

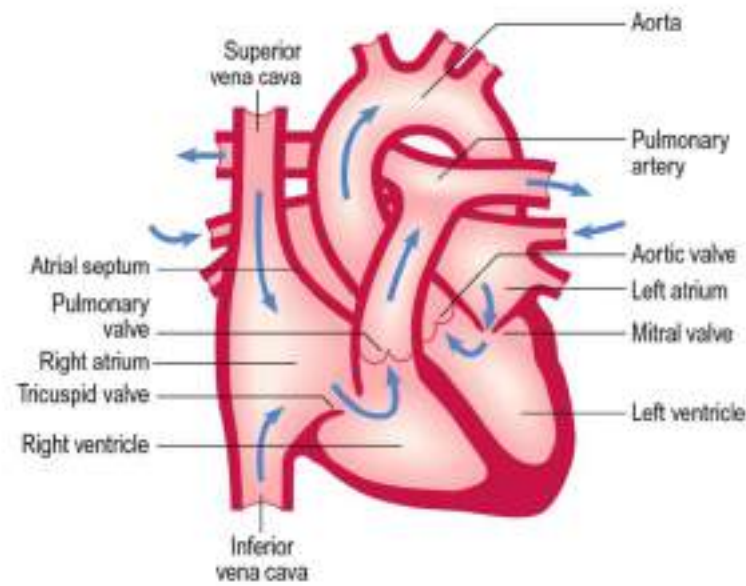
Sri Aurobindo College of Dentistry

Indore, Madhya Pradesh
INDIA



MODULE PLAN

- TOPIC: Oral Manifestations of Cardiovascular Disease
- SUBJECT: OMDR
- TARGET GROUP: UNDERGRADUATE DENTISTRY
- MODE: POWERPOINT – WEBINAR
- PLATFORM: INSTITUTIONAL LMS
- PRESENTER: DR.PRAGYA SANGHI



INTRODUCTION

- Cardiovascular diseases (CVD) comprise of a group of diseases of the heart and vascular system affecting majority of individuals worldwide.
- Ischemic heart disease, Hypertension, Dysrhythmias, and Infective Endocarditis are some of the cardiovascular conditions most commonly seen among the population.
- Co-existent cardiovascular disease is the most frequently cited medical condition for patient referral from general dental practitioners to hospital departments, which reflects widespread concern over potential problems during treatment.
- Dentists must be able to identify medical emergencies and adopt the opportune measures to avoid them or treat them quickly and effectively.

- For many of these patients, a consultation with the patient's primary care physician or cardiologist may be desirable for questions concerning sedation, exercise tolerance, or risks from invasive or stressful dental procedures, or anticoagulation and other medications.
- Oral health care providers also need to be aware of medications that:
 - (1) may have systemic side effects that are of importance to the provision of dental care,
 - (2) interact with medications used for dental care, and
 - (3) cause intraoral changes, such as oral dryness, gingival overgrowth, or ulcerations.
- What follows is an overview of the demographics, diagnosis, medical management, and dental management considerations for the more common cardiovascular conditions seen in dental offices.

TREATMENT OBJECTIVES:

- 1) Important goal of treatment to manage patients with cardiovascular diseases is to deal with all the identified risk factors involved.
- 2) Pre-medication should be considered to alleviate anxiety and effective analgesia is important to reduce stress.
- 3) Early and short morning appointments are advised for all such patients.
- 4) All the patients are allowed to attain a comfortable position in a dental chair.
- 5) Every effort should be made to keep procedure time down to a minimum, and treatment should be terminated early if the patient becomes overly anxious.
- 6) Current medications which the patients are taking and allergies to any drugs and also any potential drug interactions and side effects are noted.

CARDIOVASCULAR DISEASES

DISEASES OF THE HEART

1. CONGENITAL HEART DISEASE

- Congenital heart defects are the most common type of heart problem in children, present in about 1% of live births.
- CHD includes a wide variety of structural defects that can lead to malfunction such as arrhythmias or flow problems.
- Lesions may involve the heart or adjacent great vessels, in isolation or in a variety of combinations.

- The main acquired causes of CHD are maternal infections –
 - ❖ congenital rubella
 - ❖ herpes or cytomegalovirus infection, which can cause patent ductus arteriosus (PDA)
 - ❖ pulmonary stenosis
 - ❖ ventricular septal defect (VSD)
 - ❖ coarctation of the aorta
 - ❖ maternal drug use (e.g. alcohol, anticonvulsants, lithium, recreational drugs, thalidomide and warfarin); or systemic disease.

TYPES OF CONGENITAL HEART DISEASE

CYANOTIC	ACYANOTIC	
	With no shunt	With left to right shunt
Eisenmenger syndrome	Aortic stenosis (AS)	Atrial septal defect (ASD)
Fallot tetralogy	Bicuspid aortic valve	Patent ductus arteriosus (PDA)
Pulmonary atresia (PA)	Coarctation of the aorta	Ventricular septal defect (VSD)
Pulmonary valve stenosis	Dextrocardia	
Total anomalous venous drainage	Mitral valve prolapse	
Transposition of the great vessels		
Tricuspid atresia (TA)		

Tetralogy of Fallot

- The most striking oral observations are seen in this group of children.
- The tetralogy of Fallot is characterized by
 - (a) pulmonary stenosis,
 - (b) enlargement of the right ventricle, :
 - (c) defect in the inter- ventricular septum, and
 - (d) dextroposition of the aorta.

1. **Lips:** The mucous membranes of the lips are purplish-blue in color. The cyanosis is very well marked in patients.

2. **Buccal mucous membranes:** The mucous membranes of the cheeks were dark bluish-red. The membranes had a pronounced wrinkling and this indicates a transient edema.

3. **Gingiva:** Severe marginal gingivitis is present. The gingivae were dark bluish-red and very markedly inflamed. Bleeding is produced on very slight pressure (e.g. mechanical or digital).

4. **Tongue:** The dorsum of the tongue in these patients presents a very bright bluish-red appearance.

