CRASH COURSE IN ORAL PATHOLOGY

DENTISCOPE

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DENTISCOPE 2020

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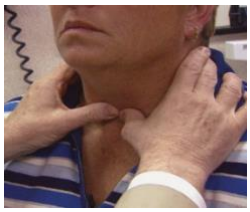
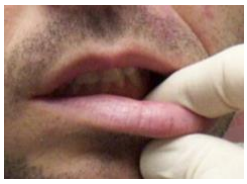
EXTRA / INTRA ORAL EXAMINATION

Examination is done initially and at every recall.

Extra oral examination: BE SYSTEMATIC TO MAKE SURE YOU DON'T MISS ANY PART

1- **Face** [note skin color, facial swellings or asymmetries]
2- **TMJ** [note any deviation on mouth opening, clicking, popping tenderness in the muscles of mastication]
3- Palpate **lymph nodes** [sub mandibular, sublingual, pre and post auricular, cervical, supra clavicular lymph nodes]
4- Palpate the **thyroid gland** [place both hands on the trachea and ask the pt to swallow – the thyroid gland moves upward]
5- **Lips** exmaination [note the vermilion border, lip color and then **Bi-digitally** palpate the tissue around the lips , avert the lips and examine the internal surface and frenal attachments]





Intraoral exmaination:

1- **Buccal vestibule** [note the color + palpate the vestibules and check stenson's duct opening for any inflammation or blockage]
2- **Gingiva** [note color, consistency and texture]
3- Examine the **hard palate** [note any tori present or any swelling of the minor salivary glands]
4- Exmaine **soft palate** + tonsils [ask the pt to say AHHH]
5- **Tongue** [wrap the tip of the tongue with gauze and pull it from side to side to observe the lateral borders of the tongue]
6- **Floor of the mouth [** palpate **bi manually +** exmaine wharton's duct fro any signs of inalmmation or blockage**]**
7- Exmaine **occlusion**

Tongue and floor of the mouth are the most common sites for oral cancer

2. Which one of the techniques listed below would be appropriate for palpating the buccal and labial mucosa?

a. Digital
b. Bidigital
c. Bilateral
d. Bimanual
e. Unilateral

1. All of the following structures would be noted when examining the oropharynx except one. Which one is the EXCEPTION?

a. Tonsils
b. Adenoids
c. Tonsillar crypt
d. Anterior/posterior pillars
e. Posterior pharyngeal wall

https://quizlet.com/216119896/the-intraoral-and-extraoral-exam-dentalcare-flash-cards/

DESCRIBING LESIONS

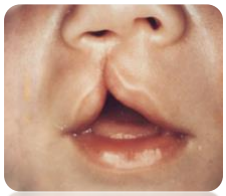
When describing any lesion you need to mention:

1- radiodensity [radio opaque, radiolucent or both]
2- site [where is it exactly in the maxilla or the mandible]
3- size [either measured in Cm or according to it's boundaries in 2 dimensions (lesion extending from this area to this area)]
4- shape [unilocular / multilocular , oval / round/ kidney shaped/ irregular shaped]
5- outline [well / poorly defined , smooth / ragged/ moth eaten/ corticated margin]
6- effect of lesion on adjacent teeth [resorption, PDL widening, Lamina dura obliteration, displacement , delayed eruption]
7- effect of lesion on adjacent bone [bone expansion, resorption, displacement of structure like the inferior dental canal]
8- how long the lesion has been present

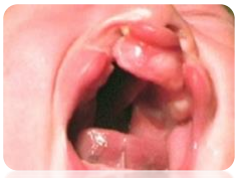
DEVELOPMENTAL DEFECTS OF THE ORAL & MAXILLOFACIAL REGION

DEVELOPMENTAL DEFECTS OF THE LIP & PALATE

- Central face develops → end of 4th week of intrauterine life
- Upper lip develops → 6- 7th week of intrauterine life
- Primary palate → forms by the fusion of the medial nasal processes
- Secondary palate → formed from the maxillary processes at week 6 of intrauterine life
- Fusion of the palatal shelves begins anteriorly and proceeds posteriorly and end at week 12



Cleft lip : wedge shaped defect caused by the failure of fusion between the **medial nasal process and the maxillary process**



Cleft palate : oro nasal communication caused by the failure of fusion between **the 2 lateral portions of the palate**

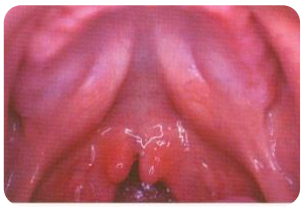
Cleft lip & palate:

