



# Cardiovascular and respiratory disease

# Learning Outcomes

- Gain an understanding of an overview of cardiovascular and respiratory disease
- To recognise the oral manifestations and management of patients with these conditions
- To develop an awareness when medically compromised patients should be referred to secondary care

# Hypertension (HTN)

- In adults, hypertension is defined as a sustained BP of 130 mm Hg or greater or sustained diastolic BP of 80 mm Hg or greater
- The American Cardiology Association and the American Heart Association defined BP in 4 stages: normal, elevated, stage 1 and stage 2
- Normal BP is <120/80
- Many patients with high blood pressure are unaware of their disease
- Early detection with referral for additional diagnosis and treatment when indicated, can prove to be lifesaving

**Classification of Blood Pressure (BP) in Adults and Recommendations for Follow-Up**

BP Classification	Systolic BP (mm Hg)	Diastolic BP (mm Hg)	Recommended Follow-Up
Normal	<120	And <80	Recheck in 2 years.
Elevated	120–129	Or <80	Recheck in 1 year.
<b>Hypertension</b>			
Stage 1	130–139	Or 80–89	Confirm within 2 months.
Stage 2	≥140	Or ≥90	Evaluate or refer to source of care within 1 month. For those with higher BP (e.g., >180/110 mm Hg), evaluate and treat immediately or within 1 week, depending on the clinical situation and complications.

Note: If there is a disparity in category between the systolic and diastolic pressures, the **higher value** determines the stage.

# Aetiology

## **Primary (essential hypertension) 90%**

- Patients have no readily identifiable cause
- Risk factors: age, family history/genetic predisposition/lifestyle factors

## **Secondary hypertension**

- 10% is secondary to other underlying medical conditions
- Renal diseases (e.g. diabetic nephropathy)
- Endocrine conditions (e.g., Cushing syndrome, hyperthyroidism)
- Chronic steroid therapy
- Drug related
- Obstructive sleep apnoea

# Signs and Symptoms of Hypertensive Disease

## Early

- Elevated blood pressure readings
- Narrowing and sclerosis of retinal arterioles
- Headache, Dizziness, Tinnitus

## Advanced

### Eye:

- Rupture and hemorrhage of retinal arterioles
- Papilledema

### Heart

- Angina pectoris, Left ventricular hypertrophy, Congestive heart failure

### Kidney

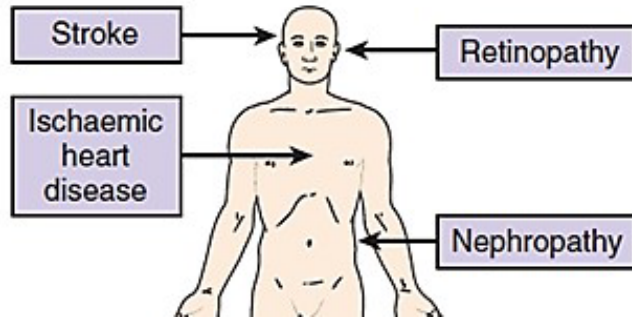
- Proteinuria, Renal failure

### Brain

- Dementia, Encephalopathy, Stroke

# Complications of prolonged hypertension

- Accelerates atherosclerosis
- Increases the risk of cardiovascular, cerebrovascular, renal and eye diseases
  - Left ventricular hypertrophy, myocardial infarction, heart failure and stroke
  - Retinal damage, proteinuria, renal failure
  - Malignant hypertension (BP >200/>130 mmHg) causes retinal haemorrhage
  - Shortens life by 10-20 years



# Classes of antihypertensive drugs

- Diuretics- Chlorothiazide (Diuril®)
- Angiotensin converting enzyme (ACE) inhibitors- Captopril (Capoten®)
- Angiotensin II receptor blockers- Candesartan (Atacand®)
- Calcium channel blockers- Amlodipine (Norvasc®)
- Beta-blockers- Atenolol (Tenormin®)
- Alpha-blockers- Prazosin (Minipres®)