- The tongue were deeply fissured and edematous.
- The middle and posterior thirds were heavily coated with a smooth, brownish-white, closely adherent material.
- The fungiform and filiform papillae were markedly raised, very prominent, and extremely reddened.
- The blood vessels on the inferior surface of the tongue were very prominent.
- This tongue has been appropriately called a "chow" tongue.

5. **Floor of mouth and pharyngeal fauces:** Marked cyanosis of both of these structures was noted.

6. **Teeth:** The teeth in such children are found to be normal in size and shape.

- Delay in the eruption time of both the deciduous and permanent teeth is seen.
- There is increase risk of dental caries.
- Dilatation and engorgement of the capillaries in the dental pulp is seen.
- The pre-dentin layer becomes abnormal and the dentine poorly calcified.

7. **X-rays:** Bite wing and periapical x-rays revealed that the alveolar bone and basal bone displayed no appreciable changes.



Cyanotic gingivitis
& stomatitis



Glossitis

Tetralogy of Eisenmenger

- In the tetralogy of Eisenmenger there is less cyanosis and clubbing than in the tetralogy of Fallot. In the Eisenmenger type there is hoarseness, while this symptom is absent in the Fallot type.
- The lips, Cheeks, and buccal mucous membranes were markedly cyanotic, but the cyanosis was less severe than that seen in the Fallot type.
- There was a very severe generalized marginal gingivitis, and the appearance of the gingivae was similar to that seen in the tetralogy of Fallot.
- The tongue presented the same clinical appearance as that seen in the Fallot type.
- Periapical and bite wing x-rays appeared normal.

Transposition of the Great Vessel

- In these cases it is found that the aorta arises from 'the right ventricle and the pulmonary artery from the left.
- The gingivitis was generalized but less severe.
- The lips, cheeks, buccal mucous membranes, floor of the mouth, pharyngeal fauces, and tongue had a similar appearance to that seen in the tetralogy but the cyanosis was less marked.
- X-ray examination reveal no observable defects.

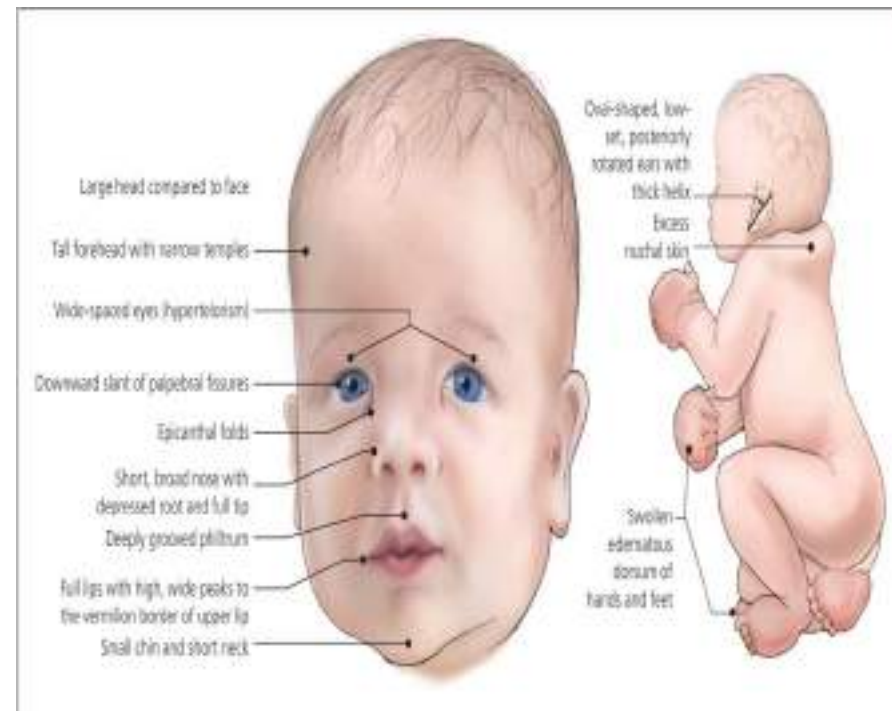
Coarctation of the Aorta

- This condition is characterized by a narrowing of the aorta in the region where it is joined by the ductus arteriosus.
- Clinical examination of such individuals demonstrates that the gingivae of the premaxilla is markedly reddened and inflamed.
- There is no wrinkling and no edema of the mucous membranes present.
- The caries index is normal.
- Periapical x-rays demonstrates the pulps of the incisors (deciduous and permanent) to be markedly enlarged.
- They appear to be funnel-shaped, occupying a great portion of the crown and root of each tooth.
- The pulps of the molar teeth appeared to be normal in size and shape.

Noonan syndrome

- Noonan syndrome, usually an autosomal dominant trait, characterized by short stature, unusual facies, chest deformity, learning disability, cryptorchidism in males and CHD.
- The commonest cardiac lesions are pulmonary stenosis, septal defects and hypertrophic cardiomyopathy.

- **Facial features may include:**
- an elongated mid-face height
- Hypertelorism
- Retrognathia
- a lower nasal bridge and nasal root
- a wider mouth
- a more prominent upper lip and low-set ears.
- Abnormal vision and hearing are common.



- Other associations include hepatosplenomegaly and an abnormal bleeding tendency associated with low levels of clotting factors (particularly XI and XII), and associations with cherubism, jaw giant cell lesions and neurofibromatosis.

DENTAL ASPECTS/MANAGEMENT

- All dental surgery staff should be certified in basic cardiopulmonary resuscitation (CPR), and the entire team should rehearse emergency protocol procedures regularly.
- Patients with heart disease should take their medications as usual on the day of the dental procedure, and should bring all their medications to the dental office for review at the time of the first appointment.
- The most important aspect for dentists to consider is how well the patient's heart condition is compensated.
- Patients with stable heart disease receiving atraumatic treatment under local anesthesia (LA) can receive treatment in the dental surgery.

