Dental Management of Medically Complex Patients

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JAYPEE BROTHERS
MEDICAL PUBLISHERS (P) LTD.
NEW DELHI

Published by

Jitendar P Vij
Jaypee Brothers Medical Publishers (P) Ltd
B-3 EMCA House, 23/23B Ansari Road, Daryaganj
New Delhi 110 002, India
Phones: +91-11-23272143, +91-11-23272703, +91-11-23282021, +91-11-23245672, Rel: 32558559
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e-mail: jaypee@jaypeebrothers.com
Visit our website: www.jaypeebrothers.com

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First Edition: **2007**

ISBN 81-8061-948-6

Typeset at JPBMP typesetting unit
Printed at Gopsons Papers Ltd., A-14, Sector 60, Noida

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Foreword

With improved quality of life and availability of advanced health care facilities, life expectancy of the population has considerably improved in recent times. With this trend in place, patients who seek dental care often present themselves with chronic lifestyle-related diseases and pose considerable threat to the outcome of dental treatment. Under these situations, dental practitioner is often expected to modify the dental management protocol. Dental practitioner, therefore, is expected to possess adequate knowledge of commonly occurring medical conditions and their impact on oral health and dental treatment. As an important member of health care providers' team, dental practitioner is also expected to liaise with medical practitioners seeking or providing appropriate advice on their patients' oral/general health.

It is true that at the undergraduate level of dental training information provided to students on medical problems particularly as they relate to dental management is inadequate. In the book *Dental Management of Medically Complex Patient,* SR Prabhu has addressed this issue admirably. The book deals with majority of common lifestyle-related diseases and offers adequate guidelines on the dental management. Chapters discussed are concise and provide relevant and adequate information on several medical conditions of dental significance. I am absolutely convinced that the dental students in clinical years of training would benefit from this book. I am also certain that practising dentists will find this book useful. I congratulate SR Prabhu for this timely addition to dental literature.

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Preface

Persons with complex medical problems seeking dental treatment often pose considerable difficulty to the dental practitioner in planning and carrying out appropriate dental management. The compromised medical status of dental patients can impact on the outcome of dental management and often this can lead to undesirable clinical outcomes. Practising dentist, therefore, should possess adequate knowledge of common medical problems that are encountered commonly in dental patients so that a proper dental treatment plan can be worked out and appropriate treatment can be offered to these patients.

In the undergraduate dental curriculum medical conditions of dental significance have not received adequate attention. Although courses on General Medicine and Surgery are offered in the third year of the BDS/DDS course, a focus on clinical application of various medical conditions, as they impact on dental management, is lacking. The book *Dental Management of Medically Complex Patient*, therefore, is designed just to address this deficiency.

In this book, medical conditions of dental significance have been briefly discussed and appropriate dental management strategies have been dealt with. This book should serve as a useful resource material for the clinical student of dentistry during their training period. Practising dentists also would benefit from the information provided in this book.

Editor wishes to thank international colleagues who have contributed chapters in this book. Special thanks are due to M/s Jaypee Brothers Medical Publishers (P) Ltd., New Delhi for the excellent quality of publication.

SR Prabhu

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Crispian Scully

1 The Medically Compromised Patients: An Overview

LEARNING OBJECTIVES

After reading this chapter the student should be able to:

1. Understand what is meant by: medically compromised patient.
2. Possess adequate knowledge and skills to collect information pertaining to those medical conditions which are likely to place them at a higher risk of developing complications by receiving invasive dental treatment.
3. Possess adequate skills of modifying dental treatment to the medically compromised patients as required.

INTRODUCTION

There is increasing awareness of the importance of oral health to those with medical problems and the hazards in operative intervention. Persons with **special needs** are those whose dental care is complicated by a medical, physical, mental or social disability. They may have oral problems that can affect systemic health, and operative intervention such as extractions and surgical procedures in particular can produce major problems.

This chapter aims at providing an overview of the areas that are of particular concern to dental staff, which are the problems associated with:

- Bleeding tendencies

- Cardiac disease
- Diabetes
- Drug allergies, use and abuse
- Fits, faints, behavioural and neuropsychiatric conditions
- Hepatitis and other transmissible diseases including HIV
- Immunosuppressive treatment
- Malignant disease
- Pregnancy.

A medical history is essential in order:

- To assess the fitness of the patient for the procedure
- To decide on the type of pain control required
- To decide how treatment may need to be modified
- To warn of any possible emergencies that could arise and to determine any effect on oral health
- To warn of any possible risk to staff
- The most relevant conditions are allergies, bleeding tendencies, cardiac disease, immune defects, or where the patient is on drugs acting on the endocrine or central nervous system (CNS)
- Relevant systemic disease is more common in the elderly, those with disability, and inpatients.

The medical history should be taken in such a fashion to elicit any relevant systemic disease, in particular to identify:

A: **A**naemia
B: **B**leeding tendencies
C: **C**ardiorespiratory disorders
D: **D**rug treatment and allergies
E: **E**ndocrine diseases
F: **F**its and faints
G: **G**astrointestinal disorders
H: **H**ospital admissions and attendances
I: **I**nfections
J: **J**aundice or liver disease
K: **K**idney disease
L: **L**ikelihood of pregnancy, or pregnancy itself.

The history must be reviewed before any surgical procedure or general anaesthetic, and at each new course of dental treatment. Examination of the patient's appearance, behaviour

and speech, and inspection of the face, neck and hands can also reveal many significant conditions.

Iatrogenic disorders are increasingly encountered, especially inpatients with complex medical or/and surgical problems such as organ transplant recipients. Some diseases are common in certain groups because of lifestyle, such as HIV infection. Some diseases are seen mainly in specific ethnic groups. Infections such as viral hepatitis and some other disorders are found predominantly in persons from the developing world, especially in the tropics but are now being seen increasingly in the developing world in travellers, in migrant populations, and in immunocompromised persons.

BLEEDING TENDENCIES

Disorders of haemostasis cause management problems mainly because of prolonged postoperative bleeding, but hypercoagulability and thromboses can be as, or more, life-threatening. About 90 per cent of post-extraction haemorrhage are from local causes:

- Excessive trauma (to soft tissue in particular)
- Inflamed mucosa at the extraction site
- Poor compliance with postoperative instructions
- Post-extraction interference with the socket, e.g. sucking and tongue pushing
- Reactive hyperaemia.

  Consult the haematologist before undertaking investigations; bleeding and clotting times are unsatisfactory. Special assays, such as factor VIII clotting activity may well be required. Prothrombin times are reported as per International Normalized Ratio (INR). The INR is the ratio of the patient's one stage prothrombin time to that of controls. A normal healthy patient has an INR of 1.
- Dental extractions and surgical procedures, including local analgesic injections, can cause problems in anticoagulated patients and persons with coagulation defects or severe thrombocytopenic states. The possibility of viral hepatitis and HIV should always be considered in persons with bleeding tendencies.

Things to Avoid in Patients with Bleeding Tendencies

- Trauma and surgery: Endodontics may be preferable to surgery
- Regional local analgesic injections (may bleed into fascial spaces of neck and obstruct airway)
- Intramuscular injections
- Drugs causing increased bleeding tendency (e.g. aspirin)
- Drugs causing gastric bleeding (e.g. aspirin and NSAIDs).

- **Anticoagulated patients**, can have local analgesia and minor surgery such as the relatively atraumatic removal of one or two teeth may generally be carried out safely in general practice with no change in treatment, if test results are within the normal therapeutic range (INR <3).
- **Thrombocytopenic patients** need appropriate measures to raise the platelet count (platelet infusions) before surgery. Thrombocytopenia is significant if platelets are below 80 to 100 $\times 10^9$ per litre. However, local analgesia and minor surgery such as the relatively atraumatic removal of one or two teeth may generally be carried out safely in general practice with no change in treatment, if the platelet count exceeds 50×10^9/L. Postoperatively, a 4.8 per cent tranexamic mouthwash, 10 ml used 4 times a day for 7 days may help.
- **Patients with clotting defects** need their bleeding tendency corrected by giving an appropriate blood product rich in the deficient factor before surgery. Factor VIII or cryoprecipitate is used for haemophilia A and von Willebrand's disease, and Factor IX for Christmas disease. Blood products may be used in lower doses if desmopressin and antifibrinolytic drugs such as tranexamic acid are used. In some mild haemophilics, minor oral surgery such as the relatively atraumatic removal of one or two teeth may be possible under desmopressin (DDAVP) cover. In others, factor replacement is necessary. In haemophilia, in all but severe cases, nonsurgical dental treatment can be carried out under antifibrinolytic cover (tranexamic acid), (taking care to maintain urinary flow to avoid urinary blood clot problems) but haematological advice must be sought before other procedures.

CARDIAC DISEASE

- **Cardiac patients** may become breathless if laid flat (as in the dental chair). Some may have a bleeding tendency because of anticoagulants. Extractions under local anaesthesia can usually be carried out one or two at a time but the trauma and blood loss of multiple extractions should be avoided. Anxiety and pain cause enhanced sympathetic activity. This increases the load on the heart and the risk of angina or dysrrhythmias. A mild premedicant such as 5 mg diazepam orally can be valuable in cardiac patients. Routine dentistry using short appointments is safe for most patients with heart disease unless they are overanxious.

  The evidence that adrenaline in local anaesthetics used in sensible doses (up to 0.04 mg) is a hazard to cardiac patients is little more than theoretical. Local anaesthetics containing noradrenaline are totally contraindicated. Even in normal persons they have caused fatal hypertensive attacks.

  Sedation with nitrous oxide is pleasant and usually acceptable and probably safer than intravenous sedation.

General anaesthesia (GA) constitutes a risk to many cardiac patients. Particularly hazardous for the following conditions:

- Myocardial infarction, if recent
- Angina pectoris, especially of recent origin or unstable
- Severe hypertension
- Intractable dyrhythmias (particularly digitalis toxicity)
- Some congenital heart diseases
- Oxygen should be kept readily accessible for use in any emergency.

Ischaemic Heart Disease

Ischaemic heart disease (IHD) is the main problem, and is commonplace in the middle aged and elderly, especially in men. It is generally accepted that:

- Routine dentistry for most patients with IHD should be undertaken using short appointments and under local analgesia
- More complex surgical procedures should be carried out in hospital with full cardiac monitoring
- Elective dental care for patients who have recently had a myocardial infarct should be deferred for at least 3 months, and some recommend 12 months
- General anaesthesia (GA) is contraindicated within 3 months of a myocardial infarct
- Patients on digoxin are at special risk of electrocardiographic changes and dysrhythmias after tooth extractions
- Oxygen and glyceryl trinitrate should be kept readily accessible for use in any emergency.

Patients with Cardiac Valvular Defects

Patients with cardiac pacemakers can be at risk since the pacemakers can be interfered with by signals from various electrical equipment. The risk from equipment such as ultrasonic scalers or pulp testers is very small. The chief hazards are from electrosurgery and diathermy. However, dental treatment precedes only 10 to 15 per cent of diagnosed cases. Cardiac patients that may need antimicrobial cover to prevent endocarditis include:

- Prosthetic cardiac valves; these are at special risk
- Previous history of endocarditis; these are at special risk
- Congenital cardiac defects
- Rheumatic heart disease
- Hypertrophic cardiomyopathy
- Aortic valve disease (bicuspid valves).

Prevention of endocarditis depends on giving prophylactic antimicrobials only a few hours preoperatively before extraction, surgery, scaling.

Oral healthcare treatment (including maintaining high levels of oral hygiene) should be completed before any valvular surgery.

It is considered prudent to provide antibiotic cover for endocarditis at-risk patients about to have:

- Extractions
- Periodontal surgery
- Mucogingival flaps raised
- Scaling
- Tooth reimplantation
- Other procedures where there is gingival laceration
- Orthodontic banding/de-banding.

There is no convincing evidence for the need for antibiotic prophylaxis for most local analgesic injections, or nonsurgical, prosthetic, restorative or other orthodontic procedures.

The current basic recommendations are to use a

- chlorhexidine mouthwash and, one hour before the dental procedure, a single oral doses of
- 3 g of amoxycillin (amoxicillin) or, for penicillin-allergic patients,
- 600 mg of clindamycin.

Patients with a history of previous infective endocarditis require *intravenous* antibiotic prophylaxis.

DIABETES

Diabetes is a common condition of impaired carbohydrate utilisation (impaired glucose tolerance) caused by insulin resistance or deficiency. A random whole blood glucose over 10 mmol/litre or fasting level over about 6.7 mmol/litre usually establishes the diagnosis.

There are two main types of diabetics: juvenile onset and maturity onset. Diabetics need to control their blood glucose levels and thus should have a diet with a constant carbohydrate content. Hypoglycaemic drugs are used for maturity onset diabetics not controllable by diet alone, and insulin is given to juvenile diabetics. The most certain way of assessing control is by serial blood glucose measurements, usually by patients testing using a glucometer, while glycosylated haemoglobin or fructosamine assess long-term control.

The great danger is hypoglycaemia, because of the risk of brain damage (neuroglycopenia) and hypoglycaemia can rapidly arise if a meal is missed. In contrast, exercise, surgery and infection increase insulin requirements.

To avoid this, it is best to offer dental treatment to diabetics early in the morning.

- Always err on the side of hyperglycaemia; ensure the patient has breakfast and lunch. Keep a glucose drink readily accessible for use in any emergency
- Try and treat under local analgesia
- Always consult the physician before considering general anaesthesia
- Well-controlled diabetics requiring a simple extraction under GA may be managed under a short GA in the early morning, provided the patient is going to be able to eat normally soon afterwards.

DRUG ALLERGIES, USE AND ABUSE

Drug use may influence dental treatment or cause oral adverse reactions. All drugs taken should be checked against a formulary for the type, action, contraindications, potential drug interactions and adverse effects. There are virtually no serious drug interactions with local analgesics used in normal doses.

- The most serious drug interactions in dentistry are with
  - GA agents
  - Drugs with activity on the CNS
  - Antihypertensive agents.
- Halothane should not be used repeatedly on any patient.
- Aspirin may be a hazard in children, persons with a bleeding tendency, peptic ulceration, and diabetes, and those with aspirin allergy.

Allergic Reactions to Drugs

Allergic reactions to drugs can cause serious life-threatening reactions such as anaphylaxis or angioedema, or merely trivial rashes.

- Allergic reactions are possible with any drug but are most common with **a**ntibiotics (especially penicillin), **a**naesthetics, **a**nalgesics, and **a**ntiseptics
- All allergens should be avoided if possible, and an alternative drug used
- Penicillin allergy is a real problem though many "allergies" to it are not true allergic responses. A minority of patients may also cross-react with cephalosporins

- Iodine sensitivity is a contraindication to the use of iodine-containing preparations such as some radiological contrast media, and povidone iodine
- Patients and staff may react to dental materials such as resins, latex, and many other materials, including restorative metals and resins
- Anaphylaxis in response to drugs is one of the most important immediate type reactions.
- Anaphylaxis is mediated by mast cell degranulation in a type I response to various allergens in susceptible individuals. This leads to vasodilatation and bronchial constriction and thus:
  - Rapid fall in blood pressure, and thus collapse
  - Wheezing
  - Sometimes urticaria
- This is an emergency. Adrenaline and oxygen should be kept readily accessible for use in any emergency
- Allergic angioedema is another acute type I response which is potentially lethal as oedema affects the face, and may spread to the tongue and upper airway
- Hereditary angioedema presents similarly to acute angioedema, but in response to trauma such as dental treatment, and is caused by a defect in the complement control enzyme C1 esterase inhibitor.

Drug Use

Drug use may also affect dental care. The most important drugs are the corticosteroids (steroids). Corticosteroids absorbed systemically suppress adrenocortical function for up to 2 years after the steroid treatment. Such patients cannot therefore respond adequately to the stress of trauma, operation or infection, which may cause collapse in adrenal crisis. Thus:

- Steroids must not be abruptly withdrawn
- Patients on, or recently on steroids, therefore need steroid supplementation before operations
- Patients on, or recently on steroids, need supplementation, if there is intercurrent infection or illness

  The necessity for these precautions have been challenged recently.

Drug Abuse

Drug abuse (chemical dependence or substance abuse) is a widespread problem in most countries, particularly among teenagers and young adults. Crime, violence, social and medical complications are frequently associated. Violent injuries and even death, sexually transmitted diseases, and poor compliance with health care are common in the drug-using population.

Alcohol and solvent abuse and the use of cannabis are the most common habits, followed by abuse of psychedelics (particularly *Ecstasy*), heroin, methadone, and cocaine. Organic solvents such as glue are commonly abused by children and teenagers and can cause neurological, respiratory and liver damage. Cardiac effects including dysrhythmias may be fatal.

Injected drug use can be associated with particular problems due to blood-borne infections, notably the hepatitis viruses and HIV, and sometimes infective endocarditis or septicaemia.

Drugs of abuse may

- Cause behavioural or psychotic reactions leading to accidents, assaults or death
- Be associated with medical complications that influence dental care (such as blood-borne viral infections).

FITS, FAINTS, BEHAVIOURAL AND NEUROPSYCHIATRIC CONDITIONS

Patients with epilepsy or behavioural problems are often otherwise healthy. Access to care is often their greatest difficulty. Psychiatric disorders are common and can significantly influence oral health care, predominantly because of behavioural abnormalities.

- **Patients with epilepsy** may sometimes have brain damage or physical disabilities such as cerebral palsy, or have other management problems. Grand mal epileptics may damage themselves, especially the orofacial tissues. Epileptogenic drugs such as methohexitone and enflurane should be avoided. Diazepam should be kept readily accessible for use in any emergency.
- **Anxiety before dental treatment** is common but usually manageable with reassurance and, occasionally mild anxiolytics such as short-acting benzodiazepines. Sometimes anxiety is extreme enough to warrant the term "phobia," when there are symptoms such as terror, rapid breathing, palpitations and agitation. Phobics require psychiatric support sometimes with medication such as buspirone, or a benzodiazepine. Painless dental care and the use of sedation may help.
- **Depressed patients** are characterised by lowering of mood and many aspects of activity; sufferers may attempt suicide. Depression may underlie a variety of oral complaints, particularly atypical facial pain and dry mouth. GA is best avoided but local anaesthetics, provided they contain no noradrenaline, can be safely used in patients taking antidepressants. Maniac depression is a psychosis characterised by phases of depression and mania (elation, hyperactivity, flight of ideas, lack of restraint), often requiring psychiatric care. Manic depression is often treated with lithium, which may precipitate dysrhythmias, contraindicating GA, and can cause dry mouth.
- **Eating disorders** include anorexia nervosa (slimming disease) and bulimia. These are seen mainly in young females of higher socioeconomic class, who starve themselves into poor health

and there is a high mortality. Anaemia is common in the eating disorders, and is a contraindication to GA, as is hypokalaemia. Paracetamol has heightened hepatotoxicity in these conditions, and should be avoided.

- **Schizophrenia**, a common major psychosis which affects mood, thought, and behaviour, often with illusions, delusions, hallucinations and sometimes paranoia, is controlled with phenothiazines or butyrophenones mainly, and thus dry mouth and extrapyramidal features such as orofacial dyskinesias are common. The acutely disturbed patient may be suffering from such a psychosis, but organic disease such as infections, drug intoxication, or drug withdrawal are other possibilities.
- **Dementia**, the loss of intelligence, memory and cognitive functions, usually seen in the elderly, can be caused by vascular disease, HIV, other causes, or is idiopathic (Alzheimer's disease). It leads to general neglect of everything, including health, and thus oral hygiene deteriorates and oral disease increases. Close care and considerable compassion and patience are required.
- **Strokes** (cerebrovascular accidents) are common and caused by haemorrhage, thrombosis or embolism, may be lethal, or may leave hemiplegia, facial palsy, speech defects, or other sequelae. Close care and considerable compassion and patience are required.
- **Parkinson's disease** is a disease that may be caused by repeated trauma (boxing), drugs, toxins, or infections. Managed mainly with L-dopa and antimuscarinic agents, tremor and drooling can make dental care difficult. Close care and considerable compassion and patience are required.
- **Multiple sclerosis** (MS) is a common disorder, often starting in younger adults, in which neurological lesions are disseminated in site and time. Some patients with MS become chairbound. Close care and considerable compassion and patience are required.
- **Autism** is a failure in interpersonal relationships, ritualistic behaviour, failed development of language and speech in children of normal appearance and often normal intelligence. Close care and considerable compassion and patience are required.
- **Hyperkinesia** in children may result from psychiatric disorders, foods or additives, or drugs. Poor concentration, restlessness, and overactivity are almost uncontrollable. Close care and considerable compassion and patience are required.

HEPATITIS AND OTHER TRANSMISSIBLE DISEASES INCLUDING HIV

Oral fluids can contain a range of microorganisms, and saliva and blood can be the vehicle for transmission of a range of agents, especially herpesviruses and hepatitis viruses. There is as yet no evidence of transmission of transmissible spongiform encephalopathies (TSE) by this route.

- **Serious transmissible infections** of established relevance to dentistry include
  - Blood-borne viruses such as human immunodeficiency virus (HIV) and hepatitis viruses
  - Respiratory pathogens, notably tuberculosis.

Serious transmissible infections are most likely in:

- Injecting drug users
- Patients who have attended clinics for sexually transmitted diseases
- Men who have sex with men
- Prostitutes
- Vagrants
- Immunocompromised persons
- Persons from parts of the developing world.

Infections are transmissible in dentistry unless infection control measures are continually practised. The routine practice adopted for *all* dental patients must be sufficient to prevent cross-infection (universal precautions). Blood-borne viruses are most readily transmitted by sharps (needlestick) injuries, or use of infected blood, blood products, or tissues.

All members of the dental team have a duty to ensure that all necessary steps are taken to prevent cross-infection, in order to protect their patients, colleagues and themselves.

- Gloves should be worn routinely by all dentists, students, hygienists and close support dental staff
- Wash hands before gloving, and after gloves are removed. Cuts and abrasions should be protected with waterproof dressings and/or double gloving as appropriate
- Gloves must be changed if punctured, and after treatment
- When aerosols or tooth fragments are generated masks and eye protection should be worn, high volume aspiration used and waste should go into a central drain or sanitary suction unit
- Clean white coats, or clean surgical gowns must be worn, changed if contaminated and not taken into any food/drink area
- All 3-in-1 syringe tips, handpieces and ultrasonic scaler tips should be changed after use, and cleaned and autoclaved before refuse
- Ultrasound scaler handpiece ends, which cannot be sterilised, must be thoroughly cleaned and disinfected before refuse
- Cling-film should be placed over control buttons, operating light handles, ultrasonic scaler handpieces and 3-in-1 syringe bodies, and changed or decontaminated after every patient
- Work surfaces should be protected with cling-film or other disposable material and changed after every patient.

- All 'sharps' must be disposed of in rigid containers
- Inoculation injuries are the most likely source of cross-infection. Resheathing of needles should be avoided wherever possible
- When cleaning an operation area or instruments, heavy-duty gloves should be worn.

In the event of accidental injury to operator

1. Ensure that the accident is not repeated.
2. Wash the wound.
3. Test the patient's serum for hepatitis B antigens and enquire about possible HIV positivity.
4. If the patient's serum is negative, there is probably no problem.
5. If the patient's serum is positive, consult a microbiologist immediately for advice.

Dental treatment may carry a risk of cross-infection and patients may have problems, including bleeding tendencies, and may be immunocompromised.

- **Liver disease** is important because of
  - Bleeding tendencies
  - Drug intolerance, which is a problem mainly in relation to general anaesthesia, but even a small dose of diazepam, may be hazardous. Drugs to be avoided include:
    - Aspirin
    - Carbamazepine
    - Diazepam and other sedatives
    - Erythromycin estolate
    - Halothane; this should never be given within 3 months of a previous halothane anaesthetic, nor repeatedly, nor to patients with unexplained jaundice or pyrexia after exposure to it
    - Ketoconazole
    - MAOI
    - NSAIDs
    - Paracetamol
    - Tetracyclines.
  - Possible viral causes, including hepatitis B virus (HBV), C (HCV), D (HDV), G (HGV) or transfusion transmitted virus (TTV).

Hepatitis B immunisation is recommended for all dental clinical staff. Hepatitis B vaccine is a recombinant vaccine of HB_sAg, which gives protective antibody levels after three doses in 85 to 95 per cent of healthy adults for at least 3 years.

IMMUNOSUPPRESSIVE TREATMENT

Iatrogenic immunosuppression is seen in patients on corticosteroids, azathioprine or other agents, but patients after organ transplants are the most severely immunocompromised. Such patients have depressed T lymphocyte responses and are liable mainly to viral and fungal infections, and mycobacterioses. Prophylactic antivirals and antifungals may be indicated in profoundly immunosuppressed persons. Odontogenic infections are potentially life-threatening in these patients, and broad-spectrum cover is needed (such as penicillin plus gentamicin). Dental treatment should be completed well before the transplant operation, if possible.

- **Patients with transplants** are, particularly during the immediate postoperative period, liable to present a number of complications to dental treatment; in particular:
  - Need for a corticosteroid cover
  - Liability to infection
  - Bleeding tendency (if on anticoagulants)
  - Gingival hyperplasia if on cyclosporin (and nifedipine).

  Oral health is important as these patients are particularly liable to fungal (candidosis) and viral (herpesvirus) infections.

  Erythromycin is contraindicated since it decreases cyclosporin metabolism and increases its toxicity.
- **Renal transplant patients** may also
  - Have a bleeding tendency, usually due to platelet dysfunction.
  - Have impaired drug excretion, a problem mainly when general anaesthesia is contemplated. Consider reducing the dose of most drugs, and avoid
  - NSAIDs (including aspirin)
  - Opioids
  - Aminoglycosides
  - Tetracyclines.
- **Immunosuppressed patients with indwelling peritoneal catheters**

  Dental procedures are rarely followed by infection and these rarely involve oral microorganisms. Thus patients do not require antimicrobial prophylaxis before routine dental procedures, unless they have a severe immune defect, there is some other indication or surgery is to be performed.

MALIGNANT DISEASES

Malignant tumours in children are mostly leukaemias, lymphomas, CNS tumours, bone tumours, Wilms' tumours, neuroblastomas or retinoblastomas. Malignant tumours in adults are

mostly carcinomas of the lung, breast, stomach or colon but oral carcinoma is important in dentistry.

Leukaemias and Lymphomas

Leukaemias and lymphomas may be complicated by a bleeding tendency, liability to infections, and anaemia. Septicaemias arising from oral sources can be fatal. Cytotoxic chemotherapy, the main treatment for leukaemias, causes stomatitis as can the radiotherapy and bone marrow transplantation which may also be used.

The main oral complications of cytotoxic chemotherapy are infections and ulceration.

