Review Article

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MANAGEMENT OF MEDICALLY COMPROMISED PATIENTS IN DENTISTRY –A REVIEW

Periodontology

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ABSTRACT

Oral diseases are linked to several medical diseases in a two way interrelationship. Dental management in medically compromised patients requires special attention. Understanding pathophysiology of diseases, pharmacological treatment and their interactions with dental treatment is necessary. Dentist and physician can work together to provide a holistic approach to improve patients care. Here we discuss various medically compromised patients, pathophysiology and safe approach.

KEYWORDS

diabetes, hypertension, management, medically compromised

Introduction:
The general population is now aware of various modalities of dental treatment. Old concept of removal of tooth is the only way of dental treatment has waned of from general population. with the advances in medical facilities, the life expectancy has prolonged. Thus it is not uncommon to see in dental opd that elderly patients coming for dental treatment with complex medical disorders on treatment. [1] Patients coming for dental treatment may not be free from comorbid illness. Irrespective of age, accidental comorbid illnesses are identified during routine examination. Most patients coming for dental treatment are out patient (OPD) based. Thus dentist should have adequate knowledge of various common medical conditions, possible interplay with dental treatment and its management so that there Will be decrease in patient morbidity and mortality rate.[2,3] Following are some of the commonly encountered medically compromised patients in dental OPDs for the treatment.

Definition of medically compromised patient:
Person suffering with medical disorder and may get compromised while treating other pathology.

Cerebrovascular accident:
A cerebrovascular accident or stroke, is a sudden interruption of blood supply to the brain which is accompanied by overt signs.[4]

Pathophysiology:
It may be hemorrhagic i.e rupture of a cerebral blood vessel into the subarachnoid space or brain parenchyma or ischemic i.e due to occlusion of cerebral artery due to degenerative vessel wall disease or emboli.

Management:
After stroke dental treatment is not considered until 6-12 months due to presumed risk of recurrent stroke. However previous studies have shown that it may be safely considered under proper medical care.[5] During dental treatment it is not uncommon that patient may develop new episode of stroke. The goals are early stroke evaluation, medical care and specific interventions to optimize the cerebral perfusion.[6] Previously diagnosed or one who is prone for stroke invariably will be on anticoagulant treatment. All medications are continued until and unless contraindicated.

Epilepsy:
A neurological disorder marked by sudden recurrent episodes of sensory disturbance, loss of consciousness, or convulsions, associated with excessive electrical activity in the brain.[7]

Management:
The side effects of antiepileptic drugs are seen in gingiva. Poorly controlled epilepsy should be treated in-hospital while in well-controlled one can be treated on day care basis. All drugs which patient is receiving should be continued. New onset of epilepsy should be referred to physician for optimization. All emergency equipment and drugs should be available before the start of treatment.

Diabetes mellitus (DM):
A metabolic disorders which is characterized by high blood sugar levels over a prolonged period. Symptoms include frequent micturition, increased thirst and hunger.

Pathophysiology:
Diabetes may be the result of insulin deficiency (type 1) or decreased receptor sensitivity to insulin (type 2) or both.

Management:
In well controlled diabetic patients dental treatment can be routinely carried out. One should not skip insulin dosage. These patients are more prone for infection thus a planned antibiotic therapy is needed. In uncontrolled diabetic patients a proper evaluation by physician and insulin adjustments is must. Patients with known diabetes having infective foci needs to be treated on emergency basis as infective foci may itself be causative factor for it. Perioperativey patient should take regular medications and diabetic diet. Uncontrolled and complicated diabetic patients should be treated on in-patient basis with comprehensive multidisciplinary approach. These patients are at risk for hypoglycemia, ketoacidosis and autonomic neuropathy. There may be a rise in blood sugar level when Lignocaine with adrenaline used.[8] 1:80,000 concentration of 1.8 ml capsule each can be safely used in diabetic patients.[9] Previous study showed that, administration of 5.4 mL of 2% lidocaine with adrenaline (1:100000) for dental treatment in type 2 DM patients neither caused hyperglycemia nor had significant hemodynamic changes.[10] Hypoglycemic patients should receive

100gm of oral glucose if conscious or 25 - 30 mL of a 50% dextrose solution or 1 mg of glycogen intravenously or intramuscular or subcutaneously.

