ORAL MANAGEMENT OF ENDOCRINE DISORDERS

(KRITIKA JHA & ISHA JOSHI)

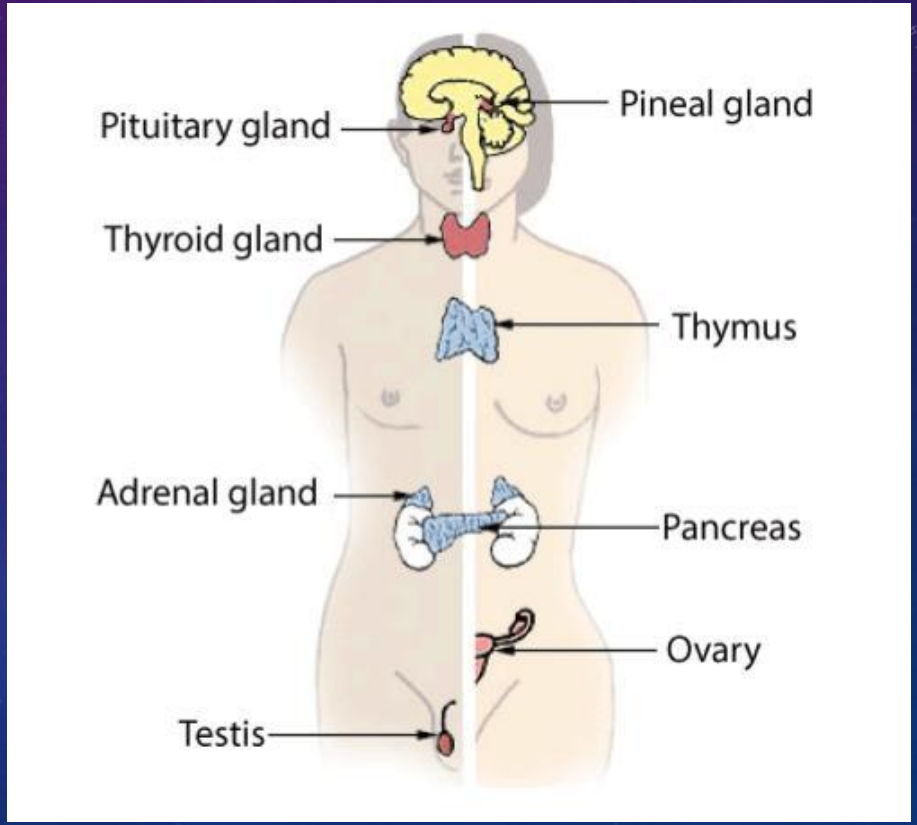
CONTENTS

- Endocrine glands
- Endocrine disorders

1. Osteoporosis
2. Diabetes Mellitus
3. Hyperthyroidism
4. Hypothyroidism
5. Hyperparathyroidism
6. Hypoparathyroidism

MAJOR ENDOCRINE GLANDS

1. Pineal Gland
2. Pituitary Gland
3. Thyroid Gland
4. Thymus
5. Adrenal Gland
6. Pancreas
7. Ovaries
8. Testes



TOP COMMON ENDOCRINE DISEASES

1. Osteoporosis
2. Diabetes Mellitus
3. Hyperthyroidism
4. Hypothyroidism
5. Hyperparathyroidism
6. Hypoparathyroidism

Osteoporosis

OSTEOPOROSIS

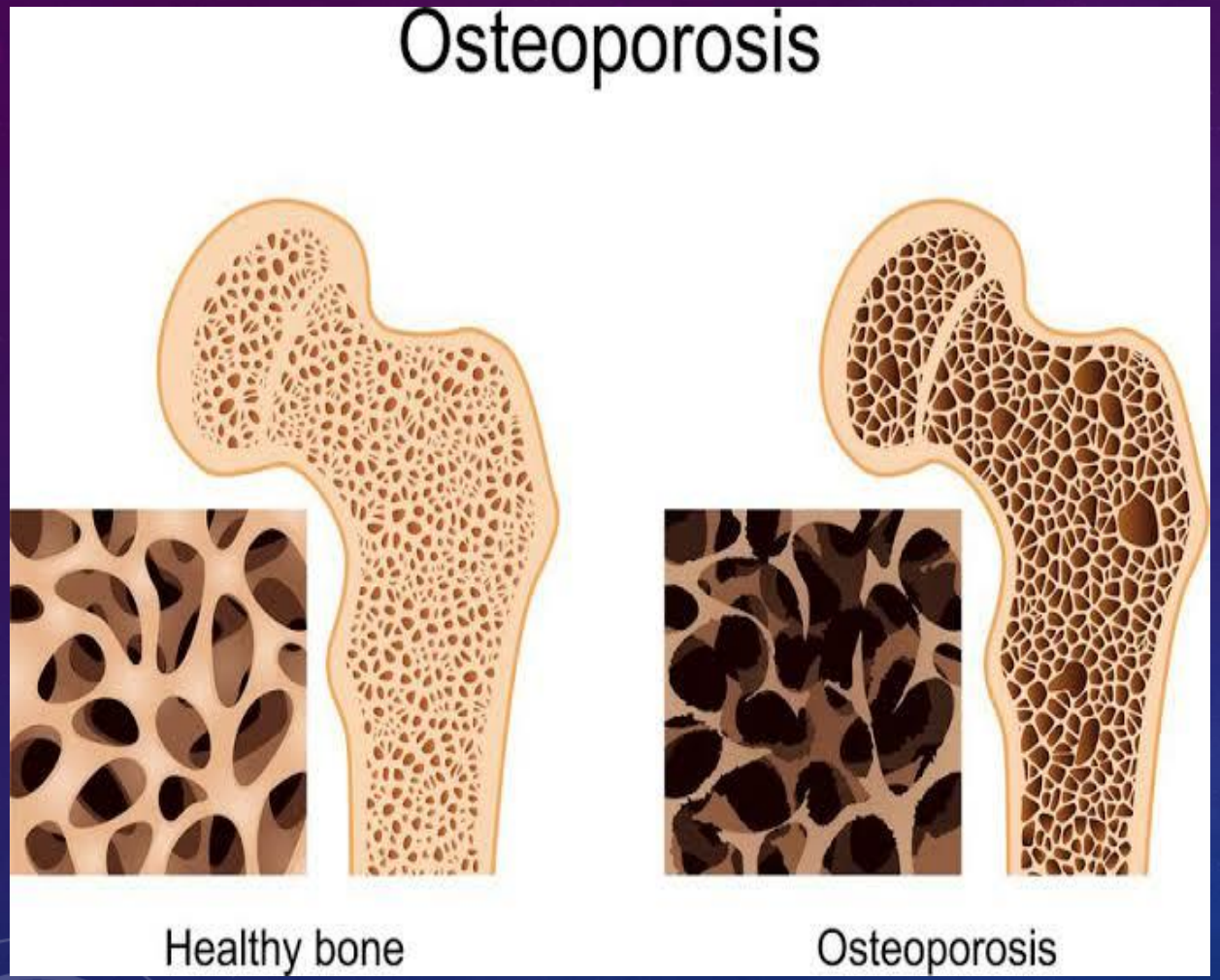
- A disease commonly found amongst Women.
- Bones become fragile, and more likely to fracture.
- CAUSES :
    - Lack of intake of Vit.D/ Calcium.
    - Meanopause (decreased oestrogen level).

