionable the airway should be cleared by instruct the patient to cough forcefully to throw the object if the patients conscious different than if patients unconscious so should sit straight if they are conscious, support chest with one hand, and be given 5 firm back blows between shoulder by the heel of the other hand [2]. If back blows fail, till 5 abdominal thrusts the paramedic should stand behind the patient and put their arms around the upper part of their abdomen and lean the patient forwards. The rescuer's fist should be clenched and placed between the umbilicus and lower end of the sternum by grasping the other hand and pulled sharply inwards and upwards. This should be repeated up to 5 times. The back blows and abdominal thrusts should be continued in a cyclical fashion [47]. In the case of the infant, you should lay the infant on your arms or thigh in a head-down position and strike the middle of the infant's back 5 times with the heel of your hand. If it is obstructed, turn the infant over and give it five strong chest thrusts with 2 fingers on the lower half of the sternum. Then the mouth should be checked If the obstruction persists, because it may be something to be removed. Then back it slaps and repeat it if needed. In older children; while the child is sitting, kneeling or lying, and strike the child's back 5 times with the heel of the hand. If it is obstructed, go behind the child and put your arms around the child's body; form a grip with one hand below the sternum; place the other hand over the fist and thrust sharply upwards into the abdomen. Repeat this up to 5 times. Then check the child's mouth for any obstruction that can be removed. If necessary, repeat the sequence with back slaps again [48]. Chest radiography should be taken when a foreign body inhalation is suspected. But the ABCDE approach is applied and an ambulance is called if the patient becomes unconscious . Visible bodies from the mouth and pharynx are removed. Aspirate with suction if it is needed [49]. The patient put in a supine position and deliver inward and upward thrust 5 times if the patient was unconscious. Then turning patient to one side to clear the oral cavity. Then reventilate, CPR and give oxygen. If the foreign body isn't dislodged and patient gotten worse, so surgical airway is

done by laryngoscopy or cricothyrotomy. Dentists can prevent that by setting the patient in the correct position and use (rubber dam, chain with small instrument , high volume suction, and others) [50].

CONCLUSION

Medical emergencies can be happening unsuspectedly during dental treatment so all dentists should be understanding it and know how to deal with it. If the medical emergency had been left without proper treatment may be gotten worse and even life-threatening. Patient's life may depend on the readiness as well as having good staff-skill training and accessibility of suitable emergency medication and tools all that are vital for the emergency management in a dental-clinic. Most emergencies are prevented via ideal patient examination and analysis of past medical history. With careful planning of emergency protocol with a team approach and specialized theoretical and practical training, many emergency conditions can be prevented.

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Conflict of interests

There are non-conflicts of interest.

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الخلاصة

قد تحدث حالات الطوارئ الطبية في عيادات الأسنان بشكل غير متوقع، وتشمل مجموعة من الحالات، بدءًا من مشاكل الجهاز التنفسي والقلب والأوعية الدموية وصولًا إلى ردود الفعل التحسسية والاضطرابات العصبية. يجب على أطباء الأسنان الاستعداد جيدًا من خلال التدريب والتعليم المستمر للتعامل مع هذه الحالات الطارئة على الفور. يُمكن تجنب معظم حالات الطوارئ من خلال الفحص الأمثل للمريض وتحليل التاريخ الطبي السابق. من خلال التخطيط الدقيق لبروتوكول الطوارئ مع نهج الفريق والتدريب النظري والعملي المتخصص، يُمكن تجنب العديد من حالات الطوارئ؛ مما يُساعد في تخفيف المخاطر، وضمان استجابة سريعة وفعالة لحماية صحة المريض.

الكلمات المفتاحية: إدارة الطوارئ، الإسعافات الأولية، عيادات الأسنان.