Causes of cleft lip and palate: [CL & CP]

1- Maternal alcohol and smoking
2- Maternal consumption of corticosteroids / anticonvulsants
3- Folic acid / riboflavin deficiency
4- Excess vitamin A
5- Relative ischemia to the areas and infections
   - **CL +/- CP** is more common in **males** but **isolated CP** is more common in **females**
   - Most CL is **unilateral** and on the **left side**

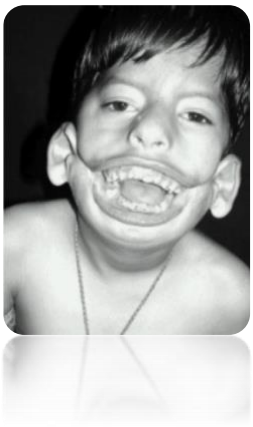
Submucous palatal cleft :

- the mucosa is intact – the cleft is in the muscles of the soft palate
- There is a notch in the bone along the posterior border of the hard palate



- Cleft uvula

Lateral facial cleft :



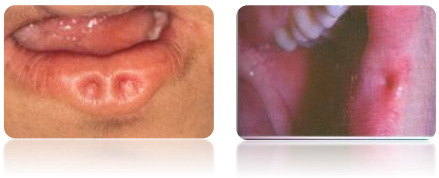
- lack of fusion b/w maxillary and mandibular processes
- Extends from commissures to the ears → Macrosomia [baby is larger than normal]

Oblique facial cleft:

- Failure of fusion of the lateral nasal process and the maxillary process
- Extends from the upper lip to the eye
- **Always associated with cleft palate**

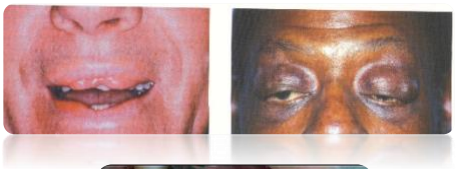
Median cleft of the upper lip: Failure of fusion of the medial nasal processes

Congenital lip pits:



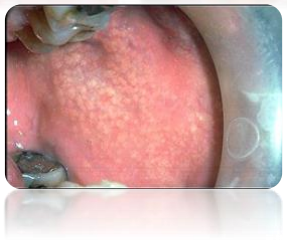
A. **Paramedian :** might be associated with **vander Woude Syndrome**
B. **Commissural :** might be cause by the failure of fusion b/w maxillary and mandibular processes [might be a blind fistula or a dilated ectopic salivary gland]

Double lip : associated with non toxic thyroid enlargement + edema of the upper eyelid *(Ascher syndrome).*

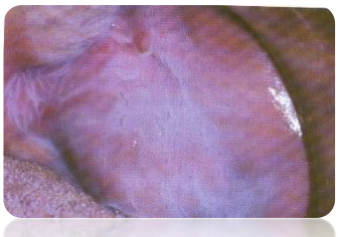


DEVELOPMENTAL DEFECTS OF ORAL MUCOSA

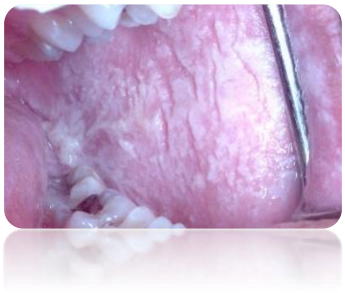
Fordyce granules: **normal variation** – bilateral small yellow maculo popular structures on the **buccal mucosa** – basically are **ectopic sebaceous glands**



Leukodema : Asymptomatic , bilateral diffuse translucent grayish white filmy apperance on the buccal mucosa – ***<u>disappear when the check is stretched</u>*** – **no Tx needed**

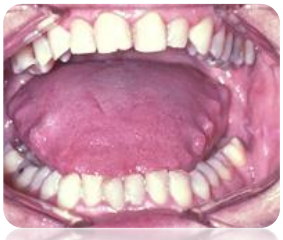


White spongy nevus **:** whitish thickening of the buccal mucosa – **no Tx needed**



DEVELOPMENTAL DEFECTS OF THE TONGUE

Macroglossia ***(Abnormal Large tongue):***

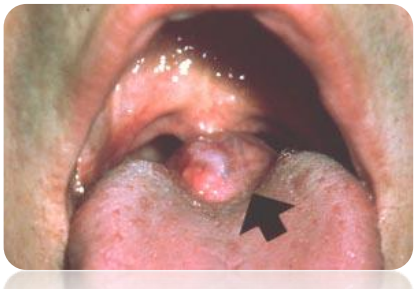


A. ***Congenital Macroglossia****:* in Down's syndrome, Hemangioma & Lymphangioma.
B. ***Acquired Macroglossia:*** in Edentulism, Amyloidosis, Acromegaly & myesthenia gravis**.**

Macroglossia leads to Noisy breathing, Drooling & difficulty in eating.