RISK FACTORS

Low Body Weight

Family History

Smoking & High Alcohol Consumption

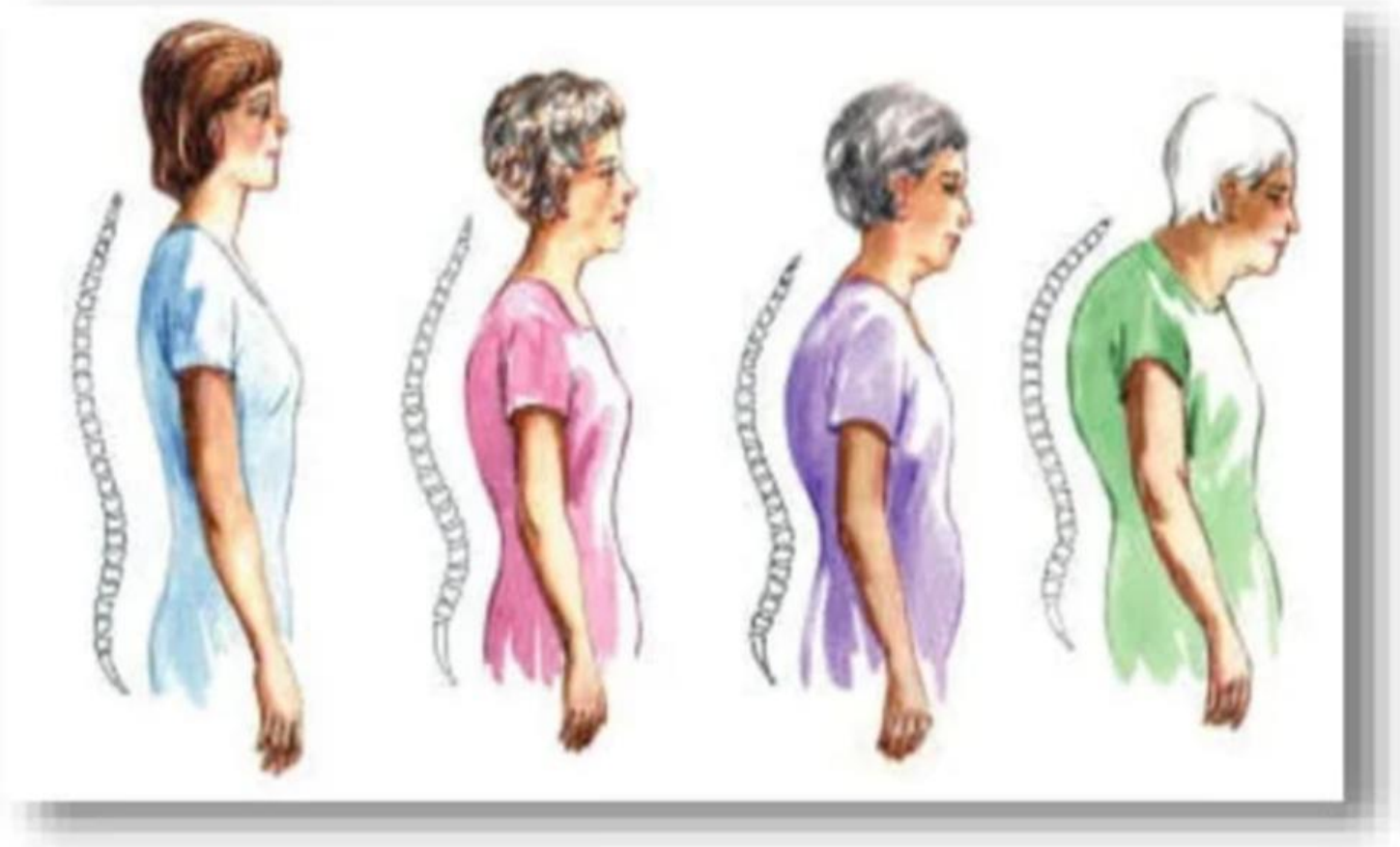

Osteoporosis
Healthy bone
Osteoporosis


Bone:
Normal
Osteoporotic

SYMPTOMS:

- Early Stages :
  - Almost no symptoms.
  - More than often, many will have experienced a fracture before finding out.
- Later Stages :
  - Pain (due to compression fractures).
  - Loss of height.

Clinical Manifestations



DENTAL CONSIDERATIONS

- Associated with Alveolar Bone loss and Increased risk of Periodontal Disease
  - Weakened bone structure
  - Increased Alveolar bone resorption, attachment loss, tooth loss, edentulism.
- Bisphosphonate Therapy
  - Increased risk of osteonecrosis after dental extraction.

- Frequent Dental Visits
  - Scaling and Root planing to prevent progression of periodontal disease resulting in bone loss.
- Denture fit
  - Ill-fitting dentures.
- Susceptible to periodontal bacteria
  - Increased risk for periodontal diseases and tooth loss.

MEDICAL MANAGEMENT

Management

- **Pharmacological**
  - Calcium and vitamin D
  - Bisphosphonates
  - Denosumab
  - Teriparatide
  - SERMs (Selective estrogen receptor modulators)
  - Hormone replacement therapy
  - Calcitonin : no longer used

DENTAL MANAGEMENT

1.All patients should be asked about the current or past use of bisphosphonate drugs and the mode of administration because IV bisphosphonate have a longer half life and patients on IV mode are at more risk for development of ONJ than patients on oral bisphosphonate.

2.Patients yet to start with bisphosphonate therapy should be first examined for requirement of any surgical dental procedures prior to the therapy, if the risk factors allows. Hopeless teeth should be removed. Subgingival scaling should be performed. Poorly fitting dentures should be replaced to avoid soft tissue trauma. Comprehensive treatment should be performed to minimize the need for future dental treatment.

3.For patients who have already started with the therapy, any elective procedures should be avoided if possible to avoid the risk of bisphosphonate induced osteonecrosis of jaw. Root canal treatment should be done rather than dental extraction when possible.

4.Patient should be routinely examined radio graphically for osteonecrosis and baseline data should be recorded for the patient. Certain laboratory test may help to monitor markers of bone turnover and can help in diagnosis and risk assessment of developing bisphosphonate associated osteonecrosis. Bisphosphonates reduces the level of CTx (C-telopeptides) which are fragment of collagen released during remodelling and skeleton turnover. So by assessing the serum CTx levels risk assessment can be done

5.Patients should be educated about the importance of good oral hygiene, regular dental check-ups and also about the symptoms of osteonecrosis of jaw so that patient can report early if the symptoms develop.

6.Patients in which dental extractions are unavoidable should be first consulted with the prescriber of bisphosphonate therapy for possible temporary interruption of drug if beneficial. Extraction should be done as atraumatically as possible and flap raising should be avoided. Sterile technique has to be followed. Patient should be kept on chlorhexidine mouthwash twice daily for two months and postoperatively 2 month follow up should be done. In some cases it has been recommended to do root canal of the teeth followed by coronal amputation and leave the roots.

Diabetes Mellitus

DIABETES MELLITUS

- High blood sugar, because Pancreas dies not produce enough Insulin or cells do not respond to Insulin.
- Male pedilection
- Types:

1. Type 1 DM (Juvenile/Insulin Dependent).
2. Type 2 DM (Adult onset/ Non-Insulin Dependent).
3. Gestational Diabetes.

SYMPTOMS

- Excessive thirst, urination, hunger
- Sudden weight loss
- Increased fatigue
- Increased susceptibility to infections due to lowered immunity

HbA1c (Hb joins with glucose)

- Glycosylated Hemoglobin
- Measured 3-6 monthly to check DM is under control.
- Blood sample from vein or finger prick is needed.
- 6.5% is good for DM patient.
- >7% is not well controlled.

RISK FACTORS

TYPE 1	TYPE 2
Genes	Age > 45 years old
Environment	Pre-diabetes (DM during prev. pregnancy)
Diet	Given birth to a baby > 9 pounds
Chemicals and Drugs	Impaired glucose tolerance
	Distribution of fats: Excess body weight(esp. around waist)
	Family history of DM
	Inactivity: Low activity level (exercising < 3 times a week)

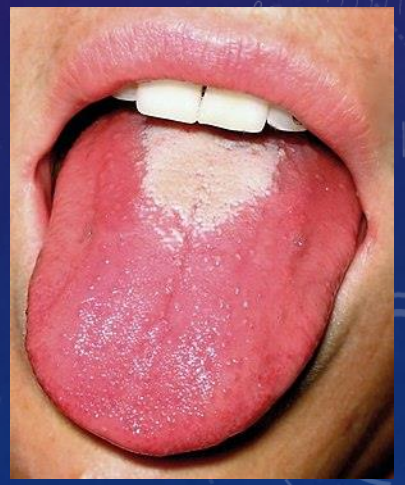
Gestational Diabetes :

- Greater than 25 years old
- Family or personal health history
- Excess weight
- Nonwhite race

ORAL MANIFESTATIONS

- Compromised periodontal health
- Candidiasis (denture wearers)
- Dry mouth/ sialosis -> increased caries
- Glossitis
- Burning mouth syndrome
- Oral, facial dysasthesia
- Poor response to periodontal therapy
- Dental infections