Lip cracking, bleeding, xerostomia, and delayed or abnormal dental development may also follow chemotherapy.

The main points in relation to oral health care include:

- Strict attention to oral hygiene
- Asepsis
- Avoidance of aspirin
- Avoidance of general anaesthesia
- Platelet infusions to cover surgery.

Oral Carcinoma

In the developed world this is mainly a disease of the elderly male who uses tobacco and alcohol. In developing countries it is seen mainly in younger persons using tobacco or betel. Oral carcinoma is treated mainly with surgery, sometimes with radiotherapy.

Surgical treatment of malignant neoplasms in the head and neck is inevitably disfiguring to some degree, but cosmetic results are continually being improved and much can be offered.

Radiotherapy involving the oral tissues may give rise to a range of complications, especially

- Mucositis; corticosteroid mouthwashes may help ameliorate radiotherapy-induced mucositis and ice cubes may relieve chemotherapy-induced mucositis. Benzydamine rinses may ease discomfort of mucositis and ulceration but opioids may be needed.
- Xerostomia; predisposing to caries, candidosis and sialadenitis. Salivary substitutes may help relieve symptoms. Pilocarpine may help stimulate salivation. Dietary control and the use of fluorides are necessary to prevent caries. Prophylactic antimicrobials may help minimise fungal infections.
- Loss of taste

- Trismus
- Endarteritis obliterans; predisposing to osteoradionecrosis. Treatment planning is essential to minimise trauma and infection, and to ensure any surgery is carried out at the optimum time in relation to cancer therapy. Tooth extraction, or other surgical procedures should be done at least one week *before* radiotherapy is started, because of the risk of serious infection later.
- Dental and craniofacial maldevelopment.

In patients on cancer therapy, gentle reiteration of oral hygiene instruction and supervision, and scaling and polishing, is not only valuable but is appreciated. Haemorrhage needs the advice of a haematologist. If it is due to thrombocytopenia, a platelet transfusion, plus tranexamic acid might be indicated.

PREGNANCY

Spontaneous abortion is most common in the first three months of pregnancy (trimester), a time when not only is the possibility of pregnancy often overlooked but also a time when drugs, infections and irradiation are most likely to cause foetal damage. Damage from these agents may range from subtle anomalies to cardiac or other organ defects, or foetal death. No drug is safe beyond all doubt. Therefore,

- Drugs (especially aspirin, tetracyclines, co-trimoxazole, retinoids and CNS depressants) and radiation should be avoided whenever possible during pregnancy, particularly the first trimester.
- Drugs which have been extensively used in pregnant women should be used in preference to newer drugs, and in the smallest effective dose.
- In general, most dental treatment is best carried out in the 4th to 6th months of pregnancy (second trimester).
- In the third trimester, avoid GA because of the liability of vomiting and do not lay the patient supine, as this may cause hypotension.
- Lactating mothers should avoid
  - Aspirin
  - Benzodiazepines and other CNS depressants
  - Co-trimoxazole
  - Tetracyclines.

  Pregnancy is the ideal opportunity to begin preventive dental education.

This chapter has been reproduced from: C Scully: The Medically Compromised Patient: In S R Prabhu (Ed): Textbook of Oral Medicine (2004): Oxford University Press.

SR Prabhu

2 Dental Management of Patients with Hypertension

LEARNING OBJECTIVES

After studying this chapter the students should be able to:

1. Know the types, causes, clinical features and implications of hypertension
2. Know basics of hypotensive drugs
3. Discuss dental management of a hypertensive patient.

INTRODUCTION

Hypertension is an abnormal elevation in the blood pressures to a level greater that 140/90 mmHg. Confirmation of the diagnosis of hypertension should be made on at least two measurements of the blood pressure at separate times. Further, the reading should be taken after five minutes of rest and using an appropriate cuff and appropriate technique. Blood pressure measurement in the dental clinic of all adult patients is an effective screening tool that alerts patient, dentist and physician to an unsuspected potential problem.

In the long run hypertension results in arterial damage, which leads to end organ damage in the heart, retina, kidneys, and brain.

- A blood pressure of under 120/80 mmHg is considered normal (range: 120-139 mmHg Systolic and 80-89 mmHg diastolic).
- Patients with blood pressure consistently above 160/90 mmHg are hypertensive and should receive treatment since they are at increased risk of stroke, heart failure myocardial infarction and renal failure

- Systolic blood pressure is produced by transmission of left ventricular systolic pressure, where as the diastolic blood pressure is maintained by vascular tone and an intact aortic valve
- There is diurnal variation of blood pressure; the pressure during the day is higher than of night
- Anxiety and exertion increases the blood pressure
- In children or young adult the blood pressure are correspondingly lower than those of adults.
- In the elderly the blood pressures are higher due to arterial rigidity
- The systolic blood pressure varies by up to 10 mmHg between the right and left brachial arteries
- Standing posture usually reduces the systolic blood pressure and an increase in the diastolic blood pressure.

CAUSES OF HYPERTENSION

Over 95 per cent of hypertensive patients have no definite identifiable aetiology. These patients are said to have essential hypertension. Fewer than 5 per cent of hypertensive patients have hypertension secondary to an identifiable cause such as renal disease, adrenocortical hyperfunction, phaeochromocytoma or thyrotoxicosis.

Hypertension can be either primary (essential) or secondary.

Primary (Essential) Hypertension

Though primary hypertension has no clearly identifiable aetiology a few factors have been identified to be associated with the condition. These include:

- Genetic factors in some patients with family background of hypertension
- Lower birth weight and subsequent higher blood pressure
- Obesity
- Alcohol intake
- Sodium intake
- Chronic stress
- Some humoural mechanisms
- Insulin resistance.

Secondary Hypertension

The causes are classified as under:

Renal Causes

- Diabetic nephropathy

- Chronic glomerulonephritis
- Adult polycystic disease
- Renal vascular disease.

Endocrine Diseases

- Adrenal hyperplasia
- Phaeochromocytoma
- Cushing's syndrome
- Acromegaly.

Cardiovascular Causes

- Coarctation of aorta.

Drugs

- Oral contraceptive pill
- Steroids
- Carbenoxolone
- Vasopressin
- Monoamine oxidase inhibitors.

Pregnancy

Blood pressure in pregnant women is usually lower than in those not pregnant. This is due to a relatively greater fall in peripheral resistance despite the rise in cardiac output.

Hypertension detected in the first half of pregnancy is usually due to pre-existing essential hypertension. Hypertension presenting in the second half of pregnancy (pregnancy-induced hypertension) usually resolves after delivery. Pre-eclampsia is a syndrome consisting of pregnancy-induced hypertension with proteinuria. Severe form of pre-eclampsia may manifest severe hypertension, convulsions, cerebral and pulmonary oedema, jaundice, clotting abnormalities and fetal death. Eclampsia requires immediate treatment.

COMPLICATIONS OF HYPERTENSION

The most common complications of hypertension are cerebrovascular disease and coronary artery disease. Hypertensive patients are also prone to renal failure and peripheral vascular disease.

Malignant Hypertension

When blood pressure rises rapidly and is considered with severe hypertension (diastolic blood pressure >140 mmHg) the condition could be labelled as malignant hypertension. Renal failure proteinuria and haematuria set in rapidly. Cerebral oedema and retinal vascular changes can occur, the latter being diagnostic of malignant hypertension.

White Coat Hypertension

This refers to elevated blood pressure that is solely due to the presence of a doctor or nurse.

DIAGNOSIS OF HYPERTENSION

Diagnosis of hypertensive patients can be made in three stages:

- History
- Clinical examination
- Investigations.

History

- Patient with mild hypertension is usually asymptomatic
- History of palpitations and sweating may suggest hypertension
- Headache, visual disturbances transient loss of consciousness may indicate malignant hypertension or cardiac failure.

Examination

- Blood pressure recording
- Signs of underlying diseases such as renal disease, cardiovascular disease, etc.
- Fundoscopy.

Investigations

Routine investigations of hypertensive patients include:

- Chest X-ray (for cardiomegaly or pulmonary congestion)
- ECG (for coronary artery disease or left ventricular hypertrophy)
- Echocardiogram (left ventricular hypertrophy)
- Urinalysis (for proteinuria, haematuria, urinary metanaephrines for phaeochromocytoma)
- Fasting blood for lipids and glucose (for lipid profile and diabetes)
- Serum urea, creatinine and electrolytes (for renal disease endocrine disorder (low serum potassium).

MANAGEMENT OF HYPERTENSION

General measures of hypertension management include:

- Weight reduction
- Reduction of heavy alcohol intake
- Salt restriction
- Regular exercise
- Avoidance of smoking.

Drug Treatment

If the diastolic blood pressure exceeds 100 mmHg during the assessment period (of six months during which patient is closely monitored with repeated blood pressure measurements) treatment should be initiated. If there is target organ damage with 90 to 100 mmHg of diastolic blood pressure, or the patient has diabetes and/or is above 60 years of age treatment should be started.

Patients with constant systolic pressure of 160 mmHg should receive drug therapy since they are at increased risk of cardiovascular diseases.

Hypertensive Drugs

Drugs available are:

Diuretics

- Thiazide diuretics
- Bendrofluazide (2.5-5 mg/daily)
- Cyclopenthiazide (0.25-5 mg/daily)

β-blockers (these reduce the force of cardiac contraction)

- Atenolol (50 mg/daily)
- Acebutol (400 mg once or twice daily)
- Bisoprolol (10-20 mg/daily).

Angiotensin-converting enzyme

ACE inhibitors (these block the conversion of angiotensin to angiotensin II which is a potent vasoconstrictor)

- Captopril (50-150 daily)
- Enalapril (10-20 mg/daily)
- Trandolapril (1-4 mg/daily)

Angiotensin II receptor antagonists (these selectively block the receptors for angiotensin II)

- Losartan (50-100 mg daily)
- Valsartan (80-160 mg daily).

Calcium channel blockers (these cause arterial dilatation and thus reduce blood pressure)

- Nifedipine (10-20 mg 3 times daily)
- Amlodipine (5-10 mg daily).

α-blockers (these cause post-synaptic α_1-receptor blockage with resultant vasodilatation and reduction in blood pressure)

- Doxazosin (1-4 mg daily)
- Labetalol.

Other vasodilators

- Minoxidil (up to 50 mg daily)
- Indapamide (25 mg daily).

Centrally acting drugs

- Moxonidine (used rarely).

Management of Malignant Hypertension

Malignant hypertension includes hospitalization of the patient and immediate initiation of treatment.

Management of Hypertension in Pregnancy

Many antihypertensive drugs are contraindicated in pregnancy.

Mild hypertension is treated with methyldopa or labetalol. Pre-eclamptic hypertension can be treated with nifedipine. Eclampsia requires treatment with intravenous hydralazine and may require termination of the pregnancy.

DENTAL MANAGEMENT OF THE HYPERTENSIVE PATIENTS

- Treatment of hypertension is not dentist's responsibility
- If the dentist happens to diagnose the condition, the patient must be referred to a physician for treatment
- Dentist should measure blood pressure of all adult patients. This is particularly important if patients are known to be hypertensive
- Stress of dental treatment may artificially raise the blood pressure

- Changes in blood pressure can also be seen before the administration of local anaesthetic, dental extraction, restorative treatment and so on. Variation in blood pressure under these conditions is normal but in those with cardiovascular disease or hypertension variations in blood pressure may be exaggerated
- Minimizing anxiety and elimination of pain are important factors in these patients
- Dentists should assess the severity of a patient's hypertension by means of a medical history, physical examination and consultation with the patient's physician
- The patient should fill dentist's medical record questionnaire and dentist should ask the patient about details of the medications
- Knowledge of the medications provides information about the side effects that may complicate dental treatment. For example, vasodilators and diuretics can induce orthostatic (postural) changes in blood pressure resulting in syncope when the patient is brought from supine to upright position. Proper precautions therefore must be taken by the dentists in order to avoid accidental trauma
- Patients on propranolol may on occasion start wheezing.

Blood pressure readings that assist the clinician in determining the blood pressure and severity of hypertension are as follows:

Normal	:	120/80 mmHg
Controlled/Borderline	:	Up to 140/90 mm/Hg
Mild hypertension	:	140-160/90-105 mmHg
Moderate hypertension	:	160-170/105-115 mmHg
Severe hypertension	:	170-190/115-125 mmHg

Dental management of patients with hypertension should follow a proper plan. The following guideline is useful (Figure 2.1).

- Blood pressure at each visit for hypertensive patients must be recorded
- Dentists should be aware of the side effects of the antihypertensive drugs
- Calcium channel blockers, for example, are known to cause gingival hyperplasia, where as diuretics cause dehydration and hypokalaemia
- Propanol may cause bronchospasm whereas Reserpine causes sedation and depression
- Postural hypotension and diarrhoea are one of the causes of the drug gannethidine.

Local Anaesthetics Containing Epinephrine

- Clinical evidence points to the fact that local anaesthetics containing epinephrine have negligible influence on blood pressure in hypertensive patients

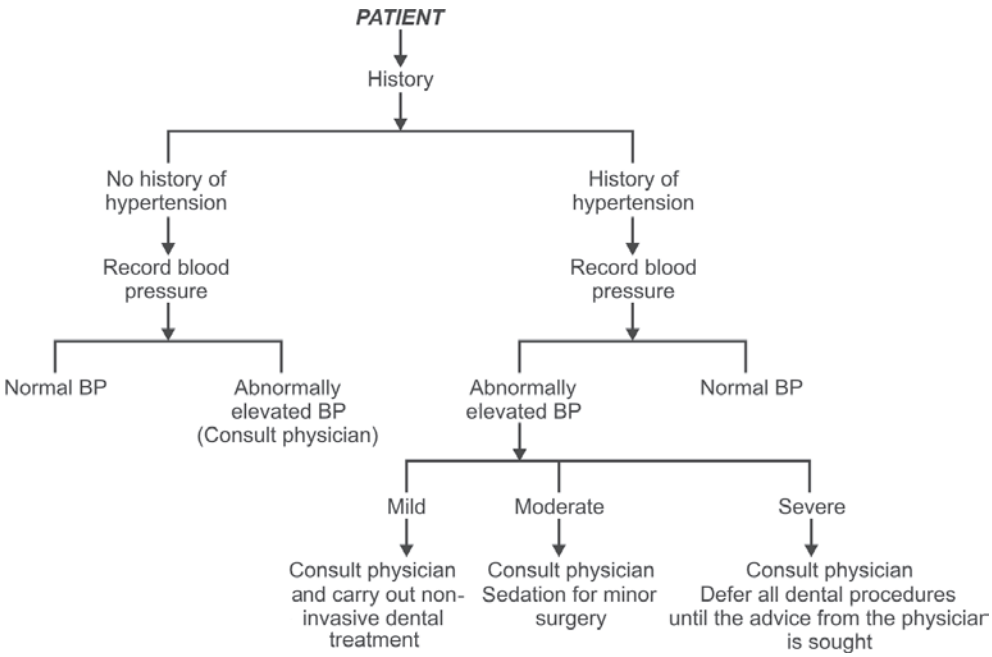


FIGURE 2.1: Dental management of patients with hypertension

- Heart rate and blood pressure are minimally affected by the low doses and short-term uses of local anaesthetic in dentistry
- Furthermore, the exogenous epinephrine contained in anaesthetic solution may actually help prevent the release of excessive endogenous epinephrine
- Patients with controlled hypertension tolerate regular doses of local anaesthetic containing epinephrine used for dental treatment
- Dentist should avoid using anaesthetic solutions containing vasoconstrictors in patients with uncontrolled hypertension
- Using an epinephrine impregnated retraction cord in these patients is also contraindicated. The use of local anaesthetics with vasopressors is to be avoided even in those patients using non-selective β-blockers when possible
- Oral bleeding has been reported in hypertensive patients
- The relationship of bleeding and hypertention, however, is not clear
- Long-term NSAID use to be avoided and dental appointments should be scheduled for afternoons.

SR Prabhu

3 Dental Management of the Diabetic Patients

LEARNING OBJECTIVES

After studying this chapter the students should be able to:

1. Know in detail the types, causes clinical features complications and diagnostic tests of diabetes mellitus
2. Know implications of diabetes on oral health
3. Know basics of medical management of diabetes mellitus
4. Discuss dental management of diabetic patient.

INTRODUCTION

Diabetes mellitus (DM) is a common complex metabolic disorder characterized by abnormalities in carbohydrates, lipid and protein metabolism. These abnormalities occur either from a considerable deficiency of insulin (Type I DM) or from target tissue resistance to its cellular metabolic effects (Type II DM). A third type of diabetes represents carbohydrate intolerance with its onset or first recognition during pregnancy.

Diabetes mellitus presents with multiple symptoms and a variable course. The common characteristic is the elevated persistent blood glucose level (hyperglycaemia), which occurs when the pancreas produces insufficient insulin, or cells are not responsive to insulin that is produced. In addition to systemic effects of the condition diabetes mellitus may also have significant oral

effects. It is highly likely that the dentist is often the first health care provider to encounter an individual with undiagnosed or untreated disease. In these circumstances the treating dentist is expected to refer the patient to a physician for management of diabetes. It is also common practice that the physicians frequently refers diabetic patients to dentists seeking oral health care.

Dentists have a major responsibility to acquire adequate knowledge of the disease particularly with regard to its signs and symptoms, diagnosis and medical management. It is dentist's responsibility to offer appropriate dental management to his/her diabetic patient and also manage diabetic emergencies when they occur in dental clinics.

CLASSIFICATION AND PATHOGENESIS OF DIABETIC MELLITUS

Diabetic mellitus (DM) manifests in two forms: Type I or Insulin-Dependent Diabetic Mellitus (IDDM) and Non-insulin Dependant Diabetes Mellitus (NIDDM). These two types can be considered as forms of primary diabetes mellitus while the secondary diabetes mellitus occurs in association with other systemic conditions including gestation. Secondary diabetes mellitus is an uncommon condition representing 2.5 per cent of the total disease occurrence.

- Type I (IDDM) is the more common form of the disease representing between 80 and 90 per cent of all DM cases followed by the Type II DM which constitutes 5 to 15 per cent of all diabetes patients
- Type I DM, previously referred to, as Juvenile Onset Diabetes is more severe form of the disease. In the absence of insulin supplementation it results in systemic ketosis or acidosis
- Type I DM is caused by the destruction of insulin producing beta cells of the pancreatic islets of Langerhans. The pathophysiology may involve an autoimmune or virally mediated destructive process
- Type II (NIDDM), previously referred to as Maturity Onset Diabetes Mellitus results from defects in the insulin molecule or from altered insulin cellular receptors
  This type of DM therefore results from impaired insulin function and not from its deficiency. In later stages of the disease however, insulin production may be diminished and supplementation of insulin may become necessary
- Patients are less likely to develop ketoacidosis in type II diabetes mellitus
- The defect in type II DM may also include impaired insulin secretion, a defect distal to the insulin receptors and a defect in the hepatic uptake of glucose contributing to insulin intolerance.

GENERAL SIGN AND SYMPTOMS OF DIABETES MELLITUS

The classic signs and symptoms of diabetes mellitus are common in type I (IDDM) diabetes. In type II (NIDDM) diabetes signs and symptoms do occur but slowly. General signs and symptoms of diabetes mellitus include:

- Polyurea (frequent urination)
- Polyphagia (increased hunger)
- Polydipsia (increased thirst)
- Weakness and fatigue
- Pruritus (itching: skin, rectum or vagina)
- Headache
- Recent weight gain or loss
- Nausea
- Confusion
- Dehydration
- Delayed wound healing
- Acetone breath.

Onset of symptoms may occur suddenly in type I (IDDM). In type II (NIDDM) additional features may include:

- Blurred vision
- Chronic skin infections
- Numbness of extremities
- A variety of oral manifestations as discussed in the following paragraphs.

It must be realized that a number of factors other than diabetes mellitus itself are responsible for the fluctuations in blood glucose levels in diabetic patients. These include:

- Stress
- Food intake (carbohydrates in particular)
- Exercise
- Menstruation
- Pregnancy
- Alcohol.

A detailed discussion on these factors is beyond the scope of this chapter.

COMPLICATIONS OF DIABETES MELLITUS

Several years following onset of the disease, nearly half of diabetic patients develop chronic progressive and potentially severe complications of the disease. These include:

- Retinopathy
- Artherosclerotic cerebrovascular, cardiovascular and peripheral vascular diseases

- Renal dysfunction
- Peripheral neuropathies
- Muscle wasting
- Type I (IDDM) diabetes mellitus patients are prone to ketoacidosis, which is an acute and potentially life-threatening metabolic complication
- Ketoacidosis can develop rapidly and lower the pH of the blood, leading to coma and death
- The destruction of the beta cells in the type I diabetes mellitus patient has been linked to the presence of certain major Histocompatibility Locus Antigens (HLA). This may therefore have an autoimmune basis. Familial association in type I (IDDM) diabetes mellitus is minimal.
- In the type II diabetes mellitus hyperglycaemia is not caused by autoimmune destruction of beta cells, but it is rather a failure of those cells to meet an increased demand for insulin.
- A significant percent of adult diabetics (NIDDM) are obese.
- Regular exercise with weight loss is associated with a decreased incidence of NIDDM.
- Sixty per cent of NIDDM patients have either a parent or a sibling with the disease.

ORAL MANIFESTATION OF DIABETES MELLITUS

The oral manifestations or complications of uncontrolled diabetes mellitus include:

- Xerostomia
- Parotid gland enlargement
- Oral candidiasis
- Progressive periodontitis
- Burning mouth
- Altered taste
- Increased caries rate
- Oral neuropathies
- Periapical abscesses

The oral findings in patients with uncontrolled diabetes are most likely related to the following factors:

- The excessive loss of fluids through frequent and excessive urination
- Altered response to infection
- The microvascular changes and
- The increased concentrations of glucose in the saliva.

Xerostomia in Diabetes

Xerostomia or dry mouth can lead to cracking and atrophy of the oral mucosa.

Mucositis, ulcer formation, desquamation, increased likelihood of bacterial and fungal infections and depapillation of the dorsum of the tongue are commonly encountered in uncontrolled diabetic patients.

Xerostomia may also predispose to accumulation of dental plaque and contribute to periodontal disease and caries.

Burning Mouth and Altered Taste in Diabetes

Burning mouth and altered taste may be due to diabetic neuropathy.

Periodontal Disease and Dental Caries in Diabetes

Evidence suggests that there is direct relationship between diabetes mellitus and periodontal disease. Marginal gingivitis in children with diabetes is higher in incidence and severity as compared with gingivitis in non-diabetic children.

Some other factors that could account for periodontal disease among diabetics include:

- Decreased collagen synthesis
- Increased collagenous activity
- Decreased bone mineral content (in IDDM)
- Secondary hypoparathyroidism due to diabetic nephropathy
- Defective polymorphonuclear leukocytes chemotoxins

Each of these factors could result in accelerated alveolar bone destruction.

Dental caries in diabetic patients is related to the increased levels of glucose in saliva and crevicular fluid.

DIAGNOSIS OF DIABETES

Diagnosis of diabetes (in a non-pregnant adult female) rests on the following:

- Presence of classic symptoms of diabetes (such as polyurea, polyphagia and polydipsia) with hyperglycaemia (random plasma glucose > 200 mg/dL)
- Fasting plasma glucose > 140 mg/dL or fasting venous or capillary whole blood glucose > 120 mg/dL on more than one occasion, or
- Abnormal oral glucose tolerance test result. Both the 2 hours level and at least one other sample must exceed 200 mg/dL.

MEDICAL MANAGEMENT

- The main aim of the treatment of diabetes mellitus is to lower blood glucose levels and prevent the complications associated with the disease.

Medical Treatment of Type I Diabetes Mellitus

- Exogenous insulin injection by subcutaneous route. The insulin used include:
  - Rapid acting
  - Intermediate acting and
  - Long-acting insulin preparations
- Rapid insulin (Lispro) and regular insulin are generally taken close to meal-time to match the activity of the injected insulin with the peak absorption of glucose from small intestine into the bloodstream. These can be self-monitored by the patient
- Patients taking rapid acting insulin preparations should not delay their meal. If they do, they may progress to severe hypoglycaemia (insulin shock)
- Intermediate acting insulin preparations have their effects at about 3 hours and peak at about 8 hours
- Long-acting insulin preparations begin their action at about 3 hours and peak at 14 hours.
- Patients using insulin preparations therefore require combination of two or more insulin preparations, given several times per day. The objective is to maintain blood glucose level at 80 to 140 mg/dL
- Insulin pump is a battery operated device that uses phosphate buffered rapid acting regular insulin stored in a reservoir syringe that is located within the pump and is replaceable.

Treatment for Type II Diabetes (NIDDM)

- Oral hypoglycaemic drugs are used for type II diabetes patients. These are prescribed for patients who produce insulin but whose cells are not adequately responsive to the hormone. These agents stimulate insulin release from pancreatic beta cells and promote insulin uptake in body tissues.

  Currently, there are four classes of oral hypoglycaemic agents available. They are:
  - Alpha-glucoside inhibitors (e.g. Precose)
  - Sulfonylureas (e.g. Glucotrol diabeta)
  - Biguanides (e.g. Glucophage)
  - Thiazolidinediones (e.g. Rezulin)

- Alpha-glucoside inhibitors delay the digestion of carbohydrates resulting in smaller rise in blood glucose concentration following meals
- Sulfonylures stimulate pancreatic insulin release and decrease the output of glucose by the liver
- Biguanides decrease hepatic glucose production and improve insulin sensitivity.
- Thiazolidinediones lower blood glucose by improving target cell response to endogenous insulin.

By reducing the carbohydrate intake (diet control) and by minimizing excess body fat NIDDM can be controlled.

It must **not** be assumed that a patient who does not require insulin (as in type II diabetes) is healthier than a well-controlled type I patient. It must also be realized that a controlled diabetic is at risk during acute infections, immunocompromised states, pregnancy, menstrual periods and dietary excesses.

DENTAL CARE OF DIABETIC PATIENTS

Dental care carried out in diabetic patients fall in three categories.

1. Major surgical procedures
2. Invasive procedures and
3. None-invasive procedures.

Major Surgical Procedures

These include:

- Facial bone fracture repair
- Jaw surgery for tumour removal
- Orthognathic surgery, etc.

Invasive Procedures

These include:

- Tooth extraction
- Periodontal surgery
- Apical endodontic surgery
- Surgical drainage of abscesses, etc.

Non-invasive Procedures

These include:

- Restorative procedures

- Prosthodontic appliances
- Injection of local anaesthetics
- Intracanal endodontics
- Orthodontic procedures
- Dental impressions
- Routine oral prophylaxis
- Fluoride treatment and
- Intraoral radiographs, etc.