Hypo and hyperthyroidism.

Decrease or increase in thyroid hormones will lead to conditions called hypothyroidism or hyperthyroidism respectively. Its dysfunction is the second most common glandular disorder of the endocrine system.[11]

Pathophysiology:

The autoimmune thyroiditis is most common cause of primary hypothyroidism where thyroid gland is destroyed by autoantibodies. Grave's disease, an autoimmune disease, is most common cause of hyperthyroidism which is characterized by production of autoanti bodies that in turn activates TSH receptor, resulting in excess T_3 and T_4 production.[12]

Management:

Untreated thyrotoxicosis patients are at risk and develop thyroid crisis, hence optimization before the start of dental treatment is mandatory. LA with adrenaline and surgery itself may precipitate it. In euthyroid patient except for enlarged tongue no other problems are usually encountered; also LA with adrenaline can be safely used.[13,14]

Patient on chronic steroid therapy:

Patients receiving glucocorticoids therapy are prone for infection and delayed wound healing.

Management:

A proper history and previous records examination should be done in patients with a history of glucocorticoid therapy. The dental treatment also imposes stress to the patient which in turn leads to adrenal crisis. Discussion should be made with physician for steroid dose adjustment, antibiotic therapy. One should adapt stress reduction protocol to prevent the morbidity and mortality.[15]

Hypertension:

Hypertension can be defined as, if average of 2 or more systolic and diastolic blood pressure (BP) measurements on at least 2 subsequent visits is ≥140 and 90 mm Hg respectively. If SBP alone is ≥140 and DBP is ≤ 90 mm Hg then patient can be labeled as having isolated systolic hypertension. Based on recent guidelines, table no 1 shows normal values and class of hypertension.[16]

Table 1: Classification of hypertension.

Classification	Systolic BP (mmHg)
Normal	< 120
Prehypertension	120-139
Stage 1 Hypertension	140-159
Stage 2 Hypertension	≥160

Pathophysiology:

More than 90% of hypertensive patients are of essential hypertension where definitive cause is unknown while secondary hypertension develops as a result of underlying pathology.

Management:

Tooth ache itself may raise BP in patients with borderline hypertension. Adequate analgesia with definitive treatment for toothache should be considered. A known hypertensive patient on treatment reaching dental OPD shows raised BP then patient may require the physician consultation for dosage adjustment. A patient with accidental findings of the hypertension needs to be evaluated further by physician before starting dental treatment. Problems that may encounter are myocardial infarction, angina, arrhythmia and cardiac failure. Judicious use of local anesthetics with adrenaline should be considered i.e restricting adrenaline to 400 mcg in total. Previous studies have shown that, there is no increase in perioperative risk and outcomes for patients undergoing treatment with a blood pressure <180/110 mmHg.[17] BP of 180/110 mmHg should be considered as absolute cutoff for any dental treatment.[18,19]

Congestive cardiac failure:

Congestive cardiac failure (CCF) is also known as heart failure. The patient may give history of previous hospitalization for breathing difficulty and might have received the artificial ventilation support.

Pathophysiology:

CCF may results due to primary pathology in the heart muscle or anatomical defects in structure itself. The heart fails to contract effectively to meet required quantity of oxygen to tissues. Two types of heart failure are seen i. e right sided or left sided vntricular failure.

Management:

The patients will be on various medications hence details should be sought. The position of patient during treatment is important, as lying down or recumbent position may exaggerate the condition. Any patients who are having acute episode of breathlessness or on auscultation crepitations or abnormal sounds are heard then consultation should be sought from the cardiologist or physician. No drug should be discontinued, judicious use of LA with adrenaline should be considered. These patients are at risk for acute episode of CCF, arrhythmia and hypotension.

Myocardial infarction (MI)/ angina:

MI is defined as sudden ischemic death of myocardial tissue.[20] Patients who have suffered with myocardial infarction or angina may be on medications such as antihypertensives, anticoagulants, vasodilator such as nitroglycerin or on antiplatelet. Such patients could have treated with angioplasty or coronary artery bypass surgeries.