- Congestive cardiac failure may complicate management.
- In cyanotic CHD there may also be polycythemia-related bleeding tendencies caused by thrombocytopenia, platelet dysfunction, coagulation defects (from liver hypoxia – causing reduced vitamin K-dependent factors), and excessive fibrinolytic activity.
- Thus platelets may be reduced, and the haematocrit, prothrombin time (PT) and activated partial thromboplastin time (APTT) increased. Occasionally there is a thrombotic tendency.
- A special hazard in some types of CHD is the development of cerebral abscess, occasionally due to oral bacteria.
- There may be susceptibility to infective endocarditis.



2. ISCHAEMIC/CORONARY HEART DISEASE

- Atheroma (atherosclerosis; arteriosclerosis) is characterized by the accumulation of cholesterol and lipids in the intima of arterial walls, and can lead to thromboses (clots), which sometimes break off and move within the vessels to lodge in and occlude small vessels (embolism).
- Atheroma can thus lead to IHD with angina, myocardial infarction, cerebrovascular disease and stroke.
- Oral manifestations: If the patient is receiving anticoagulant or antiplatelet treatment, bleeding may occur, manifesting as hematomas, petechiae or gingival bleeding.

- Drugs may affect dental care.
- Angina can rarely cause pain in the mandible, teeth or other oral tissues. Patients with CAD appear to have more severe dental caries and periodontal disease than the general population.
- Whether these infections bear any causative relationship to heart disease remains controversial but periodontal disease could be an independent risk factor, because oral bacteria, inflammatory mediators and endotoxaemia might contribute.

DENTAL ASPECTS

- Stress, anxiety, exertion or pain can provoke angina and, therefore, patients should receive dental care in short, minimally stressful appointments in the late morning.
- Effective painless LA is essential. An aspirating syringe should be used since adrenaline/epinephrine in the LA may enter the blood and may (theoretically) raise the BP and precipitate arrhythmias.
- Adrenaline/epinephrine-containing LA should not be given in excessive doses to patients taking beta-blockers, since the interaction may induce hypertension and cardiovascular complications if excessively large doses are given.

- In dental practice a minimum safety period of 6 months has been established before any oral surgical procedure can be carried out. After this safety period, the treatment decision should be established on the basis of the situation and medical condition of each individual patient. If nitrates are used, the patient should bring them to each visit to the dental clinic, in case chest pain develops.
- In the case of very anxious patients, premedication can be administered to lessen anxiety and stress (5-10 mg of diazepam the night before and 1-2 hours before treatment).
- The patient should be placed in the position most comfortable for him or her (semi-supine), and should get up carefully in order to avoid orthostatic hypotension. Depending on the patient, blood pressure and pulsioxymetric monitoring may be required before and during dental treatment.

- If the patient is receiving anticoagulants, the international normalized ratio (INR) on the day of treatment should be determined, and treatment should be provided within the recommended limits (< 3.5), with local hemostasis if surgery is planned. If the patient is receiving antiplatelet medication, excessive local bleeding is to be controlled.
- The local hemostatic measures that can be used comprise bone wax, sutures, gelatin of animal origin, regenerated oxidized cellulose, collagen, platelet rich plasma, thrombin, fibrin sealants, electric or laser scalpels, antifibrinolytic agents such as tranexamic acid.

3. ANGINA PECTORIS

- Angina pectoris is the name given to episodes of chest pain caused by myocardial ischaemia secondary to CAD. It affects around 1% of adults and its prevalence rises with increasing age.
- The usual underlying causes are atherosclerotic plaques that rupture with resulting platelet activation, adhesion and aggregation, and thrombosis impeding coronary artery blood flow (or, if this is complete occlusion, myocardial infarction). Arterial spasm alone may, rarely, be responsible.
- Features of angina are as follows:

- Chest pain described as a pressure sensation, fullness or squeezing in the mid-portion of the thorax, relieved by rest or glyceryl trinitrate
- Radiation of chest pain into the jaw/teeth, shoulder, arm, and/or back
- Occasionally associated dyspnoea or shortness of breath, epigastric discomfort or sweating

- Angina is a rare cause of pain in the mandible, teeth or other oral tissues, or pharynx.
- Drugs used in the care of patients with angina may cause oral adverse effects such as lichenoid lesions (calcium-channel blockers), gingival swelling (calcium-channel blockers) or ulcers (nicorandil).

DENTAL MANAGEMENT

- Coronary heart disease is very common in the general population, and it is therefore likely that a dentist will meet such a patient in clinical practice.
- Treatment sequence should start with taking complete medical history followed by short morning appointments, premedication with anxiolytics or prophylactic nitroglycerin, nitrous oxide-oxygen sedation, and slow delivery of an anesthetic with epinephrine (1:1,00,000) coupled with aspiration.
- Angina pain is often felt in the mandible, with secondary radiation to the neck and throat.
- Therefore, the patient may initially suspect the pain to be of dental origin. The dental environment increases the likelihood of an angina attack because of fear, anxiety, and pain.

A patient who has an angina episode in the dental chair should receive the following emergency dental treatment:

- Dental procedure is discontinued and Patient is allowed to attain a comfortable position.
- Patient is reassured and restrictive garments are loosened. Patient is encouraged to have his own NTG spray 1 or 2 metered sprays depending on his usual requirement (up to 3 doses of NTG spray can be given in 15 min).
- If angina signs and symptoms do not resolve with this treatment within 2–3 min, administer another dose of nitroglycerin, monitor the patient's vital signs, call his or her physician, and be ready to accompany the patient to emergency department.
- Oxygen is administered 4–6 lit/min. Dental procedure may be restarted if it is the usual type of experience for the patient. If no improvement within 3 min – Myocardial Infarction (MI) is suspected, patient is sent to the hospital.

