

Medical Emergencies In Dentistry-An Update

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ABSTRACT:

Medical emergencies at dental office are a rare situation. When the dentist encounters such occasional incidences, they should initiate emergency procedures to save the life of the patient. In case of an emergency, the roles and activities of the dentist and the team members should be planned, documented, and displayed. The staff members should be trained and updated in first aid, cardiopulmonary resuscitation, and other emergency procedures. The knowledge of management of medical emergencies will increase the confidence of the dental surgeons in their clinical practice. The objective of this review article is to provide a vision to the commonly occurring medical and dental emergencies and complications in dental practice and their management.

Keywords: Anaphylaxis, asthmatic attack, complications, Emergency drugs, medical emergencies, syncope.

1. INTRODUCTION:

Medical emergencies in dental offices are unpredictable, but unfortunately common nowadays. Medical emergencies are acute conditions that require grave attention and can be life threatening, if not managed cautiously and successfully. They can occur anywhere, be it hospital, dental offices, or a road. However rare, but they can occur to anyone even in the dental office- a patient, a doctor, a member of the office staff and a person who is merely accompanying a patient.^[1] Not only on dental chairs, the emergencies can and do occur even in the waiting rooms and after treatment. Medical emergencies are 5.8 times more likely to occur in dental offices than in medical offices.^[2] Medical emergencies though manageable, can be turned disastrous. To prevent morbidity, each dental official should be well versed and trained for the first line management in medical emergencies, including the provisions of BLS. The General Dental Council document published in 2002 also stated the fact that all

dental practitioners should be able to diagnose and confidently oversee medical emergencies and be proficient in resuscitation techniques.^[3]

CAUSES:

Medical emergencies in dental practice usually occur in an already medically compromised individuals.

Other factors precipitating the risks for emergencies are:

- The increasing number of older persons looking up to dental care.
- Therapeutic leap in medical and pharmaceutical professions.
- The budding trend towards longer dental appointments.
- The increasing use and administration of drugs.^[4]

TYPES OF MEDICAL EMERGENCIES:

SYSTEMS INVOLVED	EMERGENCIES
1 CNS Related disorders	Syncope, Seizures, Cerebrovascular accident, Epilepsy, Status epilepticus
2 CARDIOVASCULAR emergencies	Cardiovascular collapse/ Cardiac arrest, Angina pectoris, Postural hypotension, Myocardial infarction.
3 HAEMATOLOGICAL emergencies	Haemorrhage
4 RESPIRATORY emergencies	Asthmatic attack, Hyperventilation, Acute Pulmonary failure
5 DRUG Related emergencies	Local Anaesthetic overdose, Systemic anaphylaxis
6 ENDOCRINAL emergencies	Adrenal insufficiency, Insulin shock(hypoglycaemia), Thyroid storm, Diabetic coma.

PREVALENCE:

The most frequent medical emergency in the dental office is syncope representing 50%, followed by mild allergy about 8% and then hyperventilation making up to 7% of all emergencies. More than 54% of emergencies occur during or right after administration of local anaesthesia.^[5] Almost 90% of emergency episodes are considered mild and 8% are regarded as serious.^[6] Life threatening conditions are extremely rare. On an average, the dentists encounters an emergency situation approximately 3 to 4times a year. However, with the advancement and decreasing mortality rate more older individuals are seeking for dental treatment, thereby probability of facing the emergencies may multiply.

MEDICAL RISK ASSESSMENT

With the associated substantial co morbidities and population undergoing complex and frequently changing medical treatments, it is of utmost importance to grade an individual at high risks.

A thorough history taking could serve as the basis. Complete evaluation of vitals, all medical questionnaire could help to assess an individual and modify the dental treatment as per.

Anxious and apprehensive patients are generally at alarming risk of developing emergencies like syncope, hyperventilation.

PREPARATION FOR EMERGENCIES:

❖ PREVENTION-

'Prevention is better than cure.'

'Forewarned is forearmed.'

Both these quotes go hand in hand with medical emergencies.

Prevention of any medical emergency begins as soon as the patient enters the office and fills in the medical questionnaire.