## Side Effects of Antihypertensive Drugs

Condition/Finding	Comment
Orthostatic hypotension	Particularly in older patients on multiple medications More with diuretics
Dry mouth	Several medications particularly Clonidine (Catapres)
Hypokalemia	Low potassium is a side effect of diuretics Hypokalemia in turn can produce arrhythmia
Gingival hyperplasia	Calcium channel blockers, particularly Nifedipine (Procardia) Not dose-related but patient-specific. The severity depends on the quality of oral hygiene, frequency of dental prophylaxis, presence of crowded teeth, and defective restorations
Lichenoid reactions	Several medications
Cough/taste disturbances	ACE inhibitors; e.g., Captopril is commonly associated with metallic or loss of taste
Burning mouth	ACE inhibitors
Angioedema	ACE inhibitors
Influence on vasoconstrictors	Non-selective beta-blockers (e.g., propranolol) can potentiate the effect of epinephrine and result in acute elevation in blood pressure Limit epinephrine to 2 carpules of 1:100,000 epinephrine (0.036 mg of epinephrine)
Other considerations	Erythromycin and clarithromycin (but not azithromycin) can exacerbate the hypotensive effect of calcium channel blockers (CCBs) and can result in acute kidney injury. Prolonged use of NSAIDs should be avoided in patients who have hypertension and on antihypertensive drugs. Prolonged NSAIDs use is associated with decreased efficacy of antihypertensive drugs and increased risk for MI and stroke in this population.

# Oral manifestations

- No recognized oral manifestations of hypertension
- Antihypertensive drugs can cause
  - Dry mouth (clonidine)
  - Gingival hyperplasia (calcium channel blockers)
  - Lichenoid reactions (several medications)
  - Erythema multiforme
  - Angioedema
  - Burning mouth (ACE inhibitors)
  - Parotid gland swelling (sialadenosis)



# Dental management considerations

- Patient evaluation
- Review medical history, assess the severity of hypertension
- Obtain a medical consultation if the patient has poorly controlled BP
- Dry mouth-improve oral hygiene, dietary counselling, sugarless candy or gum, artificial saliva, fluoride application
- Drug-induced gingival hyperplasia-Scaling and root planning, increase frequency of dental prophylaxis and oral hygiene instructions, consult physician to assess the possibility of changing the drug
- Lichenoid reactions-consult physician to replace medication if possible

# Key points

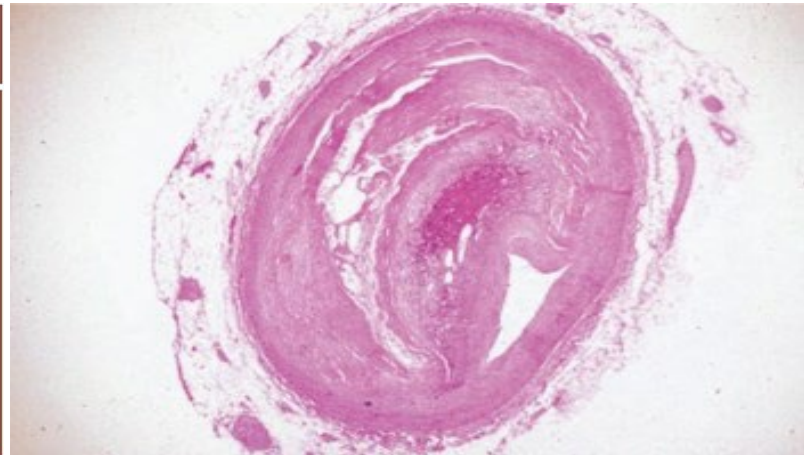
- Hypertension is undiagnosed, not well controlled in many patients and accompanied by comorbidities
- BP should be routinely assessed in the dental office and assess for signs, symptoms and comorbidities
- BP can be elevated due to dental anxiety and pain, but can be reduced with appropriate measures
- Routine dental care can be provided to most patients when anxiety and pain are controlled
- LA with 1:100,000 epinephrine is limited to two carpules or fewer
- Dental treatment should be deferred when BP is  $>180/110$ ; these patients should be referred for medical care
- Antihypertensive drugs are associated with hyposalivation, xerostomia, dental caries, and fungal infections