Pathophysiology:

MI occurs due to atherosclerotic or thrombotic occlusion of coronary vessel caused by rupture of a vulnerable plaque. This increases resistance to the blood flow thus impairing oxygen delivery to myocardium.

Management:

Only the emergency dental treatment procedures should be done during first 6 months after acute MI or unstable angina .This is mainly needed for collateral revascularization of infarcted area and also to fibrinize the necrosed myocardium. It is also found that the incidence of reinfarction due to surgery or anesthesia is very high during these 6 months. The tooth ache due to any reason may aggravate MI and it is important to differentiate the pain is due to dental pathology or radiating pain of angina. In a study it was concluded that the dental treatment can be considered in a hospital where monitoring, emergency drugs, and emergency life support care and specialists for handling the life threatening situation are available. One should continue anticoagulants and anhtihypertensives until and unless contraindicated. A patient who develops angina like symptoms should receive the glyceryl trinitrate either in tablet (400 – 500 mcg) or in spray form (one to two puffs sublingually).

Judicious use of local anesthetic with adrenaline can be considered but life threatening complications are observed if injected into intravascular or intraligamentary.

Infective endocarditis prophylaxis (IEP):

Bacterial endocarditis is a relatively uncommon, life-threatening infection of the endothelial surface of the heart. Different theories suggest that dental procedures could cause infective endocarditis in patients with underlying cardiac risk factors. Studies have shown that antibiotic prophylaxis is effective in preventing it. This can result from interactions between bloodstream pathogen with blood cells at sites of endocardial cell damage. It is important to give IEP for patients who fulfill the criteria of AHA.[21] Table 2 summarizes recent guidelines to treat IEP.

Table 2: Infective endocarditis prophylaxis

Condition	Drug	Adult	Children
Oral	Amoxicilline	2gm	50mg/kg
Unable to take oral	Ampicillin or Ceftriaxone/cefazolin	2gm IM/IV 1gm IM/IV	50mg/kg IM/IV
Allergic to ampicillin/ penecillins Oral	Cephalexin Or Clindamycin Or Carythromycin or azithromycin	2gm 600mg 500mg	50mg/kg 20mg/kg 15mg/kg

Allergic to ampicillin/ penecillins + unable to take orally	Cephalexin or ceftriaxone Or Clindamycin	1gm IM/IV 600mg IM/IV	50mg/kg IM/IV 20mg/kg IM/IV
Single dose administration 30-60 min prior to procedure All procedures that involve manipulation of gingival tissue or periapical region or perforation of oral mucosa			

Pacemaker:
An Automated Implantable Cardioverter Defibrillator (AICD) is a small battery-powered electrical impulse generator that has the function to convert abnormal rhythm like ventricular fibrillation and tachycardia into normal sinus rhythm thus preventing death in patients who are at a risk of sudden cardiac arrest.[22,23]

Management:
Treatment should be completed in shortest possible time and terminated if patient develops any signs or symptoms of hypotension or syncope. Hemodynamic monitoring of these patients while treating is mandatory. Excessive use of LA with adrenaline should be avoided as adrenaline itself will cause arrhythmias. These patients are also at a risk of any electrical devices used in dentistry, such as electrosurgery and ultrasonic scalers. Warfarin, most commonly used anticoagulant drug, can be antagonized by Inj. Vitamin K. Extraction and several other dental procedures can be performed after evaluation of INR. The patients with mechanical heart valves or recurrent episodes of emboli therapeutic range of INR should be maintained at 2.0–3.0. Prophylactic antibiotics are not recommended to be used in patients with AICD.[24,25]

Coagulation disorders / anticoagulant treatment:
It is not uncommon to see patient with coagulation disorder requiring dental treatment. Patients with hemophilia or other coagulation problems should be optimized by the physician whenever required. Many times elderly patients reaching dental OPDs will be receiving anticoagulant treatment. The cause for starting of anticoagulant treatment and whether it can be discontinued before the proposed procedure should be discussed with physician. Patients with liver, renal failure or on chemotherapy may be at risk for bleeding. Different coagulation tests need to be conducted depending upon drug therapy before starting the procedure. Prothrombine time (for extrinsic pathway assessment), activated prothrombine time (for intrinsic pathway assessment), International Normalized Ratio, platelet count, platelet function assessment and thromboelastography can be considered. Dental treatment which involves minor procedures, patient medication indicated for treatment of background disease should not be discontinued unless instructed by physician.[26] A study has shown that, optimal INR value for dental surgical procedures is 2.5 as it diminishes the risk of either hemorrhage or thromboembolism. Minor oral surgical procedures like, tooth extraction, biopsies, and periodontal surgery, can safely be done with an INR lower than 4.0.[27]