SPECIAL CONSIDERATIONS IN DENTAL TREATMENT

Morning Appointments

- Diabetic patients are more stable in the morning because most diabetic regimens include the use of medication exercise and prescribed breakfast in the morning.
  - Dental care therefore should be provided in the morning
  - Appointment should be short.

Medications

- Stable (controlled) diabetics should take their medication at the usual time
- Unstable diabetics do require physician-guided alterations in medication.

Diet

- Stable diabetics should take their normal diet prior to dental care
- Unstable diabetics require counselling with regard to nutritional intake before and after dental treatment.

Stress Reduction

- For all diabetics stress must be reduced
- If necessary, premedication and/or analgesics to control pain should be considered
- Stress releases endogenous epinephrine and can lead to mobilization of glycogen from the liver and cause additional hyperglycaemia
- Opportunities to use bathroom and availability of small snacks greatly improve the patients' feeling of well-being. These also reduce level of stress.

Hygiene and Recall Visit

- Diabetic patient must be recalled for complete dental examinations as frequently as non-diabetic patients
- In selective cases more frequent recalls may be necessary
- Home care should be reviewed at each appointment.

Antibiotics

- All diabetic patients do not need antibiotic cover prior to dental care
- Only unstable diabetic patients should be covered by antibiotics before invasive oral care starts and this should continue for several days after the surgical procedures
- Amoxicillin 2 g, 1 hour preoperatively followed by amoxicillin 500 mg 3 times daily for 4 days is adequate
- Clindamycin 600 mg 1 hour preoperatively followed by clindamycin 150 mg four times daily for 4 days is used for those allergic to penicillin type antibiotics.

Post-treatment Diet Control

Dietician's opinion should be sought for patients with diabetes.

Other

- Ask the patient to bring the glucometer to dental clinic at each visit
- Dentist should have a glucometer in his/her clinic. Patients can check their blood glucose levels at the start of the dental appointments
- Dentist should have glucose tablets ready. A rapidly acting simple carbohydrate should be available in the clinic at all times.

Common Causes of Hypoglycaemia

Common causes of hypoglycemia include:

- Injection of excess insulin
- Delaying or missing meals with the usual dose of insulin
- Increasing exercise without adjusting insulin dose
- Consuming alcohol.

Sign and Symptoms of Hypoglycaemia

Sign and symptoms of hypoglycaemia include:

- Confusion

- Shakiness/tremors
- Agitation
- Sweating
- Tachycardia.

Dentist should take accurate history from the patient with respect to:

- The time, dose and type of insulin the patient took on that day
- Time, amount and type of carbohydrate (simple vs complex) the patient consumed before the dental visit.

Hypoglycaemia symptoms are likely to occur when the blood glucose fall below 60 mg/dL. If glucometer shows hypoglycaemia, then the administration of glucose tablets usually rapidly reverses it.

If the patient is unable to drink or take food by mouth, then 25 to 30 mL of 50 per cent dextrose or 1 mg of glucagon can be administered intravenously or intramuscularly. In other instances rubbing a preparation of glucose or dissolved sugar under the tongue of the unconscious patient may reverse hypoglycaemia.

Treat patient presumptively for hypoglycaemia if they experience tremors, increased sweating, tachycardia or disorientation and agitation. Even if these symptoms are as a result of hyperglycaemia, the additional amount of carbohydrates will normally cause no harm.

SR Prabhu

4 Dental Management of Patients with Ischaemic Heart Disease and Heart Failure

LEARNING OBJECTIVES

After studying this chapter the students should be able to:

1. Discuss clinical features of angina and myocardial infarction and their medical management.
2. Describe dental management of patient with a history of angina and myocardial infarction.

INTRODUCTION

With a high prevalence of ischaemic heart disease in the general population there is no doubt that the dental practitioner will frequently encounter patients with these conditions. Angina in particular is one of the most common medical emergencies encountered in dental practice.

Dental procedures on patients with cardiovascular disease should be carried out with utmost care. Dental practitioner should seek thorough medical history in order to be able to take appropriate precautions prior to initiating dental treatment in these patients.

ISCHAEMIC HEART DISEASE

Ischaemic heart disease (IHD) is common in general population. This may lead to heart failure or angina. The major risk factor for ischaemic heart disease are:

- Cigarette smoking
- Hypertension

- Advancing age
- Family history
- Diabetic mellitus
- Hypercholesterolaemia.

Angina

Angina (angina pectoris) is the most common and most important symptom of ischaemic heart disease. This is caused by an imbalance between the myocardial oxygen supply and demand. Cardiomyopathies, coronary artery spasm and aortic stenosis can also produce angina. These are not to be considered among ischaemic heart diseases.

Symptoms of Angina

Symptoms of angina include:

- Severe pain described as gripping or crushing
- Pain often radiates to left arm and jaws
- Pain is induced by exercise or stress
- Pain is released within 1 to 2 minutes by nitroglycerine.

Sign of Angina

- Usually none
- Patient may be hypertensive, heavy smoker, anaemic or with high blood cholesterol levels.

Diagnosis

Investigative method:

- ECG
- Exercise test (treadmill exercise)
- Radioisotope thallium scanning
- Coronary angioraphy.

Treatment

- Identify/eliminate/correct risk of factors such as smoking, hypertension, obesity, hyperlipidaemia, etc.
- Drug therapy:
  - Nitrates (e.g. isosorbide mononitrate 20 mg bd) or glyceryl trinitrate (GTN) to be placed sublingually

- β-blockers, e.g. atenolol 50 mg/daily
- Calcium antagonists, e.g. nifedipine 10 mg
- Coronary angioplasty and bypass surgery for triple vessel disease.

Unstable Angina

This is angina of recent onset, which is severe and present with minimal exertion or at rest. Treatment is similar to that of angina but more vigerous. Angioplasty or bypass surgery may be required in most patients.

Dental Consideration of Angina

- The dental environment can increase the likelihood of an anginal attack because of the associated fear, pain and anxiety
- At risk patient should be asked to bring their anti-anginal medications with them
- Oral nitrates should be kept ready in the clinic
- Sublingual glyceryl trinitrate (GTN) tablet or slow-release GTN tablet can be placed in the buccal sulcus (Buccal suscard) if an attack occurs in the chair
- The dental treatment should stop
- Oxygen administration may be necessary, if pain persists
- If pain disappears and patient feels better and confident treatment can be continued.

Myocardial Infarction

Myocardial infarction is the leading cause of death in many countries. It is an irreversible acute ischaemic event that produces an area of myocardial necrosis in the heart tissue.

The pain experienced during infarction is prolonged and severe.

Signs and Symptoms

These include:

- Prolonged severe retrosternal chest pain
- Patient may be cold, clammy and nauseous and frightened
- Pain is not relieved by sublingual nitrate tablets or spray
- Dyspnoea is usually present
- Pain may radiate to the neck and down the arm
- Many infarcts are associated with lesser or no pain. These are called silent infarcts
- Patient is pale and often cyanosed
- Tachycardia is present

Investigations

These include:

- ECG
- Estimation of cardiac enzymes:
  - Creatine kinase
  - Aspartate transaminase
  - Lactate dehydrogenase
- ^{99m}Tc-pyrophosphate scanning (shows the infarct as a "hot-spot").
- Chest X-ray (to identify pulmonary oedema).

Treatment

- Pain relief with morphine sulfate as the drug of choice
- Aspirin (300 mg) to be given as soon as possible. If tablet is given it must be chewed by the patient so that it reaches circulation faster
- Glyceryl trinitrate: either as a spray or sub-lingual tablet in order to relieve any spasm within coronary vessel
- Antiemetic to be administered immediately
- Administration of oxygen by nasal cannula
- Transfer to coronary care unit
- Continuous ECG monitoring and intravenous access through an intravenous cannula
- Thrombolytic therapy up to 24 hours of the onset of pain (e.g. streptokinase)
- Continous heparin (500 IU/8 hours)
- Prohibition of smoking.

Dental Considerations

- Minor dental interventions seem to be well-tolerated by patients with recent uncomplicated myocardial infarction
- Post-myocardial infarction patients are often on anticoagulants such as warfarin and antiplatelet agents such as aspirin
- Consultation with the patient's cardiologist by the dentist is essential prior to invasive procedures

- Temporary dose reduction may sometimes be necessary to allow dentist with most dental procedures
- List of dental management steps are shown in Tables 4.1 to 4.3.

Table 4.1: Dental management of the patient with stable angina pectoris or history of myocardial infarction (6 months or longer)

- Short appointments (morning preferable)
- Pretreatment vital signs
- Semisupine chair position for comfort
- Patient should bring own supply of nitroglycerin to appointment for use, if necessary
- Stress and anxiety reduction as necessary
  Diazepam 2 to 5 mg the night before and/or 2 to 5 mg 1 hour before appointment. N_2O-O_2 inhalation sedation during procedure or low-flow oxygen (3L/min) with nasal cannula.
- Consider premedication with nitroglycerin if dental treatment predictably precipitates angina
- Ensure good pain control; use local anaesthetic with vasoconstrictor (epinephrine,maximum dose 0.036 mg;levonodefrin 0.20 mg)
- Avoid use of epinephrine in retraction cord (can use plain cord soaked with agents such as oxymetazoline [Afrin] or tetrahydrozoline [Visine])
- Avoid anticholinergic drugs (scopolamine or atropine)
- If patient becomes fatigued or has a change in pulse rate or rhythm, discontinue treatment and reschedule
- Patients receiving daily aspirin therapy may have increased bleeding but is usually not clinically significant.Dipyridamole (Persantine) and ticlopidine (Ticlid) not usually associated with increased bleeding.
- If patient is taking warfarin sodium (Coumadin) for anticoagulation, pretreatment prothrombin time should be less than 2 time normal international normalized ratio (INR) < 3.0

Table 4.2: Dental management of the patient with unstable angina pectoris or with recent MI (<6 months)

- Avoid elective dental care
- For urgent dental needs, consider treating patient in special patient care setting such as hospital dental clinic
- Consultation with physician

1. Pretreatment home:
   a. Benzodiazepine (10 mg oxazepam or 5 mg diazepam) night before appointment
   b. Application of long-acting dermal nitroglycerin
2. Pretreatment in office
   a. Periodic or continuous monitoring of vital signs
   b. Establishment and maintenance of intravenous line
   c. Prophylactic nitroglycerin sublingually before procedure
3. Intraoperatively
   a. Use N_2O-O_2 inhalation sedation
   b. Use pulse oximeter for O_2 saturation monitoring
   c. Use intravenous benzodiazepine such as midazolam
   d. Supplemental nitroglycerin sublingually as needed
   e. Ensure excellent pain control with local anaesthesia; probably best to avoid vasoconstrictors, although small amount of epinephrine (< 0.036 mg) or levonordefrin (< 0.20 mg) may be tolerated

Table 4.3: Dental management of the dental patient with a history of ischaemic heart disease who develops chest pain

1. Stop dental procedure
2. Give patients nitroglycerin tablet under the tongue (from patients' own medication, if possible)
3. Administer O_2
   a. If pain is relieved within 5 minutes, let patient rest and continue with appointment or terminate appointment and reschedule for another day.
   b. If pain is not relieved within 5 minutes:
      i. Take patients blood pressure and pulse.
      ii. If patient's condition is stable, give second nitroglycerin tablet; if pain is relieved in 5 minutes, manage as in 3a above.
      iii. If patients condition remains stable but pain continues, give third nitroglycerin tablet; if pain is relieved within 5 minutes, manage as in 3a above.
      iv. If pain is not relieved following three nitroglycerin tablets given within 15 minutes. period, or if patient becomes unstable at any time, call 911 for immediate transport to emergency facility.

HEART FAILURE

Heart failure exists when the heart is unable to pump sufficient blood to satisfy the body's metabolic requirements. The most common cause of heart failure is ischaemic heart disease (IHD). Other causes include: valvular heart disease, hypertension, arrhythmia, pulmonary embolism, anaemia, thyrotoxicosis, myocarditis, infective endocarditis, cardiomyopathy and thiamine deficiency (wet beri-beri).

Diagnosis of heart failure is based on clinical findings and investigations.

Symptoms of Heart Failure

- Dyspnoea on exertion
- Orthopnoea
- Nocturnal dyspnoea
- Ankle oedema
- Fatigue
- Lethargy.

Signs of Heart Failure

- Ankle and sacral oedema
- Raised jugulovenous pressure
- Hepatomegaly

Investigations

- Chest X-ray for cardiomegaly or pulmonary oedema

- ECG for left ventricular hypertrophy
- Echocardiography to see left ventricular function.

Treatment of Heart Failure (Table 4.4)

- Dietary salt restriction
- Diuretics
- Digoxin
- ACE inhibitors (e.g. captropril)

Hospitalization may be necessary in refractory cases of heart failure.

Table 4.4: Cardiovascular drugs: dental drug interactions and effects on dental treatment

Alpha-Blocker	
Prazosin (Minipress®)	Significant orthostatic hypotension a possibility; monitor patient when getting out of dental chair; significant dry mouth in up to 10% of patients
Alpha/Beta-Blocker	
Carvedilol (Coreg®)	See non selective beta-blockers
ACE Inhibitors	The NSAID indomethacin reduces the hypotensive effects of ACE inhibitors. Effects of other NSAIDs such as ibuprofen not considered significant
Angiotensin-converting enzyme inhibitor/diuretic combination	
Captopril/HCTZ (Capozide®)	No effect or complications on dental treatment reported
Angiotensin II receptors blockers	
Candesartan (Atacand®)	No effect or complications on dental treatment reported
Losartan (Cozaar®)	
Antiplatelet/Anticoagulant Agents	
Aspirin	May cause a reduction in the serum levels of NSAIDs if they are used to manage postoperative pain
Clopidogrel (Plavix®)	If a patient is to undergo elective surgery and an antiplatelet effect is not desired, clopidogrel should be discontinued 7 days prior to surgery
Eptifibatide (Itegrilin®)	Bleeding may occur while patient is medicated with eptifibatide; platelet function is restored in about 4 hours following discontinuation
Warfarin (Coumadin®)	Signs of warfarin overdose may first appear as bleeding from gingival tissue; consultation with prescribing physician is advisable prior to surgery to determine temporary dose reduction or withdrawal of medication

Contd...

Contd...

Beta Blockers	
Cardioselective	Cardioselective beta-blockers (i.e. atenolol) have no effect or complications on dental treatment reported
Noncardioselective	Any of the noncardioselective beta blockers (i.e.,nadolol, penbutolol, pindolol, propranolol, timolol) may enhance the pressure response to vasoconstrictor epinephrine resulting in hypertension and reflex bradycardia. Although not reported, it is assumed that similar effects could be caused with levonordefrin (Neo-Cobefrin).® Use either vasoconstrictor with caution in hypertensive patients medicated with noncardioselective beta-adrenergic blockers
Calcium Channel Blockers	Cause gingival hyperplasia in approximately 1% of the general population taking these drugs. There have been fewer reports with diltiazem and amlodipine than with other CCBs such as nifedipine. The hyperplasia will usually disappear with cessation of drug therapy. Consultation with the physician
Class I Antiarrhythmics	
Disopyramide (Norpace®)	Increase serum levels and toxicity with erythromycin. High incidence of anticholinergic effect manifested as dry mouth and throat
Flecainide (Tambocor®)	No effects or complication on dental treatment reported
Procainimide (Pronestyl®)	Systemic lupus-like syndrome has been reported resulting in joint pain and swelling, pains with breathing, skin rash
Propafenone (Rythmo®)	Greater than 10% experience significantly reduced salivary flow; taste disturbance, bitter or metallic taste
Quinidine (quinaglute®)	Secondary anticholinergic effects may decrease salivary flow, especially in middle aged and elderly patients; known to contribute to caries, periodontal disease, and oral candidiasis
Class III Antiarrhythmics	
Amiodarone	Bitter or metallic taste has been reported
Digitalis Glycosides	Use vasoconstrictor with caution due to risk of cardiac arrhythmias. Sensitive gag reflex induced by digitalis drugs may cause difficulty in taking dental impressions
Diuretics	
Thiazide Type	No effects or complications on dental treatment reported
Loops	NSAIDs may increase chloride and tubular water reuptake to counter-act loop type diuretics
Potassium-sparing	No effects or complications on dental treatment reported
Potassium-sparing combination	No effects or complications on dental treatment reported

Contd...

Contd...

HMG-CoA Reductase Inhibitors	Concurrent use of erythromycin, clarithromycin, and some of the statin drugs may result in rhabdomyolysis
Nitrates	No effects or complications on dental treatment reported
Supplemental Drugs for Heart Failure	
Amrinone (Inocor®) Milrinone (Primacor®)	No effects or complications on dental treatment reported.
Supplemental Drugs for Hypertension	
Central Acting Alpha-Agonists	
Clonidine (Catapres®)	Greater than 10% of patients experience significant dry mouth
Direct Acting	
Hydralazine (Apresoline®)	No effect or complications on dental treatment reported

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5 Dental Management of Patients with History of Asthma

LEARNING OBJECTIVES

After studying this chapter the students should be able to:

1. Discuss key clinical features of asthma and its medical management
2. Discuss dental management of patient with asthma.

INTRODUCTION

Asthma is a chronic inflammatory respiratory disorder characterized by attacks of wheezing and difficulty in breathing.

This disorder is due to reversible narrowing of the airways which is generally caused by bronchospasm, congestion and thickening of the lining of the bronchial tree or accumulation of mucous and phlegm in the smaller bronchi.

Asthma is a world wide problem. It commonly affects during childhood.

Asthma can be classified as follows:

- Extrinsic:
  - Early onset
  - Atopic
  - Allergic

- Intrinsic:
  - Late onset
  - Cryptogenic
  - Non-atopic.

Extrinsic asthma occurs most commonly in atopic individuals who show positive skin-prick (approximately 90% children with asthma) reactions to common inhaled allergens. Usually, there is a positive family history among these patients. Intrinsic asthma often starts in middle age. Majority of these patients may not show positive skin tests to common inhaled allergens.

KEY FEATURES

There are many factors which can cause or precipitate an attack of asthma. These include:

- House dust mite
- Animal danders or pollens, fungal spores
- Non-specific trigger factors such as:
  - Cold
  - Exercise
  - Drugs (β-blockers, aspirin).
- Ingestion of allergens in fish, egg, milk, yeast and wheat
- In intrinsic asthma often the cause is non-identifiable
- An attack of asthma usually begins quite suddenly
- Wheezing respiration and tightness in the chest are initial symptoms
- Attack of asthma is frequently worse at night
- Patients may be aware of any trigger factors in chronic asthma
- Signs of chronic asthma typically include hyperinflation of the chest, tachypnoea, prolonged expiration and audible expiratory wheeze
- In more severe attacks, tachycardia, restlessness, pulses paradoxus and cyanosis occur (status asthmaticus) and may be life-threatening
- A silent chest associated with patient's inability to speak is often indicative of severe attack.
- In severe cases (status asthmaticus) patient adopts an upright position fixing the shoulder gently to assit the accessory muscles of respiration
- Investigations of importance include: Chest X-rays, full blood count, sputum examination, pulmonary function tests, arterial blood gas analysis, skin hypersensitivity tests to common allergens, and serum IgE levels.

MEDICAL MANAGEMENT OF ASTHMA

(Guidelines proposed by British Thoracic Society 1993).

Aims of Management

- To recognize asthma
- To abolish symptoms
- To restore normal or best possible long-term airway function
- To reduce the risk of severe attacks
- To enable normal growth to occur in children
- To minimize absence from school or work.

Principles of Management

- Patient and family participation
- Avoidance of identified cause where possible
- Use of lower effective doses of convenient medications and minimizing short- and long-term side effects.

British Thoracic Society Guidelines

Management of chronic asthma in adults includes:

- Check that inhale technique is adequate
- Prescribe PEFR meter, treatment may be stepped up or down as appropriate
- Rescue course of predinisolone may be needed at anytime and at any step.

Step 1: Occassional use of relief of β-agonist (i.e. < once daily).

Step 2: Regular inhaled anti-inflammatory agents (e.g. beclomethasone or budesonide 100 to 400 μg/24 hours) or cromoglycate or nedocromil.

Step 3: Move to high dose inhaled steroid (800-2000 μg/24 hours) via large volume spacer (and mouth-rinse). Theophyllines may be useful.

Step 4: High dose inhaled steroids and regular bronchodilators (e.g. ipratropium, oxitropium, salmeterol β-agonist tablets).

Step 5: Addition of regular steroid tablets in a single daily dose (rarely needed).

Review treatment regularly and try to step down slowly. Treatment of acute asthma requires urgent assessment and aggressive management as it is life-threatening.

Administration of oxygen and medications such as salbutamol (5 mg) or terbutaline (10 mg) by nebulizer, solbutamol (250 mcg) as slow intravenous injection, hydrocortisone sodium succinate 200 mg intravenously or predonisolone 40 mg orally are required both at home and in the hospital depending on the severity of asthma.

Treatment of asthma is the responsibility of a medically trained professional.

DENTAL MANGEMENT OF ASTHMATIC PATIENTS

Asthmatic patients seeking oral care are common in day to day practice of dentistry. The primary responsibility of a dental clinician in these circumstances is to prevent an attack of asthma during the dental treatment.

Identification of asthmtic patient and the assessment of asthma should include the following:

History

- Type of asthma (extrinsic/intrinsic) or by degree of severity such as mild, moderate or severe
- Precipitating factors if known
- Age and onset
- Frequency—time of day/night, and severity of attacks
- How does the patient manage usually
- Hospitalization record for acute attacks
- History of triggering factors such as emotional stress, aspirin intolerance, etc.
- Type and duration of bronchodilators used other (e.g. corticosteroids) drugs used.

Avoidance of known Precipitating Factors

- Every effort to reduce stress must be made
- Preoperative or intraoperative sedation may be necessary in some cases
- If sedation is necessary nitrous oxide-oxygen inhalation is the approach of choice
- Oral premedication may be achieved with small doses of short-acting benzodiazepine
- Out-patient general anaesthesia is generally contraindicated
- Antihistamines such as promethazine (Phenargan) or diphenhydramine (Benadryl) should be avoided since they cause dryness of mucosa that can exacerbate the formation of tenacious mucus in the event of an acute attack
- Aspirin containing drugs (or NSAIDs) should be avoided since these may cause an acute exacerbtion of asthma.

- For those who have had nocturnal attacks of asthma, schedule appointments late in the morning.
- Instruct the patient to bring their inhalers (bronchodilators)
- The use of local anaesthetics without epinephrine or levonordefrin is advisable since the sulfites which are used as preservatives in local anaesthetic solutions (containing epinephrine and levonordefrin) can precipitate acute attacks of asthma
- Asthmatics who have been medicated with systemic corticosteroids on a long-term basis, may require supplementation for dental procedures. Long-term use of steroids can result in addrenal suppression and major procedure on these patients may precipitate adrenal insufficiency if steroid dosage is not adjusted appropriately
- Barbiturates and narcotics are also known to precipitate asthmatic attacks and hence are to be avoided
- Patients taking theophylline preparations should not be given antibiotics such as erythromycin. This may cause toxic blood levels of theophylline
- Patients with rare attacks and low risk can be treated with normal operating procedures
- Patients of moderate risk are those asymptomatic patients on chronic maintenance therapy (such as steroids or bronchodilators). Those on torbutaline should be examined for regulating and rate of pulse since this drug does possess cardiac stimulatory effects
- Patients with significant risks are those with a history of frequent exacerbations despite chronic maintenance therapy. These patients should receive clearance from their physicians prior to extensive dental treatment
- Patients with higher risk are those who are wheezing audibly or coughing. Dental treatment in these must be deferred because of the risk of precipitating an acute attack during treatment.

Acute asthma if occurred in the clinic, situation requires immediate treatment. A short-acting beta-adrenergic agonist inhaler is the most effective and fastest bronchodilator.

Subcutaneous injection of epinephrine (0.3 to 0.5 mL 1:1000) is also very effective. Also administer oxygen.

Oral Complications in Asthmatics

These include:

- Oral candidiasis due to inhalation of corticosteroids
- Reduced resistance to oral infections.

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6 Dental Management of Patients with History of Epilepsy

LEARNING OBJECTIVES

After studying this chapter the students should be able to:

1. Discuss key clinical features of epilepsy and its medical management.
2. Discuss dental management of a patient with a history of epilepsy.

INTRODUCTION

Epilepsy is a periodic disturbance in neurological function with frequent changes in consciousness which is due to abnormal excessive electrical discharge within the brain.

During an epileptic seizure, large groups of neurones are activated repetitively and hypersynchronously. There is failure of inhibitory synaptic contact between neurones. This causes high-voltage spike-and-wave activity on the EEG which is the electrophysiological hallmark of epilepsy.

Epilepsy is classified as follows:

1. Generalized epilepsy implying abnormal electric activity which is widespread in the brain.
2. A simple partial seizure that describes a seizure without loss of awareness.
3. A complex partial seizure which describes a seizure with loss of awareness.

KEY FEATURES

- In majority of cases epilepsy is idiopathic
- Aetiological and precipitating factors in epilepsy include:
  - Genetic predisposition
  - Developmental abnormalities
  - Trauma and surgery on the head involving brain
  - Pyrexia in children
  - Intracranial mass lesions
  - Cerebral infarction
  - Drugs (e.g. lidocaine, alcohol withdrawal)
  - Encephalitis
  - Metabolic abnormalities such as porphyria
  - Degenerative brain disorders
  - Photosensitivity and auditory stimuli.

In clinical practice two main forms of epilepsy are recognized. They are:

1. Grand mal and
2. Petit mal.

Grand Mal

Grand mal epilepsy is characterized by seizures accompanied with loss of consciousness and usually manifests in well-defined stages which are:

1. **The warning stage** in which a familiar sensation may occur prior to the occurrence of seizures.
2. **Tonic stage** in which the patient falls unconscious often with an epileptic cry. Muscles go rigid, the breathing ceases and the patient goes blue in the face. In this stage the tongue is usually bitten.
3. **Clonic stage** in which spasms of the muscles occur resulting in violent movements of the limbs. Frothing at the mouth and incontinence of urine and faeces are also usually present.
4. **Stage of coma** After the clonic spasms the patient remains in a coma which quickly passes into a deep ordinary sleep if the patient is not awakened.

The duration of the fit is usally less than 2 minutes. In severe cases, however, fit may succeed fit leading to the condition of status epilepticus. This may go on for hours, and if the fits are not controlled, death from exhaustion may occur.

Petit Mal

Minor fits are common in this form of epilepsy. The attacks are more numerous and much briefer. The fit consists of a transient loss of consciousness lasting for a second or two and sometimes known as an 'absence'. The patient may feel 'dazed' and experience 'blackouts' and onlookers may not notice anything wrong. Patient may stay still with a vacant expression on his/her face.