# Ischemic Heart Disease (Coronary Artery Disease; IHD; CAD)

- A condition marked by a progressive decrease in the blood supply (ischemia) to the heart muscles
- Main cause is plaque accumulation (atherosclerosis) in the coronary artery wall
- IHD can lead to angina pectoris, myocardial infarction (MI) or sudden cardiac death

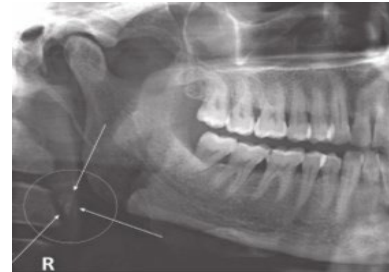
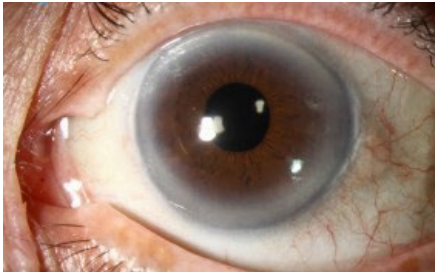
## Risk Factors for Coronary Atherosclerosis

Modifiable (Lifestyle Choices)	Not Modifiable
Hypertension, cigarette smoking	Older age
Physical inactivity	Male gender
Diet rich in simple sugars and starches	Family history of cardiovascular disease
Obesity, insulin resistance, diabetes mellitus	
Hyperlipidemia	Genetic hyperlipidemia
Mental stress, depression	
Infections and systemic inflammation	



# Clinical Presentation

- Chest pain or discomfort (angina)
- Weakness, shortness of breath, light headedness, nausea, cold sweat
- CVD and CAD warning signs:
  - Corneal arcus, eyelid xanthomas
  - Carotid artery calcifications-may show on panoramic radiographs in areas of C3 and C4



# Dental management considerations (IHD)

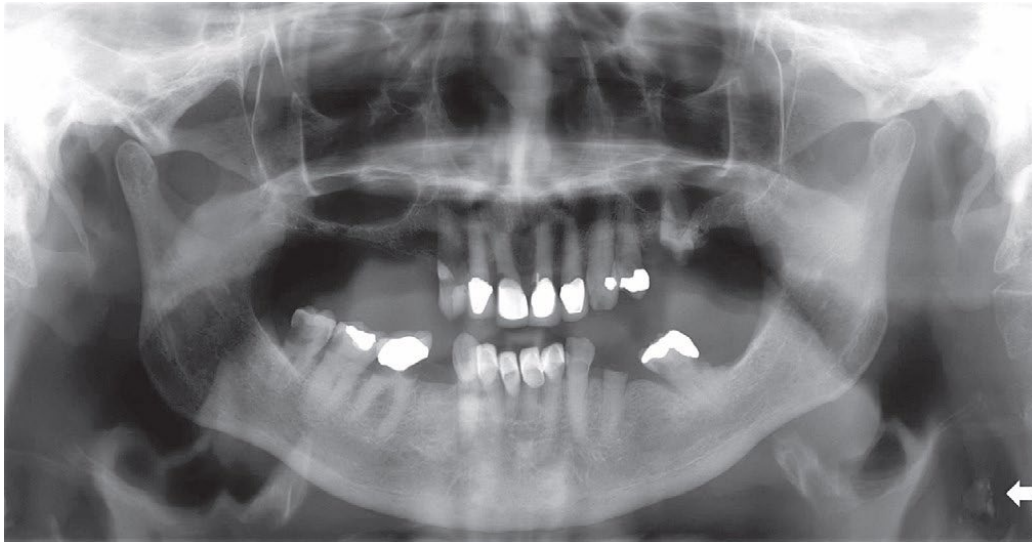
- Determine the severity, onset and symptoms of IHD
- Stable patients (stable angina)- can receive routine dental care

## **Unstable patients (unstable angina) and patients who had MI within the previous 30 days**

- Should not receive elective dental care,
- If urgent treatment required: minimal and conservative
- Consult with physician to develop a treatment plan
- Patients are best treated at a hospital-based clinic or special care facility that offers vital sign monitoring