Candidiasis

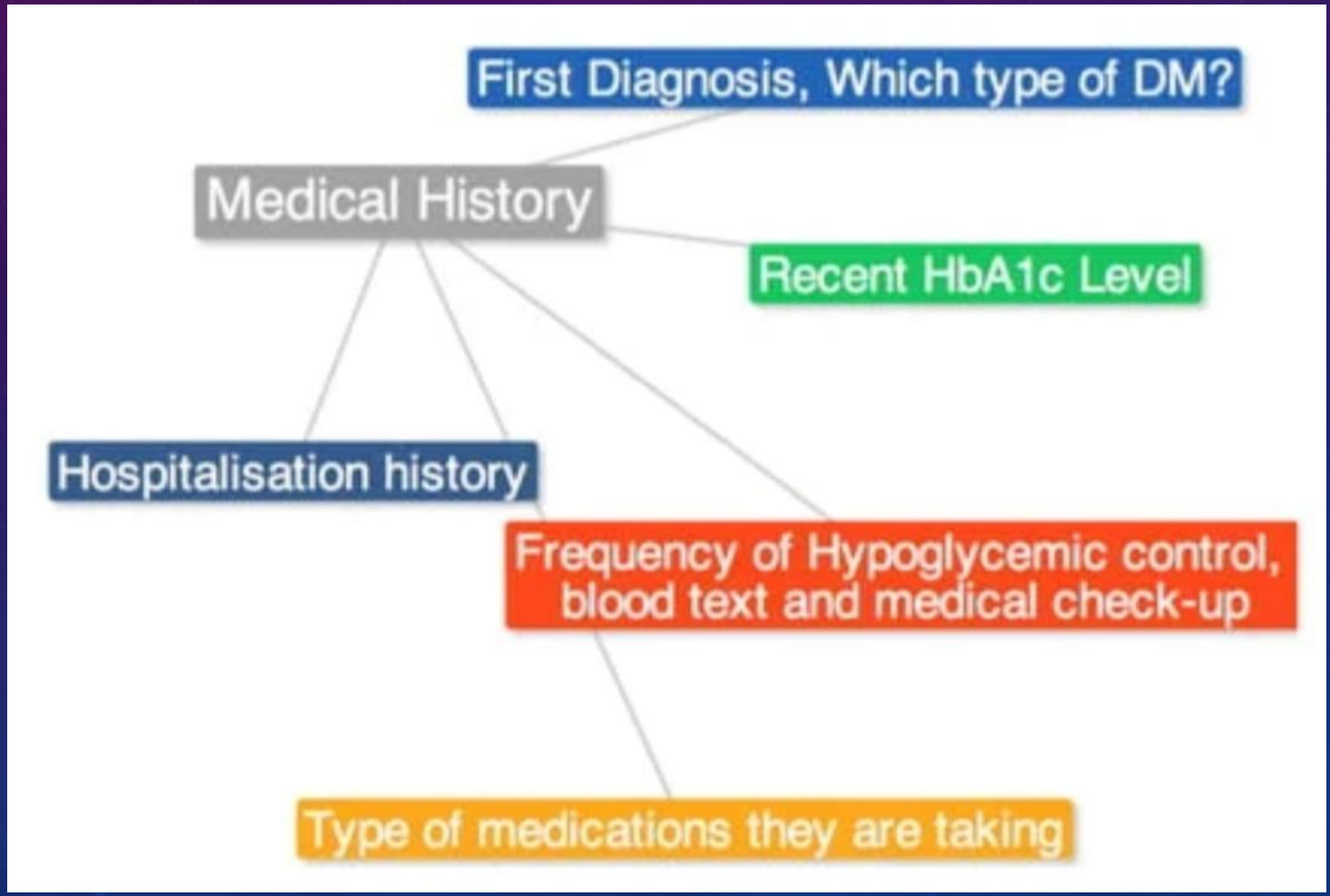


Glossitis

Burning mouth syndrome

- Enlarged salivary gland
- Xerostomia
- Poor wound healing
- Severe cases of periodontal disease

PATIENT MANAGEMENT



- When a patient comes to the dental clinic for tooth extraction and declares that he is a diabetic, the principles of treatment must be followed accordingly:

(1) Establish if the patient is controlled with diet alone, tablets, or insulin injections.

(2) Diabetic patients are immunocompromised and required early treatment of infections.

(3) Controlled diabetic patients listed for standard dental extraction do not need prophylactic antibiotics. However, uncontrolled ones need antibiotic prophylaxis.

(4) Hypoglycemia must be avoided as it may cause brain damage.

- fasting blood glucose level of 240 mg/dl is a critical point for any dental treatment. When blood glucose levels reach (240 mg/dl), warning signs of diabetes start coming out .
- These signs include tingling in hands or feet, nausea, vomiting, diarrhea, and dizziness.
- An emergency tooth extraction at a blood glucose level of 240 mg/dl will lead to severe infection and delay socket healing because the blood starts to build-up a high concentration of ketones.
- Blood glucose levels for selective/emergency tooth extraction under LA should be considered acceptable if the dental treatment can be achieved with the minimal levels of risk or in other words with no sign of out of control diabetes. So, fasting blood glucose level of 180 mg/dl is a cut-off point for any selective dental extraction. However, random blood glucose level (2 h after a meal) of 234 mg/dl is a cut-off point for an emergency tooth extraction

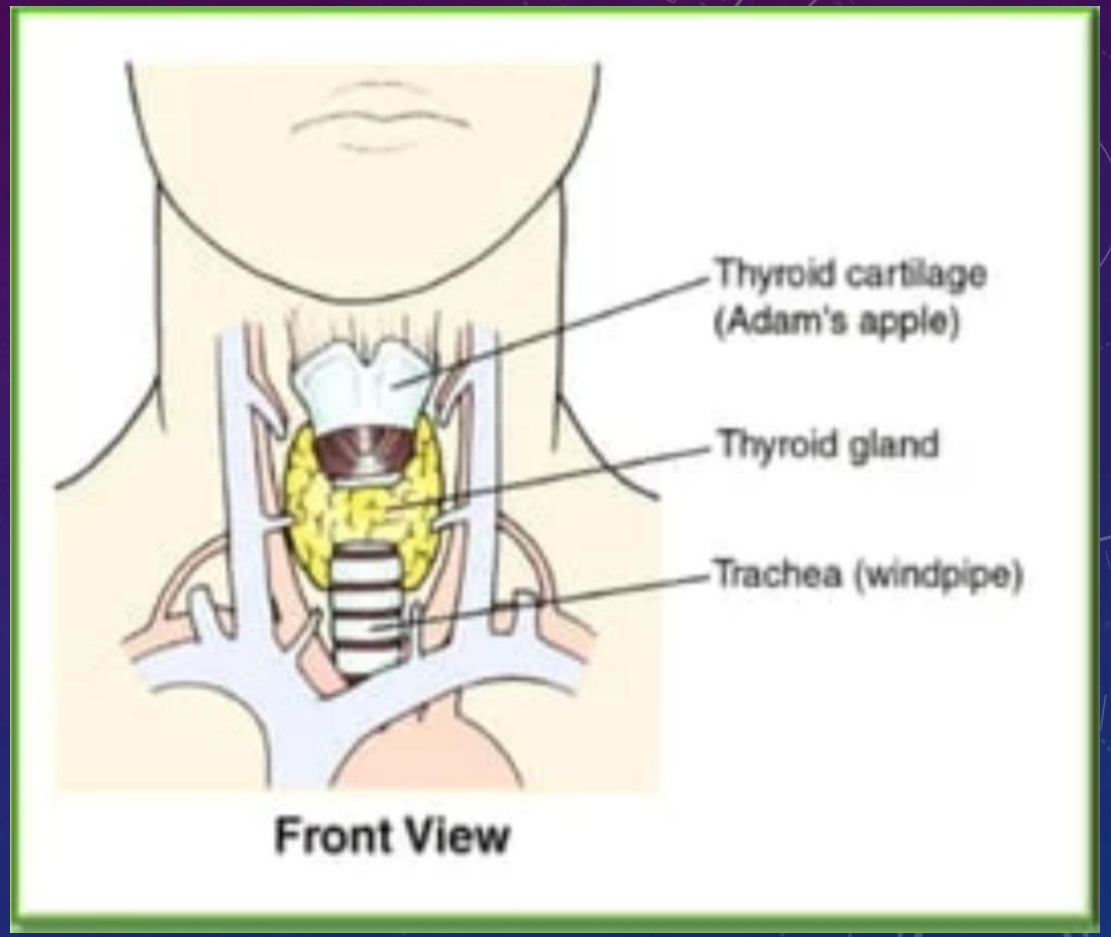
- Scheduling dental visits:
  - Early morning because blood sugar is higher at this time
  - Regular dental visits
- Infection and wound healing
  - Post-op antimicrobial and antibiotic therapy
  - Avoidance of smoking
- Diet
  - Ensure patient has eaten normally and taken medicines as usual

- Advice:
  - Eat healthy
  - Exercise regularly
  - Take medications on time
  - Frequent medical checkup (HbA1c)

Hyper/Hypo thyroidism

ABOUT THE THYROID

- Secretes 3 hormones:
    1. Thyroxine(T4)
    2. Triiodothyronine(T3)
    3. Calcitonin : regulate Ca and P levels, skeletal remodelling



- Thyroid hormones influence the growth and maturation of tissues, energy metabolism and turnover of both cells and nutrients.