- a) An accurate medical history is of extreme importance for the dentist to identify any predisposing factor that could precipitate an unforeseen event.
- b) Visual Inspection of an individual: Detection of any abnormal discoloration of the skin or lips or shortness of breath.
- c) Talking to an individual: Examination of anxiety levels and state of mind.
- d) Recording baseline vitals.
- e) Constant reviews of physiology.
- f) Correction of insufficient oxygen supply to brain or heart.
- g) Staying Vigilant at all times should be of prime importance.^[7]

TRAINING –

Dental officials cannot prevent every medical emergency; accordingly, they must be prepared to recognise and manage medical emergencies when they exist.^[8]

The American Dental Association [ADA] Council on Scientific Affairs has set certain guidelines for preparedness, which include;

- 1) Current BLS certificate for all staff.
- 2) Didactic and clinical courses in emergency medicine.
- 3) Periodic office emergency drills.^[9]

The ADA has also made mandatory specific training and emergency drugs and equipments necessary for dentists who use conscious sedation, deep sedation or general anaesthesia.^[10,11,12]

Apart from this, confidence and satisfactory management can be achieved, at least all the dentists should be able to perform venepuncture. They must know how to maintain airway and how to carry out cardiopulmonary resuscitation.^[13]

EQUIPMENTS AND DRUGS –

Acknowledging the common medical emergencies, listed are certain emergency drugs that forms the component of emergency kits.

DRUGS	INDICATIONS	DOSAGE AND ROUTE
1) Epinephrine (1:1,000); 1 mg/ml	Anaphylaxis	0.3ml IM
2) Epinephrine (1:10,000); 0.1 mg/ml	Cardiac Arrest	1mg in 5minutes, 10 ml IV
3) Pheniramine maleate	Allergy	1-2 ml, 45mg IM or IV
4) Nitroglycerin	Angina	Sublingual over 5 minutes. Maximum 3 tablets in 15 minutes.
5) Ephedrine	Hypotension	IV 0.1- 0.2 ml over 2-3 min. Maximum dose of 50mg or 0.5 ml IM or sublingual injection.
6) Atropine	Bradycardia	0.5 mg sublingual injection or 0.5mg IV over 2-3 minutes.

7) Salbutamol	Bronchospasm in asthma and allergy	2-3 inhalations over one 2 minutes and can be repeated as per need
8) Glucagon	Hypoglycaemia	1mg IM/SC/IV
9) Normal Saline or Ringer's Lactate	Hypotension	IV, 25-30 ml/kg
10) Aspirin	Myocardial Infarction	4 tablets to be chewed and swallowed
11) Aromatic Ammonia	Vasovagal Syncope	To be inhaled

Other drugs that are found to be essential are Esmolol, Naloxone, Flumazenil, Dextrose, Diazepam.^[14]

EQUIPMENTS –

The Resuscitation Council (UK) has recommended as a minimum of the listed equipments to be available in the dental offices to handle emergency situations. The list is as follows:^[15]

1. Portable Oxygen Cylinder (E size) with a flowmeter and pressure reduction valve.
2. Face masks
3. Oropharyngeal airways – size 1,2, 3 and 4.
4. Bag valve mask device (Ambu Bag)
5. Endotracheal tubes.
6. Supraglottic Airway Devices: Laryngeal Mask Airway
7. Glucometer
8. Portable Suction
9. Syringes and needles
10. Automated External Defibrillator.

MANAGEMENT –

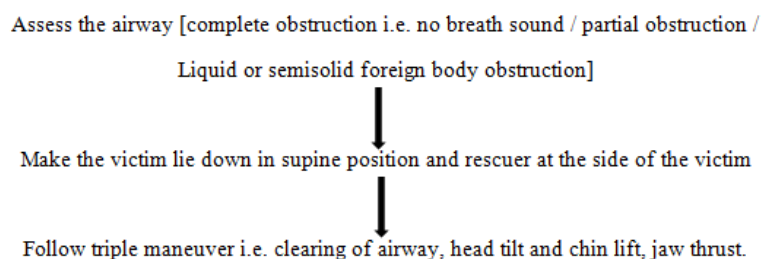
- Principle line of Management:

The first line of Management includes Position, Airway, Breathing and Circulation.