4. MYOCARDIAL INFARCTION

- Myocardial infarction (coronary thrombosis or heart attack) results from the complete occlusion (blockage) of one or more coronary arteries.
- It arises when atherosclerotic plaques rupture causing platelet activation, adhesion and aggregation with subsequent thrombus formation within the coronary circulation.
- Features of MI are as follows:

- Chest pain described as a pressure sensation, fullness or squeezing in the mid-portion of the thorax
- Radiation of chest pain into the jaw/teeth, shoulder, arm, and/or back
- Associated dyspnoea or shortness of breath
- Associated epigastric discomfort with or without nausea and vomiting
- Associated diaphoresis or sweating
- Syncope or near-syncope without other cause
- Impairment of cognitive function without other cause

DENTAL MANAGEMENT

- A careful medical history with short appointments along with anxiety reduction should be carried out.
- Supplemental Oxygen via a nasal cannula will help meeting the extra oxygen requirements of the Myocardium: 4 lit/min.
- Caution should be taken if more than 3 ml of 2% Lignocaine Hydrochloride with 1:80,000 adrenaline solution is required.
- Drug interactions with potential adverse reactions need to be taken into account after treatment (e.g. interaction between NSAIDs, Penicillin, Tetracycline, Metronidazole, and anticoagulants) because prophylactic antibiotic may need to be considered to prevent infection.

- In patients with pacemakers, electrocautery and the use of cavitron should be avoided.
- Within 6 months, if any urgent invasive treatment is required such as Extractions/RCT, with 6 months of infarction, the treatment should be delivered in a hospital setting where facilities exist should there be another attack of MI.
- After 6 months, myocardial infarction patients can usually be treated using techniques similar to the stable angina patient.

5. ARRHYTHMIAS (DYSRHYTHMIAS)

- A cardiac arrhythmia can be described as an abnormality in rate, regularity, or site of origin of the cardiac impulse.
- Arrhythmias may also arise from cardiac, respiratory, autonomic or endocrine disease, fever, hypoxia or electrolyte disturbances.
- Surgery is sometimes implicated; the trigemino-cardiac reflex (TCR), which may be associated with maxillofacial surgery, consists of bradycardia, hypotension, apnea and gastric hypermotility.
- Central stimulation of the trigeminal can cause reflex bradycardic responses during maxillofacial or ocular surgical procedures or neurosurgery, but some have followed oral or perioral procedures.

Signs and Symptoms

Fluttering chest
sensation



Sweaty



Chest pain (angina)



Lightheaded or dizzy



Short of breath



Tiredness

ORAL FINDINGS:

caries



Periapical abscess



periodontitis



gingivitis



DENTAL MANAGEMENT

- A specific diagnosis of an arrhythmia during a dental appointment necessitates continuous ECG monitoring and good knowledge of interpretation of the abnormalities observed.
- Thus, in the usual dental setting, patient history, symptoms, and palpation of the pulse are the available diagnostic tools.
- The risk of harmful arrhythmias is also increased in patients with cardiomyopathies, heart failure, and valvular problems.
- Such patients should be carefully evaluated by their physician and adequate medication and other measures (such as an implantable cardioverter-defibrillator) should be implemented before extensive dental procedures.

- If a patient with known heart disease develops arrhythmia during treatment, the treatment should be discontinued, supplemental oxygen considered, and the patient status closely monitored.
- If the patient recovers quickly, continuation of treatment may be considered if the patient wishes.
- Even a brief loss of consciousness, however, may indicate significant cardiac arrhythmia, and the patient should be referred to medical evaluation.
- If a patient with heart disease collapses in the chair, cardiac arrest should be suspected and emergency medical services activated immediately and cardiopulmonary resuscitation initiated without delay. These patients are advised to take their medication regularly. Beta-blockers are the preferred drug of choice.

6. INFECTIVE ENDOCARDITIS

- Endocarditis is a life-threatening disease, although it is relatively uncommon.
- Endocarditis usually develops in individuals with underlying structural cardiac defects who develop bacteremia with organisms likely to cause endocarditis.
- Some surgical and dental procedures and instrumentations involving mucosal surfaces or contaminated tissue cause transient bacteremia that rarely persists for more than 15 minutes.
- Blood-borne bacteria may lodge on damaged or abnormal heart valves or on the endocardium or the endothelium near anatomic defects, resulting in bacterial endocarditis or endarteritis.
- *Streptococcus viridans* (α -hemolytic streptococci) is the most common cause of endocarditis following dental or oral procedures.

Patients at highest risk from infective endocarditis

- Prosthetic valves
- Previous infective endocarditis
- Complex cyanotic congenital heart disease – e.g. tetralogy of Fallot, TGA (transposition of great arteries) or Gerbode defect
- Surgically constructed systemic–pulmonary shunts or conduits
- Mitral valve prolapse with regurgitation or thickened leaflets

Fever

New or changing
heart murmurs

Petechiae of the
palpebral conjunctiva,
the buccal and palatal
mucosa, and
extremities

Osler's nodes

Janeway lesions

Splinter
hemorrhages

Roth spots

Splenomegaly
and clubbing of
the digits

DENTAL MANAGEMENT

- Management of patients with infective endocarditis will involve Health questioning which will cover history for all potential categories of risk. If any doubt exists, the patient's physician should be consulted.
- Oral hygiene should be practiced with methods that improve gingival health yet minimize bacteremia. In patients with significant gingival inflammation, oral hygiene is initially limited to gentle procedures.
- Oral irrigators are generally not recommended because their use may induce bacteremia. Susceptible patients should be encouraged to maintain the highest level of oral hygiene once soft tissue inflammation is controlled.
- Severe periodontal disease and areas of periodontal suppuration or dental focus of infection require elimination.