Hyperthyroidism and Hypothyroidism are most common thyroid disorders in women between the age of 20 and 50, who are also five times more likely than men to develop thyroid disorders

Hyperthyroidism *is the condition caused by unregulated production of thyroid hormones (Decrease TSH, Increase T3, T4)*

Hypothyroidism *is caused by thyroid hormone production and thyroid gland function (Increased TSH, decreased T3, T4)*

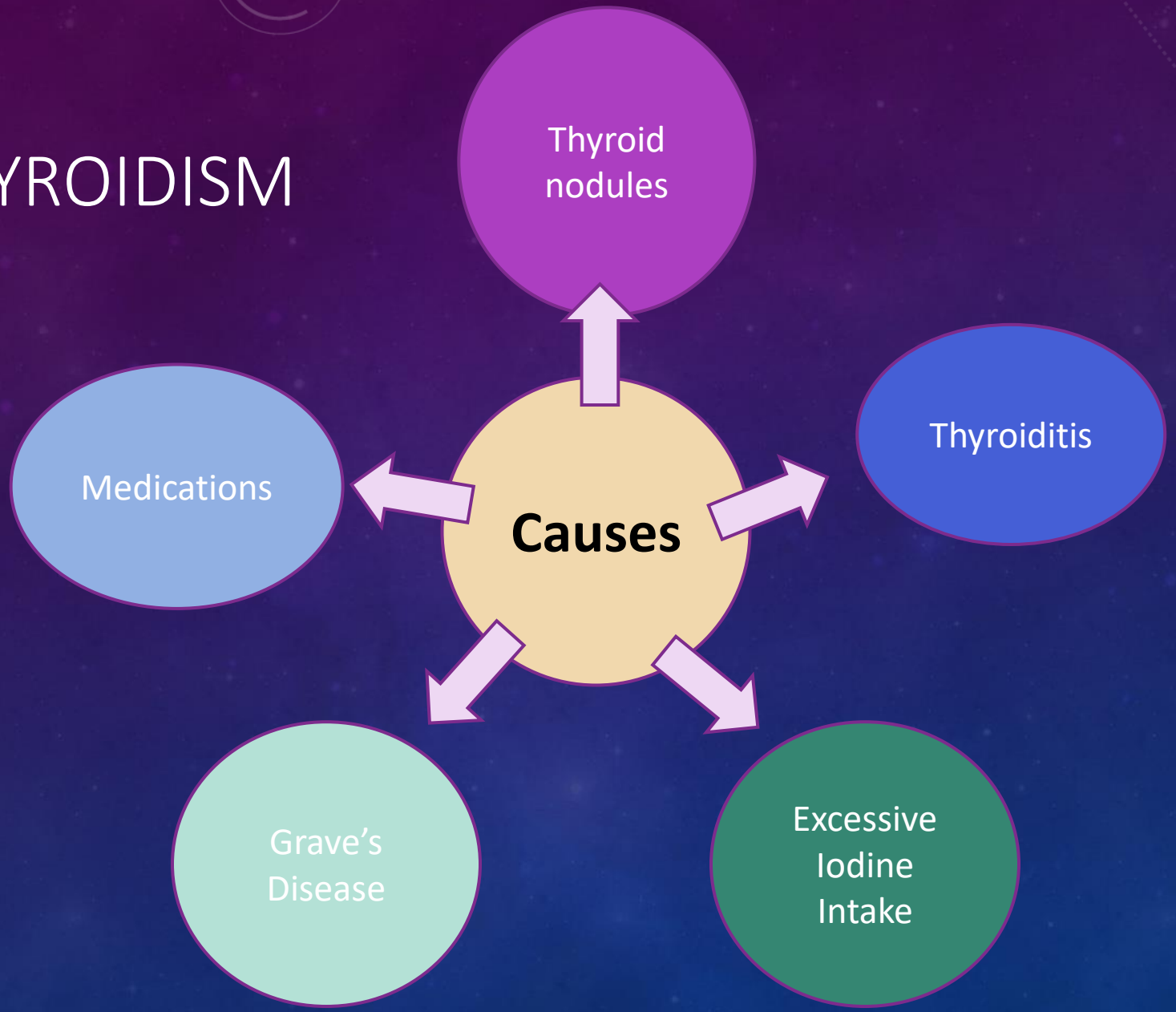
Thyroid Gland Disorders:
SYMPTOMS

HYPERTHYROIDISM	HYPOTHYROIDISM
1. Nervousness	1. Fatigue
2. Anxiety	2. Cold intolerance
3. Hand tremors	3. Thin brittle hair or fingernails
4. Goiter	4. Weight gain, easily with normal diet
5. Weight loss, despite increased appetite	5. Weakness
6. Heart palpitations	6. Goiter
7. Heat intolerance	
8. Increased perspiration	

Hyperthyroidism

HYPERTHYROIDISM

Causes :



Other risk factors

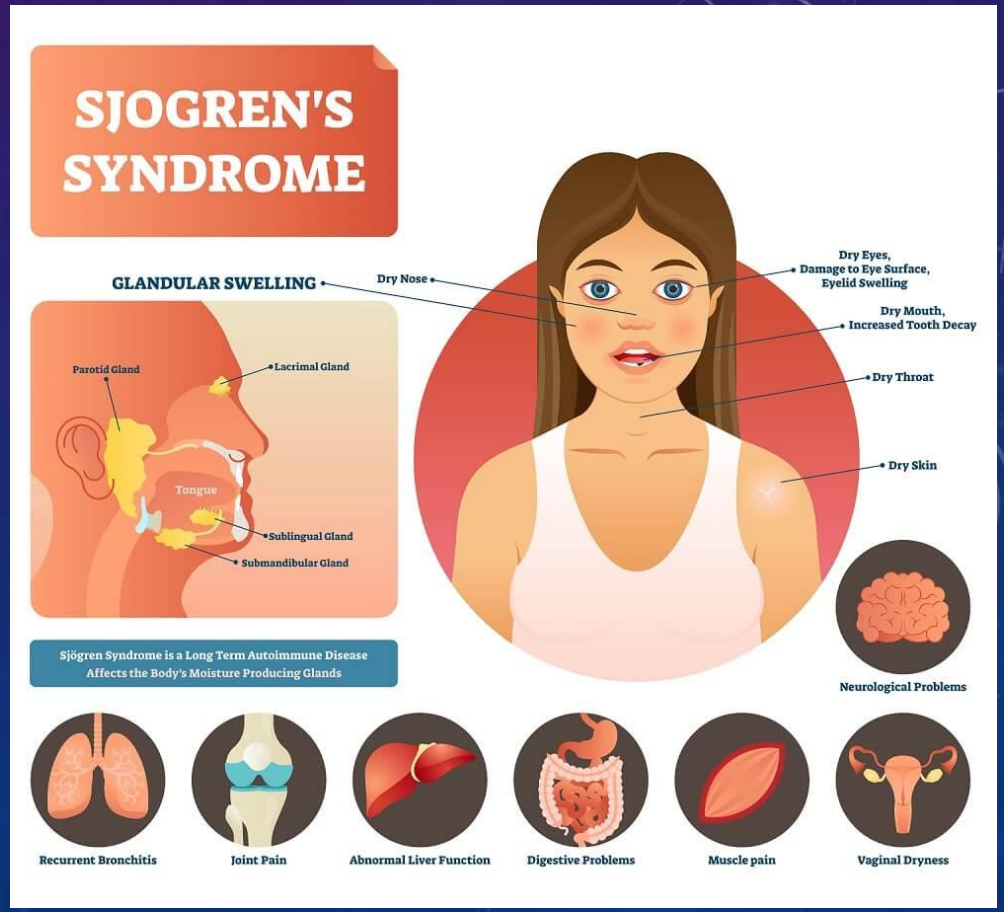
- Gender
- History
- Age
- Smoking
- Trauma to the thyroid
- Major stress