POSITION: The primary positions during emergency situations are as follows –

- a) Supine for seizures.
- b) Supine position with elevated legs for syncope and cardiac arrest.
- c) Semi erect and upright position for angina, myocardial infarction, heart failure and asthma.^[16]

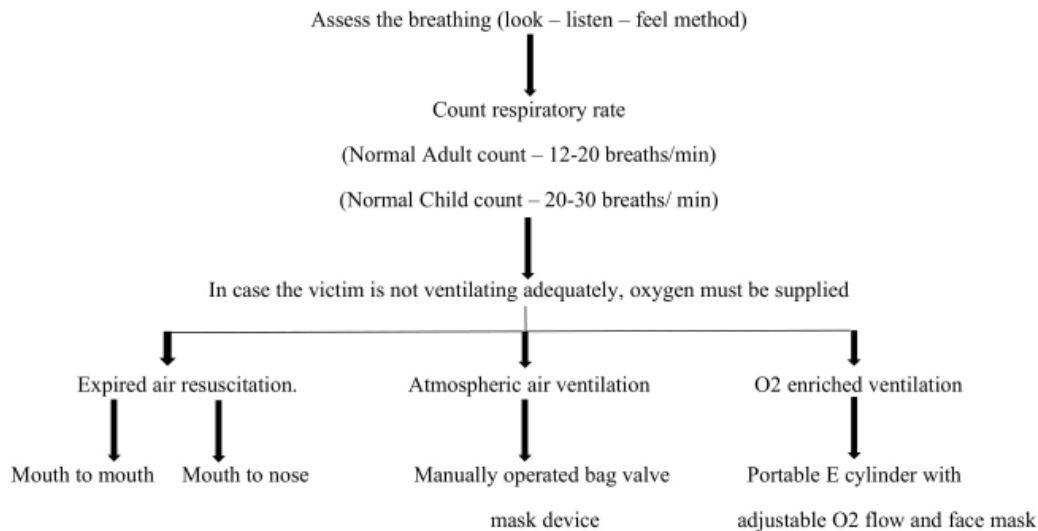
AIRWAY: Airway Obstruction is a potent medical emergency.



If there is any foreign body airway obstruction, then methods advised are

- Back blows
- Heimlich maneuver
- Finger sweep method.

BREATHING:



CIRCULATION: After appropriate ventilation and patent airway clearance, still the victim is not stabilised, CPR guidelines should be followed.

- ✓ Make the victim lie in supine position.
- ✓ Place the heel of one hand over lower sternum with the other hand over the first hand. The fingers should be interlocked.
- ✓ Open the airway and deliver slow breaths.
- ✓ Perform 18 compressions / 2 breaths.
- ✓ Perform 5 cycles and check for the vitals.

Also, the circulation has to be assessed by;

- Carotid pulse or brachial pulse.
- Discoloration on nails and limbs.
- Temperature of limbs (if cold extremities are there or not).
- Blood Pressure.^[14,15,17,18]

SPECIFIC RESPONSES TO EMERGENCY SITUATIONS:-

Vasovagal Syncope –

Synonyms: Atrial bradycardia, simple / benign faint, swoon, neurogenic syncope, vasodepressor syncope, psychogenic syncope.^[1]

Most common medical emergency. It is described as sudden, transient loss of consciousness due to cerebral hypoperfusion.

Predisposing factors: They can be presented as psychogenic factors including extreme anxiety, fear and pain. Non psychogenic factors comprise of sitting or upright position, hunger, poor physical condition and hot, humid and crowded environment.^[1,14]

Signs and symptoms: Light headedness, headache, pallor, dizziness, nausea, sweating, visual disturbances i.e. pupil dilation and blurred vision.^[1,14,19]

Prevention: a) Thorough pre treatment medical evaluation and grading an individual on the ability to tolerate psychological stress.