Respiratory disorders:
Two types of respiratory disorders are commonly seen, viz asthma and chronic obstructive pulmonary disease (COPD). Asthma is a chronic disorder of airways which is characterized by variable and recurring symptoms, airflow obstruction, hyperresponsiveness, and inflammation. [28] Patients with history of COPD may present with recurrent coughing of mucoid secretions or breathlessness caused by destruction of the airways.[29]

Pathophysiology:
In case of asthma, airway inflammation causes an interaction between cells and chemical mediators with the airways which eventually results in bronchial inflammation and airflow limitation resulting in recurrent episodes of cough, wheeze, and dyspnea.[30][31] While in COPD patients, poorly reversible airflow obstruction and an abnormal inflammatory response in the lungs due to exposure to smoke is observed.

Dental management:
While treating these patients one should ensure the position is upright in dental chair.[32] Medications like, bronchodilators and steroid inhalers should be continued. Physician opinion before the start of the treatment to rule out acute exacerbations should be sought. LA with adrenaline can be used cautiously in these patients. In acute emergency oxygen should be judiciously used as it may suppress respiratory center. Non-steroidal anti-inflammatory drugs are contraindicated in these patients as it may precipitate acute exacerbations.

Pregnant patient (Special condition)
Dental problems are common in pregnant lady. The goal is to treat mother safely without affecting fetus.

Physiological changes:
Physiological changes occur in cardiovascular, hematologic, respiratory, gastrointestinal, genitourinary, endocrine, and oro-facial systems.

Dental management:
Organogenesis occurs in first trimester hence greater chances of teratogens occur during this time. Only emergency dental procedures and oral prophylaxis should be considered during first trimester. One should avoid routine radiographs but use selectively whenever needed. [33] Once organogenesis is completed during second trimester the risk to fetus is declined. During this period elective dental treatment can be considered. In third trimester the pregnant mother may experience an increasing level of discomfort due to gravid uterus. Short dental appointments, avoiding complete supine position while in the dental chair to prevent supine hypotension. A wedge should be placed below right hip joint to prevent supine hypotension syndrome.

Table 3 summarizes emergency drugs indication and dosages.

Table 3: Essential Emergency Drugs

Sr. No.	Drug	Indication	Initial Adult Dose
1	Oxygen	Fall in saturation	100% inhalation
2	Epinephrine 1:1000	Anaphylaxis/Asthma Cardiac arrest	0.1 mg i.v., or 0.3-0.5 mg i.m. 1 mg i.v.
3	Aspirin	Myocardial infarction	160-325 mg oral
4	Diphenhydramine	Allergic reactions	25-50 mg i.v., i.m.
5	Albuterol/ Salbutamol	Asthmatic bronchospasm	2 sprays: inhalation
6	Nitroglycerine	Angina	0.3-0.4 mg sublingual
7	Glucagon	Hypoglycemia	1 mg, intramuscular (i.m)
8	Flumazenil	Benzodiazepine overdose	0.1 mg i.v.
9	Naloxone	Opioid overdose	0.1 mg i.v.
10	Hydrocortisone	Adrenal insufficiency Anaphylaxis	100 mg i.v or i.m.
11	Morphine	Angina like pain unresponsive to nitroglycerine	Titrate 2 mg i.v., 5 mg i.m.
12	Lorazepam or Midazolam	Status epilepticus	4 mg i.m. or i.v
13	Atropine	Bradycardia	0.5 mg i.v. or i.m.
14	Ephedrine	Hypotension	5 mg i.v. or 10-25 mg i.m.

Conclusion:
A complete history, clinical examination, comprehensive medical care and individualizing dental treatment plan will decrease patient morbidity and mortality. Training of basic and advanced life support to dentists and mandating availability of all emergency equipment in dental clinics is necessary.

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