# Oral manifestations

- Angina is a rare cause of pain in the mandible, teeth or oral tissues
- Carotid calcifications can be detected on panoramic images in 1/3<sup>rd</sup> of patients who have atherosclerosis
- Several drugs used by patients have reported oral manifestations
  - Dry mouth, taste changes, lichenoid lesions, gingival hyperplasia, oral ulcers (nicorandil)
  - Bleeding may occur with antiplatelet/anticoagulant drugs (e.g. aspirin; warfarin)



## Key points: Ischemic Heart Disease

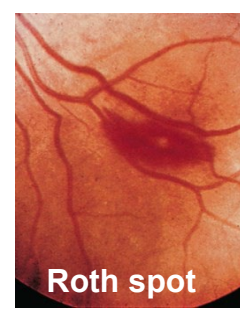
- Atherosclerosis and IHD may be asymptomatic or symptomatic
- Features suggestive of this disease may appear in the panoramic image
- Patients with atherosclerosis may be at risk for angina, MI, and stroke, before, during or after dental treatment
- Managing BP, anxiety, pain and limiting the amount of LA with epinephrine will help to reduce adverse outcomes during dental treatment
- Routine dental care deferred for patients who have had a MI within 30 days, and those who are unstable and have symptoms of IHD
- Dental providers must be aware of drug interactions in patients with IHD and avoid drugs that may cause adverse interactions
- Patients with IHD must be evaluated on a regular basis by the physician

# Infective endocarditis (IE)

- Infection caused by microbes that settle on the endothelial surface of the heart valves
- Staphylococci aureus, viridans group streptococci (alpha-haemolytic streptococci)
- Occurs near congenital or acquired cardiac defects
- Results when microbes enter the blood stream and colonize damaged or artificial cardiac valves
- Associated with significant morbidity and mortality
- Most IE cases related oral microflora are random bacteraemia resulting from routine activities
- A very small number of cases are believed to result from dental procedures

# Signs and symptoms

- Appear within 2 weeks after the initiating bacteraemia
- Fever is the most common sign
- Heart murmurs in 85% of patients
- Immune-complex mediated vasculitis, arthritis, renal damage
  - Petechiae (skin, conjunctiva, oral mucosa)
  - Osler nodes (tender red nodules on the pulp of fingers)
  - Janeway lesions (painless red haemorrhagic macules on the palms and soles)
  - Splinter haemorrhages (dark-red linear lesions in the nail beds)
  - Roth spots (oval retinal haemorrhages with small clear centres)
  - Glomerulonephritis



# Antibiotic Prophylaxis Regimens

- Antibiotic prophylaxis should be administered in a single dose 30-60 minutes before the procedure
- If not administered before the procedure, dosage may be administered up to 2 hours after the procedure

## American Heart Association Antibiotic Regimens for Dental Procedures: Single Dose 30–60 min Before the Procedure

Situation	Agent	Adults	Children
Oral	Amoxicillin	2 g	50 mg/kg
Unable to take oral medication	Ampicillin or	2 g IM or IV	50 mg/kg IM or IV
	Cefazolin or ceftriaxone	1 g IM or IV	50 mg/kg IM or IV
Allergic to PCNs or ampicillin (oral)	Cephalexin <sup>a,b</sup> or	2 g	50 mg/kg
	Azithromycin or clarithromycin	500 mg	15 mg/kg
	Or doxycycline	100 mg	>45 kg, 100 mg <45 kg, 4.4 mg/kg
Allergic to PCNs or ampicillin and unable to take oral medication	Cefazolin or ceftriaxone <sup>b</sup>	1 g IM or IV	50 mg/kg IM or IV

<sup>a</sup>Or other first- or second-generation oral cephalosporin in equivalent adult or pediatric dosing.

<sup>b</sup>Cephalosporins should not be used in an individual with a history of anaphylaxis, angioedema, or urticaria with penicillin or ampicillin. Clindamycin is no longer recommended for antibiotic prophylaxis for a dental procedure. *IM*, Intramuscular; *IV*, intravenous; *PCN*, penicillin.