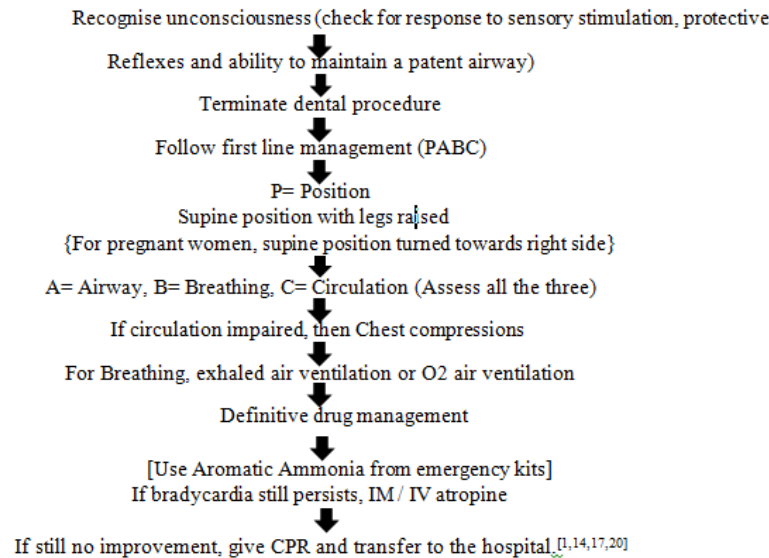
b) Stress reduction protocols.

c) Good communication.

d) Reassurance.

[NOTE: Since many medical emergencies developed due to stress, 'sit down' dentistry with patient in supine position came into practice.]

Management:



Mild Allergy -

Second most common medical emergency.

“A hypersensitive state acquired through exposure to a particular allergen, reexposure to which produce a heightened capacity to react.”^[21]

Predisposing factors: a) Drugs (Penicillin group of antibiotics)

b) NSAIDS (Ketorolac, Diclofenac)

c) Local anaesthesia (Benzocaine, ester linked local anaesthesia)

d) Methyl Paraben (preservative in LA)

[Note- A thorough medical history again plays an active role and is of major significances.]

Clinical Manifestations:

NSAIDS – urticaria, rhinitis, asthma, skin rashes, pruritus, angioedema.

Local anaesthesia- rashes, angioedema, dermatitis, contact sensitivity, asthma, anaphylaxis (rarely)

Antibiotics Penicillin group- Frequent reactions are rashes, urticaria, itching, fever. Less common are angioneurotic edema, serum sickness, exfoliative dermatitis. Rare is anaphylaxis.^[22]

Management: Drug specific i.e. Antihistamines (Diphenhydramine – 25-50mg IV or Oral)

Pheniramine maleate (avil) can be used from emergency kit.

Paediatric dosage IV diphenhydramine HCl: 1- 1.25mg/kg upto 50mg maximum.^[1,6]

Anaphylaxis -

An allergic response/ hypersensitive reaction which is quick in onset and can be life threatening. It is considered to be a true emergency and should be diagnosed immediately and managed urgently. In dental offices the type 1 hypersensitivity reaction is mainly due to latex eg. Latex gloves, rubber dam etc.^[23]

Clinical manifestations:

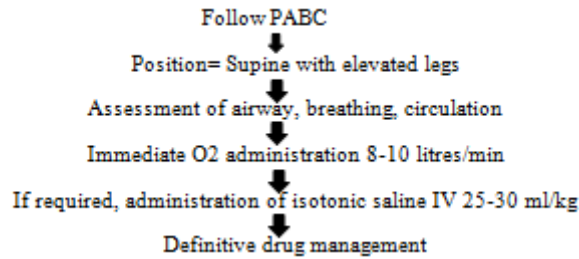
General- A sense of impending doom

Skin- erythematous rashes, urticaria, pruritus

Respiration- stridor, shortness of breath, hoarse voice, respiratory arrest, cough

CNS- hypotension, tachycardia, cardiac arrest, cardiac arrhythmia.^[1,17,24]

Management:



Drug of choice- Adrenaline or Epinephrine.

Dosage Adults 0.3 mg of 1:1000, weight greater than 30 kg.

0.15 mg weight 15-30 kg.

0.075 mg weight less than 15 kg.^[1,14,17,20,22,24]

Paediatric dosage 1:1000 SC/ IM (0.05 – 0.3 mg maximum) or 1:10,000 IV.