Prophylactic antibiotic protocol for infectious endocarditis, recommended by the American Heart Association (AHA)

SITUATION		AGENT	SINGLE DOSE 30-60 min BEFORE PROCEDURE	
			ADULTS	CHILDREN
Standard general prophylaxis (oral)		Amoxicillin	2gr	50 mg/kg (maximum 2 gr)
Unable to take oral medication		Ampicillin	2 gr im or iv	50 mg/kg im or iv
		Cefazolin or Ceftriaxone	1gr im or iv	50 mg/kg im or iv
Allergic to penicillins	Oral	Cephalexin *	2gr	50 mg/kg
		Clindamycin	600 mg	20 mg/kg
		Azithromycin or Clarithromycin	500 mg	15 mg/kg
	Unable to take oral medication	Cefazolin or Ceftriaxone	1g im or iv	50 mg/kg im or iv
		Clindamycin	600 mg im or iv	20 mg/kg

Pamplona et al, 2011: Dental considerations in patients with heart disease

7. Cardiac pacemakers and implantable cardioverter-defibrillators:

- Automated Implantable Cardioverter Defibrillators (AICDs) or otherwise simply known as Implantable Cardioverter Defibrillators (ICDs) have been in use for more than 30 years.
- An ICD is a small battery powered electrical impulse generator that is implanted in patients who are at a risk of sudden cardiac death due to ventricular fibrillation and ventricular tachycardia.
- In practice, the most common cause of problems is the electrosurgical unit or diathermy.
- Diathermy is best avoided in patients with pacemakers.

- If diathermy must be used, bipolar diathermy is preferred.
- If unipolar diathermy must be used, the ground pad should be placed so that the pacemaker or its leads do not lie within the electric field (between the ground pad and the instrument).
- Thus, it is commonly recommended that if diathermy is to be used, ICD devices should be programmed off immediately prior to surgery and on again postoperatively.

Oral health care equipment effects on cardiac pacemakers	
Procedures where interference is unlikely	Procedures where interference is likely
Amalgamator	Diathermy units
Composite curing lights	Electronic dental analgesia units
Dental chair or light	Electrosurgical units
Dental handpieces	Ferromagnetic (magnetostrictive) ultrasonic scalers
Dental radiography unit	Lithotripsy units
Electric toothbrushes	Magnetic resonance imaging (MRI)
Electronic apex locators	TENS (transcutaneous electrical nerve stimulation) units
Electronic pulp testers	Ultrasonic instrument baths
Microwave ovens	
Piezoelectric ultrasonic scalers	
Sonic scalers	

DENTAL MANAGEMENT

- 1. All patients who have any type of implantable cardiac devices should provide the details of manufacturer's identification card like manufacturer of the device, model number, serial number, date of implantation, and mode of operation to their oral health provider.
- 2. Dental professionals should encourage sterilized working environment.
- 3. Before any therapeutic service dentist should consult patient's cardiologist and if needed, cardiologist should be informed about the dental procedure.

- 4. For oral prophylaxis, the dentist should consider the use of hand scalers although piezoelectric scalers are documented to be safe.
- 5. Care should be taken not to place electrical cords over patient's chest.
- 6. Unshielded pacemakers should be covered with a lead apron.
- 7. Dentists should be aware of symptoms of pacemaker malfunction such as difficulty in breathing, lightheadedness, dizziness, change in pulse rate, prolonged hiccoughing, swelling in chest and arm, and chest pain.
- In such conditions, cardiologist should be consulted immediately.

8. Patients on anticoagulant therapy

- Anticoagulant treatment is very common in cardiac patients.
- For a healthy person without anticoagulant treatment, the International Normalized Ratio (INR) = 1.
- Anticoagulant treatment usually targets to an INR between 2.0–3.0.
- In certain high-risk situations (e.g. a mechanical mitral valve prosthesis), higher INR values 2.5–3.5 (–4.0) may be required.

DENTAL MANAGEMENT

Warfarin treatment may interact with several drugs, causing derangement of anticoagulant treatment.

Following are the key recommendation for dental treatment:

- 1. The risk of significant bleeding in patients on oral anticoagulants and with a stable INR in the therapeutic range 2-4 (i.e. <4) is very small and the risk of thrombosis may be increased in patients in whom oral anticoagulants are temporarily discontinued.

Oral anticoagulants should not be discontinued in the majority of patients requiring outpatient dental surgery including dental extraction.

- 2. The risk of bleeding in patients on oral anticoagulants undergoing dental surgery may be minimized by:
 - a) The use of oxidized cellulose (Surgicel) or collagen sponges and sutures.
 - b) 5% tranexamic acid mouthwashes used four times a day for two days. Tranexamic acid is not readily available in most primary care dental practices.
- 3. Patients taking warfarin should not be prescribed non-selective NSAIDs and COX-2 inhibitors as analgesia following dental surgery.
- 4. Patients on anticoagulant therapy should be delicately handled in a dental setup.
- This may involve use of local hemostatic measures to control bleeding in anticoagulated patients.

- These include atraumatic surgical technique, adequate wound closure, pressure application, and topical clotting agents. Oral rinsing with tranexamic acid can also be used.

5. On the other hand, anticoagulant treatment should in general not be discontinued in patients with mechanical valve prostheses.

- Close collaboration with the patient's physician is recommended in these matters.

6. In patients receiving long-term anticoagulant therapy and who are stably anticoagulated on warfarin, an international normalized ratio (INR) check 72 h prior to surgery is recommended.

- This allows sufficient time for dose modification if necessary to ensure a safe INR (2–4) on the day of dental surgery (including subgingival scaling). There is no need to check the INR for non-invasive dental procedures.

9. Stroke Patient

- Stroke (produced by cerebral hemorrhage or cerebral ischemia) is a serious neurological accident, often fatal, due to a sudden interruption of the oxygenated blood supply to the brain.
- **DENTAL MANAGEMENT:**
 1. Blood pressure and pain should be monitored and maintained during the entire intervention.
 2. If the required dental treatment may cause bleeding, anticoagulant systemic medication may cause serious hemorrhage, therefore anticoagulant drugs like heparin should be stopped at least 6-12 hours before treatment. Six hours after bleeding, when blood clots are built up, heparin systemic treatment can be resumed.
 3. The minimal amount of anesthetic solutions should be injected, concentration of added epinephrine should be very low (1:100.000 or 1:200.000).
 4. If the patient shows symptoms of stroke, he should get oxygen therapy immediately and should be referred to a hospital as soon as possible.