# Infective endocarditis: Key Points

- IE is associated with significant morbidity and mortality
- IE results when microbes enter the blood stream and colonize damaged or artificial valves
- Viridans group streptococci (VGS) in the oral cavity can cause IE because of transient bacteraemia from daily mouth activities and less commonly after dental procedures
- Good oral health and regular dental care are important to prevent VGS IE
- AHA guidelines recommend antibiotic prophylaxis based on 3 risk factors: (1) underlying cardiac conditions, (2) dental procedure being performed, and (3) oral microbes (VGS) likely to cause bacteraemia
- Dental providers must be aware and follow recommended guidelines for antibiotic prophylaxis

# Respiratory Diseases

# Asthma

- Asthma is a chronic inflammatory disease of the airways marked by reversible episodes of enhanced airway hyperresponsiveness, resulting in recurrent bouts of dyspnea, coughing, and wheezing
- Asthma is a multifactorial and heterogeneous disease
- Factors that can exacerbate asthma are grouped into one of four categories:
  - Extrinsic (allergic or atopic)
  - Intrinsic (idiosyncratic, non-allergic or non-atopic)
  - Drug induced
  - Exercise induced

# Allergic or extrinsic asthma

- The most common form; account for 35% of all adult cases
- Triggered by inhaled seasonal allergens such as pollens, dust, house mites, animal dander, and irritating fumes (seasonal variations)
- Usually is seen in children and young adults
- Patients frequently have well-defined allergy history, high IgE levels upon allergen exposure, positive skin tests to numerous allergens, and a family history of allergic conditions
- When exposed to an allergen, several inflammatory mediators are secreted resulting in bronchial smooth muscle contraction (bronchoconstriction) and spasm (bronchospasm)
- Increased vascular permeability, tissue oedema, mucous secretion

# Intrinsic asthma

- Accounts for about 30% of asthma cases and seldom is associated with a family history of allergy or with a known cause
- Most common in middle-aged adults (adult onset, over the age of 30)
- Patients often have normal IgE levels, negative skin testing, and no history of allergies
- Its onset is linked to endogenous factors like emotional stress or GERD
- Patients are more likely to develop status asthmaticus
- Keep in mind that some patients may have both extrinsic and intrinsic asthma.

## Drug induced asthma:

- Triggered by drugs (aspirin, NSAIDs, betablockers, ACE inhibitors, metabisulphite preservatives)
- Aspirin causes bronchoconstriction (10% of asthma patients)
- Aspirin sensitivity affects 30% asthmatic patients
- Metabisulphite preservatives found in epinephrine-containing local anaesthetics

## Exercise-induced asthma

### +/- Infection related asthma

- Caused or triggered by respiratory infections
- Controlled by antimicrobial treatment (bacterial) and supportive care (viral)

# Clinical Presentation

- Recurrent episodes of wheezing, dyspnea, cough, and chest tightness
- Symptoms are frequently worse at night, early morning, or after exposure to a stimulus
- Onset is abrupt, with the peak of symptoms happening within 10-15 minutes
- Most episodes are self-limiting; severe attacks needs medical attention
- Favourable prognosis when diagnosed in childhood
- Condition resolves spontaneously after puberty in young children

## Complications

- Acute asthmatic attacks can happen in the dental office; usually self-limiting or respond to inhaler

## Status asthmatics

- Serious manifestation of asthma; potentially fatal
- Severe and prolonged attack that persists for hours despite therapy
- Increased and progressive dyspnea, jugular venous pulsation, cyanosis and pulsus paradoxus ( fall in systolic pressure with inspiration)

# Diagnosis

- Diagnosis is based on clinical symptoms and response to therapy
- Spirometry before and after administration of a short-acting bronchodilator
  - Widely applied in diagnosing asthma
  - Single best test for asthma
  - If the pulmonary function improves more than 12% following administration of a bronchodilator, this is supportive of the diagnosis
- Other
  - Bronchial provocation (by histamine or methacholine chloride challenge)
  - Allergy blood and skin tests
  - Cell counts (to detect neutrophilia or eosinophilia)
  - Chest radiographs (to exclude other lung diseases)

# Oral Findings

- Dry mouth
  - $\beta$ 2-and anticholinergics can cause dry mouth
- Oral Candidiasis
  - Occurs in 5% of patients who use inhalation steroids for long periods at high dose or frequency
  - Condition rare if a “spacer” or aerosol-holding chamber is used, mouth rinsed with water after each use
- Angina bullosa haemorrhagica
  - Related to the use of corticosteroids inhalers and trauma
- Enamel erosion
  - $\beta$ -agonists and theophylline can exacerbate GORD which contributes to erosion of enamel