12-18 years 0.5ml, 6-12 years 0.3ml, less than 6 years 0.15ml.^[17,19,25]

[Note- A medical emergency 'Adrenaline Sensitivity' has also been reported. However, it should not be perceived as the patient with adrenaline sensitivity cannot be administered adrenaline in anaphylaxis. The route of administration in both the cases are different.]

Hyperventilation -

It is an adult condition, in which there is ventilation more than the normal required, resulting in hypocapnea ('wash out' of carbon dioxide), cerebral vessels constriction and respiratory alkalosis.

Predisposing factors: Acute anxiety, fear.^[1,14]

Signs and symptoms: Initially giddy or light headedness

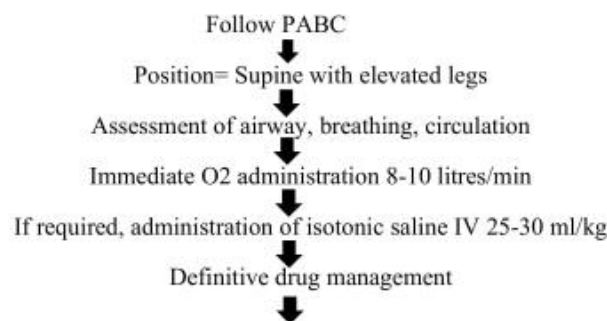
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Cardiovascular and GIT symptoms (palpitation, precordial pain, epigastric discomfort, globus hystericus)

↓
Tingling, numbness or paraesthesia in limbs

↓
Muscular twitching, carpopedal tetany.^[1,14,26]

Prevention: Medical history questionnaire, Assessment of vitals, stress reduction protocols.^[1]

Management:



Drugs used are Midazolam 3-5mg, Diazepam 10mg.^[1,14,17,24,26]

[Note- A hyperventilation is a medical emergency in which O2 therapy is uncalled]

Asthma -

Synonym: Bronchospasm

“A paroxysmal affection of respiratory organs characterised by greater difficulty of breathing, tightness across the breast and a sense of impending suffocation, without fever or local inflammation.”^[27]

Or

“Chronic inflammatory disorder i.e. characterised by reversible respiratory obstruction.”^[28]

Predisposing factors: 1) Allergens [extrinsic/ atopic] including housedust, food, feathers.

2) Intrinsic [nonatopic] includes respiratory infection, environmental and air pollution,

Occupational stimuli.^[1,13]

Signs and symptoms: General manifestations include paroxysmal dyspnoea, coughing, wheezing.

In severe cases, there will be tachycardia with heart rate greater than 110, respiratory rate greater than 45.

In life threatening areas, 'silent chest', cyanosis, bradycardia.^[1,14,17,24,29]

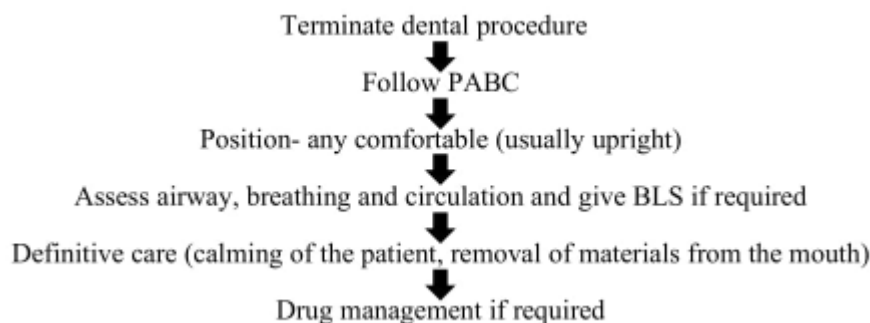
Status Asthmaticus: A continuous state of asthma in which patient does not become symptom free in between attacks. Clinical manifestations include increased nasal secretions, eczema, tachypnoea, tachycardia. Breath sounds are vesicular.

Prevention: a) Medical history questionnaire

b) For known asthmatic patients, the inhalers should be brought at the time of appointments. Prophylactic use is the best advisable.

c) Appointment should be either late morning or afternoon.

Management:



Administration of O₂: The oxygen can be administered either by nasal cannula, nasal hood or face masks. The flow rate should be 5-7 L/min.

Drug treatment: Step wise regimen should be followed.