10. CARDIAC FAILURE

- Cardiac failure is defined as the incapacity of the heart to function properly, pumping insufficient blood towards the tissues and leading to fluid accumulation within the lungs, liver and peripheral tissues.
- The American College of Cardiology/American Heart Association has defined four stages in the progression of cardiac failure :

Stage	Features
A	High risk of failure in the future but no structural heart disorder
B	Structural heart disorder but no symptoms
C	Previous or current symptoms of heart failure in the context of an underlying structural heart problem, but managed with medical treatment
D	Advanced disease requiring hospital-based support, heart transplant or palliative care

DENTAL MANAGEMENT

- Dental treatment is to be limited to patients who are in stable condition.
- The patient should be placed in the semi-supine position in a chair, with control of body movements (which should be slow), in order to avoid orthostatic hypotension.
- In patients administered digitalis agents (digoxin, methyl digoxin), the vasoconstrictor dose is to be limited to two anesthetic carpules, since this drug combination can favor the appearance of arrhythmias.
- Aspirin (acetylsalicylic acid) can lead to sodium and fluid retention, and therefore should not be prescribed in patients with heart failure.
- In the event of an emergency and after contacting the emergency service, the patient should be placed seated with the legs lowered, and receiving nasal oxygen at a rate of 4-6 liters/minute. Sublingual nitroglycerin tablets are indicated (0.4-0.8 mg), and the dose may be repeated every 5 or 10 minutes if blood pressure is maintained.^{14,15}

11. DENTAL MANAGEMENT IN CARDIAC TRANSPLANTATION PATIENTS

- A meticulous pre-surgery oral assessment is required and dental treatment undertaken with particular attention to establishing optimal oral hygiene and eradicating sources of potential infection.
- Dental treatment should be completed before surgery. For 6 months after surgery, elective dental care is best deferred.
- If surgical treatment is needed during 6 months after surgery, or until the ECG is normal, antibiotic prophylaxis against endocarditis may be requested by the surgeons.
- It has been suggested that heart transplant patients cannot show any vasovagal reaction because the donor heart is completely deprived of any vagal or sympathetic innervation.
- However, episodes of vasovagal syncope in heart transplant patients undergoing periodontal surgery have been reported. Local analgesia without adrenaline/epinephrine is indicated.

12. HYPERTENSION

Classification of hypertension according to the JNC6 and JNC7^{14,17}

Stages of hypertension	Range for systolic and diastolic blood pressure
Normal blood pressure	Systolic <120 mmHg and diastolic <80 mmHg
Prehypertension	Systolic 120–139 mmHg or diastolic 80–89 mmHg
Stage 1 hypertension	Systolic 140–159 mmHg or diastolic 90–99 mmHg
Stage 2 hypertension	Systolic \geq 160 mmHg or diastolic \geq 100 mmHg
Hypertensive urgency	Severe hypertension (diastolic pressure usually >120 mmHg); no end-organ damage
Hypertensive emergency	Severe hypertension (diastolic pressure usually >120 mmHg); end-organ damage
“White coat” hypertension	Elevated blood pressure secondary to fear and anxiety from a health care provider

Abbreviations: JNC6, 6th joint national committee report; JNC7, 7th joint national committee report.

- White coat hypertension, hypertension induced facial palsy first by Moxon in 1869.
- Secondary hypertension, : vascular diseases such as coarctation of the aorta and systemic diseases such as Cushing's syndrome; obstructive sleep apnea; adrenal medullary dysfunction; and hormonal dysfunction, ie, primary hyperaldosteronism, pheochromocytoma, hyperthyroidism, hyperparathyroidism, and hypothyroidism.
- Other factors contributing to hypertension include substance abuse, alcohol consumption, contraceptive use, and chronic kidney disease.

DRUGS	Oral manifestations
Beta-blockers	Dry mouth, taste changes, lichenoid reaction
ACE inhibitors	Rash, dry cough, loss of taste, taste changes, dry mouth, ulceration, angioedema, burning mouth, lichenoid reactions, neutropenia → delayed healing, gingival bleeding
Angiotensin II receptor blockers	Dry mouth ,angioedema, sinusitis, taste loss, cough
Calcium channel blockers	Gingival enlargement, dry mouth, altered taste, erythema multiforme
Alpha-blockers	Dry mouth, taste changes
Diuretics	Dry mouth, lichenoid reaction, altered taste (acetazolamide)
Direct-acting vasodilators	Facial flushing, gingival bleeding, infection, lupus-like oral/skin lesions, lymphadenopathy

GENERAL PRECAUTIONS

- Morning appointments.
- Prescription of anxiolytic agents may prove necessary in particularly anxious patients (5-10 mg of diazepam the night before and 1-2 hours before the appointment) before dental treatment.
- LA with vasoconstrictor should be avoided or used in low doses in patients taking nonselective beta-blockers or in patients with uncontrolled hypertension.

DENTAL MANAGEMENT

Following are the stages in management of hypertensive patients undergoing dental treatment.