# Dental management considerations for patients with a history of asthma

- Take a thorough history to determine the severity and stability of the disease
- Ask about the type of asthma, adherence to medication, precipitating factors, timing, frequency and severity of attacks
- Remind the patient to bring their rescue inhaler to the appointment
- Encourage smokers to stop smoking
- Obtain medical consultation of asthma is poorly controlled (wheezing or coughing or recent hospitalization)
- For severe and unstable asthma, consult with the patient's physician, routine dental treatment should be postponed

# Prevention of an acute asthmatic attack during dental care

## Anxiety

- Provide a stress-free environment through the establishment of rapport and openness to reduce the risk of anxiety-induced asthma attacks
- If sedation is required, use of nitrous oxide-oxygen inhalation sedation or small doses of a short-acting benzodiazepine (oral diazepam) (or both) is recommended
- Avoid barbiturates and narcotics because they can provoke asthmatic attacks in some patients (histamine-releasing drugs), and can depress respiration

## Anaesthesia

- Epinephrine-containing local anesthetics are generally not contraindicated
- Sodium metabisulfite preservative may elicit asthmatic attacks in susceptible individuals

## Antibiotics

- Avoid prescribing macrolide antibiotics (e.g., erythromycin, azithromycin) or ciprofloxacin to patients who are taking theophylline (raise blood levels)

## Analgesics

- The administration of aspirin to patients with asthma is not advisable because it can provoke asthma attacks in some patients
- Avoid aspirin and other NSAIDs in susceptible individuals

## Drugs

- Make sure that the patient has taken their most recent scheduled dose of medication
- Check the availability of the rescue inhaler; use it prophylactically in moderate to severe disease
- For patients on systemic steroids, provide corticosteroid on the morning of a surgical procedure

## Other preventive measures

- Patients who have nocturnal asthma should be scheduled for late-morning appointments, when attacks are less likely
- Keep away materials with irritating odors (e.g., surface disinfectants, methyl methacrylate, fissure sealants)
- Use a dental dam to reduce exposure to irritating particles like tooth-enamel dust and prophylaxis paste
- Non-latex gloves and dental dams should be used for latex-sensitive patients
- Cold-temperature clinics and surgical rooms should also be avoided
- Patients who experience respiratory discomfort when fully reclined should be treated in a semi-supine position

# Chronic obstructive pulmonary disease (COPD)

- COPD is a general term for pulmonary disorders characterized by chronic and progressive air flow limitation that is irreversible
- Linked to exposure to harmful environmental stimuli-cigarette smoke
- 2 main diseases: chronic bronchitis and emphysema
- Chronic bronchitis: defined as a condition associated with chronic inflammation of the bronchi that produces excessive tracheobronchial mucous production
- Emphysema: defined as a permanent enlargement of the air spaces in the lung (distal to the terminal bronchioles) followed by the destruction of the air space (alveolar) walls



**Healthy lung**

**Emphysema**

# Aetiology/Pathogenesis

## Cause

- Tobacco smoking is the most important cause of COPD
- One in five chronic smokers develops COPD
- Long-term exposure to occupational and environmental pollutants
- Hereditary absence or deficiency of alpha-1 antitrypsin

## Pathogenesis

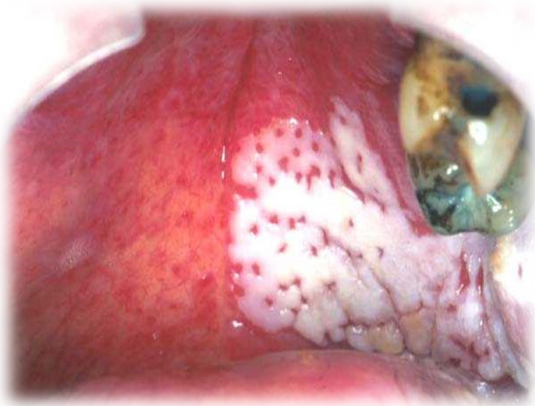
- Chronic exposure to cigarette leads to persistent inflammation, narrowing of small airways, damage the alveolar walls, airflow limitation and obstruction