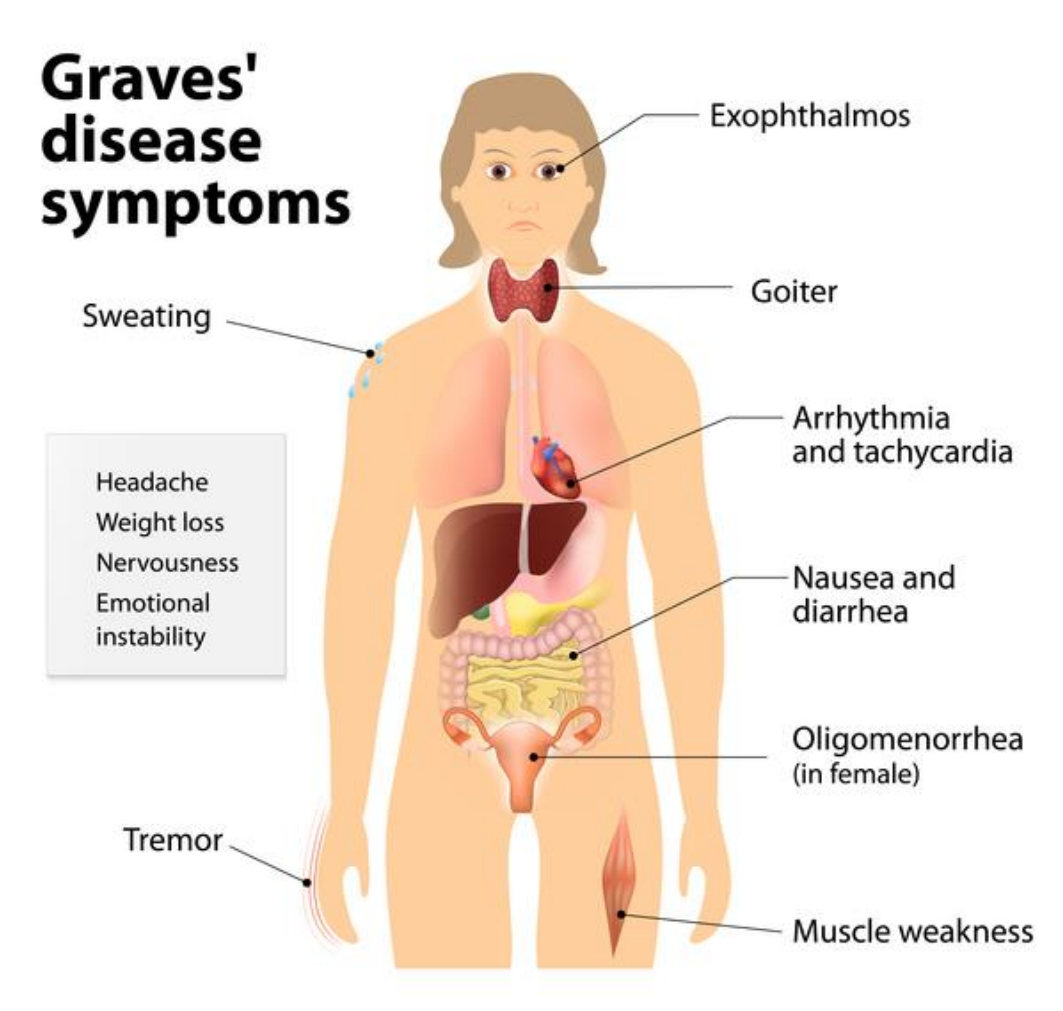
DENTAL CONSIDERATIONS

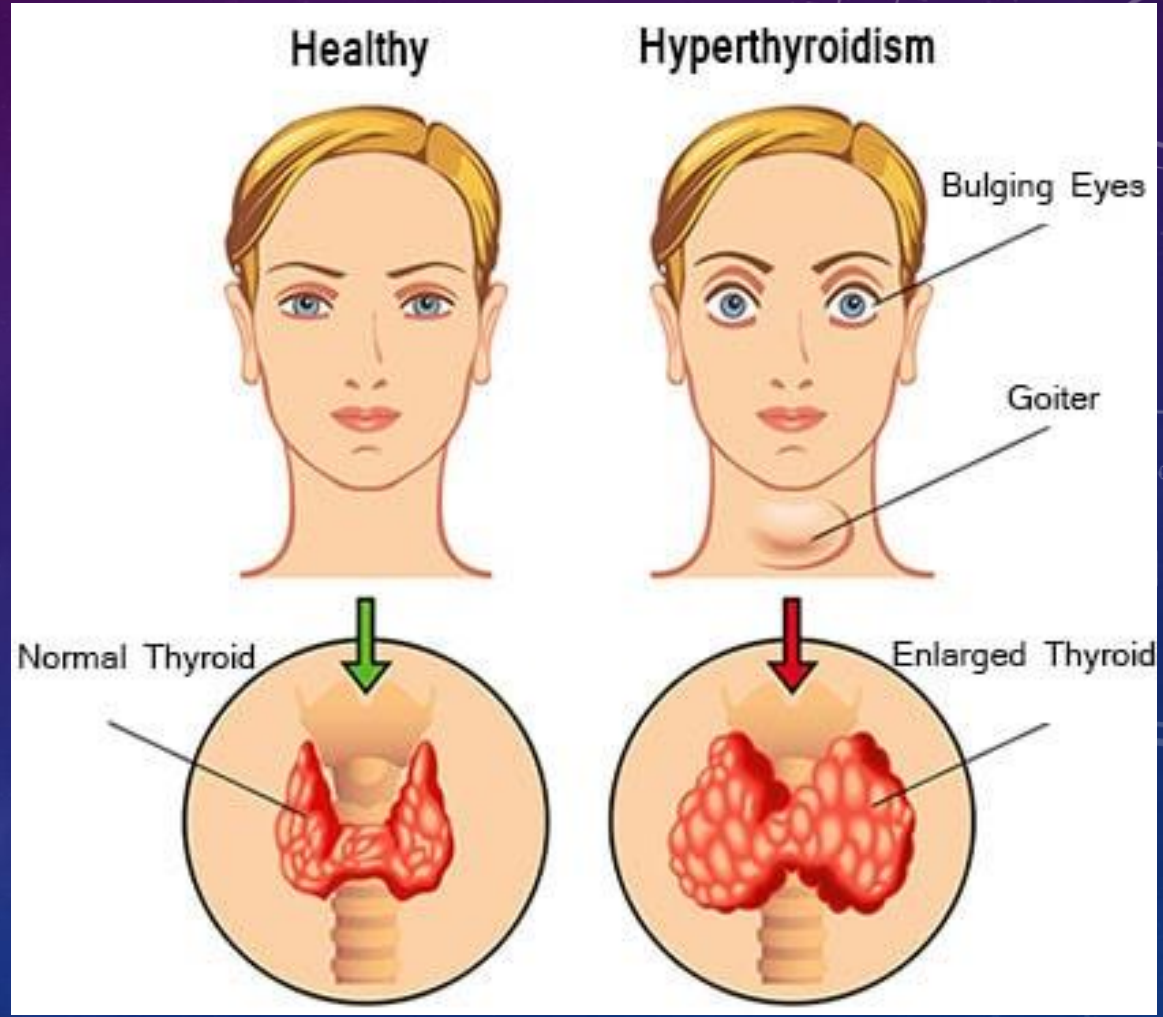
Burning mouth syndrome

Oral Manifestations :

- Enlargement of extra glandular thyroid tissue
- Accelerated dental eruption
- Burning mouth syndrome
- Increased susceptibility to caries
- Periodontal disease
- Maxillary and Mandibular osteoporosis
- Sjogren's syndrome
- Grave's disease




Graves' disease symptoms
Exophthalmos
Goiter
Sweating
Arrhythmia and tachycardia
Headache
Weight loss
Nervousness
Emotional instability
Nausea and diarrhea
Oligomenorrhea (in female)
Tremor
Muscle weakness


Healthy
Hyperthyroidism
Bulging Eyes
Goiter
Normal Thyroid
Enlarged Thyroid

MEDICATIONS

- Anti-thyroid drugs: *Methimazole, P*ropylthyouracil
- Radioactive Iodine
- Beta-blockers and iodides.

PATIENT MANAGEMENT

Our role: Look out for signs and symptoms to aid in early diagnosis. If a suspicion of thyroid disease arises for an undiagnosed patient, all elective dental treatment to put on hold until full medical evaluation.

1. Brief and stress-free appointments

2. NO local anaesthetic with epinephrine and epinephrine impregnated cord for uncontrolled hyperthyroidism

3. Side effects: Propylthiouracil
   - agranulocytosis
   - Sialolith
   - prolonged bleeding due to warfarin

4. Susceptible to infections due to drug side effects

5. Dietary advice: Avoid iodized salt, seafood

Ref. Indian Journal of Endocrinology and Metabolism.

DENTAL MANAGEMEMT

- Hemostasis - Patients with hyperthyroidism may have elevated blood pressure and heart rate on the basis of the effects of thyroid hormone on sympathetic nervous system activity. Patients with high arteriolar pressures may require increased attention and a longer duration of local pressure to stop bleeding. Hyperthyroid patients who are on warfarin sodium have increased metabolism of this drug, leading to alteration in previously therapeutic coagulation indices.
- Anti-thyroid drugs namely propylthiouracil (PTU) has anti-vitamin K activity and can cause hypoprothrombinemia and bleeding that poses a risk for hemorrhage. Thus, patients taking PTU must be carefully evaluated before surgery or invasive dental treatment.

- Susceptibility to infection - Thionamides may cause a very rare reaction of agranulocytosis (0.5% of patients) that can result in oral infections and inadequate wound healing. These post-operative complications could be prevented if clinicians carefully follow precautions stated with thionamides.
- Drug actions and interactions – Combination analgesics containing acetylsalicylic acid (ASA) are contraindicated in patient with hyperthyroidism because ASA interferes with the protein binding of T_4 and T_3, thereby increasing their free form. This may worsen the symptoms of thyrotoxicosis.
- NSAIDs should also be used with caution in the patients who have hyperthyroidism and who take β-blockers, as the former can decrease the efficiency of the latter. Pain, however, can complicate cardiac functions in patient who have hyperthyroidism and symptomatic disease, and alternative pain medications need to be instituted.

- One way the dental professional can protect the thyroid gland is to use a thyroid collar while taking patient X-rays. The thyroid is extremely sensitive to radiation, and excessive radiation exposure is a known risk factor for various thyroid conditions.
- Awareness of the condition and current stage of treatment is important in understanding the possible modifications needed for dental treatment. Length and current state of therapy are important in understanding the metabolic control of patients.
- Consultation with the patient's primary care physician or an endocrinologist is warranted if any sign or symptom of thyroid disease is noted on examination.