Post-epileptic automatism may follow an epileptic fit. In this state, the patient may carry out actions and procedures of which he/she is unaware and has no recollection afterwards of what has been done ('psychomotor epilepsy').

DIAGNOSIS

Diagnosis and investigations in patients with epilepsy include:

- History
- EEG
- Biochemical tests including glucose, calcium estimation
- Liver function tests
- CT and MRI scans to detect unsuspected masses in the brain
- Routine blood picture.

TREATMENT

Treatment of epilepsy includes:

- Phenytoin, carbamazepine (Tagretol) and valproate are effective for most seizure types other than myoclonic and petit mal where valproate is preferred. Chronic use of phenytoin can cause gingival hyperplasia, hypertrichosis, osteomalacia, folate deficiency, polyneuropathy and encephalopathy.

General Measures

General measures of manageent include:

- Children not to cycle on public roads
- Swimming to be avoided by patients
- Working with moving machinery not recommended for epilepsy patients
- Adequate sleep is essential.

During fits, if possible, padded gag (towel, for example) may be placed inbetween the teeth by the on lookers. It should not be forced into the mouth.

DENTAL MANAGEMENT OF THE EPILEPTIC PATIENT

The first step in the management of an epileptic patient is identification of the problem in a dental patient. This is done by way of history or talking to the family members of the patient.

- Ask for type of seizures
- Age at time of onset
- Cause of seizure, if known
- Medications
- Degree of seizure control
- Frequency of last seizure
- Known precipitating factors
- History of seizure-related injuries.

Oral Care

- If a known epilepsy patient is undercontrol, there are no management problems. Routine oral care can be provided
- Patients with poorly controlled seizures need clearance from the physician before commencement of dental treatment. Often modification in medication may be necessary
- Oral care provider should be knowledgeable of adverse affects of anticonvulsant drugs used in epilepsy. Some of these include:
  - Drowsiness
  - Dizziness
  - Gastrointestinal upset
  - Ataxia
  - Allergic reactions such as rash, erythema multiforme.
- Patients on valporic acid (Depakene) or carbamazapine (Tegretol) may show bleeding tendencies because of platelet interference. Pre-treatment assessment of bleeding time is recommended in these patients
- Clinician should be prepared to manage grand mal seizures if they occur in the clinic. This is usually an emergency. Steps taken include:
  - Place a ligated mouth prop (padded tongue blade) at the beginning of the oral procedure (do not attempt this during seizures)
  - Chairback to be in supported supine position
  - Do not move him/her to the clinic floor
  - Clean the area

- Turn this patient to one side in order to avoid aspiration
- Do not hold or restrain the patient forcibly
- After the seizure, examine traumatic injuries, if any
- Discontinue treatment and arrange for transport.

Gingival hyperplasia due to long-term use of phenytoin is common in epileptic patients. Surgical reduction of the hyperplastic tissue is often necessary. Oral hygiene must be maintained at its optimum level.

If teeth are missing, fixed prosthesis is preferable to a removable one. If removable acrylic prosthesis is used, this must be reinforced with wire mesh.

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7 Dental Management of Patients with Parkinson's Disease

LEARNING OBJECTIVES

After studying this chapter the students should be able to:

1. Discuss key clinical features and medical management of Parkinson's Disease.
2. Discuss dental management of patients with Parkinson's disease.

INTRODUCTION

Parkinson's disease (idiopathic or primary parkinsonism, paralysis agitans) is clinically characterized by slow movement (bradykinesia), reduced movement (hypokinesia) rest tremor, rigidity and postural instability.

The disease is a degenerative disorder of the basal ganglia of the brain associated with a lack of dopamine, a neurotransmitter. The cause is usually idiopathic.

Secondary or symptomatic parkinsonism is often due to toxins, drugs, tumours, and punch-drunk syndrome in boxers.

KEY FEATURES

- Persons affected are usually over 40 years of age
- Characteristic rigidity of appearance and movement is seen
  - Face is mask-like

  - Patient walks with short shuffling steps
  - Arms are pressed in the sides and do not swing on walking.
- Tremor:
  - Tremor is common and most marked in the hands
  - Constant rolling movement of the fingers and thumb (pill rolling tremor)
  - Tremor becomes worst when emotionally upset.
- Speech becomes slurred and monotonous
- Intellect is unimpaired
- **Diagnosis** is on clinical basis. There are no specific tests available to confirm the diseases.
- **Management** of Parkinson's disease includes:
  - *L-dopa (Levadopa)* is useful in advanced disease
  - Amantadine is effective in initial stages of the disease.
  - Physiotherapy, occupational therapy and speech therapy are important in advanced disease.
- Prognosis is variable. Life span is not reduced in these patients. Symptoms improve but underlying progression of the disease may continue.

DENTAL MANAGEMENT

- Identification of the patient with Parkinson's disease is not difficult as the characteristic clinical features of the disease are evident
- Patients on *Levodopa* often present orthostatic hypotension. Patient therefore should be carefully assisted from the dental chair and observed for the sings or orthostatic hypotension
- Occasionally, these patients may present with cardiac arrhythmias, chest pain, syncope, palpitations, dizziness, and headaches
- Movement and gait abnormalities being common, dentist should be careful in handling these patients
- Excessive salivation is common in parkinsonism due to increased amounts of acetylcholine in the brain and this can cause oesophageal dysmobility and inadequate swallowing of saliva. *Levodopa* causes xerostomia
- "Mask like" face is due to rigidity of the muscles of facial expression
- Tremors of the lips, tongue and head are common. Any dental treatment therefore should be carefully carried out
- Salivary substitution and topical fluoride treatment are necessary in patients with xerostomia
- Four handed dentistry with suction is important when treating patients with Parkinson's disease

- Positioning of the patient is important to limit muscle rigidity and breathing difficulties. Semi-reclined (45^0) position is recommended
- Appointment should be kept short
- Stressful situations must be avoided or reduced
- Nitrous oxide sedation is useful in reducing stress and prevalence of tremors
- No local anaesthetic restrictions are necessary in patients with Parkinson's disease
- Fixed prosthesis is preferred to removable ones.

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8 Dental Management of Patients with History of Stroke

LEARNING OBJECTIVES

After studying this chapter the students should be able to:

1. Discuss key clinical features and medical management of stroke
2. Discuss dental management of patients with history of stroke.

INTRODUCTION

A stroke is an extremely common disease that results from ischaemic infarction or haemorrhage within the brain. Stroke, also known as cerebrovascular accident (CVA) is uncommon below the age of 40 years and is more common in males. The death rate following a stroke is reported to be around 25 per cent.

KEY FEATURES

Risk Factors

Risk factors of stroke include:

- Advancing age
- Hypertension
- Transient ischaemic attacks (TIAs)
- Diabetes mellitus

- Smoking
- Cardiac abnormalities
- Hyperlipidaemia
- Alcohol abuse
- Long-term use of oral contraceptive pills.

Aetiology

Aetiology of stroke includes:

- Thrombosis
- Embolism
- Hemorrhage
- Vasculitis.

Clinical Features

Clinical features of stroke depend on the causes such as thrombosis, embolism or haemorrhage and the intracranial vessel involved. Among these, stroke due to thrombosis is common.

Strokes can be divided into different groups on clinical basis. They are:

- **Completed stroke** characterized by a rapid onset
- **Stroke-in-evolution** exhibiting gradual step-wise development
- **Transient ischaemic attack** (TIA) in which symptoms resolve completely within 24 hours
- **Progressive diffuse disease** characterized by gradual deterioration in cerebral function leading to multi-infarct dimentia
- Stroke due to thrombosis may take hours or days to develop
- Stroke due to embolism is very sudden
- Stroke due to haemorrhage is fairly sudden.

Symptoms and Signs

Symptoms and signs in majority of the cases are as follows:

- Patient becomes drowsy and lapses into unconsciousness or becomes comatose suddenly
- Breathing becomes deep and noisy
- Pupils are dilated
- Incontinence of urine and faeces is common
- Patients in milder cases (usually due to cerebral thrombosis) become paralytic without loosing consciousness.

- The patient in severe cases may die without regaining consciousness
- If the patient regains consciousness, paralysis and loss of sensation on the opposite side of the body may be present. This is because sensory and motor tracts from the brain cross over to the opposite side of the body on the brainstem
- If the lesion is in the left side of the brain, the language centre may also be involved and aphasia (loss of language ability) may result together with right sided hemiplegia.

Patient in some cases may regain some power of movement and this may be gradual over some weeks.

Investigations

Investigations in stroke include:

- Blood pressure recording (just after the attack of stroke BP rises frequently)
- Liver function test
- Glucose estimation
- Cholesterol estimation
- Full blood count to exclude anaemia, thrombocytopenia
- ESR
- CT scan to rule out other intracranial pathology and to differentiate haemorrhage from infarct
- ECG to rule out cardiac problems
- Angiography
- Coagulation studies, etc.

Management

Management of patients with stroke includes:

- Since hypertension is the major cause of stroke, it must be treated. However too drastic reduction in blood pressure is not advised since it may cause diminished cerebral circulation
- Anticoagulant therapy (warfarin) is useful, if stroke has been caused by an embolus from atrial fibrillation
- Aspirin (300 mg daily) is given to patients with non-haemorrhagic strokes to prevent further vascular events.

Oral Complications

Oral complications in stroke are not uncommon. They include:

- Slurred speech.

- Difficulty in swallowing
- Unilateral paralysis of orofacial musculature
- Loss of sensory stimuli of oral tissues
- Flaccid tongue
- Deviation of tongue on extrusion
- Dysphagia
- Poor oral hygiene
- Patients with right side brain damage may neglect cleaning of left side of their teeth.

DENTAL MANAGEMENT

Identification of the stroke-prone-individual and preventing attacks of stroke are primary responsibilities of the treating dentist.

Steps involved are as follows:

- Identification of risk factors
- Encourage the patient to control risk factors
- Modify dental treatment for those who have had a stroke in the past
  - Provide urgent dental care **only** during first six months
  - Anticoagulant drugs predispose to bleeding problems
  - Use measures that minimize haemorrhage
  - Have haemostatic agents readily available
- Schedule appointments during mid morning
- Keep short appointments
- Monitor blood pressure
- Use minimum amount of anaesthetic with vasoconstrictor (epinephrine 1:100,000 - 1:200,000 is appropriate in most cases).

SR Prabhu

9 Dental Management of Patients with Chronic Renal Failure

LEARNING OBJECTIVES

After studying this chapter the students should be able to:

1. Discuss key clinical features of chronic renal failure.
2. Discuss dental management of patients with chronic renal failure.

Chronic renal failure refers to the gradual permanent loss of renal function leading to uraemia.

KEY FEATURES

Causes

Causes of chronic renal failure include:

- Diabetes
- Pyelonephritis
- Hypertension
- Renal stones
- Bladder outlet obstruction
- Connective tissue disorders
- Polycystic kidneys
- Myeloma
- Hypercalcaemia

There may be few symptoms and signs or patient may be severely-ill.

Symptoms

Symptoms include:

- Nausea, vomiting and diarrhoea
- Drowsiness, twitching
- Elevated blood pressure
- Pulmonary oedema and respiratory infections
- Anaemia
- Pruritus
- Vision may become dim
- Nocturia
- Polyuria
- Peripheral oedema.

Investigations

Investigations include:

- Biochemistry:
  - Increased urea and creatinine
  - Hypercalcaemia
- Hyperphosphataemia
- Hypoproteinaemia

  Radiology may show increase renal size.

Treatment

Treatment is usually sumptomatic and directed towards preventing complications.

- Restoration of protein rich diet
- Salt and water status of the patient needs monitoring
- Potassium containing foods and beverages to be avoided (coffee, chocolate, etc.)
- Hypotensive drugs to check hypertension
- Correction of anaemia: blood transfusion, if necessary
- Long-term dialysis or kidney transplantation.

Dialysis can be peritoneal or haemodialysis. Continuous ambulatory peritonial dialysis (CAPD) is a common procedure which requires an indwelling peritoneal catheter. Patient is taught to run dialysis fluid into the peritoneum where it is left for several hours before being exchanged for clean fluid. Three or four cycles are carried out per day each lasting 20 minutes.

Haemodialysis involves linking the patient's circulatory system up to an artificial kidney machine by inserting two large needles into a special blood vessel which is formed by an operation which anastomoses an artery to a superficial vein. Single haemodialysis takes 4 to 6 hours and has to be repeated 3 times a week. Patients can be taught to dialyse themselves on their own kidney machine at their own home.

Renal transplantation allows patients to return to their normal lifestyle without having to worry about renal dialysis.

DENTAL MANAGEMENT

Consultation with patient's physician is recommended before the start of dental treatment.

- If the patient is under control, routine dental treatment can be provided
- Monitor blood pressure before and during dental treatment
- Carry out pre-treatment screening for bleeding time.

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10 Management of Patients with Facial Paralysis

LEARNING OBJECTIVES

After studying this chapter the student should be able to:

1. Provide a classification of facial paralysis.
2. Know how to take history from a patient with facial paralysis.
3. Know how to examine a patient with facial paralysis.
4. Know the key clinical features of Bell's palsy.
5. Know what investigations are generally carried out in patients with Bell's palsy.
6. Know the treatment modalities available for Bell's palsy.
7. Know the prognosis of treatment for Bell's palsy.

INTRODUCTION

Damage to the seventh cranial nerve (facial nerve) which controles the muscles of facial expression results in facial paralysis. The neurological level of the damage determines the clinical picture. It is important to remember that facial paralysis is a symptom, not a disease.

Facial paralysis may be idiopathic as in Bell's palsy, or may be a part of an underlying disease process, traumatic event or congenital syndrome.

CLASSIFICATION

Facial paralysis is classified on the following basis:

1. **Degree of paralysis**
   - Partial
   - Complete.
2. **Nature of onset**
   - Delayed
   - Immediate
3. **Aetiology**
   - Idiopathic (Bell's palsy)
   - Blunt trauma (surgical, temporal bone fracture)
   - Herpes-zoster infection
   - Tumour invasion (parotid tumours)
   - Infection of the facial nerve (CN VII)
   - Mastoiditis and otitis media
   - Birth trauma: Congenital/birth trauma at delivery
   - Brain lesions: Supranuclear or brainstem lesions
   - Other: Sarcoidosis, polyneuritis, leprosy, etc.

   The commonly followed classification is the one based on aetiology.

HISTORY TAKING

A **detailed history** will reveal the likely cause of the facial paralysis.

History should include:

- The nature of the onset of facial palsy (delayed or immediate)
- The timing of facial paralysis
- Associated otologic findings such as hearing loss, tinnitus, vertigo, itching ears, etc.
- Previous facial nerve paralysis
- Head or ear trauma
- Other cranial nerve disorders
- Associated medical illnesses such as diabetes mellitus, cerebrovascular disease
- Family history of facial paralysis
- Alterations in taste
- Sensitivity to high intensity sounds
- Dryness of the eye

CLINICAL EXAMINATION

Clinical examination includes otolaryngologic, neurologic and oro-facial examinations.

Examination of the Ear

In examining the ear, evidence for middle ear infection or vesicular eruptions in the external ear canal should be looked for.

- In Ramsay Hunt syndrome, for example, vesicular eruptions of herpes-zoster on the external ear will be evident
- In Bell's palsy a reddish line behind the eardrum suggesting primary infection of the facial nerve may be noted.

Examination of the Cranial Nerves

A complete cranial nerve examination is essential.

- This is important because diseases such as multiple sclerosis may involve other cranial nerves; particularly those concerned with extraocular motility
- Acoustic neuromas also may involve the acoustic and trigeminal nerves before involving the facial nerve.

Examination of the Face, Mouth and Oesophagus

The most common (80%) form of facial paralysis is Bell's palsy.

- Bell's palsy is the unilateral absence of motor function of the facial nerve (CN VII) and is characterised by the inability on the part of the patient to wrinkle the forehead, close the eyelids or to smile.
- The facial movements should be assessed on the forehead, around the eyes, cheek and the mouth.
- A parotid tumour may often be palpable in the neck or a lesion of the deep lobe of the parotid may be present in the oropharynx pushing the tonsils medially.

Key Features of Bell's Palsy

These include:

- Drooping corner of the mouth
- Expressionless face during conversation
- Loss of taste
- Inability of the patient to smile, whistle, close eye on the involved side and to wrinkle forehead.

- Neuritis of facial nerve probably due to viral infections (Herpes-zoster/herpes-simplex)
- Prodromal symptoms such as burning sensation near the ear followed by paralysis
- Facial paralysis may accompany vesicular ear eruptions (Ramsay-Hunt syndrome).

Additional tests such as gustometry and lacrimation tests (Schirmer's test) will be required which may help locate the exact site of facial nerve pathology.

In examining the facial nerve itself, attention must be paid to:

- Extent of paralysis
- The peripheral divisions affected (frontal, zygomatic, buccal, mandibular, or cervical)
- Degree of voluntary function loss
- Successive examination of the facial nerve in a patient may demonstrate progressive paralysis.
- If slow progression over several weeks or months is revealed, a neoplasm must be suspected.
- Recurrent paralysis may be a feature of Melkersson-Rosenthal syndrome, sarcoidosis, idiopathic facial paralysis (Bell's palsy) and tumours.
- Immediate facial paralysis without progression in the absence of other symptoms is consistent with idiopathic paralysis (Bell's palsy).
- Facial paralysis of the central type due to cerebrovascular accident (CVA) usually spares the forehead.

In an established facial paralysis, an ophthalmological and otolaryngological opinion must be sought.

Investigations

The following investigations are recommended:

- **Baseline haematology and biochemistry**
- **Imaging:** Plain radiographs of the mid ear structures. MRI to visualize the facial nerve from brainstem to the periphery. CT scans of the facial nerve, internal acoustic canal and of the mastoid bone are useful
- **Audiometry:** Pure tone audiometry (PTA) is used as a diagnostic aid
- **Schirmer's test** for lacrimation
- **Electrophysiology** tests including electromyography and electroneurography
- **Test for salivary flow** is carried out as chorda tympany involvement is known to reduce salivary flow.

Recovery

The degree of recovery is dependent on the extent of nerve damage. A reversible conduction block that results from minor injury to the nerve is reversible and complete recovery within six weeks is usual.

Paralysis due to lesions causing axon degeneration takes longer time (3 to 12 months) to recover.

Treatment

Treatment of facial paralysis depends on its cause.

- If neoplasms are the causative factors they are to be surgically removed. After benign tumour removal, facial function returns to normal in some cases
- Paralysis following temporal bone trauma requires decompression of the nerve
- Paralysis secondary to otitis media requires aggressive treatment of the infection. If it is secondary to chronic otitis media mastoid surgery is recommended
- Virally induced facial paralysis is treated conservatively
- Idiopathic facial paralysis (Bell's palsy) requires the use of steroids and surgical decompression.
- A close follow-up is essential
- About 80 per cent of the patients with Bell's palsy will have full recovery and about 15 to 20 per cent will have partial recovery. Under the latter category patients may show twitching, closure of the eye while attempting to smile (synkinesis) or gustatory tearing ("crocodile tears").

In those with no spontaneous return of function, rehabilitative methods should be employed. These include surgical procedures involving rotation and implantation of innervated adjacent muscle flaps, insertion of a nerve graft, and cross-facial grafting from branches on the normal side to branches of the nerve on the damaged side.

Eye care is an important aspect in the management of facial paralysis patients. Lubricating eyedrops, ointments need to be used in this respect.

SR Prabhu

11 Dental Management of Patients with Gastrointestinal Diseases

LEARNING OBJECTIVES

After studying this chapter the students should be able to:

1. Discuss key clinical features of those gastrointestinal disorders, which have oral implications.
2. Discuss oral manifestations and management of gastrointestinal disorders.

INTRODUCTION

A few gastrointestinal diseases are known to present oral manifestations which often pose diagnostic problems for the clinician. From the patients' point of view also these conditions may be frustrating because of the amount of discomfort and pain they produce.

In this chapter only those conditions of the gastrointestinal system which produce oral manifestations are briefly discussed.

Gastrointestinal disorders of oral significance include:

- Peptic ulcer disease: Gastric and duodenal ulcers
- Inflammatory bowel disease: Ulcerative colitis and Crohn's disease
- Coeliac disease.

PEPTIC ULCER DISEASE

Peptic ulcer is a term used to include both gastric and duodenal ulceration.

Peptic ulcer disease is believed to result from an imbalance in hydrochloric acid production and defensive factors such as mucus production, bicarbonate secretion and mucosal resistance.

Helicobactor pylori is also associated aetiologically with disruption of musocal resistance.

Clinical Features

These include:

Although some patients may be asymptomatic, patients with peptic ulcer disease may present with burning, epigastric pain, gastrointestinal bleeding, obstruction or perforation.

- Patients with duodenal ulcers are more common compared to those with gastric ulcer
- The pain in duodenal ulcer is sometimes referred to as "hunger pain". This is relieved by eating
- In gastric ulcers, on the other hand, pain, is in the epigastric region and aggravated by eating
- Duodenal ulcer pain usually awakens the patient at night
- Pain in gastric ulcer often radiates to the back
- Vomiting blood is sometimes associated with gastric ulcers
- Gastric ulcers are usually single. They lie on the lesser curve of the stomach
- Duodenal ulcers occur in the first half of the duodenum or "duodenal cap"
- Severe bleeding may indicate perforation in gastric ulcers.

Certain foods or drugs are known to aggravate peptic ulcer disease. These include:

- Tobacco use
- Caffeine
- Aspirin containing drugs
- Corticosteroids
- Non-steroidal anti-inflammatory drugs (NSAIDs), such as:
  - Indomethacin
  - Phenylbutazone
  - Ibuprofen
  - Naproxen, etc.

Complications

Complications of peptic ulcers include:

Haemorrhage, perforation, pyloric stenosis and malignant change (only gastric ulcers can show malignant change but not the duodenal ulcers).

Oral manifestations in peptic ulcer disease may include dental erosion due to regurgitation of gastric contents in pyloric stenosis.

Diagnosis: Laboratory Findings

- Endoscopy
- Double contrast barium radiographs
- Lab tests for *H. pylori* [an anaerobe]
- A biopsy to rule out malignancy.

Treatment

- Pain relief: antacids such as magnesium trisilicate or aluminium hydroxide
- Drugs to heal ulceration include: ranitidine (Zantac) and cimetidines (Tagamet). These agents block the production of acid in the stomach

  Sucralfate is a new drug that coats the stomach and promotes healing.
- Antimicrobial agent for *H. pylori*
  1. Rx [amoxicillin 500 mg or tetracycline 500 mg × 4 hr daily for 2 weeks].
  2. Metronidazole 250 mg × 3 times daily for 10 to 14 days.
  3. Bismuth subsalicylate [Pepto-Bismol] 2 tabs four times daily for 2 weeks.

Patients with active bleeding are treated endoscopically by heat or laser cauterisation. Some may require surgical intervention. Excision of the vagus nerves from the gastric fundus yields good results and reduce recurrences.

General Considerations

General considerations include:

- Meals to be taken at regular intervals
- Frequent small meals of bland food is advised
- Spicy, fried or those with vinegar may be avoided although these do not seem to reduce acid production
- Alcohol and smoking should be avoided as these do increase acid production in the stomach
- Drugs taken for other conditions such as NSAIDs for arthritis should be discontinued or monitored
- Anxiety or depression should be treated
- Stress should be minimized.

Dental Management

- Dentist should be able to identify intestinal symptoms [good history is essential]
- Rx of drugs: avoid aspirin containing compounds, non-steroidal anti-inflammatory drugs [Acetaminophen] are recommended
  Antibiotics and dietary supplements to be taken 2 hours before or 2 hours after antacids
- If patients are on antacids containing aluminium hydroxide (such as Mylanta, Gelusil, etc.) tetracyclines should not be prescribed because these antacids prohibit adequate absorption of antibiotics
- There is no contraindication for routine dental treatment
- Long-term antibiotics taken for peptic ulcers may sometimes promote oral fungal infections.

INFLAMMATORY BOWEL DISEASE [IBD]

Two gastrointestinal diseases in this group are: (i) ulcerative colitis, and (ii) Crohn's disease. Their sites of involvement and the extent of involvement determine the main differences between the two.

- Ulcerative colitis is limited to the large intestine
- Crohn's disease involves entire wall of the bowel [terminal ileum] and may produce ulcers along any point of the alimentary tract including the mouth.

Key Features of IBD

- Both are inflammatory diseases of unknown cause
- Suggested aetiologic factors of IBD include:
  - Allergy
  - Destructive enzymes
  - Bacteria
  - Viruses
  - Psychologic stress
  - Immunologic factors.
- Occurrence of IBD is higher in Jews and White people
- Peak age 20 to 40 years of age
- First degree relatives are at higher-risk [10-fold].

ULCERATIVE COLITIS

Key Features

- Ulcerative coitis is an inflammatory reaction of the large intestine
- Colon dilates due to weakening of its wall
- Carcinoma of the colon is 10 times more likely in these patients than in general population

Symptoms

Symptoms include:

- Diarrhoeal attacks
- Rectal bleeding
- Abdominal cramps
- Dehydration
- Fatigue
- Weight loss
- Frequent fevers are common. Extraintestinal symptoms such as arthritis, erythema nodosum and eye disorders are frequently encountered.

Oral Features

Oral features of ulcerative colitis include:

- Oral ulcers
- Mucosal pustules.

Diagnosis

It is based on clinical features, colonoscopy, biopsy, intestinal radiographs with air contrast barium enema, stool examinations, electrolyte estimations and haematologic profile.

Treatment

- IBD can be managed but not cured
- Anti-inflammatory drugs are the first line of drugs [e.g. sulfasalazine, corticosteroids]
- Immunosuppressive drugs [e.g. azathioprine] antibiotics and mast cell stabilizers are second line drugs
- Bed rest, nutritional supplements are required.

CROHN'S DISEASE

Crohn's disease is a chronic inflammatory condition that may affect any part of the GI tract from the mouth to the anus, but has a particular tendency to affect the terminal ileum and ascending colon.

Key Features

- Has a peak incidence between 20 and 40 years
- Recurrent diarrhoea is common
- Abdominal pain [right quadrant]
- Anorexia
- Unexplained fever
- Malaise
- Weight loss.

Orofacial Features

Orofacial features of Crohn's disease include:

- Facial and/or labial swelling
- Angular stomatitis
- Linear ulcers
- Mucosal tags or cobblestone appearance
- Gingival hyperplasia
- Melkersson-Rosenthal syndrome [lip swelling, facial palsy, fissured tongue].

Complications

Complications of Crohn's disease include:

- Anaemia
- Clubbing of fingers
- Severe weight loss
- Increased risk of intestinal carcinoma.