# Clinical Presentation

- Symptoms develop slowly
- Chronic cough with sputum (more frequent with chronic bronchitis)
- Dyspnoea that is persistent and progressive or worsens with exercise
- Patients with chronic bronchitis are described as “blue bloaters”: sedentary, overweight, cyanotic, oedematous and breathless
- Patients with emphysema are described as “pink puffers”: enlarges chest walls (barrel-chested appearance), weight loss, severe exertional dyspnoea
- Many patients with COPD may exhibit features of both diseases

## Oral manifestations

- Smoking-related: halitosis, extrinsic tooth stains, nicotine stomatitis, periodontal disease, cancerous and precancerous lesions in chronic smokers
- Drug related: dry mouth, caries and oral candidiasis



# Dental management considerations for patients with COPD

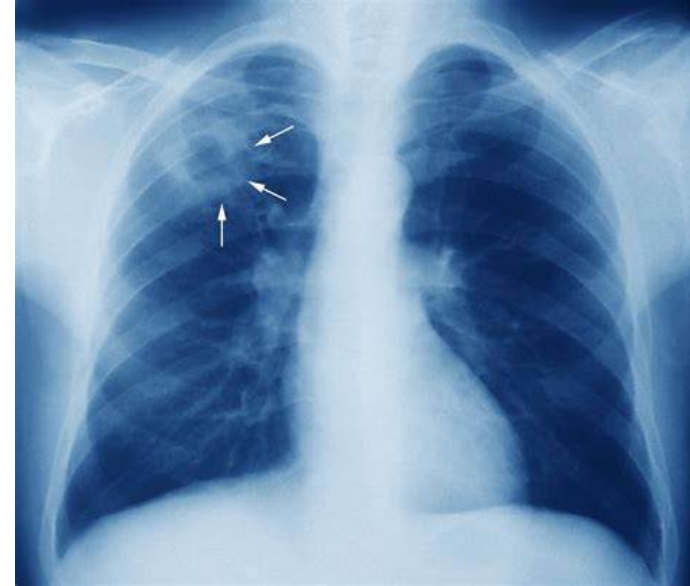
- Assess the severity of the respiratory disease and the degree of control
- Take a thorough history and review the systems to determine onset, stage, symptoms, medications and coexisting conditions (hypertension, congestive cardiac failure, respiratory infections)
- Assess vital signs (BP, pulse, respiratory rate)
- Determine the smoking status and advise smokers to stop smoking
- Remind the patient to bring the inhaler (short-acting) to each dental appointment
- Obtain medical consultation if the condition is undiagnosed (H/O of smoking, coughing, exertional dyspnoea, cyanosis or frequent respiratory infections)
- A patient with shortness of breath at rest, productive cough, URI infection or an oxygen saturation less than 91% is unstable
- If the patient has no dyspnoea, oxygen saturation greater than 95%, no URI- stable patient

# Prevention of respiratory depression during dental Tx

- Limit epinephrine if significant CVD is present
- Avoid bilateral blocks (can cause unpleasant airway constriction sensation)
- Avoid macrolide antibiotics (reduce the metabolism of theophylline)
- If orthopnoea is present, treat the patient in semi-supine or upright chair position
- Avoid the use of rubber dam in patients with severe disease or who mouth-breathe
- If sedation medication is required, low dose oral diazepam may be used
- Narcotics and barbiturates avoided (depresses respiration)
- Anticholinergics and antihistamines used with caution (drying properties and increase in mucous tenacity)
- Outpatient GA is contraindicated for most patients with COPD

# Tuberculosis

- Chronic infectious disease caused primarily by *Mycobacterium tuberculosis* (acid-fast aerobic, non-motile bacillus)
- Transmission occurs through inhalation of infected airborne droplets from a person with active pulmonary TB
- Primary TB (primary site is lung, spread to other parts of the body)
- Latent TB (90-95% of patients develop)
  - Healed primary lesions leave a calcified nodule+/-hilar lymph node)
  - Bacteria can remain dormant in the nodules for years
  - Patients asymptomatic and cannot infect others
- Secondary TB
  - 5-10% latent infections can progress to active disease
  - Common in immunocompromised persons
  - HIV infection most significant risk factor for developing active TB