- Stress reduction, awareness of drug side effects or interactions, and vigilance for appearance of signs or symptoms of hormone toxicity are among the responsibilities of the oral health care provider.
- Dental treatment modification may be necessary for dental patients under medical management and follow-up for a thyroid condition. If a suspicion of thyroid disease arises for an undiagnosed patient, all elective dental treatment should be postponed until a complete medical evaluation is performed.
- A medically well-controlled patient will have no contraindications to have dental treatment.

HYPOTHYROIDISM

HYPOTHYRODISIM

- Caused by insufficient secretion of thyroxin by thyroid gland.
- ***Causes*** -
- Thyroiditis
- Insufficient thyroid replacement
- Post-thyroidectomy
- Post-radioactive iodine therapy.

CLINICAL FEATURES

- IN CHILDRENS - HOARSE CRY, COSTIPATION, RETARDED MENTAL & PHYSICAL GROWTH, HYPOTHERMIA, SKIN IS DRY TO TOUCH, FINGER NAILS ARE BRITTLE.
- IN ADULTS - WEAKNESS, COLD INTOLERANCE , LETHARGY SKIN DRYNESS,HEADACHE
- IN LATER STAGES - . ANOREXIA, SLOWING OF INTELLECTUAL AND MOTOR ACTIVITY ,ABSCENCE OF SWEATING, MODEST WEIGHT GAIN, COSTIPATION. PALLAR,DYSPNEA PUFFINESS OF FACE , DELAYED RETURN OF DEEP LENDON REFLEXES, THYROID GLAND MAY BE ENLARGED.

HYPOTHYROIDISM

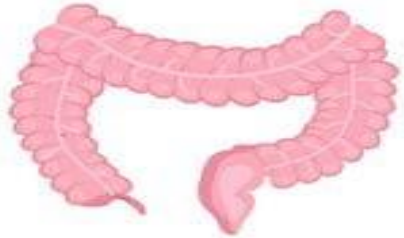
obesity

intolerance to cold

depression

hair loss

slow heartbeat



constipation

menstrual changes

fatigue

joint pain

Oral manifestations.

1) Teeth-Delayed dental development & Late exfoliation of primary teeth. Enlarged pulp chambers. Enamel hypoplasia.

2) Jaw bone-Mandible is underdeveloped because of Retarded condylar growth.

3) Tongue- Tongue is enlarged by a oedema fluid

4)Skull -Base of skull is shortened leading to a of the retraction of the bridge of . nose with Flaring.

ENLARGED TONGUE

Dental Considerations :

1) Precautions -Use of sedative & analgesics are dangerous as these agents tend to precipitate coma in patient with hypothyroidism

2) Other therapy - like supporting respiration, narcotic antagonist & oxygen can be given if necessary

3)Hospitalization- if severe patient should be immediately hospitalized.

Oral manifestations:

- Delayed dental eruption
- Salivary gland enlargement
- Macroglossia
- Glossitis (swollen tongue)
- Compromised periodontal health- delayed bone formation
- Dysgeusia (distortion of taste)
- Delayed wound healing

Medications: Synthroid. levothyroxine, armour thyroid

DENTAL MANAGEMENT

- ***Hemostasis*** - Patients with long standing hypothyroidism may have increased subcutaneous mucopolysaccharides due to decrease in the degradation of these substances. The presence of excess subcutaneous mucopolysaccharides may decrease the ability of small blood vessels to constrict when cut and may result in increased bleeding from infiltrated tissues, including mucosa and skin. Local pressure for an extended time will probably control the bleeding from the small vessels adequately.
- ***Susceptibility to infection*** - Patient with hypothyroidism may have delayed wound healing due to decreased metabolic activity in fibroblasts. Delayed wound healing may be associated with an increased risk for infection because of the longer exposure of the unhealed tissue to pathogenic organisms. Hypothyroid patients are not considered to be immunocompromised.

- Patients who have hypothyroidism are susceptible to cardiovascular disease from arteriosclerosis and elevated LDL. Before treating such patients, consult with their primary care providers who can provide information on their cardiovascular statuses. Patients who have atrial fibrillation can be on anticoagulation therapy and might require antibiotic prophylaxis before invasive procedures, depending on the severity of the arrhythmia. If valvular pathology is present, the need for antibiotic prophylaxis must be assessed.

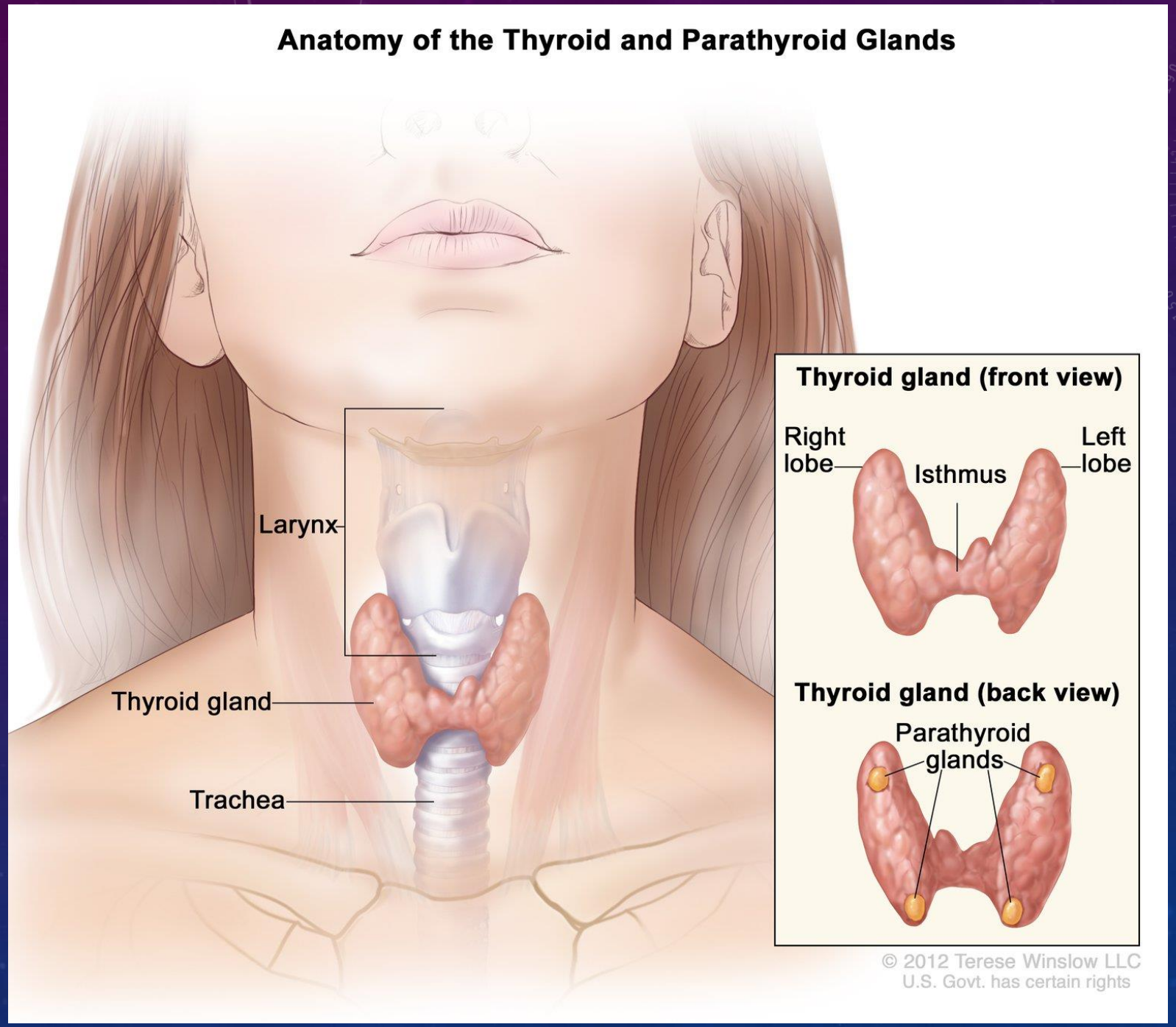
- ***Drug actions and interactions*** - Patients who have hypothyroidism are sensitive to central nervous system depressants and barbiturates, so these medications should be used sparingly.

HYPERPARATHYROIDISM

HYPERPARATHYROIDISM

- Excess of circulating parathyroid hormone.
- Excess PTH stimulates osteoclast to mobilize from skeleton leading to hypercalcemia in addition to PTH increased renal tubular re-absorption of calcium.