Diagnosis

As for ulcerative colitis.

Treatment

As shown for the group of IBDs.

Dental Management

Dental management in IBDs:

- Dental treatment can be provided. Dentist should be able to identify oral manifestations of the disease
- Adrenal crisis during treatment may occur if the patient has stopped steroids recently
- Analgesic selection
- Aspirin and NSAIDs to be avoided.

COELIAC DISEASE (GLUTEN-SENSITIVE ENTEROPATHY)

Coeliac disease is a genetically determined disease characterized by the involvement of jejunum due to hypersensitivity to gluten—a protein from wheat and other cereals.

Clinical Features

Clinical features include:

- Manifestations of malabsorption
- Deficiencies of haematinics [e.g. iron, folate, B_{12}, etc.]
- Oral ulcerations
- Angular cheilitis
- Glossitis and burning mouth
- Dental hypoplasia.

Diagnosis

- Clinical features are suggestive
- Haematology
- Small bowel biopsy.

Treatment

- Haematinics
- Gluten-free diet
- Topical application of steroids for oral lesions.

Dental Management

Dentist should be able to identify oral manifestations of the disease. A thorough history concerning food intake and symptoms provide clues to diagnosis.

There are no contraindications for routine dental treatment. Oral lesions, however, should be treated appropriately.

SR Prabhu

12 Dental Management of Patients with Alcohol Abuse and Liver Cirrhosis

LEARNING OBJECTIVES

After studying this chapter the students should be able to:

1. Discuss key clinical features of alcohol abuse and liver cirrhosis.
2. Discuss dental management of patients with liver cirrhosis.

INTRODUCTION

Alcohol abuse is a serious public health problem in many countries in the world. The economic impact of alcohol abuse and dependence is also alarming. The chronic ingestion of large amounts of elthanol can give rise to a host of health problems. In general these include:

- Periapheral neuropathies
- Cerebellar degeneration
- Dementia
- Oesophagitis
- Gastrititis
- Pacreatitis
- Malignancies of liver and other organs
- Haematopoietic disorders
- Prolonged liver damage leading to cirrhosis.

In several countries cirrhosis forms a leading cause of death among adults.

In this chapter, the discussion will be on general and dental management aspect of liver cirrhosis due to alcohol abuse.

It is not clear as to how much and for how long an individual should abuse alcohol in order to produce cirrhosis of liver. Available data, however, point to the fact that daily consumption of a pint or more of whisky, several quarts of wine or equivalent amount of beer for at last 10 years would be sufficient to produce alcoholic liver cirrhosis.

Some other important aspects include:

- Alcohol is a hepatotoxic drug
- Alcohol has a deleterious effect on neural development, corticotrophin-releasing hormone system, metabolism of neurotransmitters and the function of their receptors. This causes motor and sensory disturbances
- Prolonged abuse of alcohol causes malnutrition particularly folic acid deficiency, anaemia, and decreased immune functions.
- On liver effects of alcohol are expressed by one of the three disease entities:
  - Fatty infiltrate of the liver which is reversible.
  - Alcoholic hepatitis which in some cases may be irreversible and fatal.
  - Liver cirrhosis—an irreversible change characterized by fibrosis and abnormal regeneration of liver architecture. This leads to hepatic failure.

Hepatic failure in turn leads to:

- Malnutrition
- Weight loss
- Protein deficiency
- Urea synthesis impairment
- Glucose metabolism impairment
- Endocrine disturbances
- Encephalopathy
- Renal failure
- Portal hypertension associated with ascites and oesophageal varices
- Jaundice
- Bleeding tendencies due to deficiency of coagulation factors coupled with portal hypertension resulting in epistaxis, gastrointestinal bleeding, ruptured oesophageal varices and ecchymoses
- Increased risk of infections

- Liver and spleen enlargement is a feature of cirrhosis
- Ankle oedema, spider angiomas are also common among these patients
- Alcoholic cirrhosis may remain asymptomatic for many years.

Less specific changes include:

- purpura
- gingival bleeding
- palmar erythema
- parotid gland enlargement.

Laboratory Changes of Alcoholic Liver

Laboratory changes of alcoholic liver include:

- Increased levels of bilirubin
- Raised alkaline phosphatase levels
- Elevated levels of aspartate aminotransferase (AST), alanine aminotransferase (ALT), amylase, uric acid, trighyceride and cholesterol
- Deficiency of coagulation factors
- Elevation of prothombin time (PT) and partial thromboplastin time
- Thrombocytopenia
- Increased bleeding time
- Prolonged thrombin time
- Anaemia
- Leukopeina or leukocytosis.

Medical Treatment of Alcoholic Liver

Medical treatment of alcoholic liver includes identification of the problem and then withdrawal and abstinence from alcohol.

Abrupt withdrawal symptoms include:

- Loss of appetite
- Tachycardia
- Anxiety
- Insomnia
- Delirium tremens (Dts) which include: hallucinations, disorientation and extreme agitation.

High protein, high calorie low sodium and vitamin supplementation are necessary in these periods.

DENTAL MANAGEMENT

Dentists' responsibility rests with identification of the problem by:

- History
- Clinical examination
- Alcohol odour on breath
- Information from relatives.

Referral to a physician to verify history, current status, current medications, laboratory values and to discuss suggestions for management.

Dentist also will request laboratory investigations on:

- Complete blood count with differential count
- AST, ALT
- Bleeding time
- Thrombin time
- Prothrombin time.

Minimize drugs metabolized by the liver. If surgery is needed all precautions to prevent excessive bleeding must be undertaken.

Oral complications of chronic alcoholism include:

- Poor oral hygiene
- Glossitis
- Angular or labial cheilosis
- Candidiasis
- Gingival bleeding
- Oral precancer/cancer
- Petechiae
- Ecchymosis
- Jaundiced mucosa
- Parotid gland enlargement
- Alcohol odour on breath
- Impaired healing
- Bruxism
- Dental attrition
- Xerostomia.

Jeff Hill

13 *Dental Management for HIV-infected Patients*

LEARNING OBJECTIVES

After reading this chapter the student should:

1. Be able to assess the indications for invasive and non-invasive dental procedures to be carried out in HIV-infected patients.
2. Be able to assess the need for antibiotic prophylaxis prior to invasive procedures.

INTRODUCTION

Modifications of the care of patients with HIV disease is similar to that of other medically compromised patients such as uncontrolled diabetes, hypertension and cardiovascular diseases. In HIV patients planning and prioritization of dental treatment are important. These require careful assessment of individual case. In situations such as advanced HIV infection for example, appropriate deviation of treatment from the usual sequence of treatment plan may be necessary. Following issues are briefly discussed in this chapter:

1. Treatment planning.
2. Antibiotic coverage.
3. Bleeding abnormalities.
4. Anaemia.
5. Pain and anxiety control.

6. Preventive treatment.
7. Periodontal disease.
8. Oral surgery.
9. Endodontic procedures.
10. Restorative procedures.
11. Orthodontic considerations.

TREATMENT PLANNING

Treatment planning for HIV-infected patients should proceed in the same manner as that for non-infected persons. Priorities should include:

- Alleviation pain
- Restoration of function
- Prevention of further disease
- Consideration of esthetics.

Each patient must be assessed individually. With antiretroviral therapy, patients can live long, productive lives. Dental treatment for asymptomatic HIV-positive patients therefore requires no special considerations or changes in treatment protocol. However, symptomatic AIDS patients may require alterations in the treatment plan or sequence until the resolution of medical complications allows the patient to continue with a more ideal course of dental treatment.

- With HIV-disease progression and the possibility of changing medical and/or mental status, the patient's ability to attend multiple appointments or to tolerate long, complicated dental procedures may be compromised
- Careful consideration must be given to addressing the patient's immediate needs, especially the elimination of pain and infection
- Special attention should be given to sensitive esthetic issues related to the patient's self-esteem with immediate temporary measures taken, if necessary. Further restoration of function and esthetics may follow with a conservative approach. As the patient's health improves, treatment may become more aggressive as needed.

Antibiotic Coverage

- Routine antibiotic coverage for HIV-positive patients is not recommended. The decision to provide antibiotic coverage should not be based on HIV status, CD4+ cell count or viral load alone
- A thorough past medical history to identify tendencies for infections and complications, along with current laboratory values, is needed to make an informed decision.

- The potential for allergic reactions and drug resistance increases over time with increased usage and may increase with decreased immune function; therefore, the judicious use of antibiotics is warranted
- The decision to use antibiotics or antimicrobials should always be made on an individual case-by-case basis.

Antibiotic prophylaxis is required for patients with the following conditions:

1. Neutropenia (neutrophil count < 500 cells/mm^3) occurs in approximately 10 to 30 per cent of patients with early symptomatic HIV-infection and up to 75 per cent of those with AIDS. Antibiotic prophylaxis is recommended for immunocompromised patients with neutropenia prior to procedures likely to cause bleeding. The standard American Heart Association guideline for the prevention of bacterial endocarditis should be followed. To decrease the oral bacterial load and the risk for transient systemic bacteraemia in neutropenic patients, an antimicrobial mouth-rinse, such as 0.12 per cent chlorhexidine gluconate, may be used 2 to 3 days pre- and post-procedure in severe cases, or immediately prior to emergency and routine procedures.
2. In patients with CD4+ cell counts < 200, prophylactic antibiotics for the prevention of *Pneumocystis pneumonia* and *Mycobacterium avium* complex (MAC) may be instituted by the physician.
3. For those patients who may also require antibiotic prophylaxis prior to dental procedures for the prevention of bacterial endocarditis due to valvular deficiency or for prosthetic joint replacement, an appropriate antibiotic should be selected from an alternate drug class and administered following the American Heart Association guidelines. For example, if a patient with mitral valve prolapse with regurgitation and a CD4+ cell count of 100 is taking azithromycin 1200 mg once weekly for the prevention of MAC, the patient may be given 2 grams of amoxicillin one hour prior to their dental appointment for the prevention of bacterial endocarditis. Immunocompromised patients should always be considered in the "high-risk" category.

BLEEDING ABNORMALITIES

Many HIV-positive patients have bleeding disorders such as thrombocytopenia (platelet counts < 150,000). Approximately 30 to 60 per cent of patients are affected at some time throughout the course of HIV disease.

- For those patients with platelet counts > 60,000, no increased complications with routine treatment are expected. However, with platelets < 60,000, increased bruising and bleeding may be observed. Spontaneous bruising and bleeding may occur when platelet counts drop below 20,000

- In immunocompromised patients with platelets > 60,000 and PT/PTT values no more than 2 times normal, routine procedures, including simple extractions, can be safely performed without increase in postoperative complications
- If the patient's past medical history includes increased bleeding tendencies or platelets are below 60,000, a conservative tooth-by-tooth approach should be taken
- All screening tests for platelet counts should be no more than 1 to 2 days prior to procedure, with same-day values being optimal.

ANAEMIA

Anaemia is a common haematologic abnormality seen in patients with HIV infection, affecting approximately 10 to 20 per cent of patients in early HIV-infection and as many as 85 per cent of those with late-stage AIDS.

- A thorough past medical history, including pertinent laboratory values, is needed to establish a baseline for each patient. In general, with haemoglobin levels > 7 g/dL, no increased complications with routine treatment are expected
- When haemoglobin levels drop below 7 g/dL, conservative tooth-by-tooth treatment is recommended
- If extensive surgical treatment is needed, close consult with the patient's physician to formulate an acceptable strategy for treatment is advised.

PAIN AND ANXIETY CONTROL

HIV-infection is not a contraindication for the use of chemical agents for the control of pain and anxiety in dental patients.

- As with all patients, a thorough review of the past medical history and all current medications, both prescribed and over-the-counter, should be conducted, preferably with an update at each appointment
- Familiarity with the patient's complete medication list and possible drug-drug interactions is essential
- ***Nitrous oxide***
  - The judicious use of nitrous oxide and other short-acting antianxiolytics is acceptable for the temporary relief of the symptoms of anxiety associated with dental procedures
- ***Local anaesthetics***
  - For procedural pain control, there are no contraindications for the use of local topical and injectable anaesthetics with or without epinephrine. However, bleeding abnormalities are

not uncommon in HIV-positive patients; therefore, in patients with increased bleeding tendencies, deep block injections should be avoided in favor of local infiltration, intraligamentary and crestal injections

- ***Non-steroidal anti-inflammatory drugs and non-narcotic and narcotic pain relievers***
  - Non-steroidal anti-inflammatory drugs (NSAIDs), non-narcotic and narcotic pain relievers are acceptable for postoperative pain control. If the patient has an existing narcotic prescription for other pain control issues, consultation with the patient's physician is advised before prescribing additional pain control medications.

PREVENTIVE TREATMENT

Preventive dental treatment is highly stressed early in HIV disease.

- Patients should be introduced to oral healthcare as an integral part of their disease management strategy as soon as possible following an HIV diagnosis
- Establishing and maintaining good oral health helps to ensure that the patient is free of pain and infection, is able to take medications as prescribed and sustain proper nutrition, is able to communicate effectively, and is comfortable with their appearance
- Routine dental prophylaxis, fluoride treatment, sealants and patient education are all essential to an effective preventive programme
- Proper home-care techniques, including daily brushing and flossing to remove plaque and decrease bacterial load, and, where available, the use of over-the-counter fluoride rinses to reduce caries incidence, should be reinforced at each recall appointment
- Asymptomatic patients should be seen for routine cleanings and evaluation at least every 6 months
- For symptomatic patients, or those who are unable to maintain optimal oral hygiene, a more frequent recall interval is indicated and should be appropriate to assure the maintenance of good oral hygiene
- Additionally, oral soft tissue lesions are common throughout the course of HIV infection; therefore, a thorough soft tissue examination should be performed at each recall appointment
- Xerostomia, either drug-induced or salivary gland disease related, is common among HIV-infected patients. "Dry mouth" contributes to an increased caries rate, especially cervical and root caries, and, along with poor oral hygiene, increases the likelihood of developing soft tissue lesions such as ulcers and fungal infections
- Patient counseling should include the importance of meticulous oral hygiene, diet modification, the use of at-home fluoride treatments and sugarless sialogogs

- Smoking, caffeine, alcohol including alcohol-containing mouth rinses, and sugar-sweetened and acidic drinks should be avoided.

PERIODONTAL DISEASE

Many HIV-infected persons suffer from periodontal disease.

- In HIV-positive patients, periodontal disease is often severe, aggressive and difficult to manage.

Management of Necrotizing Ulcerative Periodontitis (NUP)

- The appearance of necrotizing ulcerative periodontitis (NUP) is associated with severe immune deterioration. Patients may experience intense deep-seated pain, spontaneous bleeding, mobile teeth, and faetid breath
- Routine periodontal treatment modalities may need to be modified or intensified to gain control over the rapidly destructive process
- Intervention methods should include immediate gross debridement of all plaque, calculus and necrotic tissue, followed by sulcular lavage with 10 per cent povidone-iodine solution and thorough irrigation with 0.12 per cent chlorhexidine gluconate
- The use of ultrasonic scalers is acceptable if preceded by a minimum 30 second rinse with an antimicrobial solution and proper infection control measures are observed. Frequent follow-up appointments every 1 to 3 days for the debridement of additional affected tissues may be necessary during the first 2 to 3 weeks, depending on patient response
- Stabilisation is closely followed by fine scaling and root planing to further eliminate aetiological factors
- Diligent home care is extremely important and should include an oral antimicrobial rinse twice daily during the initial phase and may be helpful for long-term maintenance as well
- Systemic antibiotics are usually indicated for the first 4 to 5 days
- Pain medication and nutritional supplements may be needed as well. If moderate to severe tooth mobilization is noted, a stint may be fabricated to aid in stabilization of the teeth and protection of the soft tissues, especially while eating, during the healing process. Monthly recall is suggested until the patient's overall periodontal condition has stabilized. Evaluation every 3 to 4 months thereafter is recommended.

Management of Linear Gingival Erythema

Linear gingival erythema (LGE) presents as a distinctive linear band of erythema at the free gingival margin, extending 2 to 3 mm apically. Mild pain and occasional bleeding are often reported.

- LGE can be can be distinguished from conventional gingivitis in its failure to respond to routine plaque control measures and proper home care maintenance
- Also, the affected gingival tissue may appear somewhat "clear" or have a gelatinous quality, with little or no oedema noted
- Thorough prophylaxis and irrigation with 10 per cent povidone-iodine solution should be performed, followed by a 0.12 per cent chlorhexidine gluconate rinse twice daily for 2 weeks
- Frequent follow-ups and a daily maintenance dose of an antimicrobial mouthrinse may be required
- Some studies have associated LGE with intraoral *Candida* infection; therefore, persistent lesions may be treated empirically with an appropriate antifungal medication.

ENDODONTIC PROCEDURES

No substantial evidence exists to suggest that patients should not receive endodontic therapy where indicated based on their HIV status alone. Consideration should be given to the overall health of the patient and the strategic importance of the tooth to the treatment plan.

- In severely immunosuppressed patients, the ability to resolve chronic periapical lesions versus healing time following extraction has not been adequately studied.
- Anecdotal evidence suggests that for symptomatic patients with low CD4+ cell counts, extraction and curettage followed by an appropriate course of antibiotics may provide faster resolution of chronic infection.

ORAL SURGERY

Oral surgical procedures may be safely performed in HIV-seropositive patients following standard protocols. In well-controlled, asymptomatic patients, no increase in postoperative complications and no delay in healing time is expected. Routine antibiotic coverage is not indicated.

- Pre-procedural antimicrobial mouthrinse, especially in patients with poor oral hygiene, may help decrease bacterial load, and thus reduce the risk of systemic bacteraemia, prior to traumatic procedures where bleeding is likely to occur
- Intraoral fungal infections should be cleared prior to procedures likely to cause bleeding to reduce the risk for systemic fungaemia
- For emergency procedures, the use of an antimicrobial pre-procedural rinse is indicated
- An appropriate course of antifungal therapy should be started immediately following
- Severely immunocompromised patients may experience delayed healing, but do not appear to be at greater risk for postoperative complications, including alveolar osteitis and local infections.

However, clinical signs of postoperative infections, such as inflammation and purulence, may be reduced or absent due to the patient's inability to mount a proper immune response

- Postoperative complications observed may be treated on a routine outpatient basis.

RESTORATIVE PROCEDURES

Routine restorative procedures, including operative and fixed and removable prosthodontics, may proceed as per the standard of care.

- Non-restorable (due to extensive caries) and periodontally hopeless teeth should be removed as soon as possible to reduce bacterial and fungal reservoirs
- In severe cases where restorability is questionable, excavation and temporization of large carious lesions, in conjunction with intense periodontal therapy, may be indicated until stabilisation can be achieved
- The employment of immediate temporary or interim prosthesis is acceptable until such time that definitive restorations may be fabricated
- Restoration of proper function is extremely important for HIV-positive patients who must maintain adequate diet and nutrition as part of their comprehensive disease management strategy
- The ability to eat a variety of foods is essential due to the complexities of the absorption and metabolism mechanisms of many antiretroviral medications. Additionally, due to the sometimes overwhelming psychosocial factors associated with HIV disease, special consideration should be given to sensitive esthetic issues relating to the patient's self-esteem.

ORTHODONTIC CONSIDERATIONS

There is no evidence that HIV infection is a contraindication for orthodontic treatment. Asymptomatic HIV-patients respond to orthodontic treatment in the same manner as do non-HIV orthodontic patients. Late-stage AIDS, however, is a primary contraindication for orthodontic treatment.

N Narayana

14 Dental Management in Pregnancy

LEARNING OBJECTIVES

After reading this chapter the students should be able to:

1. Know the physiological changes during pregnancy.
2. Identify pregnancy-induced oral changes.
3. Identify the appropriate trimester to perform various dental procedures.
4. Know indications and contraindications for administration of drugs to a pregnant dental patient.

INTRODUCTION

Dentists often hear "a tooth for every pregnancy" from their pregnant patients. This indeed is a myth. A proper education and management of these patients is therefore a necessity. It is common for a pregnant female to present with unusual dental management problems due to her altered physiologic state, neglect in oral hygiene or postural position during treatment. Teeth related problems could result in a compromised nutritional status to the foetus and therefore needs immediate attention.

PHYSIOLOGIC CHANGES DURING PREGNANCY

Pregnancy results in several physiological changes. Changes occur in the endocrine, cardiovascular, respiratory, urinary, haematologic and the gastrointestinal systems.

- Normal pregnancy lasts approximately 40 weeks
- The process by which the infant is born is called *parturition*
- Female who suspects pregnancy provides a history that she has missed the menstrual period
- Urine test 10 days after the missed period for the presence of human chorionic gonadotrophin (hCG) is suggestive of pregnancy. Measurements of beta-subunits of hCG are sensitive and confirmatory
- The duration of pregnancy is divided into 3 trimesters of 3 months each
- In the first trimester the organ systems are organized and by the fourth month organogenesis is grossly completed
- The first trimester is very critical. During this period serious complications such as spontaneous abortion can occur
- During pregnancy placenta secretes three major hormones; namely estrogen, progesterone and chorionic gonadotrophin. These hormones ensure the viability of the placenta and the foetus
- Cardiovascular changes in pregnancy include increase in cardiac output and gradual increase in the mean blood pressure. This reaches its peak by early part of the second trimester and returns to normal levels on completion of the term. Pregnant female may experience shortness of breath and oedema. Increased heart size and rate with heart murmur is also common in pregnancy
- Respiratory changes in pregnancy include increased metabolic rate with an increase in maternal oxygen uptake by 20 per cent. The elevation of the diaphragm by the foetus reduces functional residual capacity and maternal oxygen reserve
- Haematologically, no actual changes in blood cell mass are seen in pregnancy. An increase in blood volume by up to 40 per cent by the end of pregnancy is common. Iron deficiency anaemia is also a common feature in pregnancy. In addition, an increase in clotting factors leads to a hypercoaguable state
- An increase in the glomerular filtration rate is common in pregnancy
- A decrease in gastric motility is the other common finding in pregnancy.

MONITORING A PREGNANT FEMALE

Her gynaecologist throughout the duration of pregnancy should monitor the pregnant female. Periodic recording of the following is necessary:

1. Weight.
2. Blood pressure.
3. Complete blood count (CBC).

4. Urinalysis.
5. Foetal heart sounds during later stages of pregnancy.

Pregnancy-induced physiological change results in alterations in drug absorption, metabolism and excretion.

- The decrease in plasma proteins results in modification in drug binding. This leads to an altered (increased or decreased) activity of the given drug
- The increased renal filtration rate will increase excretion of antibacterial agents resulting in inadequate dosing
- There may be an increased biotransformation of the drugs in the liver and this may result in decreased availability of the drug
- Decreased gastric motility enhances absorption of hydrophilic drugs that are poorly absorbed normally.

Healthy mother and good foetal care make complications during pregnancy less frequent. Diet and drugs control gestational diabetes and hypertension developed by a pregnant mother during term.

FOETAL CONCERNS

Foetus is susceptible to malformations during the first trimester, as it plays an important role in the formation of organ systems while the remainder of pregnancy is devoted to growth and maturation with diminished chances of malformation. A notable exception to this is the foetal dentition, which is susceptible to staining and enamel hypoplasias due to tetracycline and nutritional deficiencies.

DENTAL MANAGEMENT

Stress Reduction

Stress induced by pregnancy may result in modification in dental treatment. Loss of physical attractiveness and the fear of dental pain are other factors that add to stress. Stress reduction during dental procedures, therefore, is an important aspect of the dental management of a pregnant patient. The first step in prevention of dental diseases is to emphasize the importance of oral hygiene in pregnant patients.

Timing of Dental Treatments

- Dental pain and infection should be treated regardless of the trimesters. If necessary endodontic therapy, incision and drainage or extractions can be carried out

- Routine oral hygiene procedures can be performed during any time of pregnancy
- Avoid elective procedures during the first trimester due to teratogenic concerns but render routine care during the second and first halves of the third trimester
- Avoid undue problems to the mother or the foetus. Main concern is foetal hypoxia, premature labour, abortion and teratogenic effects. Maternal hypoxia may result from hypo or hyperventilation, hypotension or due to vasodilatory drugs. This in turn results in foetal hypoxia
- During the first trimester use of any medications identified as teratogens should be avoided
- Avoid morning appointments during the first trimester due to vomiting/hyperemesis. Patients may be susceptible to vomiting, if any impression material with smell is used
- Additional appointment time should be given in view of the increased frequency of urination during pregnancy.

Use of Amalgam

There is controversy on the use of amalgam restorations in pregnant patients and pregnant dental personnel. Studies have shown that there is negligible risk to pregnant dental personnel who are exposed to higher mercury levels than their patients. It is a good practice to minimize exposure of pregnant patients to mercury. Amalgam fillings should not be removed or routinely placed in pregnant patients, if unavoidable, a rubber dam should be used while placing amalgam fillings.

Positioning

- Placing a pregnant patient on the dental chair during second and third trimesters in a supine position may result in partial obstruction of the vena cava and the aorta resulting in the reduction in the cardiac return and blood pressure. This may result in supine hypotensive syndrome
- Foetal distress without maternal symptoms is a common symptom. This can be prevented by placing the pregnant patient in the left lateral decubitus position, by elevating the right hip 10 to 12 cm, or by manually displacing the uterus to the left
- Short appointments and allowing the patient to change positions frequently during dental appointments are a must.

Medications

- Drugs should be administered with caution during pregnancy though no drugs should be administered during the first 13 weeks. The drugs frequently prescribed by a dentist falls in to category A or B (Table 14.1)

Table 14.1: Drugs classification into categories based on their effect on the foetus by the FDA

A. Controlled studies in humans have failed to demonstrate a risk to the foetus, and the possibility of foetal harm appears remote.
B. Animal studies have not indicated foetal risk and there are no human studies; or animal studies have shown a risk, but controlled human studies have not.
C. Animal studies have shown a risk, but there are no controlled human studies; or no studies are available in humans or animals.
D. Positive evidence of human foetal risk exists, but in certain situations the drug may be used despite its risk.
X. Evidence of foetal abnormalities and or foetal risk exist based on human experience, and the risk outweighs any possible benefit of use during pregnancy.

Adapted from: FDA Drug Bulletin 1982;12:24-5.