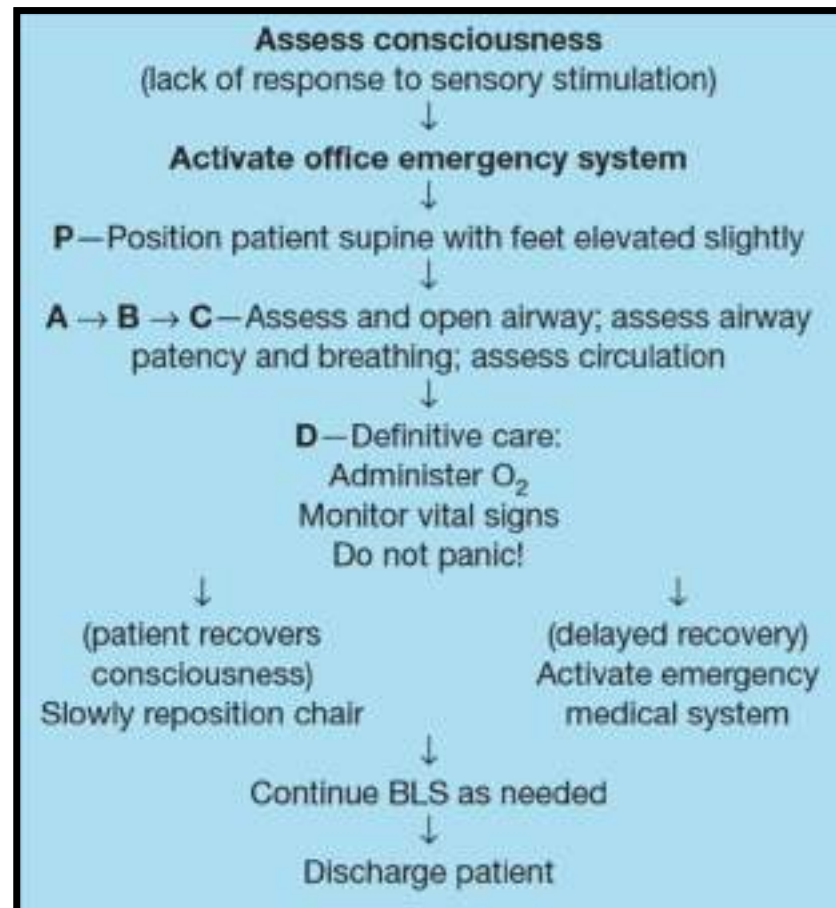
- Initial evaluation of each patient with hypertension should include detailed family history of cardiovascular disease, history of hypertension, medications, duration and antihypertensive treatment history, severity of disease, and its complications.
- Before starting dental treatment, dentist has to assess the presence of hypertension and accordingly the treatment changes needed.

- Patients with hypertension are at increased risk of developing adverse effects in a dental office. Therefore, measuring blood pressure (BP) will be done in the dental office to every new patient for each visit.
- In patients with chronic systemic diseases, BP measurement will be carried out during more complicated dental interventions as oral surgical procedures, restorative treatment complicated with longer sessions, placing dental implants, and periodontal surgery.
- Routine measurement of BP may reduce the risk of cardiovascular events and acute complications during dental treatment, especially when conscious sedation or general anesthesia is required.
- Whenever a dentist meets a patient with hypertensive crisis, the dental procedure should be postponed and the patient should be immediately sent to a hospital.

13. POSTURAL HYPOTENSION

- Postural hypotension, also known as orthostatic hypotension, is the second-leading cause of transient loss of consciousness (syncope) in dental settings.
- Postural hypotension is defined as a disorder of the autonomic nervous system in which syncope occurs when the patient assumes an upright position.

MANAGEMENT



VASCULAR PROLIFERATIVE LESIONS

- Abnormal masses composed of highly vascular tissues occur commonly in the mouth. Such lesions can be classified under three headings:

1. Reactive hyperplasia, e.g. Pyogenic granuloma
2. Vascular hamartomas, e.g. hemangioma and lymphangioma
3. Neoplasms

1. REACTIVE VASCULAR HYPERPLASIA

- These represent a localized over-growth of vascular granulation tissue formed in some response to local irritation.
- A vascular epulis produced as a result of the localized accumulation of plaque on the surface of a tooth is of this nature.

2. VASCULAR HAMARTOMAS

- These represent localized abnormalities but infrequently form one component of the syndromes with oral and extra-oral lesions and their presence in the mouth points to the existence of abnormalities elsewhere.
- These syndromes are:
 1. Sturge-Weber and Klippel-Trenaunay-Weber Syndrome
 2. Rendu-Osler Syndrome
 3. Fabry-Anderson Syndrome
 4. Maffucci's Syndrome

Sturge-Weber and Klippel-Trenaunay-Weber Syndrome

- In this syndrome, a facial hemangioma is associated with other features.
- The facial lesion affects one side and often does not extend medially to the outer border of the philtrum.
- Oral manifestations:
 - 1) Gingival enlargement due to excessive vascularity occurs, particularly in the upper jaw, and may be so massive as to prevent closure of the mouth.
 - 2) The gingival change extends to the mid-line, in contrast to the facial angioma, and the angioma may also affect the lips, cheek and tongue.
 - 3) The permanent teeth get prematurely erupted and there is many



Rendu-Osler-Weber Syndrome

- This syndrome is inherited as an autosomal dominant trait.
- It rarely appears in infancy and is more common in puberty.
- In this syndrome, variously shaped, thin walled, blood filled channels exist on the mucous membrane of the tongue, palate, lips, cheek and oropharynx.
- The characteristic early lesion is a macule, 2 or 3 mm in diameter and cherry red in colour. It is said to resemble a "crushed spider".
- Dental treatment involving surgery in such patients has not shown any consequences.



Fabry-Anderson Syndrome

- It is characterized by pain and eruption.
- The disease is inherited as a sex-linked characteristic and an enzyme deficiency resulting in accumulation of an abnormal lipid has been suggested as the basis of the disease.
- Small blood filled cavities occur on the oral mucosa in this uncommon syndrome, the lower lip, palate, buccal mucosa and gingiva being altered.
- The angiokeratomas are maroon or blue-black, flat or slightly elevated, and a few millimeters in diameter.

Maffucci's Syndrome

- It is characterized by the presence of numerous mesenchymal malformations, particularly enchondromas and angiomas.
- The disorder has one of the generalized tendency to develop in to mesenchymal neoplasias.
- These produce neurological effects.
- Oral hemangiomas are uncommon in Maffucci's Syndrome but have been described in cheek, lip, tongue and soft palate.

3. Neoplasms arising from the vessels

- Kaposi's sarcoma is a generalized disorder.
- Oral lesions occur in one quarter of such patients.
- The early oral lesion appears as small area of reddish blue discoloration but later it becomes elevated and then ulcerates.
- Sites which are involved are palate, tongue and buccal mucosa.
- Occasionally, they may have a "strawberry like appearance".