Anatomy of the Thyroid and Parathyroid Glands

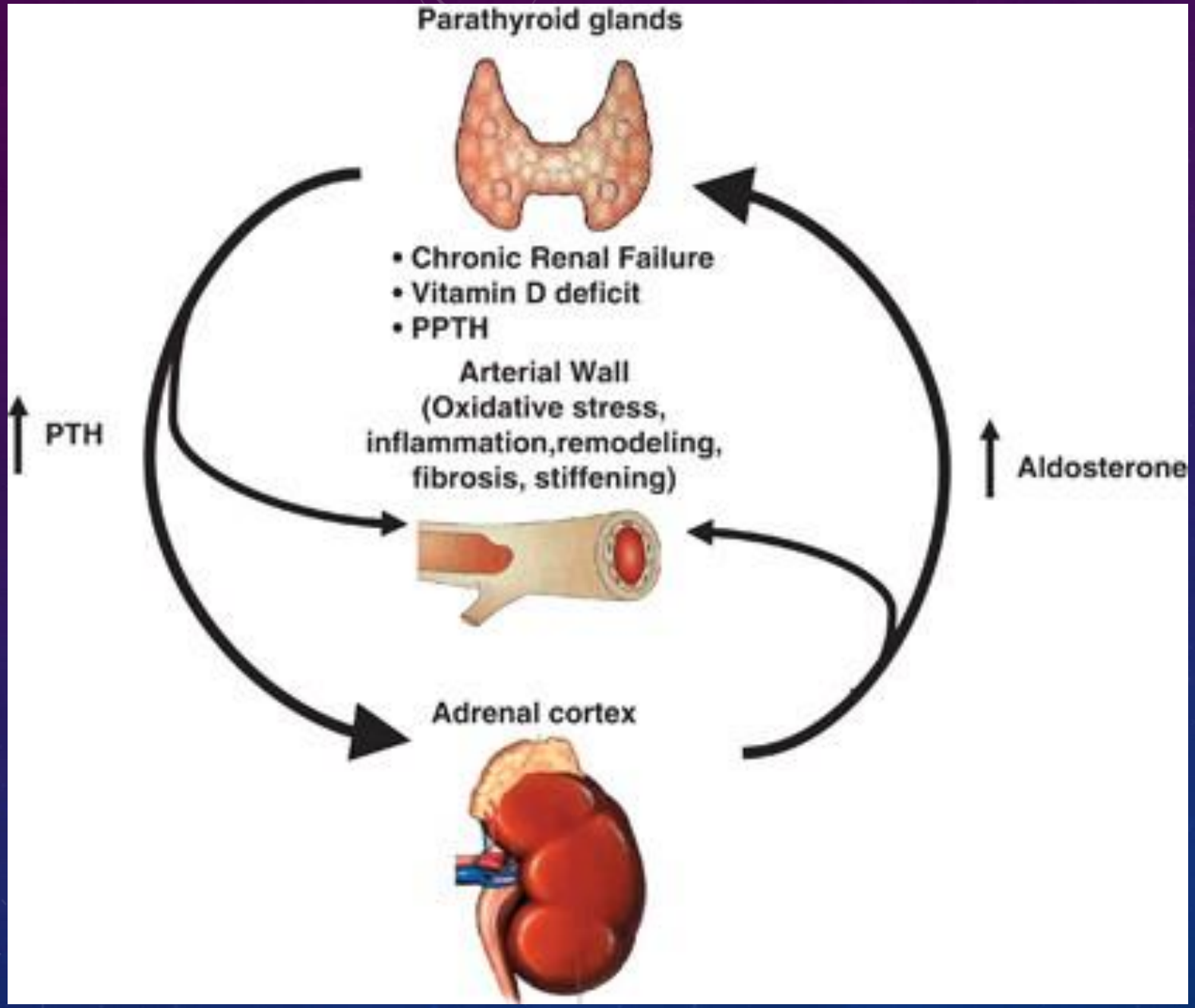


TYPES OF HYPERPARATHYROIDSM

TYPES.

1) PRIMARY- AUTONOMOUS SECRETION OF PARATHYROID HORMONE (PTH) BY HYPERPLASIA. BENIGN & MALIGANT TUMOR OF ONE MORE OF PARATHYROID GLAND.

(2) SECONDARY- COMPENSATORY INCREASE IN PTH IN RESPONSE TO HYPOCALCEMIA.



Mechanism of action

CLINICAL FEATURES

1)CLASSIC TRAD= PRESENCE OF KIDNEY STONES, RESORPTION OF BONE, DUODENAL ULCERS

2) RENAL CALCULI - HEMATURIA ,URINARY TRACT INFECTIONS, BACK PAIN.

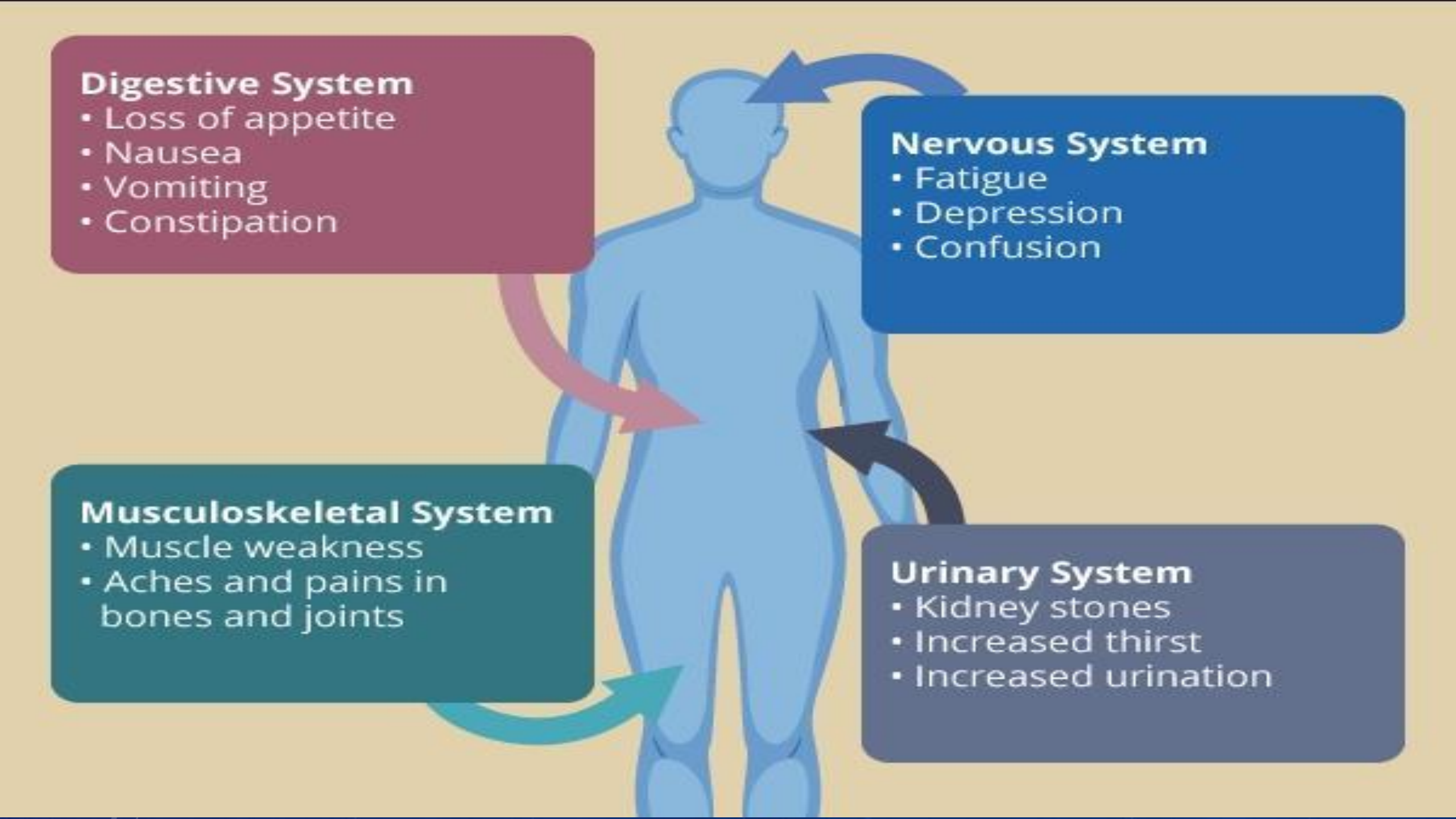
3)PSYCHOLOGICAL PROBLEMS

4) BONE - BONE PAIN, PATHOLOGICAL FRACTURES,

BONE DEFORMITIES.

5) HYPERCALCEMIA- MUSCLE WEAKNESS, WEIGHT LOSS, FATIGUE, INSOMNIA, POLYDIPSIA , POLYURIA, HEADACHE.

6) GIT PROBLEMS - ANOREXIA, NAUSEA, VOMITTING, CRAMPY PAIN.