1 Use of inhaled bronchodilators generally salbutamol or terbutaline (100-200 mg)

2 Bronchodilators+ regular use of anti-inflammatory agents inhaled steroids such as beclomethasone dipropionate with maximum dosage of 800mg. Instead of steroids, sodium cromoglycate can be used.

3 Bronchodilators+ high doses of steroids with the maximum dosage of steroids 800-2000mg. Large volume spacer (holding chamber) are used for the inhalation of high doses of steroids.

4 High doses corticosteroids + bronchodilators + sequential therapeutic drug. Sequential therapeutic drug management follows a) long acting beta 2 receptor antagonist (salmeterol or formoterol)

b) Oral theophylline

c) Inhaled ipratropium bromide

d) sodium cromoglycate

5 Addition of oral steroids Prednisolone 20-30 mg/day.

For Status Asthmaticus

Administration of O₂ (40-60%) through mask

Drug management includes IV bronchodilator i.e. Aminophylline (250-375 mg) or IV Salbutamol. 100 mg IV hydrocortisone. 0.3 mg IV epinephrine.^[1,13,14,17,20,22,25,29]

Angina pectoris / Myocardial infarction -

Angina is "discomfort in the chest or adjacent areas caused by myocardial ischemia."^[30]

Myocardial infarction is a clinical syndrome occurring due to thrombus formation in coronary artery.

Predisposing factors: Exertion.

Environment (cold conditions).

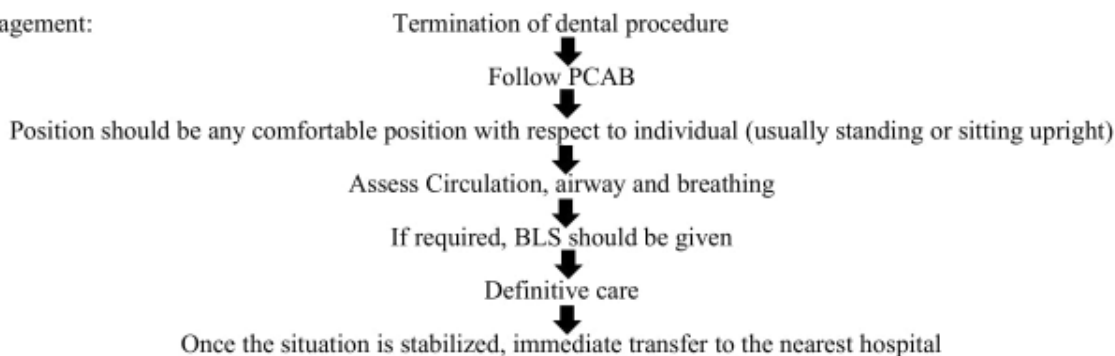
Undue stress.

Cigarette smoking.^[1,13]

Signs and symptoms: In Angina, chest tightness, heaviness, choking, radiating pain (pain usually radiates to left shoulder).^[1,13,14] In Myocardial infarction, anginal type pain, risk of impending death, pallor, syncope, cold sweat, dyspnoea.^[1,13]

Prevention: Stress reduction protocols, time to time monitoring of vitals. If the patient presents any history of the above conditions, length of appointments should be considered.

Management:



Definitive care comprises of:

Administration of O₂ at any time. The flow rate should be 2-4 litres/ minute

Drug specific management - Nitrates: sublingual glyceryl trinitrate (GTN) as a tablet (500 microgram) or spray (400 microgram), 1-2 metered doses, with no more than 3 doses within 15 minutes.

[Note: GTN is generally avoided orally due to extensive first pass metabolism. Other drugs used are isosorbide dinitrate or isosorbide mononitrate.]

Other drugs for angina are

Calcium channel blockers i.e. verapamil (oral, 120-240mg, 8th hourly) diltiazem (oral, 60-120mg, 8 hourly).

Beta blockers i.e. atenolol 50-100mg oral

Potassium channel blockers i.e. nicorandil

Other drugs for myocardial infarction are

Antiplatelet drug- Aspirin 150-300 mg.

Analgesic – IV morphine (5mg) + metoclopramide (10mg)

Thrombolysis – Fibrinolytic agents like streptokinase IV 1.5 million units in 100ml of saline.