# Diagnosis

- Tuberculin skin test (TST)
  - Also known as Mantoux test, purified protein derivative (PPD) test
  - PPD injected under the skin of forearm, after 72 hours, circumference of induration measured (15mm induration is considered positive)
- Interferon-gamma release assay (IGRA)
  - Blood test to determine exposure to *M.tuberculosis*
  - Can detect recent infections, results available within 24 hours
  - Cannot differentiate latent TB from active TB

# Dental management

- Four infectivity categories (1) active TB, (2) history of TB (3)+ TST or IGRA and (4) signs or symptoms suggestive of TB
- Consult with physician before treatment
- Provide emergency care in a hospital setting: isolation, sterilization, ventilation and filtration masks (N95; N99; N100)
- Rubber dam and high-speed suction should be used to minimize aerosolization of oropharyngeal microbes

# Dental management

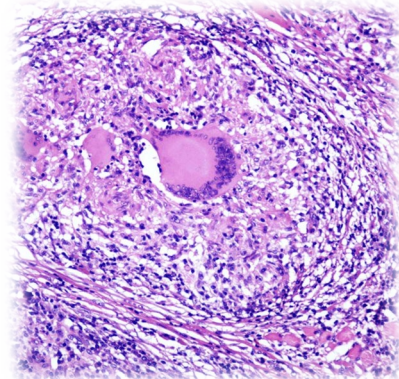
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# Dental treatment considerations with antituberculosis drugs

Drug	Adverse effects	Dental consideration
Isoniazid	Hepatotoxicity; elevation in serum aminotransferase in 10-20% of patients	Avoid acetaminophen when aminotransferases are elevated; isoniazid increases the concentrations of diazepam
Rifampicin	Hepatotoxicity; leukopenia, jaundice, thrombocytopaenia	Infection increased, delayed healing, gingival bleeding; rifampicin decreases serum levels of (diazepam, erythromycin, clarithromycin, fluconazole)
Streptomycin	Ototoxicity	Streptomycin and aspirin can interact and cause ototoxicity; avoid concurrent use of aspirin

# Oral findings

- Mouth ulceration rare
- Chronic, painless, undermined ulcer on the dorsum of tongue (can be indurated with raised margins)
- Caused by infected sputum
- Granulating gingival lesions also reported
- Cervical lymphadenitis, sinus tracts from necrotic lymph node to the skin surface ('collar stud' abscess)
- Biopsy (caseating epithelioid granulomas)
- Identified in Ziehl-Neelsen stained sections, culture or PCR
- Prolonged antibiotic therapy required to clear the infection (isoniazid, rifampicin)



# Cystic fibrosis

- Autosomal disorder characterised by the build-up of thick, viscous secretions that can damage many organs
- Mutations in the cystic fibrosis transmembrane conductance regulator (CFTR) gene
- Affects mostly lung and pancreas
- Also affects liver, kidneys, testicles and salivary glands
- End-stage lung disease main cause of death
- Difficulty in breathing, coughing up mucous
- Frequent lung infections, fatty stool, poor growth
- Nasal polyps, recurrent sinusitis
- Treatment:
  - Antibiotics, bronchodilators, mucolytic agents
  - Oxygen therapy as needed, Chest physiotherapy to loosen mucous
  - Diet high in protein with pancreatic enzymes and fat-soluble vitamins

# Oral manifestations

- Major salivary glands may enlarge and hyposalivation can occur
- Delayed dental eruption (due to poor growth)
- Higher incidence of enamel defects (due to repeated infections)
- Low fat, high carbohydrate diet and dry mouth may predispose to caries
- Increased calculus formation (due to higher amount of Ca in saliva)

# Dental considerations

- Reduced respiratory function, liver disease (bleeding tendency) and diabetes may complicate treatment
  - Short appointments recommended
  - Avoid early morning appointment (mucous production)
  - Patients best treated in upright position
- Antimicrobials for oral infections selected carefully since patients are often on long term antibiotic therapy