Digestive System
• Loss of appetite
• Nausea
• Vomiting
• Constipation
Nervous System
• Fatigue
• Depression
• Confusion
Musculoskeletal System
• Muscle weakness
• Aches and pains in bones and joints
Urinary System
• Kidney stones
• Increased thirst
• Increased urination

Oral manifestations

1) Brown tumor = it may develop peripherally or centrally.

2) Teeth- gradual loosening-drifting & loss of teeth malocclusion

Radiological Features

1) Demineralization of skeleton.

2) Moth-eaten appearance

BROWN TUMOR

Braz J Otorhinolaryngol. 2010;76:404

Dental Management

1) Vit -D supplement to prevent skeletal demineralization

2)Precaution = restriction of dietary phosphate, Phosphate binding agent & aluminium salts should be done.

3)The clinical management of these patients requires special consideration. We should know that there is a higher risk of bone fracture, so we must take precaution in surgical treatments. Before providing endodontic treatment, a thorough medical history taking is important as in some instances, these lesions appear as a radiolucency the periapical region of teeth and can lead to a misdiagnosis of a lesion of endodontic origin.

HYPOPARATHYROIDISM

HYPOPARATHYRODISM

- Uncommon Condition in which there is insufficient secretion of parathyroid hormone.
- There is hypocalcemia due to loss of parathyroid hormone can lead to tetany.

CLINICAL FEATURES

1) HYPOCALCEMIA - LEAD TO TETANY

2) STIFFNESS IN HANDS, FEET & LIPS. TINGLING IN CIRCUMORAL AREA, FINGERS & TOES.

3) ANXIETY, DEPRESSION, EPILEPSY

4) REDUCTION IN INTELLECTUAL CAPACITY DUE TO CALCIFICATION. WITHIN THE BRAIN.

Oral manifestations

1) Teeth -Hypoplasia of enamel ,delayed eruption ,external root resorption, root dilaceration, blunting of of molar roots.

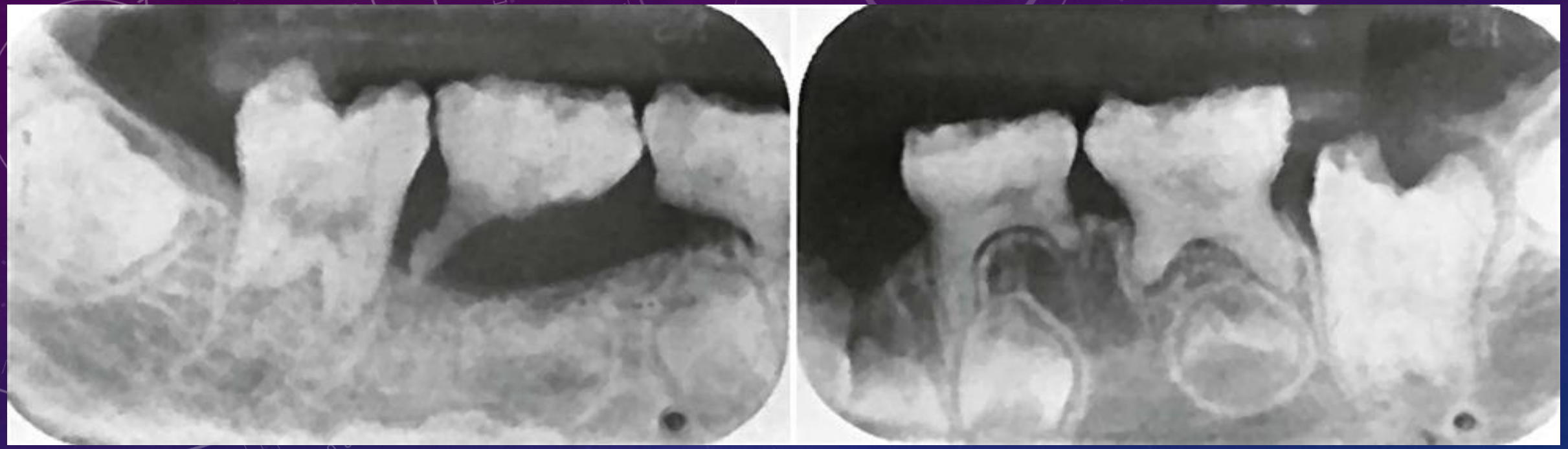
2) Chvostek sign -a sharp tap over the Facial nerve, in front of ear causes muscle twitching of Facial muscle around the mouth which is called Chovstek sign

3)Candidiasis –Associated with endocrine – Candidiasis syndrome.

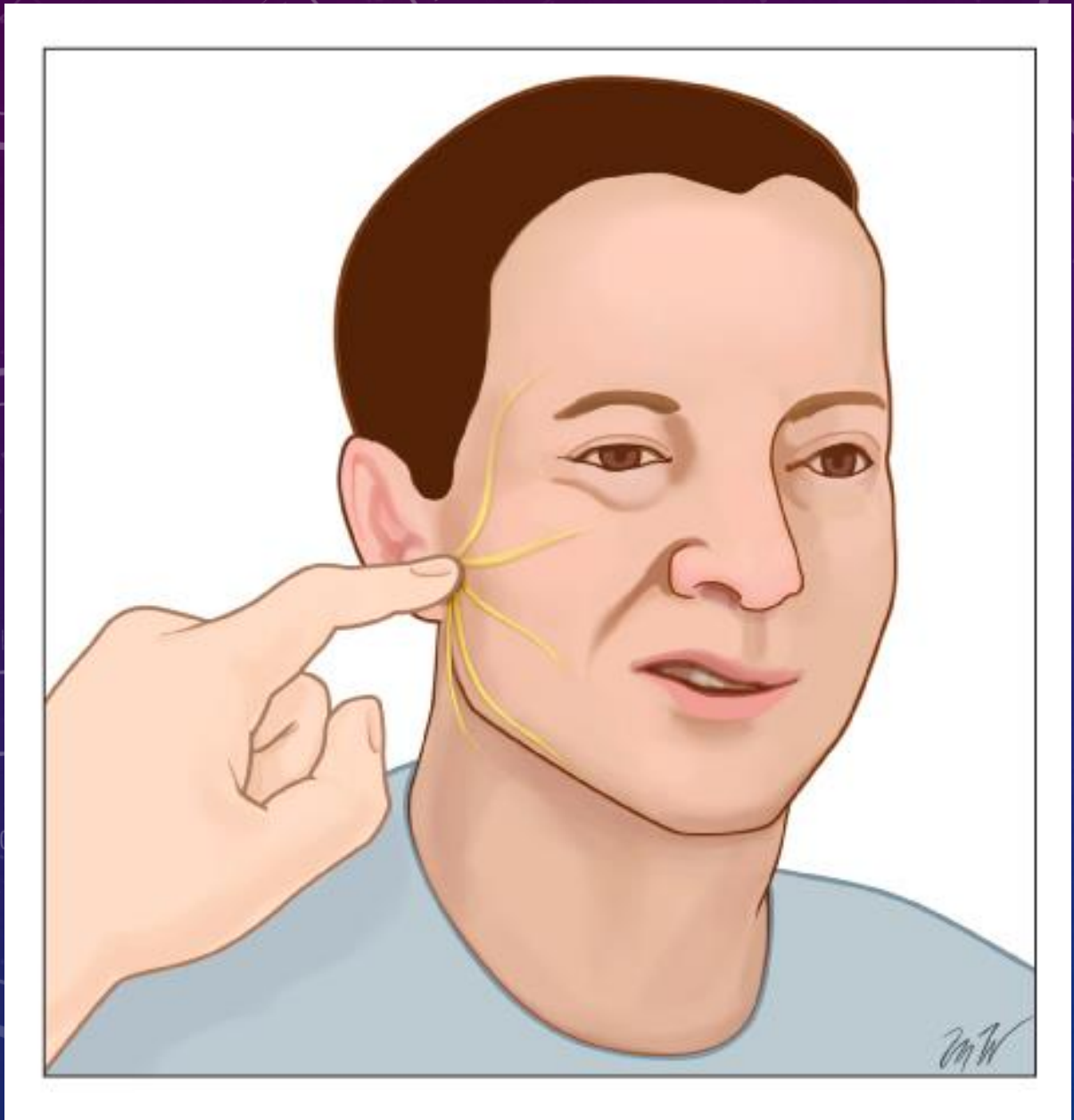
Congenital Hypoparathyroidism

- Hypoplasia of the teeth, shortened roots, and retarded eruption

Endocrine Candidiasis disorder



EXTERNAL ROOT ABSORPTION



CHVOSTEK SIGN

Dental Management :

1) Calcium & Vit-D supplement.

2) Intravenous calcium gluconate.

3) These patients have more susceptibility to caries because of dental anomalies. Dental management will be the

prevention of caries with periodic reviews, advice regarding diet and oral hygiene instructions. Before performing dental treatment, serum calcium levels should be

determined. They must be above 8mg/100ml to prevent

cardiac arrhythmias, seizures, laryngospasms or bronchospasms. Hypopara

THANKYOU