- Use of tetracycline, metronidazole, vancomycin, aspirin and other non-steroidal anti-inflammatory medications should be avoided (Table 14.2)

Table 14.2: Drug administration during pregnancy and breast-feeding

Drugs	*FDA category*	*Use during pregnancy*	*Use during nursing*
Local anaesthetics			
Lidocaine	B	Yes	Yes
Prilocaine	B	Yes	Yes
Mepivacaine	C	Use with caution	Yes
Bupivacaine	C	Use with caution	Yes
Procaine	Not assigned	Use with caution	Yes
Analgesics			
Ibuprofen	B	Caution, avoid in second trimester	Yes
Codeine	C	Use with caution	Yes
Hydrocodone	C	Use with caution	—
Oxycodone	C	Use with caution	—
Aspirin	C/D	Caution, avoid in third trimester	Avoid
Acetaminophen	Not assigned	Yes	Yes
Antibiotics			
Penicillins	B	Yes	Yes
Erythromycin	B	Yes, not estolate form	Yes
Cepalosporins	B	Yes	Yes
Clindamycin	Not assigned	Avoid	Yes
Tetracycline	D	Avoid	Avoid
Sedatives/hypnotics			
Barbiturates	D	Avoid	Avoid
Benzodiazepines	D/X	Avoid	Avoid
Nitrous oxide	Not assigned	Best used in second/third trimester for < 35 minutes	Yes

Adapted from: Drug information for the health care professional,vols IA and IB, ed 12, Rockville Md 1992.

- There is a need to consult the patient's obstetrician before prescribing medications especially narcotic analgesics
- The advantage of administering medications to pregnant patients must outweigh the risks
- Antibiotics such as penicillin, cephalosporin, erythromycin and clindamycin are used with no apparent toxic manifestations while streptomycin, chloramphenicol and metronidazole are associated with foetal defects when used during pregnancy. Yellow or brown discoloration of the teeth can be caused due to tetracycline use during the formative phases of the tooth development
- Antifungal agents can be used with no problems
- Analgesics and anti-inflammatory agents: Use of acetaminophen during pregnancy has no adverse effects. Use of non-steroidal anti-inflammatory agents during pregnancy is discouraged, as they may be associated with birth defects and intrauterine foetal death
- Long-term use of narcotics may induce premature delivery, growth retardation and foetal physical dependence
- Codeine use is associated with cleft lip, cleft palate, cardiac defects, chest wall deformities, inguinal hernias, and circulatory deficiencies
- Corticosteroids and a 1 per cent incidence of cleft palate in human beings have been reported when used during pregnancy
- Studies have shown that local and general anaesthetics when administered properly do not cause any apparent problems in pregnancy. Based on animal studies chronic use of N_2O-O_2 inhalation anaesthesia is not recommended during the first trimester as foetal abnormalities and birth defects may occur due to altered DNA metabolism. The guidelines for use of N_2O-O_2 inhalation (Table 14.3) should be followed

Table 14.3: Guidelines for use of N_2O-O_2 in pregnancy

Limit the use of N_2O-O_2 not exceeding 30 minutes
Maintain 50 per cent O_2 flow
Avoid diffusion hypoxia at the end of administration
Avoid repeated and prolonged exposure to nitrous oxide

- Studies indicate that pregnant female dental health workers should not be exposed to nitrous oxide for more than 3 hours per week if proper scavenging equipment to vent exhaled gas is not used
- There is a controversy regarding the use of fluoride supplements during pregnancy but studies have shown that the fluoride supplementation from the third through to the ninth month

of pregnancy was safe. This has been also shown to reduce incidence of caries in 97 per cent of the offspring for up to 10 years

- Thalidomide ingested during the first trimester induces birth defects characterized by short arms and legs.

Radiographs

Oral radiography is one of the controversial areas in the dental management of a pregnant patient. The developing foetus is susceptible to radiation damage particularly during the first trimester.

- The dentist must be aware of all the safety precautions and be able to provide adequate and correct information to the expectant mother
- The safety in oral radiography is at its best with minimal radiation exposure using features such as high-speed films, shielded collimation, filtration, and a lead apron. Therefore, intra-oral X-rays can be taken with no problems to the mother and the foetus
- The maximum permissible radiation dose for a pregnant dental health care worker is 0.005 Gy or 5 millisieverts per year. In addition, standing 6 feet from the tube head, positioning self between 90 and 130 degrees of the beam, and wearing a film badge add to safety of the individual

ORAL FINDINGS IN PREGNANCY

Gingivitis

- Plaque related mild gingivitis to extensive periodontitis is common in pregnancy. This is largely due to exaggerated inflammatory response to local irritants mediated by elevated levels of oestrogen and progesterone
- Gingivitis in pregnancy begins in the marginal and interdental papillae in the first trimester
- Pyogenic granuloma/pregnancy tumour is seen in 1 per cent of expectant mothers. As a sessile or a pedunculated asympotomatic reddish soft tissue mass, pyogenic granuloma is frequently seen on the free gingiva/interdental papilla of the maxillary anterior teeth. Often this lesion causes bleeding. The gingiva may return to normal at parturition and removal of local irritants.

Caries

- An increase in sugar consumption increases the incidence of caries in pregnant patients. Caries can also be attributed to poor diet and lack of oral hygiene
- Regurgitation of acidic stomach contents can result in erosion of the lingual surfaces of maxillary anterior teeth. Patients with history hyperemesis should be instructed not to rinse their mouth

with water following a bout of vomiting as this would spread the acidic contents on many teeth resulting in demineralization of enamel

- A fluoride mouth wash to neutralize the acidity in the mouth is recommended.

Breast-feeding and Dentistry

- It is known that 1 to 2 per cent of maternal drug is excreted in the breast milk. Therefore a prescribing dentist should be aware of possible adverse effects (see Table 14.2)
- There are very few conclusive studies regarding drug dosage and its effect via breast milk
- Anticancer drugs and radioactive pharmaceuticals are to be avoided
- In order to decrease drug concentration in the breast milk it is suggested that the mother takes the drug just before breast-feeding and avoids nursing for 4 hours or more.

NW Johnson

15 Role of Oral Health Care Provider in the Prevention of Oral Cancer

INTRODUCTION

Dentists hold a vital role in the prevention and early detection of oral cancer. This is primarily due to their familiarity with the structures and health of the oral cavity and its associated tissues and to the regularity with which their patients attend for routine examination.

As discussed in chapter on oral cancer, tobacco use and heavy alcohol consumption are important risk factors in the aetiology of oral precancerous and neoplastic lesions. The dentist's role and indeed that of the whole dental team, in helping patients to quit the use of tobacco and moderating alcohol intake is of great importance. Indeed, it is an area of dental practice in which the overlap between oral health and general health can be most keenly emphasized, a feature utilized in many practice-based smoking cessation programmes. The risk of developing oral cancer falls dramatically with the halting of tobacco use, so that by ten years after cessation the patient is at no greater risk than an individual who has never smoked.

Healthy diet can also help guard against oral cancer. Fresh yellow-green fruits and vegetables have been identified as beneficial dietary components in this, as in other connections, as has the supplementation of vitamins A, C and E. Similarly, dietary advice of a general nature can help improve personal as well as oral health with regard to cancer and the other common oral diseases.

Screening and examination are both elements of dental practice routine. These two activities are unquestionably vital ways in which practitioners can help detect individuals with unhealthy

lifestyles, as well as the earliest signs of the disease, permitting the greatest opportunity for successful resolution and preventing the progress to advanced lesions.

PRACTICAL PREVENTION

Approaches to disease prevention are often classified at three levels:

- ***Primary prevention*** is the approach which concentrates on removing risk factors from the community with the intention of minimizing the number of cases of the disease which arise in that community: viz reducing the incidence of disease. If effective at an affordable cost, this is clearly the best approach in terms of both public and personal health gain.
- ***Secondary prevention*** refers to the detection of cases of the disease in question at an early stage in its natural history at which intervention is likely to lead to cure, or to minimize morbidity and reduce eventual mortality. This is the category which encompasses screening. It is a complex area of science and the risks and benefits need careful evaluation in every situation.
- ***Tertiary prevention*** refers to interventions designed to reduce recurrence of disease after treatment, or to minimize the morbidity arising from treatment.

PRIMARY PREVENTION OF ORAL CANCER

In the chapter on oral cancer, the major risk factors for oral cancer have been discussed. Taken together the effects of tobacco use, heavy alcohol consumption and poor diet probably explain over 90 per cent of cases. The preventive approach is therefore clear and dentists, along with all other primary health care professionals, have excellent opportunities to contribute.

Disease prevention or health promotion messages can be directed at whole communities, targeted at sectors of the population such as youth, prepared specifically for defined populations such as employees of a business or factory, or delivered to individual 'clients' such as dental patients. There will be much common ground in the material suitable for these approaches.

Dentist and Tobacco Control

Members of the dental profession can be active in influencing politicians and community leaders to adopt appropriate legislative approaches. All national dental associations are urged to adopt a policy on Tobacco and Health.

Most importantly, dentists can work within their clinical environment to great effect. There is ample evidence that general medical practitioner advice to quit tobacco use is respected by the majority of patients, and several recent studies show that dentists can be equally effective. This is achieved by following the simple scheme of the 5A's.

- **Ask** the patients about their tobacco habits
- **Advise** them on the importance of quitting
- **Agree** with them a quit date
- **Assist** them in achieving this
- **Arrange** follow up.

Dentists have a natural entrée to discussion of tobacco related diseases with their patients because of the oral signs of tobacco use and its influence on many oral diseases and conditions (Table 16.1). Malignant and potentially malignant lesions and conditions have been covered in the chapter on oral cancer. The socially important changes—bad breath and tooth staining—

Table 16.1: Tobacco-induced and associated conditions

Oral cancer

Leukoplakia

- Homogenous leukoplakia
- Non-homogenous leukoplakia (precancer)
- Nodular leukoplakia
- Erythroleukoplakia

Other tobacco-induced oral mucosal conditions

- Snuff dipper's lesion
- Smoker's palate (nicotinic stomatitis)
- Smoker's melanosis

Tobacco-associated effects on the teeth and supporting tissues

- Tooth loss (premature tooth mortality)
- Staining
- Abrasion
- Periodontal diseases:
  - Destructive periodontitis
  - Focal recession
  - Acute necrotising ulcerative gingivitis

Other tobacco-associated oral conditions

- Gingival bleeding
- Calculus
- Halitosis
- Leukoedema
- Chronic hyperplastic candidiasis (candidal leukoplakia)
- Median rhomboid glossitis
- Hairy tongue

Possible association with tobacco

- Oral clefts
- Dental caries
- Dental plaque
- Lichen planus
- Salivary changes
- Taste and smell

are often sufficient to focus dentists and patients alike on the desirability of quitting. Increased severity and extent of periodontal disease, and limitations in response to periodontal treatment, is another important 'hook' for involving an affected patient in tobacco control.

Almost all countries in the world have educational material designed for professionals and health promotion material designed for the public: these should be easily accessed by approaching the appropriate agencies, perhaps starting with your national dental association.

Even in the absence of oral stigmata of tobacco use, dentists should **Ask** and **Advise** in order to prevent new tobacco addicts. This is a particular challenge with young people. Statistics from many western countries show encouraging falls in the proportion of adults smoking, but rises in teenagers.

Surveys of dental practitioner knowledge, attitudes and behaviour towards tobacco control have been conducted in a number of countries with, unsurprisingly, variable results. It is clear that a substantial proportion, usually a majority, of colleagues are inhibited from asking, and reluctant to advise: barriers include uncertainty as to patient response and lack of training in counselling techniques. Educational efforts are thus required for both the public and for the profession in the hope of developing a growing awareness of the appropriateness of dentists addressing these issues. At present it is likely that many practitioners will opt to refer interested dental patients to an individual specialist or group: the AA-R approach (**Ask, Advise, Refer**) rather than the AAAAA approach. Advice leaflets which include telephone numbers and addresses of such resources, should be available in every dental clinic.

Increasingly, dentists are willing to receive training in tobacco control methods. This may involve advice to clients on the use of nicotine replacement to help over the period of withdrawal. As an active substance, nicotine, on a milligram for milligram basis, is ten times more potent than heroin. It has been shown that the use of nicotine skin patches can double the rate of smoking cessation handled through a medical practitioner, from around 5 per cent to around 10 per cent of recruits. This played a role in the comparable 11 per cent quit rate we have recently demonstrated as possible in dental practice.

Nicotine replacement is available as skin patches, chewing gums, nasal sprays or inhalators. Advice on their appropriate use, including dosages and contraindications, are included in the training literature referred to below, and from the manufacturers. In some countries, these products are available over the counter, with detailed instructions: pharmacists can also be consulted by dentist or patient for advice.

Oral Smokeless Tobacco

There is no doubt that the addition of tobacco to areca nuts (betel) quids, consumed by millions in south and south-east Asia, confers a major increase in their carcinogenicity and a habit must be encouraged to quit. Indeed the benefits of doing so are clear.

Omitting tobacco from quids, and washing the mouth wee after use, may be helpful intermediate steps. The tobaccos used in mixtures such as Nass, Niswar or Toombak in North Africa, the Middle East or northern parts of the Indian subcontinent also contain high levels of nitrosamines and are dangerous.

Passive Smoking

Two very recent critical meta-analyses of the world literature from the Wolfson Institute of Preventive Medicine in London and reviews from the USA show conclusively that exposure to environmental tobacco smoke is a major cause of serious illness.

We as members of the health profession, should set an example by not smoking ourselves (seeking help if we are current smokers), and by ensuring that the whole dental team and work environment are smoke free.

Dentists and the Management of Heavy Alcohol Consumption

Dentists are even more inhibited from taking alcohol histories from their patients, but excessive alcohol consumption is a major cause of individual morbidity, mortality and contributes much damage to society. In this respect tobacco and alcohol abuse are much more significant than hard drugs, when measured by outcomes such as person years of life lost or bed days occupied in hospital.

With tact, dentists ought to be able to help their patients see that such questioning is directed at genuine concerns for their general health and that this is relevant to their oral health. Oral and other upper aero-digestive tract cancers, and potentially malignant lesions, are obviously our major concerns as dentists. As explained earlier in this chapter, many epidemiologists believe that the rise in both incidence and mortality of these cancers seen in a number of countries, particularly in Europe, is related to rising alcohol consumption over recent years. Differences in alcohol consumption (particularly amongst those who also smoke) explain most of the increasingly higher rates of oral cancer amongst Blacks, as compared to Whites in the USA.

In addition, alcohol contributes to dental and maxillo-facial injuries, and by secondary effects following liver damage and, often, under-nutrition, compromises periodontal health, wound healing

and resistance to infection. Dentists can often see these facial and intra-oral signs in their patients, and suspicion may be aroused because of patient behaviour.

A policy of **Ask, Advise** ought to be followed by dentists, accepting that **Referral** is probably then wise for patients with suspected alcohol problem.

Dentists and Healthy Eating

Dentists, it is hoped routinely, enquire about the dietary habits of their patients, usually because they are interested in likely cariogenicity. However, adequate (neither under nor over) nutrition is essential to host resistance against all diseases. Cancer is no exception, and the protective role of diets adequate in trace elements, minerals and vitamins (particularly the anti-oxidant or free-radical scavenging vitamins A, C and E) has been emphasized earlier in the chapter.

The advice which we should give to our patients is part of every nation's health promotion guidelines. It is believed that many countries in the developing world have also produced appropriate guidelines taking into consideration the disease burdern and the socio-economic circumstances.

SECONDARY PREVENTION OF ORAL CANCER

Screening for Oral Cancer and Potentially Malignant Lesions

Screening for disease is a very precise science and must follow established principles (Table 15.2). Oral cancer meets some, but not all, of these criteria, and, although there are clear potential advantages (Table 15.3), there are also potential disadvantages (Table 15.4).

Table 15.2: Screening for disease

The basic principles concerning screening are:
- The condition should be an important health problem, whose natural history is understood
- There should be an accepted and proven intervention
- There should be a suitable and accepted diagnostic test
- The cost of screening should be balanced in relation to other health expenditure

Table 15.3. Potential advantages of screening for oral cancer and precancer

- Reduced mortality
- Reduced incidence of invasive cancers
- Improved prognosis for individual patients
- Reduced morbidity for cases treated at early stages
- Identification of high-risk groups and opportunities for intervention
- Reassurance for those screened negative
- Cost savings

Table 15.4: Potential disadvantages of screening for oral cancer and precancer.

- Detection of cases already incurable may increase morbidity for some patients.
- Unnecessary treatment of those potentially malignant lesions which may not have progressed
- Psychological trauma for those with false-positive screen
- Reinforcement of bad habits among some individuals screened negative
- Costs

The rationale for screening for oral cancer is based on the fact that these malignancies are asymptomatic and localized for a period of their natural history and are often preceded by potentially malignant lesions and conditions such as leukoplakia, erythroplakia and submucous fibrosis, described earlier, when they can be detected by simple systematic oral examinations, as described. This is important because habit intervention, dietary intervention and surgical treatment can result in their resolution or elimination.

Population Screening

However, *population screening* for oral cancer cannot be recommended because there is insufficient evidence for its utility or cost effectiveness. Oral cancer screening programmes have been carried out on several hundreds of thousands of individuals in developing countries (mostly Sri Lanka, India and Cuba) and several thousands in developed countries (mostly the USA, UK and Italy) and the evidence from these is reviewed by Warnakulasuriya and Johnson, 1996. In the high incidence parts of the world a substantial proportion of suspicious lesions have been found (ranging from 2 to 16 per cent in south Asia) but compliance of patients to attend follow up was poor. In the west, the yield is substantially lower. For example, the largest study group consisted of over 23,000 adults over age 30, in Minnesota whose mouths were examined by dentists between 1957 and 1972. Although more than 10 per cent of those screened had an oral lesion these were mostly benign: 'precancer' was encountered in 2.9 per cent and cancer in less than 0.1 per cent.

Targeting Screening

Logically, a stronger case can be made for *targeting screening* to at risk populations—in the context of oral cancer perhaps to smokers and heavy drinkers over the age of, say 40. Such individuals can be identified from the records of family medical practitioners, or occupational health records.

Opportunistic Screening

Opportunistic screening, viz. offering a screening test for an unsuspected disorder at a time when a person presents to a doctor—or a dentist or any other suitably trained primary health care

professional for another reason, is rational and cost effective. This is the basis of the screening examination of the oral soft tissues recommended earlier in the chapter. We have the manpower available—ourselves as trained specialists in what constitutes normal and abnormal oral tissues—and it need take only approximately three minutes. This we have a duty to perform. The clinical identification of suspect lesions by visual observation and manual palpation is a skill which can be taught to any primary health care worker—even those with quite basic training such as the medical auxiliaries found in some developing countries.

TERTIARY PREVENTION

Preventing recurrence or further primary cancers and minimizing morbidity

When a patient treated for an oral cancer develops further cancer in the mouth, months or years after apparently successful treatment, it is often not clear whether the new lesion is a recurrence—arising because of incomplete removal of the primary lesion—a second primary lesion, arising in a field of altered mucosa. The concept of *field cancerisation* is that the patient's genetic predisposition, plus the life long accumulation of potentially carcinogenic insults from known and unknown risk factors, renders the patient, and the anatomical area most affected, at increased risk of cancer. This applies whether the second cancer is synchronous with the first, or arises later (metachronous). An alternative view is that a clone of genetically damaged, and therefore 'premalignant' cells migrated in the anatomical area and may give rise to second tumours. Either way, it is clear that with oral cancer the whole of the upper aero-digestive tract can be regarded as the susceptible field. Unsurprisingly, therefore, the risk of a further cancer is high once a patient has been treated for oral cancer, amounting to some 20 per cent of patients over a 5-year period. This is especially so if the tobacco, alcohol and dietary risk factors continue to be present. All of the above primary prevention approaches are, therefore, especially important at this stage, including supplementation with antioxidants such as vitamin A or retinoids.

Further secondary prevention (by screening) is also especially important. Treated patients should be monitored regularly in order to ensure that their mastication, swallowing, speaking, smiling and other functions, their physical appearance and their social integration are as good as the cancer care team can manage, but also to screen for the possibility of new lesions. In this latter respect Toluidine Blue application may have particular utility.

Nowhere is teamwork in cancer care more important than with treated patients, in order to maximize the quality of life for those afflicted and to ensure the best possible quality of death.

This is an abridged version of the monograph entitled "Oral Cancer" (Prof N. W. Johson) published by the FDI World Dental Press Ltd; 7, Carlisle Street London WIV 5RG UK 1999.

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SR Prabhu

16 Drug Interactions in Dentistry

LEARNING OBJECTIVES

After studying this chapter the students should be able to:

1. Discuss important drug interactions of concern to the prescribing dentists.

INTRODUCTION

Dentist often prescribes a drug to a patient who is already on one or more drugs for medical condition and these patients are prone to precipitate drug interactions. Dentists therefore should possess adequate knowledge of relevant drug interactions in dentistry. Fortunately, however, there are not many drugs used in dentistry that cause adverse drug reactions. In this chapter a few drug interactions of dental relevance are considered:

- A drug interaction occurs whenever the diagnostic, preventive, therapeutic or other action of a drug in or on the body is modified by another exogenous chemical (interactant).
- The interactant may be another drug or some other substance in the diet or in the environment that has contacted the body.
- Drugs may interact physically, chemically, or biologically in many ways. Through such interactions, chemical a physical incompatibility may arises during compounding of medications.

Such interactions may enhance, diminish, eliminate, or otherwise modify expected drug actions and effects or produce new ones. The impact of an interaction on patient response may be medically

significant or not depending on its nature and intensity. The effects may be reversible and leave no serious after-effects or irreversible and leave permanent damage. And they may be dose dependent or result from individual susceptibility.

- The risk of an interaction occurring may exist in as many as eight prescriptions out of every 100 prescribed. Patients themselves do not react consistently to some drug interaction. Racial differences may be important.

Some commonly occurring drug interactions are discussed in the following paragraphs (Table 16.1).

ANTIBIOTICS-ORAL CONTRACEPTIVES

- There is evidence suggesting antibiotic used in dentistry can reduce the effectiveness of oral contraceptives resulting in breakthrough ovulation and unplanned pregnancies.
- Oestrogens, which are components of oral contraceptives, are activated in the intestine by bacteria and reabsorbed into the bloodstream as active compound to inhibit ovulation. Antibiotics reduce the bacterial population in the intestine and this may result in less activated oestrogen available to inhibit ovulation.

Antibiotics in this context include:

- Tetracyclines
- Penicillins
- Caphalosporins
- Erythromycins.

If antibiotics are prescribed to oral contraceptive users, it is suggested that the patients be advised to use additional methods of birth control.

TETRACYCLINES-ANTACIDS (CONTAINING DIVALENT OR TRIVALENT IONS)

- Concomitant therapy with a tetracycline and an antacid containing aluminium, calcium, or magnesium can reduce serum concentration and the efficacy of the tetracycline.
- Aluminium, calcium, and magnesium ions can combine with the tetracycline molecule in the gastrointestinal tract to form a larger ionized molecule unable to be absorbed into the bloodstream.
- Foods and dairy products containing calcium will also impair the absorption of tetracyclines. Tetracyclines should be given as far apart as possible from antacids and dairy products.

TETRACYCLINE-PENICILLIN

- Simultaneous tetracycine-penicillin therapy may impair the efficacy of penicillin.

- Penicillin kills bacteria by inhibiting cell wall synthesis. Tetracycline inhibits protein synthesis in bacteria and this action has been shown to antagonize the cell wall inhibiting effect of penicillin.

Tetracycline penicillin combination should never be used to treat oral infections.

ERYTHROMYCIN-PENICILLIN

- Simultaneous erythromycin-penicillin therapy may impair the efficacy of penicillin
- Penicillin kills bacteria by inhibiting cell wall synthesis. Erythromycin inhibits protein synthesis in bacteria and this action may antagonize the cell wall inhibiting effect of penicillin Erythromycin-penicillin combination should not be used to treat oral infections.

ERYTHROMYCIN-THEOPHYLLINE

- Erythromycins interact with theophylline, a bronchodilator, to result in symptoms suggestive of a relative overdose of theophylline. Resulting symptoms are nausea, vomiting, and seizures
- Erythromycin forms complexes with a specific enzyme that metabolizes theophylline and that this complex may explain the impairment of theophylline metabolic inactivation resulting in symptoms of theophylline overdose.

Patients taking theophylline and who may be at increased risk for theophylline toxicity should be given erythromycin with caution and only if there is absolutely no alternative to erythromycin. These patients should be monitored closely.

ERYTHROMYCIN-CARBAMAZEPINE (TEGRETOL®)

- Erythromycin can interact with carbamazepine (Tegretol®), an antiepileptic, to cause increased blood levels resulting in carbamazepine toxicity. Symptoms may include drowsiness, dizziness, nausea, headache, and blurred vision.
- This interaction is suggestive of an inhibition of the hepatic metabolizing enzymes by erythromycin, which normally convert carbamazepine to inactive products.

Patients taking carbamazepine and who may be at increased risk for carbamazepine toxicity should be given erythromycin with caution and only if there is absolutely no alternative to erythromycin. These patients should be monitored closely.

ERYTHROMYCIN-TRIAZOLAM (HACION®)

- Erythromycin can interact with triazolam (Hacion®), a hypnotic type anti-anxiety agent, to cause increased blood levels resulting in triazolam toxicity. Resulting effects may be psychomotor impairment and memory dysfunction.

- This interaction is suggestive of an inhibition of the hepatic metabolizing enzymes by erythromycin, which normally convert triazolam to inactive products.

Patients taking triazolam should be given erythromycin with caution and only if there is absolutely no alternative to erythromycin. These patients should be closely monitored.

IBUPROFEN (MOTRIN®, ADVIL®, NUPRIN®)-ORAL

ANTICOAGULANTS (Coumarins)

- Bleeding may occur when ibuprofen is administered to patients taking coumarin-type anticoagulants
- Inhibition of prostaglandins by ibuprofen results in decreased platelet aggregate and interference with blood clotting, resulting in an enhancement of the anticoagulant effect of coumarins.

It is suggested that ibuprofen (Motrin®, Advil®, Nuprin®) and other dental NSAIDs such as naproxen (Naprosyn®) naproxen sodium (Anaprox®, Aleve®), diflunisal (Dolobid®), flurbiprofen, and ketorolac (Toradol® oral), be used with caution (if at all) in patients taking coumarin-type anticoagulants. Use of other analgesics is preferred.

IBUPROFEN (MOTRIN®, ADVIL®, NUPRIN®)-LITHIUM

- Concurrent administration of ibuprofen with lithium produces symptoms of lithium toxicity including nausea, vomiting, slurred speech, and mental confusion
- Prostaglandins stimulate renal lithium tubular secretion. NSAIDs inhibit prostaglandin-induced renal secretion of lithium, which increases lithium plasma levels and produces symptoms of lithium toxicity.

Extreme caution is necessary in administering NSAIDs to lithium patients; use of analgesics other than NSAIDs is preferred.