Symptoms

CHEST PAIN

EXERTIONAL
DYSPNOEA

PAROXYSMAL
NOCTURNAL
DYSPNOEA

ORTHOPNOEA

FATIGUE

PALPITATION

SYNCOPE

HAEMOPTYSIS

Signs

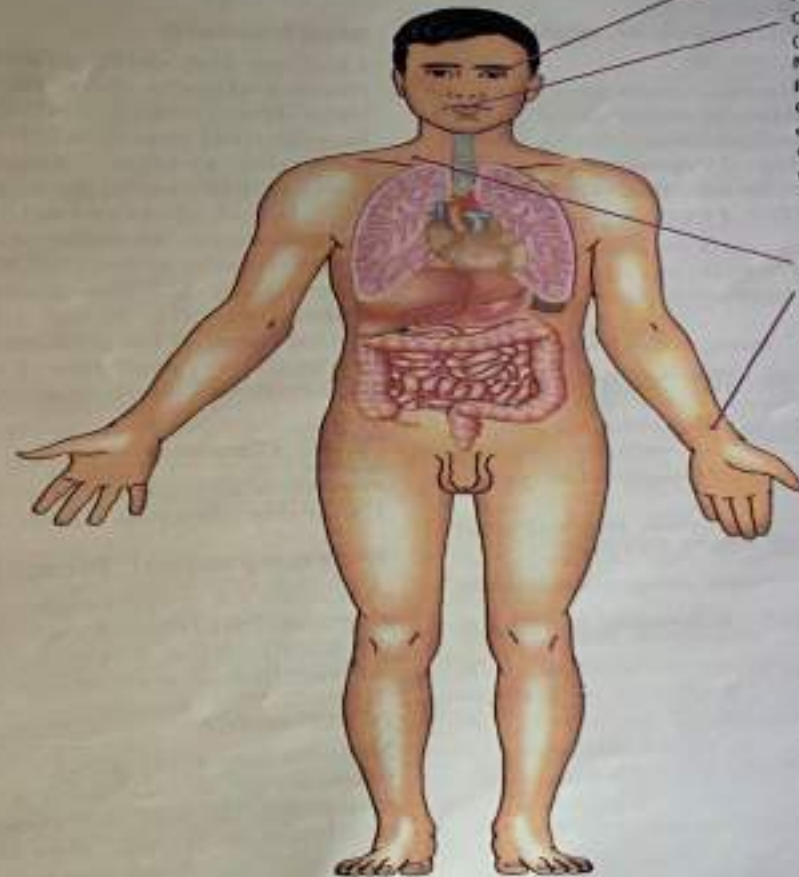
Anaemia
Corneal arcus
Xanthelasma
Cyanosis
(Central/Peripheral)
Malar flush
Pyrexia
Coldness of the
extremities
Clubbing
Oedema

Raised JVP
Arterial pulse
Rhythm disorder
Blood pressure

Position of trachea
Precordium
Apical impulse
Parasternal impulse
Palpable heart sounds
Thrills
Heart sounds/gallop
Added sounds
Murmurs
Friction rubs

Crackles/wheezes
over the lung
fields

Tender hepatomegaly
Splenomegaly



POTENTIAL ORAL MANIFESTATIONS OF CARDIOVASCULAR DRUGS

Group	Comments and adverse effects	Possible oral effects
Alpha-adrenergic blockers	Thrombocytopenia	Dry mouth
Angiotensin-converting (ACE) enzyme inhibitors	First dose may cause sudden fall in blood pressure May impede renal function, especially if NSAIDs also given Cough, angioedema	Burning sensation or ulceration or loss of taste Angioedema Dry mouth Sinusitis with quinapril, lichenoid reactions
Angiotensin II receptor blockers (ARBs)	Generally well tolerated	Facial flushing Taste disturbance Gag reflex Dry mouth Lupoid reactions
Beta-blockers	Bronchospasm Contraindicated in asthma Avoid in heart failure or heart block Muscle weakness Lassitude Disturbed sleep	Dry mouth Lichenoid lesions Paraesthesiae

Calcium-channel blockers	Headache and flushing Swollen legs	Gingival swelling, most with nifedipine (30% are affected) Salivation with nicardipine Angioedema
Centrally acting antihypertensives (largely obsolete)	Cass effects Halmolysis Hepatitis	Dry mouth
Diuretics	Hypovolaemia Electrolyte changes	Dry mouth Erythema multiforme Lichenoid lesions
Potassium-channel blockers	Headache, may cause flushing	Ulceration
Vasodilators	Lupoid reactions	

NSAIDs, non-steroidal anti-inflammatory drugs.

Drug Class	Common Drug Interactions
Beta-blockers	NSAIDs, <u>9</u> epinephrine, <u>9,11</u> local anesthetics, <u>9</u> bronchodilators, <u>9</u> vasopressors <u>22</u>
ACE inhibitors	NSAIDs <u>9,11,22</u>
Angiotensin II receptor blockers	Systemic antifungals, <u>9</u> sedatives <u>9</u>
Calcium channel blockers	Benzodiazepines, <u>9</u> parenteral anesthetic agents, <u>9</u> aspirin, <u>9,22</u> nsaid, <u>9</u> erythromycin, <u>11</u> clarithromycin, <u>11</u> cyp-3a4 concentrations <u>8</u>
Alpha-blockers	NSAIDs, <u>9,11,22</u> CNS depressants, <u>9</u> salicylates <u>22</u>
Diuretics	NSAIDs, <u>9,22</u> barbiturates, <u>9</u> fluconazole <u>9</u>
Direct-acting vasodilators	NSAIDs, <u>9,22</u> opioids <u>9</u>
Central-acting agents	NSAIDs, <u>9,22</u> sedatives, <u>9</u> epinephrine <u>9</u>
Combined alpha/beta blockers	Epinephrine, <u>11</u> NSAIDs <u>11</u>



THANK YOU