Anticoagulant – Heparin

IV Beta blockers metoprolol 5mg every 2- 5 min.^[1,13,14,20,22,24]

Diabetic emergencies -

HYPOGLYCAEMIA

Hypoglycaemia is a dreaded condition especially in patients receiving insulin therapy.

“Falling off blood glucose concentration below 70.0 mg%. In severe cases, it may fall upto 40.0 mg%.”^[13]

It is of two types: Postprandial hypoglycaemia

Fasting hypoglycaemia

Predisposing factors: Unaccustomed exercise.

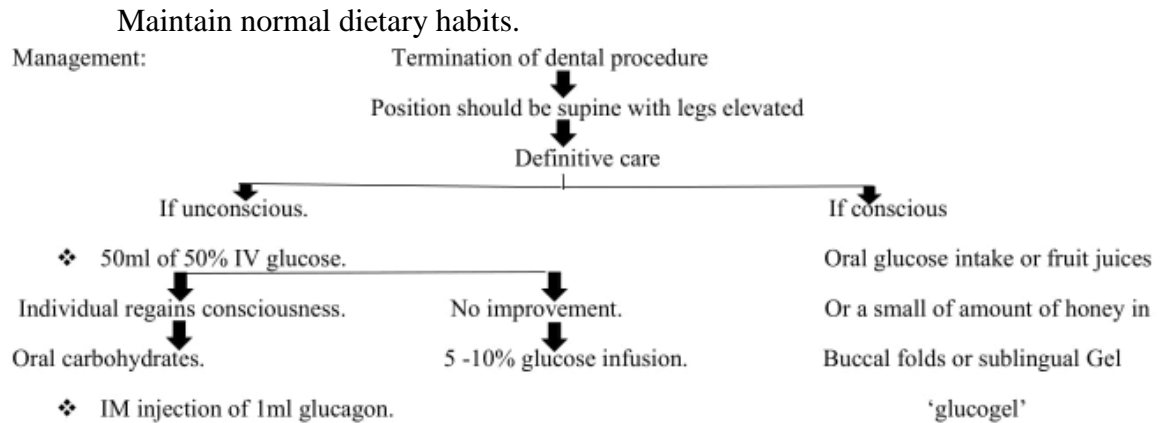
Irregular meal/ too little meal.

Malabsorption of food.^[1,13]

Signs and symptoms: Confusion, restlessness, headache, slurring speech, seizure, pale cold skin.^[1,13,19,24,26]

Prevention: Scheduling day appointments.

Patient should be encouraged to carry glucometer with them.



Once stabilized, the patient must be transferred to the nearest hospital.^[1,13,19,20,22,26,24]

HYPERGLYCEMIA

The condition can only be fatal if the individual suffers from diabetic ketoacidosis (out of stress or certain infection), if left untreated would push the individual into coma i.e. diabetic coma.

Treatment can be Insulin therapy 6 (0.15 U/kg) units IV stat followed by 6 units/hr in saline or a bolus dose can also be given i.e. 20 units IM then 6 units/hr in saline.

Other treatment modalities will include correction of fluids, acidosis, electrolytes along with the administration of antibiotics.^[13]

2. CONCLUSION:

Dental officials face medical emergencies though minor with a rare frequency of life - threatening type uncertainly. However uncertain and unpredictable words are not acceptable with the preparedness of these emergencies. All the conditions despite being manageable can also be prevented if handled vigilantly and cautiously. History-taking plays a crucial role in the prevention of the mentioned conditions. History taking is an art, the dentist being an artist should master this art. The importance of the procedure has to be made realised in the budding dentists and practitioners. The dental staff should be well trained and must possess extensive knowledge of drugs and equipments to be used at the time of emergency. Periodic training sessions and drills should be made mandatory. No panic is accepted from the official's side. The mindset of letting go has to be changed. Each treating official must acknowledge the fact that the individual can happen to collapse in the dental chairs or the waiting rooms. During urgency, any procrastination can cost the life of an individual. In today's time, dental therapists are progressively undertaking sovereign roles and there is a need for univocal standards to justify their abilities in this rapidly changing era.

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