ASPIRIN-ORAL ANTICOAGULATNS (Coumarins)

- Aspirin increases the risk of bleeding in patients taking oral anticoagulants
- Small doses of aspirin inhibit platelet function. Larger dozes (>3 g/day) elicit a hypoprothrombinaemic effect
- Aspirin may also displace oral anticoagulants from plasma protein binding sites. These actions of aspirin all contribute to increase the risk of bleeding in patients taking oral anticoagulants

Patients receiving oral anticoagulants should avoid aspirin and aspirin-containing products.

ASPIRIN-PROBENECID (BENEMID®)

- Aspirin inhibits the uricosuric action of probenecid
- Mechanism of interaction is unknown
- The inhibition of probenecid-induced uricosuria by aspirin is dose-dependent
- Doses of aspirin of 1 g or less do not appear to affect probenecid uricosuria
- Larger doses, however, appear to consideraly inhibit uricosuria
- Conversely, probenecid appears to inhibit uricosuria following large doses of aspirin
- Aspirin does not interfere with the actions of probenecid to inhibit the renal elimination of penicillins.

It appears prudent to use a nonsalicylate-type analgesic (i.e. acetaminophen or NSAIDs) in patients receiving probenecid as a uricosuric agent (treatment of gouty arthritis).

EPINEPHRINE VASOCONSTRICTOR-TRICYCLIC ANTIDEPRESSANTS

- Use of epinephrine as vasoconstrictor in local anaesthetic injections may cause hypertensive interaction in patients taking tricyclic antidepressants
- Tricyclic antidepressants cause increases of norepinephrine in synaptic areas in the central nervous system and periphery. Epinephrine may add to the effects of noronephrine resulting in vasoconstriction and transient hypertension
- The use of epinephrine in patients taking tricyclic type antidepressants is potentially dangerous. Use minimum amounts of vsoconstrictor with caution in patient on tricyclic antidepressants.

EPINEPHRINE (VASOCONSTRICTOR)

MONOAMINE OXIDASE INHIBITORS

- Use of epinephrine as vasoconstrictor in local anaesthetic injections may cause a hypertensive interaction in patients taking monoamine oxidase inhibitors (MOIs)
- Drugs, which inhibit monoamine oxidase, cause increases in the concentration of endogenous norepinephrine, serotonin, and dopamine in storage sites throughout the central nervous system. Epinephrine may add to the effects of norepinephrine resulting in vasoconstriction and transient hypertension
- There is a potential for unexpected increases in blood pressure when using epinephrine vasoconstrictor in patients taking monoamine oxidase inhibitors. Use vasoconstrictor with caution in these patients.

Table 16.1: Drug interactions of concern to the prescribing dentists

Drugs	*Interacting drugs*	*Possible effects*
Analgesics		
Narcotic analgesics		
Meperidine (Demerol), morphine, codeine	Monoamine oxibase inhibitors (MAO) (especially meperidine (Demerol])	Hypertension and excitation or potension and coma
	Phenothiazines, tricyclic antidepressants, benzodiazepines,	Increased CNS and respiratory depression and increased anticholinergic effect
Propxyphene (Darvon)	antihistamines	
Non-narcotic analgesics		
Salicylates	Orphenadrine (Norflex, Norgesic)	Confusion, anxiety, tremors
Aspirin (in moderate to large with	Coumarin anticoagulants (warfarin	Enhanced anticoagulation
doses)	[Coumadin], dicumarol)	possible bleeding episodes
	Alcohol	Possible bleeding episodes
	Heparin	Impairment of clotting mechanism
	Oral hypoglycemics (e.g. tolbutamide [Orinasel, chlorpropamide] [Diabinesel])	Enhanced hypoglycaemic effect
	Uricosuric agents (e.g. probennecid, [Benemid], phenylbutazone)	Decreased uricosuria
Acetaminophen (Tylenol, Phenaphen)	Corticosteroids	Decreased aspirin levels, possibly increased ulcerogenic effect
	Coumarin anticoagulants	Slight increase in anticoagulation effect
Sedative-Hypnotics		
Barbiturates (Brevital, Seconal, Nembutal, Butisol); nonbarbiturates, e.g. chloral hydrate (Noctec), meprobamate (Equanil, Miltown)	Alcohol, narcotic analgesics, antihistamines, tricyclic antidepressants (TCA), antipsychotic agents, or any CNS-depressant drug	Increased CNS depression, impaired mental and physical performance, increased respiratory depression especially in patients with chronic obstructive pulmonary disease (COPD)
	MAOI	Severe CNS depression
	Coumarin anticoagulants	Decreased anticoagulation effect
	TCA, digitoxin, steroids	Decreased effectiveness of these drugs
	Griseofulvin	Inhibition of oral absorption
	Phenytoin (Dilantin)	Increase, decrease, or not effect on phenytoin activity

Contd...

Contd...

Drugs	*Interacting drugs*	*Possible effects*
Tranquilizers Benzodiazepines (Chlordiazepoxide [Librium], diazepam [Valium]) Ohenothiazines	Alcohol, cimetidine (Tagamet) Phenytoin Alcohol, narcotic analgesics Levodopa, MAOI Antacids Antihypertensives Antihistamines	Increased CNS and respiratory depression Enhanced phenytoin toxicity (slight) Increased CNS and respiratory depression Enhanced parkinsonism symptoms, synergism possible (MAOI) Decreased absorption of phenothiazines Enhanced antihypertensive action, postural hypotension Increased anticholinergic effect, decreased absorption of phenotiazines

NARCOTIC ANALGESICS-CIMETIDINE (Tagamet ®)

- Cimetidine may increase the adverse effects of narcotic analgesics
- The hepatic metabolism of narcotic analgesics to inactive products may be inhibited by cimetidine The central nervous system effects of narcotic analgestics and cimetidine may be additive
- Although the side effects of cimetidine on codeine, hydrocodone, and oxycodone are unknown, it is advised to use caution in prescribing these narcotic analgesics in dental patients taking cimetidine. Ranitidine (Zantac®) is probably less likely to interact with narcotic analgesics.

BENZODIAZEPINES, DIAZEPAM (Valium®)-ALCOHOL

- Alcohol may enhance the adverse psychomotor effects of benzodiazepines such as Valium®. Combined use may result in dangerous inebriation, ataxia and respiratory depression.
- Alcohol and benzodiazepines have additive central nervous system depressant activity. Also, alcohol may increase the gastrointestinal absorption of diazepam leading to symptoms of diazepam overdose.
- Patients receiving benzodiazepines such as diazepam (Valium®) should be warned against consuming any alcohol until the benzodiazepine is cleared from the body. This is usually 48 to 72 hours after the last dose. This interaction has been unpredictable and significant CNS depression and ataxia have occurred with only a single dose of diazepam (5 mg) along with a moderate amount of alcohol.

INTERACTIONS BETWEEN TOBACCO SMOKE AND DRUGS

It has been known for sometime that nearly a dozen drugs interact with tobacco smoke in a clinically significant manner. Drug metabolism in smokers is enhanced by polycyclic hydrocarbons of the tobacco smoke.

- Patients with insulin-dependent diabetes who smoke heavily may require a higher dosage of insulin than non-smokers
- Smoking may lead to reduced theophylline serum concentrations and decreased clinical effect of the drug in asthma
- Smokers may require larger doses of diazepam to achieve sedative effect
- Smokers may require a higher dosage of propoxyphene to achieve analgesic effect.

SR Prabhu

17 Basics of Prescription Writing in Dentistry

LEARNING OBJECTIVES

After studying this chapter the students should be able to:

1. Know basic rules in prescribing drugs.
2. Know how to write a prescription.
3. Know some of the abbreviations used in prescription writing.

INTRODUCTION

Although general dental practitioners do not prescribe a wide variety of drugs, they must possess adequate knowledge of some of the fundamental aspects related to prescribing.

Drugs in dental practice possess chemical names, official (generic) names and the brand (proprietary) names. The pharmacist should understand the 'language' of the clinician and it is important that the prescription is legible.

Authorizing a pharmacist in writing to supply a patient with a specified drug regime is called a prescription.

There are a number of universally accepted rules in prescribing drugs. These include:

- The script must be in English
- The script is written in ink or typewritten.

- The script should include:
  - The name address and age of the patient
  - The name, address, status (including license number) and signature of the prescribing practitioner
  - The date on which the prescription was signed.
- Details of treatment such as:
  - Number of days of treatment
  - Name of the drug
  - Format of the drug
  - Strength of the drug
  - Frequency of treatment
  - Special instructions, if any
  - Total amount of medicine to be dispensed.
- When the strength of the drug is written, the use of decimal points should be avoided.
- The use of abbreviations that are in use should be clearly written. Only a few abbreviations should be used in one prescription, as they tend to lead to confusion or error (Table 17.1).
- The main body of the prescription refers to the drug(s) to be prescribed.
- The name of the drug (e.g. Erythromycin tablets) with its strength (250 mg) to be followed by the amount supplied (20 tablets).
- Next comes the instruction to the pharmacist as to what information is to be written on the labelled drug. In this case no abbreviations are allowed (for example "one tablet to be taken four times daily, one hour before food").
- The prescribing practitioner must sign a prescription. If an assistant writes it, the practitioner's name that has employed him/her must be mentioned.

Often dental practitioners keep a stock of drugs in order to give them to their patients. The seller of such drugs keeps a proper record of supply in the prescription register.

The dose of the drug should bear some relationship to body weight. Often age related dosage could be worked out as follows:

Age	*Percentage of adult dose*
Newborn	12
1 year	25
3 years	33
7 years	50
10 years	60
14 years	Adult dose

Table 17.1: Abbreviations used in medical orders

Abbreviation	*From*	*Meaning*
Ac	ante cibum	before meals or food
Ad	ad	to, upto
ad lib	ad libitum	at pleasure
Am	ante meridium	Morning
amp	- - - - - - - - -	Ampule
amt	- - - - - - - - -	Amount
Aq	aqua	Water
aq. dest	aqua destillata	distilled water
ASAP	- - - - - - - - - -	as soon as possible
Bid	bis in die	twice daily
Bp	- - - - - - - - - -	blood pressure
BSA	- - - - - - - - - -	body surface area
C	cong	a gallon
cum	With	
Cal	- - - - - - - - -	Calorie
Cap	capsula	Capsule
Cc	- - - - - - - - -	cubic centimetre
Cm	- - - - - - - - -	Centimetre
comp	compositus	Compound
cont	- - - - - - - - -	Continue
D	dies	Day
d/c	- - - - - - - - -	Discontinue
Dil	dilue	Dilute
disp	dispensa	Dispense
Div	divide	Divide
Dtd	dentur tales doses	give of such a dose
emp	- - - - - - - - -	as directed
Et	et	And
ex aq	- - - - - - - - -	in water
f, ft	fac, flat, fiant	make, let be made
FDA	- - - - - - - - -	Food and Drug Administration
G	gramma	Gram
Gr	granum	Grain
Gtt	gutta	a drop
H	hora	Hour
Hs	hora somni	at bedtime
I.M.	- - - - - - - - -	Intramuscular
I.V.	- - - - - - - - -	Intravenous
kcal	- - - - - - - - -	Kilocalorie
Kg	- - - - - - - - -	Kilogram
L	- - - - - - - - -	liter
Liq	liquor	a liquor, solution
mcg	- - - - - - - - -	Microgram
mEq	- - - - - - - - -	Milliequivalent
Mg	- - - - - - - - -	Milligram
mixt	mixtura	a mixture

Contd...

Table 17.1: Contd...

Abbreviation	*From*	*Meaning*
mL	- - - - - - - - -	Millilitre
Mm	- - - - - - - - -	Millimetre
M	misce	Mix
M. dict	more dictor	as directed
NF	- - - - - - - - -	National Formulary
No	numerus	Number
Noc	nocturnal	in the night
Non rep	non repetatur	do not repeat, no refills
NPO	- - - - - - - - -	nothing by mouth
O, oct	octarium	a pint
pc, post lib	post cibos	after meals
Per	- - - - - - - - -	through or by
PM	post meridium	afternoon or evening
PO	per os	by mouth
PR	per rectum	Rectally
Prn	pro re nata	as needed
pulv	pulvis	a powder
Q	- - - - - - - - -	Every
qad	quique alternatis die	every other day
Qd	- - - - - - - - -	every day
Qh	quiaque	every hour
Qid	quater in die	four times daily
qod	- - - - - - - - -	every other day
Qs	quantum sufficiat	a sufficient quantity
qs ad	- - - - - - - - -	a sufficient quantity to make
Qt	- - - - - - - - -	Quantity
Qv	quam volueris	as much as you wish
Rx	recipe	take, a recipe
Rep	repetatur	let it be repeated
sine	Without	
Sat	sataratus	Saturated
Sc	- - - - - - - - -	Subcutaneous
Sig	signa	label or let it be printed
Sol	solutio	Solution
solv	- - - - - - -	Dissolve
Ss	semis	one-half
Sos	si opus sit	if there is need
stat	statim	at once, immediately
supp	suppositorium	Suppository
Syr	syrupus	Syrup
Tab	tabella	Tablet
Tid	ter in die	three times a day
tr, tinct	tincture	Tincture
Tsp	- - - - - - -	Teaspoonful
Ung	unguentum	Ointment
x3	- - - - - - -	3 times
x4	- - - - - - -	4 times

- For aged patients it is advisable to initiate treatment with doses of little more than half that recommended for younger subjects. In these patients renal clearance may be decreased and liver may have reduced capacity to metabolize drugs
- Care should be exercised in prescribing drugs to pregnant patients because of the possibility of fetal damage. Best option is not to prescribe drugs to these patients unless it is highly essential.

PRESCRIPTION WRITING: SAMPLE

Dentist's Name
Address
Telephone Number
Patient's Name Age: Date:
Patient's Address Sex:

R_x

Name of the drug/dosage size
Disp: Number of tablets/capsules/ounces to be dispensed
(Roman numerals avoided)
Sig: Direction as to how drug is to be taken
Dentist's signature
License number

SR Prabhu

18 *Commonly Used Drugs in Dentistry*

LEARNING OBJECTIVES

After studying this chapter the students should be able to:

1. Discuss relevant aspects of commonly used antibacterial, antiviral and antifungal drugs in dentistry.
2. Discuss relevant aspects of commonly used analgesics and anti-inflammatory drugs used in dentistry.
3. Discuss relevant aspects of drugs used to arrest bleeding.
4. Discuss relevant aspects of agents used for disinfection.
5. Discuss relevant aspects of antihistamines and anxiolytics used in dentistry.

INTRODUCTION

Thirty to forty years ago, the practice of dentistry was drastically different from what it is today. Dental practice was predominantly confined to extractions, restorations and replacement of the lost teeth by dentures. List of drugs a dentist could use or prescribe then included mostly the local anaesthethics, analgesics and antibiotics. Current practice of dentistry is different in many respects. With the increasing number of medically compromised patients seeking dental treatment today, the dentist is expected to possess a wider knowledge of drugs prescribed in medical practice for complaints pertaining to different systems of the body. In addition, the dentist's list of commonly

used and prescribed drugs also has greatly expanded. Dentist today is also expected to be knowledgeable of interactions, and adverse effects of relevant drugs used in dentistry and medical practice.

Against the above background, this chapter will deals with common drugs employed in contemporary dental practice.

DRUGS USED FOR VARIOUS INFECTIONS

ANTIMICROBIAL THERAPY

This includes the use of agents that kill or suppress the growth of microorganisms that cause disease.

The group of antimicrobial agents used in dentistry includes:

- Antibacterial agents
- Antifungal agents and
- Antiviral agents.

ANTIBACTERIAL AGENTS

Penicillin

Penicillin is the drug of choice when the infection is caused by penicillin susceptible organisms.

These infections may include:

- Post-extraction infections
- Post-surgical infections
- Pericoronitis
- Dentoalveolar abscesses
- Osteomyelitis
- Cellulitis
- ANUG
- Periodontitis
- Penicillin inhibits the synthesis of bacterial cell wall and is considered bactericidal.

Dosage of Penicillin

The usual adult dosage is 500 mg every six hours or four times a day, continued for 2 days after the patient becomes asymptomatic. In streptococcal infections, therapy should be continued for 10 full days to guard against the development of rheumatic fever.

Contraindications

- Penicillin is contraindicated in patients who gave history of previous hypersensitivity reaction after using the drug. The use of penicillin may cause acute anaphylaxis, which may prove fatal unless promptly controlled
- If a penicillin allergic reaction develops, emergency drugs such as epinephrine, and antihistamines should be readily available in the clinic for parenteral administration.

Adverse Effects of Penicillin

- Penicillin is among the least toxic drug known, unless present in excessive concentration
- The gastrointestinal and other disturbances may result
- Serious allergic manifestations of penicillin can occasionally be fatal.

Erythromycin

- Erythromycin is an antibiotic whose spectrum against grain-positive organism is similar to that of penicillin V
- It is ineffective against the typical anaerobes such as *Bacteroids* that produce dental infections
- It is available in tablets and capsules, in oral suspensions, and in IV and IM forms.

Activity and Spectrum

- Erythromycin is usually bacteriostatic but may be bactericidal at normal therapeutic doses
- Its spectrum of action closely resembles that of penicillin against grain-positive bacteria
- It is indicated for streptococcal and staphylococcal infections, and for syphilis and gonorrhoea.

Uses of Erythromycin in Dentistry

- Erythromycin is useful in the treatment of the infections caused by aerobic microorganisms
- This is the drug of first choice against aerobic infections in patients with allergy to penicillin
- In certain situations erythromycin is indicated for the prophylaxis of rheumatic heart disease
- The usual adult dose of erythromycin is between 250 and 500 mg four times a day.

For bacterial prophylaxis in patients with a history of rheumatic heart disease (who are allergic to penicillin), the dose of erythromycin is 1 gm 1 hour before the dental appointment followed by 500 mg in 6 hours.

Adverse Reactions

- Erythromycin is remarkably a safe antibiotics and causes relatively few adverse effects

- The usual doses of erythromycin can produce mild adverse-reactions that can include the following:
  Gastrointestinal effects and cholestatic jaundice.
  Allergic reactions to erythromycin are very uncommon.

Drug Interactions

Patients taking theophylline chronically for asthma or acutely for bronchitis may exhibit drug interaction with erythromycin.

Drug interactions can occur with all forms of erythromycin and with all theophylline products.

If patients are taking low doses of theophylline, erythromycin can be safely given. If they are taking high doses of theophylline. an alternative antibiotic should be considered. If neither of these alternatives is feasible, then the dose of theophylline should be decreased by 25 per cent. If symptoms increase, the dosing of theophylline should be done by monitoring blood levels.

Tetracyclines

- The tetracyclines are a group of broad spectrum, bacteriostatic antibiotics that have been employed extensively in the treatment of infections.

Bacterial Resistance

- Bacterial resistance to tetracyclines can develop in a slow, stepwise fashion similar to that occurring with penicillin derivatives
- Resistance appears to be caused by a decreased uptake of tetracyclines and in some cases by active extrusion of drug from the bacterial cells.

Therapeutic Uses in Dentistry

- The usefulness of tetracyclines in the treatment of acute orodental infections is limited
- At best these agents are third-choice antibiotics after the penicillins and erythromycin
- However, tetracycline is a good alternatives to penicillin for patients with acute necrotizing ulcerative gingivitis (ANUG) who require antibiotics therapy
- Tetracycline should not be used as penicillin substitute for prophylaxis against bacterial endocarditis since many of the causative organisms are resistant to this antibiotic.

Toxic Reactions and Side Effects

- Although serious toxicity from tetracycline administration is rare, the most common adverse effect caused by the tetracyclines is gastrointestinal irritation, which for the most part reflects a direct toxic effect of the drugs, and is therefore dose related.

ANTIFUNGAL AGENTS

- Fungal diseases may take the form of superficial infections involving the skin or mucous membranes or systemic (deep) infections involving various internal organs. The mucocutaneous infection caused by *Candida albicans,* the fungus is most commonly observed in oral lesions.

Amphotericin B

- Amphotericin B exerts either fungistatic or fungicide activity depending on the concentration of the drug and the fungus involved
- Peak activity occurs at a pH between 6.0 and Ampotericin B has a broad spectrum of antifungal activity and is effective against *Candida* species.

Uses in Dentistry

- Amphotericin B is applied topically as a 3 per cent cream, ointment or lotion in treatment of superficial *Candida* infections. For intraoral application 2 per cent is useful in the treatment of oral candidiasis.

Adverse Effects

- The adverse effects accompanying the topical or oral administration of amphotericin B are local irritation and mild gastrointestinal disturbances.

Nystatin

- Nystatin is relatively insoluble in water and unstable except as dry powder
- Nystatin is either fungistatic or fungicidal depending on the concentration of the drug pH and the nature of the infecting organism.

Therapeutic Uses in Dentistry

- Nystatin is used to treat candidal infections of the mucosa, skin and intestinal tract
- Topical nystatin remains a drug of choice for the treatment of candidal infections of the oral cavity (oral moniliasis, thrush, denture stomatitis).

Nystatin is used for both the treatment and prevention of oral candiasis in susceptible cases. Although *C. albicans* is a frequent inhabitat of the oral cavity, only under unusual conditions does it produce disease. Frequently, patients affected are immunosuppressed-either because of a particular disease (for example, AIDS) or certain drug treatment (for example, patients receiving chemotherapeutic agents or broad-spectrum antibiotics).

- For the treatment oral candidiasis, nystatin is available in the form of an aqueous suspension that contains 100,000 units/ml and comes in both 60 mL and pint bottles
- The 60 ml bottle contains a dropper that is graduated in 1 and 2 mL intervals

- The adult dose of the suspension is 400,000 units to 600,000 units (4 to 6 mL) four times daily
- One half of the dose should be placed in each side of the mouth and swished for as long as possible before swallowing (at least 2 minutes)
- The oral suspension contains 50 per cent sucrose, which should be considered when using this product in patients who are diabetic
- Another form containing nystatin that is available is the vaginal tablet containing 100,000 units each
- This dosage form is placed in the mouth and allowed to dissolve four times daily
- The vaginal tablet, used orally as a lozenge, allows the drug to be in contact with the infected oral mucosa longer than the aqueous suspension, but it is not flavored because it is not designed for oral use
- The topical cream or ointment contains 100,000 units/gm and may be applied to local lesions or directly to a denture before insertion in the mouth
- Patients should be instructed to use the nystatin product for at least 2 weeks.

Adverse Effect

- Nystatin is well tolerated, and only mild and transient gastrointestinal disturbances, such as nausea, vomiting and diarrhoea may occur
- The major complaint associated with nystatin is its bitter, foul taste.

ANTIVIRAL AGENTS

The search for drugs useful in the treatment of viral infections has posed the greatest problem. This is probably because of the fact that viruses are obligate intracellular organisms that require cooperation from their host's cells. Therefore to kill the virus, often the host's cell must also be harmed.

- This discussion is primarily concerned with acyclovir and interferon but will mention other antiviral agents used in medical practice.

Acyclovir

The most promising antiviral agent currently marketed is acyclovir. Its major disadvantage however is its narrow spectrum of action.

Spectrum

- The antiviral action of acyclovir includes various herpes viruses, including herpes simplex types 1 and 2 (HSV-1 and HSV-2), varicella-zosters, Epstein-Barr viruses, and cytomegalovirus

- Several mechanisms of resistance to acyclovir have been found. Viral mutants have been discovered in immonosuppressed patients receiving repeated treatment with acyclovir
- Acyclovir is not effective in eliminating latent infection.

Uses

- **Topical.** The indications for topical acyclovir include initial herpes genitalis and limited to non-life threatening initial and recurrent mucocutaneous herpes simplex (HSV-1 and HSV-2) infections in immunocompromised patients
- Topical treatment has not been shown to be effective in the treatment of recurrent herpes genitalis or herpes labialis infections in nonimmunocompromised patients. It does not prevent recurrence
- **Oral.** The oral form of acyclovir is indicated in the treatment of initial and recurrent herpes genitalis infections in both immunocompromised and nonimmunocompromised patients. In the treatment of herpes labialis, oral acyclovir's place has yet to be established
- **Injectable.** The parenteral form of acyclovir is used for severe initial herpes genitalis infections in the nonimmunocompromised patient. It is also indicated for treatment of initial and recurrent mucocutaneous herpes simplex infections in the immunocompromised patient. Other conditions include herpes-zoster and varicella infections.

Doses

- The usual oral adult dosage of acyclovir for the treatment of initial genital herpes or for intermittent recurrent episodes is 200 mg every 4 hours daily for 5 days
- Treatment should be started as soon as the prodromal stage is noticed
- The prophylactic dosage for recurrent episodes is 200 mg 3 times daily not to exceed 6 months
- Some patients may need up to 200 mg 5 times daily.

Adverse Reactions

- The type and extent of the adverse reactions experienced depend on the route of administration of acyclovir
- Topical**:** When administered topically, acyclovir produces burning, stinging, or mild pain in about one third of patients
- Itching and skin rash have also been reported
- Oral: One of the most common adverse effects associated with oral acyclovir is headache (13% with chronic use)
- Other CNS effects include vertigo, dizziness, fatigue, insomnia, irritability, and mental depression

- Oral acyclovir also commonly produces gastrointestinal adverse reactions, including nausea, vomiting, and diarrhoea
- Anorexia and a funny taste in the mouth have also been rarely reported
- Other side effects associated with oral acyclovir include acne, accelerated hair loss, arthralgia, fever, menstrual abnormalities, sore throat, lymphadenopathy, thrombophlebitis, oedema, muscle cramps, leg pain, and palpitation
- Parenteral: With parenteral administration, local reactions at the injection site are the most common side effects reported. These include irritation, erythema, pain and phlebitis
- Because acyclovir can precipitate in the renal tubules, it can occasionally affect the serum creatinine levels. This usually occurs in patients who receive IV acyclovir and are dehydrated. Although this effect is generally reversible, some patients may progress to acute renal failure.
- Adequate hydration and urine output must be maintained to minimize this adverse reaction
- Lethargy, tremors, confusion, hallucination, agitation, seizures, and coma have been reported in about 1 per cent of patients given parenteral acyclovir.

Vidarabine

Vidarabine has an antiviral activity in vitro against any DNA viruses and some oncogenic DNA viruses. Topical treatment with vidarabine ointment is useful for keratitis caused by herpes simplex types 1 and 2.

Trifluridine

Trifluridine, an antiviral agent is active against a number of DNA viruses, such as herpes simplex, vaccinia and adenoviruses.

DRUGS USED AS ANAESTHETIC AGENTS

Anaesthetic Agents

Two types of anaesthetic agents are used in dentistry: Local anaesthetic agents and general anaesthetic agents.

Local Anaesthetics

1. Agents act by blocking both sensory and motor conduction to produce a temporary loss of sensation without the loss of consciousness
2. Unlike general anaesthesia, they normally do not cause (CNS) depression.

General Anaesthetics

These act on the CNS or autonomic nervous system to produce analgesia, amnesia or hypnosis. Used alone or in combination with other agents (e.g. pre-anaesthetic medication), an optimum depth of anesthesia may be obtained for a variety of oral surgical procedures.

In dental office, general anaesthesia can be obtained by inhalation or intravenous methods. Inhalation anaesthetics notably include: nitrous oxide oxygen.Intravenous anaesthetics are mostly used for induction of anaesthesia (e.g. thiopental) before administration of more potent anaesthetic agent. However, they can be used alone for some procedures.

THE USE OF LOCAL ANAESTHESIA IN DENTISTRY

LA agents. are administrated **topically** and **parentarally**. Topical agents have different absorption rates from one site of application to another. Injectable LA agents are administrated via local infiltration and nerve block techniques.

Topical LA

- Topical: spray: lidocane (xylocaine®) 10 per cent spray 10 mg/puff
- Pump spray for anaesthesia of mucous membrane
- Ointment: Benzocaine 20 per cent (Topex®) for mucosal anaesthesia.

Injectable LA

Injectable 2 per cent lidocaine (xylocin®) with 1:100,000 epinephrine as a vasoconstrictor. Max. Dose: 4.5 mg/kg 8 cartridges.

- Topical anaesthesia of mucous membrane should be administered to increase patient comfort during the local anaesthetic injection
- Local anaesthesia by nerve block or infiltration is given prior to all operative procedures where pain is expected
- Nerve block may also aid in diagnosis of some pain syndromes
- Topical anaesthesia of mucous membrane maybe used for temporary relief of pain from surface oral lesions

  A sensible approach to the use of local anaesthesia in practice would be as shown:
- Decide upon the maximum amount of local anaesthetic that is safe for the patient before treatment starts and do not exceed this limit at that session. Remember that topical anaesthesia will also contribute to the total dose

- Do not inject the maximum amount before treatment starts. Some must be kept in reserve to allow for failure. About 25 per cent of the maximum dose should be kept in reserve to cope with problems during treatment
- Do not dispose of any cartridges until the treatment is finished—it is easy to lose count of the amount used
- Aspirate before and during injection
- Inject slowly—a rate of 30 seconds per cartridge is a good compromise. Not only does slow injection reduce the chances of major toxicity (the injection can be stopped when minor side effects are obvious) but it can increase efficacy as the injected solution is more likely to remain in the area of interest rather than being flushed into a distant sites.

Adverse Effects of Local Anaesthetics

Though rare the following adverse effects can happen:

1. Allergy
   a. Rash
   b. Itching
   c. Urticaria
   d. Bronchospasm (difficulty in breathing)
   e. Hypotension.
2. Psychogenic reaction
   a. Loss of colour
   b. Dizziness
   c. Rapid pulse
   d. Cold sweat.
3. Vasoconstrictor effects
   a. Palpitation
   b. Talkativeness, elevated blood pressure
   c. Anxiety.
4. Central effects
   a. Nervousness
   b. Excitement
   c. Muscle switching
   d. Tremors
   e. Convulsion.

For information on the management of adverse effects of local anesthesia, the reader is referred to the chapter of Medical Emergencies in Dental Practice.

INHALATION SEDATION

Nitrous Oxide-oxygen

The nitrous oxide-oxygen inhalation may be used in a wide range of dental office procedures offering increased patient cooperation and comfort (see page 140).

Indications for its Use in Dentistry

1. To alleviate dental fear, anxiety, apprehension.
2. Increase pain threshold.
3. Increase tolerance to long appointments.
4. Suppress the gag reflex.
5. Enhance the effect of sedative per medications.

Contraindications

1. Upper respiratory tract infection.
2. Chronic pulmonary disease.
3. Otitis media.
4. Deficient and hysterical behavior.
5. Lack of cooperation, emotional disorder.

Detailed discussion on the subject is beyond the scope of this chapter.

ANALGESICS

Analgesia means "without pain". Drugs that cause analgesia reduce or eliminate the sensation of pain without necessarily altering consciousness.

DRUGS USED TO ALLEVIATE OROFACIAL PAIN

Analgesics can be grouped as:

Non-narcotic analgesics and

Narcotic analgesics.

Narcotic analgesics are rarely used in dentistry. Commonly used analgesics are the non-narcotic analgesics, which include non-steroidal anti-inflammatory drugs (NSAIDs) and acetaminophen. A few of these are briefly discussed here.

ASPIRIN

Aspirin is a salicylate that has demonstrated anti-inflammatory, analgesic, antipyretic, and antirheumatic activity. Aspirin's mode of action as an anti-inflammatory and antirheumatic agent may be due to inhibition of synthesis and release of prostaglandins. Aspirin appears to produce analgesia by virtue of both a peripheral and CNS effect.

Indications and Usage

Aspirin is analgesic, antipyretic, and anti-inflammatory. Aspirin is used for the temporary relief of headache; fever of colds; muscular aches and pains; temporary relief of minor pains of arthritis; toothache, menstrual pain; and pain following dental procedures.

Contraindications

Aspirin should not be used in-patients who have previously exhibited hypersensitivity to aspirin and/or to any of the nonsteroidal anti-inflammatory agents. Aspirin should not be given to patients with a recent history of gastrointestinal bleeding or in-patients with bleeding disorders (e.g. hemophilia).

Dosage and Administration

Usual adult dose: Adults and children 12 years old and over: One or two tablets/caplets with water.

May be repeated every four hours as necessary up to 12 tablets/caplets a day. Do not give to children under 12 unless directed by a doctor.

MEFENAMIC ACID: Ponstan®

Mefenamic acid, is a nonsteroidal anti-inflammatory drug (NSAID) with demonstrated anti-inflammatory, analgesic and antipyretic activity in laboratory animals. Its mode action is not completely understood, but may be related to prostaglandin synthetase inhibition.

Indications

For the relief of pain of moderate severity in conditions such as muscular aches and pains, primary dysmenorrhea, headaches and dental pain.

Contraindications

In patients who have previously exhibited hypersensitivity to mefenamic acid it is contraindicated.

In patients with active ulceration or chronic inflammation of the upper or lower gastrointestinal tract also Mefenamic acid should be avoided.

Dosage

Administration is by the oral route, preferably with food. The recommended regimen in acute pain for adults and children over 14 years of age is 500 mg as an initial dose followed by 250 mg every 6 hours as needed, usually not to exceed 1 week.

IBUPROFEN

Ibuprofen tablets and ibuprofen children's suspension contain ibuprofen which possesses analgesic and antipyretic activities. Its mode of action, like that of other nonsteroidal anti-inflammatory agents, is not completely understood, but may be related to prostaglandin synthetase inhibition.

Ibuprofen may be used in combination with gold salts and/or corticosteroids. It comes in the form of suspension. Ibuprofen suspension in doses of 20 to 50 mg/kg/day divided into 3 or 4 daily doses.

Indications and Usage

- *Tablets:* Ibuprofen tablets are indicated for relief of the signs and symptoms of rheumatoid arthritis and osteoarthritis. Ibuprofen is indicated for relief of mild to moderate pain. Ibuprofen is also indicated for the treatment of primary dysmenorrhea.
- *Suspension:* Ibuprofen children's suspension is indicated for relief of the signs and symptoms of juvenile arthritis, rheumatoid arthritis and osteoarthritis. Ibuprofen children's suspension is indicated for the relief of mild to moderate pain in adults and of primary dysmenorrhea. Ibuprofen children's suspension is also indicated for the reduction of fever in-patients age's 6 months and older.

Contraindications

Ibuprofen tablets or ibuprofen children's suspension should not be used in patients who have previously exhibited hypersensitivity to ibuprofen, or in individuals with all or part of the syndrome of nasal polyps, angioedema, and bronchospastic reactivity to aspirin or other nonsteroidal anti-inflammatory agents. Anaphylactoid reactions have occurred in such patients.

ACETAMINOPHEN

Acetaminophen is not an anti-inflammatory drug but is the first drug of choice as an alternative to aspirin. It is an analgesic and antipyretic. For moderate pain this drug is useful.

Dosage

Tylenol—325 to 600 mg 6 hourly per day.

THE NARCOTIC ANALGESICS

These are also called opiates/opiods.

The group consists of:

- Morphine, and its derivatives such as heroin
- Codein and its derivatives such as dihydrocodein
- Pethidine
- Methadone.

Dental use of these drugs is limited. Since opiates are known to cause dependence on repeated use, their use must be restricted. For severe painful conditions, which are unresponsive to the anti-inflammatory analgesics, the use of narcotic analgesics may be justified. Pethidine is often chosen under these conditions.

ANTI-INFLAMMATORY DRUGS

Anti-inflammatory drugs are among the groups of drugs, which may be either analgesics or co-analgesics (drugs, which are not analgesic in themselves but may aid pain relief either directly or indirectly). The two major groups are ;

- the **non-steroidal anti-inflammatory drugs** (NSAIDs) and
- the **corticosteroids (steroids).**

Examples of NSAIDs used in dentistry include:

- Aspirin
- Acetaminophen
- Ibuprofen
- Indomethacin
- Mefanamic acid
- Naproxan.

Some of the above listed drugs are discussed in the preceding paragraphs.

STEROIDS

Steroids in dentistry can be used in different forms. Topical steroid use is however common for oral mucosal lesions. This can be done in different forms:

Topical Use

a. **Hydrocortisone lozenges** 2.5 mg lozenges dissolved in the mouth.
b. **Triamcinolone acetonide** in carboxymethylcellulose paste 0.1 per cent paste applied in a thin layer. This sticks to dry mucosa and is rapidly rubbed off the palate and tip of tongue.

   Used in the management of recurrent aphthous ulcers, lichen planus, etc. They are low-potency steroids and are unlikely to have any of the systemic side effects of steroids, such as exacerbation of diabetes, osteoporosis, psychosis, etc.
c. **Betamethasone phosphate** tablets prepared as a 0.5 mg soluble tablets (Betnesol) made into a 10 mL mouthwash rinsed or a betamethasone inhaler designed for use in asthma, but can be used to spray on aphthae (1 spray = 100 micrograms). Can be repeated to a maximum of 800 micrograms. Drops are also available.
d. **Hydrocortisone 1 per cent** and **oxytetracycline 3 per cent ointment** or spray (hydrocortisone 50 mg oxytetracycline 150 mg per aerosol unit) is useful treatments for aphthae and related conditions seen in hospital.

Intralesional Steroids

Methylprednisolone acetate 40 mg/mL injection up to 80 mg per month.

Triamincinolone acetonide 2 to 3 mg per week. These are of use in granulomatous cheilitis, intractable lichen planus, and keloid scars.

Intra-articular Steroids

These can be used to induce a chemical arthrosplasty in arthrosis of the TMJ. **Hydrocortisone acetate** 5 to 10 mg single injection.

Systemic Steroids

Main indication is prophylaxis in those with actual or potential adrenocortical suppression. **Hydrocortisone sodium succinate** is used for prophylaxis. Dose:100 mg IM 30 min preoperative.

Occasionally used in erosive lichen planus and severe aphthae, Useful also in Bahcet's syndrome and temporal arteritis.

Prednisolone 30 mg per oral as enteric-coated tablets given with food in reducing dose. Regimen is dependent on the condition treated.

DRUGS USED FOR THE ARREST OF BLEEDING

HAEMOSTATICS

In this group of drugs, precise definitions are especially important. Medical usage differs somewhat from dental usage but a consistent terminology is not applied even within the dental profession.

- **Haemostatics:** Drugs or other agents which arrest the flow of blood by producing a rapid coagulation of the whole blood in close proximity to the lacerated vessels are called haemostatics
- Haemostasis is maintained by interaction of several specific blood clotting factors as well as by vascular contraction and platelet aggregation
- There are two types of serious bleeding a rapid loss of a large amount of blood due to rupture of a vessel, or a continued slow loss that may last for hours
- Haemostatic drugs are not effective against a profuse flow of blood from large vessels; under such conditions mechanical aids such as a compress, haemostatic forceps or a modeling compound splint must be applied, or ligatures should be used.
- Haemostatic drugs may control continued slow bleeding. Surgical packs and sterile gauze sponges held over the area of bleeding, plus the use of hemostatic drugs is the procedure of choice. There are no known drugs for oral administration, which will speed the clotting of blood.

Haemostatics cannot be absorbed or injected into the blood stream without producing coagulation inside the vascular system.

- Although mild to moderate haemorrhage in a haemophiliac can often be controlled by the use of pressure packs, local haemostatic agents or by routine surgical dressings; severe or prolonged haemorrhage in these patients is controlled most effectively by blood transfusion and the use of antihemophilic globulin.

Astringents

Locally acting agents, which cause contraction of tissues by precipitating protein are called astringents. Their principal uses in dentistry are to slow or stop capillary bleeding, reduce inflammation of mucous membranes and displace gingival tissues for taking impressions.

Vasoconstrictors

As their name implies, vasoconstrictors act by constricting or closing the blood vessels. They are employed to a limited extent to control capillary bleeding.

ABSORBABLE HAEMOSTATIC AGENTS

Absorbable Gelatin Sponge (Brand name: Gelfoam)

This is a sterile, absorbable, water-insoluble, gelatin-base sponge

- When absorbable gelatin sponge is implanted in tissues, it serves to promote disruption of platelets and it acts as a framework for fibrin strands
- It is completely absorbed in from 4 to 6 weeks without inducing excessive scar tissue formation or excessive cellular reaction
- It may be used to control capillary bleeding, particularly when moistened with thrombin solution.

OXIDIZED CELLULOSE, (Brand names: Novocell; Oxycel)

Polyanhydroglucuronic Acid

Oxidized cellulose, a chemically modified form of surgical gauze or cotton, exerts a hemostatic effect and possesses the property of absorbability when buried in the tissues.

- Oxidized celluose is of value as an aid in surgery for the control of moderate bleeding under conditions where suturing or ligation is technically impractical or ineffective
- Oxidized gauze is employed as a sutured implant or temporary packing depending on the anatomic site or structures involved
- Oxidized cotton and oxidized gauze are useful as temporary packing for control of alveolar bleeding following tooth extraction
- Neither oxidized gauze nonoxidized cotton should be used for permanent packing or implantation in fractures because they interfere with regeneration of bone; nor should they be used as a surface dressing except for the immediate control of haemorrhage since cellulosic acid inhibits epithelialization.

AGENTS THAT MODIFY BLOOD COAGULATION

Physiologic haemostasis involves the delicate interplay of reflex muscle contraction, the release of a vasoconstrictor agent, extravascular pressure and the interaction of multiple substances which are always present in normal blood. Coagulation, which is one factor involved in haemostasis, occurs only if free thrombin is present. This enzyme is carried in inactive form as prothrombin.

Vitamin K and Related Drugs

Agents with vitamin K activity are considered in this section because they are essential for the synthesis of prothrombin in the liver and consequently bear a relationship to the coagulation of blood.

Hypoprothrombinaemia (lowered level of prothrombin in blood) may result from inadequate available vitamin K because of decreased synthesis by intestinal bacteria, inadequate absorption from the intestinal tract or increased requirement by the liver for the normal synthesis of prothrombin.

Insufficient vitamin K in ingested foods becomes significant only when the synthesis of the vitamin by intestinal bacteria is markedly reduced by the oral administration of such drugs as sulfonamides, streptomycin or broad spectrum antibiotics.

It should be pointed out, however, that the potential role of vitamin K is but one of many complex factors involved in the blood coagulation mechanism. Bleeding problems should not be managed routinely under the umbrella of vitamin K therapy. Rather, an effort should be made to determine the specific coagulation defect and therapy should be directed at the specific coagulation deficiency. Intensive and prolonged salicylate therapy may also produce a hypoprothrombinaemia.

Thrombin

A sterile, protein substance prepared from prothrombin.

- Thrombin is intended for topical application only
- It clots the fibrinogen of the blood directly, requiring no intermediate physiological agent
- It is particularly useful whenever blood is oozing from accessible capillaries and small venules
- Thrombin must **not** be injected
- If injected intravenously or otherwise forced into a vein, it might cause serious or even fatal embolism
- Extensive intravascular thrombosis will occur, and death may result.

Vasoconstrictor for Topical Application

Epinephrine

- This is an effective topical haemostatic agent for capillary bleeding. However, its local application has been questioned because of the possibility of adverse effect caused by systemic absorption. The use of local application of epinephrine solution for homeostasis is limited to superficial bleeding from skin and mucous membrane.
- The practitioner should be aware of the possibility of serious cardiovascular reaction and local damage from ischaemia following application of such concentration.

ANTISEPTICS AND DYSINFECTANTS

- Antiseptics and disinfectants are essential in reducing the numbers of microorganisms on those instruments to which it's impractical or impossible to apply steam (under pressure), dry heat or toxic gases.

- They are useful in reduction of both resident and transient organisms on the practitioner's hand, the patients' skin and mucosa and objects used during routine operating procedures.

Table 18.1: Indications for use of selected antiseptics

Agent	*Indications*
Alcohol	Skin or mucosal antisepsis, solvent and adjuvant for other agents
Chlorhexidine	Skin antisepsis, surgical scrub Mucous membrane, plaque control
Sodium hypochlorite	Root canal irrigation Mucous membrane antiseptics
Povidine iodine	Disclosing solution
Hydrogen peroxide	Tooth bleaching Wound cleansing

- Iodine compounds are probably still the most efficient antiseptics available to modern dentistry.
- Iodine compounds in general are not inhibited by the presence of organic material, are non corrosive and have a very low toxicity. Allergic reactions are rarely encountered.
- These agents stain clothing and skin and especially with the tincture, it may cause skin irritation.

CHLOROHEXIDINE

- Chlorhexidine is highly effective against gram-positive bacteria and ineffective against tubercle bacilli, spores and hepatitis viruses.
- Recently the FDA approved a 0.12 per cent chlorohexidine gluconate solution as an antiplaque/antigingivitis mouthwash.
- Chlorohexidine applied orally in concentration of 0.12 to 1.0 per cent may cause staining of teeth, a bitter taste and occasional swelling of the parotid glands.

Oxidizing agents

Wide varieties of oxidizing agents are available as antiseptics, e.g. 3 per cent hydrogen peroxide. Hydrogen peroxide is a weak antiseptic when applied to tissue. The value of hydrogen peroxide in wound antisepsis is from the effervescent oxygen, which helps loosen trapped debris and bacteria.

MISCELLANEOUS USEFUL DRUGS IN DENTISTRY/ORAL MEDICINE

A number of other drugs are of importance in managing oral and dental disease. These include.

CARBAMAZEPINE

Primarily an antiepileptic drug which is of considerable value in the management of trigeminal and glossopharyngeal neuralgia. Dose: 100 to 200 mg bd can be increased gradually to 200 mg tds/qds. Maximum 1600 mg daily in divided doses. It is important to be sure of your diagnosis before staring patients on long-term carbamezipine.

VITAMINS

Vitamin B complex tablets in a combination of nicotinamide 20 mg pyridoxine 2 mg riboflavin 2 mg, thiamin 5 mg.
Dose: 1 to 2 tablets tds.

ARTIFICIAL SALIVA

A valuable adjunct in the management of xerostomia, especially after radiotherapy and in Sjögren syndrome. It is a slightly viscous, inert fluid which may have a number of additives, such as antimicrobial preservatives, fluoride, flavouring, etc. Useful preparations are **Glandosane** and **Saliva-Orthana,** which are aerosol sprays used as required, usually 4 to 6 times per day.

FLUORIDES

It is important that when using rinses, and particularly gels, that the fluid is not swallowed because of the possible of a risk of toxicity.

ANTIHISTAMINES

Antihistamines are competitive antagonists of histamine. By occupying the histamine receptors, they prevent histamine from reaching its site of action.

They consist of two types**: The** H_1 receptor antagonists and H_2 receptor antagonists.

H_1 RECEPTOR ANTAGONISTS

H_1 receptor antagonists usually referred to as the classical antihistamines, block the action of histamine on H_1 receptor.

H_2 RECEPTOR ANTAGONISTS

H_2 receptor antagonists are reversible competitive antagonists of the action of histamine on H_2 receptor.

Therapeutic Uses

These drugs are most effective in treating diseases of allergy involving the skin and mucosa.

In allergic reactions antihistamines are useful for counteracting the increased capillary permeability especially of the skin and mucosa which produces oedema as well as the itching and pain caused by histamine release.

Effect of Released Histamine

Histamine is found in almost all tissues in the body. It is capable of producing constriction of large veins, dilation of arterioles and increased permeability of venules.

When these vascular effects are systemic, blood pools in the small blood vessels, proteins and fluids are lost from the circulation in to the tissue and oedema and hypotension result. When locally, similar vascular effects will produce red and pale oedematous patches of skin and mucosa.

Dental Uses and Implications

1. Antihistamines such as **promethazine** and **diphenhydramine** that produce prominent sedative effects are used as pre-operative and pre-surgical medications.
2. They cause some inhibition of salivary secretions.
3. They are used to treat allergic reactions of the skin and mucosa that are the result of administering drugs or due to the contact with dental products:
   - Diphenhydramine is an adjunctive drug for treatment of anaphylactic shock.
   - Parenteral diphenhydramine in a 1per cent solution is used in dentistry as a substitute for local anaesthesia when the patient is allergic to both the esters and the amide.

Precautions and Side Effect

Antihistamines Cause

1. Drowsiness. Patient should be cautioned about the dangers of driving a car or working with heavy machinery when using these drugs.
2. Dizziness, fatigue, incoordination and double vision.
3. Nausea and vomiting.

CONTROL OF ANXIETY IN DENTISTRY

The anxiety or even outright fear with which many patients approach dentistry can be pharmacologically reduced or eliminated by a number of different drugs and techniques.

Anxiety is a feeling of apprehension, panic, and fear coupled with and positively reinforced by muscular tension, restlessness, choking, palpitation, and excessive sweating, and in the chronic form, developing into irritability, fatigue, and insomnia. Agents employed in the control of anxiety include a variety of drugs, which have been classified as:

Antianxiety agents include sedatives; hypnotics and nitrous oxide.

ANTI-ANXIETY DRUGS

Anti-anxiety drugs are used to relieve anxiety and to diminish skeletal muscle tone and involuntary movement by actions on the CNS.

The three major chemical groups of antianxiety drugs are as follows:

1. Propanediols
2. Benzodiazepines
3. Azapirode canediones.

Propanediols

Meprobamate is discussed as the representative of propanediols.

Uses and dosage: Meprobamate is widely used for a great variety of anxiety states and as a daytime sedative or nighttime hypnotic. It is used in combination therapy with other muscle-relaxing medication and has been used in dentistry as an antianxiety agent.

In the management of the apprehensive dental patient a dose schedule of 400 mg is given the night before the operative procedure.

It has been used to relieve muscle spasm.

Benzodiazepines

The short-term control of fear and anxiety associated with dental treatment can be reduced by the use of the benzodiazepines. They act as both a muscle relaxant and anxiolytics.

Diazepam has a long half-life and is cumulative on repeated dosing. Like all benzodiazepines, it can cause respiratory depression. Patients therefore should be warned not to drive or operate machinery while on this drug.

Diazepam (Valium): Dose for anxiety/TMPDS: 2 mg tds. max 30 mg in divided daily doses.

Midazolam is a water-soluble benzodiazepine of about double the potency of diazepam. Its main use is in IV sedation.

Nitrazepam. A long-acting hypnotic. This drug tends to cause a hangover effect. Dose: 5 to 10 mg nocte.

Temazepam. Shorter-acting hypnotic. Dose: 10-30 mg nocte. Main indication is pre-op or as pre-medication.

In Hospital Practice

The following may also be prescribed:

Chlordiazepoxide. Sometimes used instead of diazepam in TMPDS. It has the same side-effect profile. Dose: 10 mg tds increased to maximum of 100 mg daily.

Lorazepam. Sometimes used as a pre-medication by anaesthetists. Dose: 2 mg nocte, 2 mg 1 hr preoperatively.

Haloperidol. Very useful in the control of acute psychosis, in a dose of 10 to 30 mg IM. It is less painful and does the same job as chlorpromazine, but it's main problem is extrapyramidal side-effects.

Azapirode Canediones

Buspirone is the only available drug of this group of antianxiety drug.

It lacks hypnotic, anticonvulsant, and muscle relaxant properties.

It has been used to manage anxious dental patient.

SEDATIVE HYPNOTICS

Sedative Drugs

- Sedation is the reduction of cortical excitability, creating calmness, drowsiness, motor in coordination and allowing sleep to occur as a secondary effect.
- Hypnotic drug may be prescribed in the night before an operation to promote sleep.

Examples of sedative hypnotics are:

Barbiturates and non-barbiturates.

Barbiturates

They are the most commonly used sedative-hypnotic drugs in dental practice.

Non-barbiturates offer no advantages over the Barbiturates.

Uses of Sedative Hypnotics

They may be administered shortly before dental procedure to relieve apprehension.

They have antianxiety actions. They are certainly inferior as antianxiety agents to benzodiazepine.

Because the sedation caused by the sedative hypnotic can impair mental and physical skills, a patient taking these agents should be warned against driving a car or operating dangerous equipment.

Premedication with sedative drug before general anesthesia may minimize the occurrence of undesirable side effect.

Adverse Reaction

- In the usual therapeutic doses the barbiturates are relatively safe
- CNS depression may be exaggerated in elderly patients or those with liver or kidney impairment.
- Rashes and nausea may occur
- Although serious allergic reactions are rare, they have been reported.

Nitrous Oxide-oxygen Sedation (see page 127)

Nitrous oxide in concentration too low induce anesthesia can often be given to reduce anxiety and to raise pain threshold. This technique is known as "relative analgesia". It is extremely effective if properly employed and is associated with a high level of patient safety.

Side Effect

- Teratogenic effect, perinatal toxicity and liver damage
- Prolonged exposure (days) may cause bone narrow depression.

Antidepressants

This is another group of drugs, which can be used as coanalgesics. In conditions such as atypical facial pain they may be used as the sole 'analgesic'.

Most commonly used antidepressants are **amitryptiline** (a sedative tricyclic) and Dothiepin.

Amitriptyline

This drug should be used with caution in patients with cardiac disease (as arrhythmias may follow the use of tricyclics) and should be avoided in diabetics, epileptics, and pregnant or breastfeeding women.

Amitriptyline can precipitate glaucoma, enhance the effect of alcohol, and cause drowsiness. Dose: 50 to 75 mg either as a single dose or in divided doses, maximum 150 to 200 mg daily. Children and elderly should receive half-dose.

Dothiepin

This drug has similar properties and unwanted effects to those of amitryptiline. It has, however, been demonstrated to be of value in the treatment of facial arthromyalgia.

Dose: Initially 75 mg nocte, increasing to 150 mg daily, if needed. Half-dose in elderly.

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