Clinically: Tongue has crenated lateral borders, patient will have open bite & mandibular prognathism.

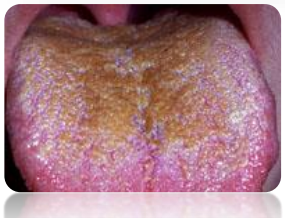
Lingual thyroid nodule:



- thyroid remnant in the region of the thyroid gland origin.
- smooth, sessile mass on mid-posterior dorsum of the tongue in the region of foramen caecum.
- Causes Dysphagia, Dysphonia, Dyspnoea & **hypothyroidism.**
- Diagnosed by **iodine isotopes or Tecnetium -99m** with CT or MRI.
- **No treatment**, periodic follow up

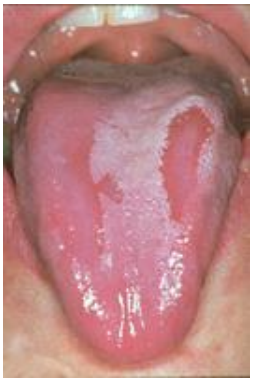
Fissured tongue**:** geographic tongue may cause fissured tongue – **no Tx required just brush the tongue**

Black hairy tongue:



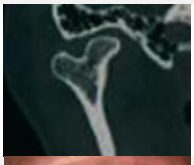
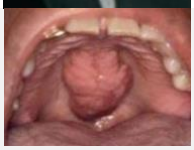
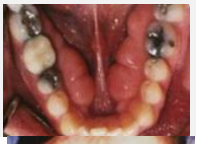
- caused by accumulation of keratin on the **filliform papillae** on the dorsum of the tongue + over growth of pigment-producing bacteria or fungi.
- Associated with **Antibiotic therapy, poor oral hygeine, use of oxidizing mouth washes, overgrowth of bacteria or fungi**.
- Patients may complain of **gagging** sensation or a bad taste in the mouth.

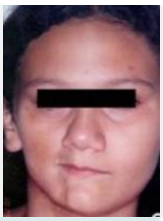
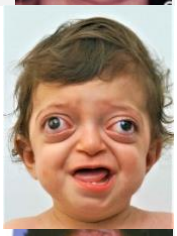
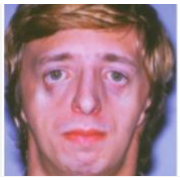
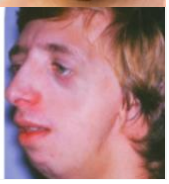
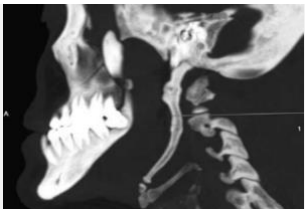
Geographic tongue **(Benign Migratory Glossitis):**



- Multiple large, red, atrophic patches on the tongue with white, slightly raised borders on the dorsum of the tongue.
- resolve in days to weeks & papillae regenerate.
- **The red areas are devoid of filiform papillae, whereas white areas show hypertrophy of papillae.**
- Recurrent issue and the lesion appears to migrate from area to area.
- **can be confused with more serious form of glossitis & even premalignant or malignant lesions.**

DEVELOPMENTAL DEFECTS OF THE JAW BONES

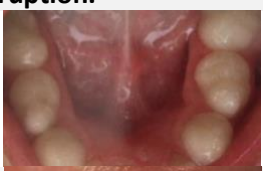
CONDITION	CHARACTERISTIC FEATURE [S] / NOTES
MICROGNATHIA	Small jaw Associated with Pierre robin sequence [Cleft palate + micrognathia + glossoptosis] Causes posterior displacement of the tongue and airway obstruction
MACROGNATHIA	Large jaw Associated with [fibrous dysplasia, acromegaly , paget's disease]
CORONOID HYPERPLASIA	Results in limitation in mandibular movement **Unilatera**l – caused by **osteoma / osteosarcoma** **Bilateral** – cause by **endocrine influence during puberty**
CONDYLAR HYPERPLASIA	Excessive growth of one condyle due to local circulatory problems, endocrine disturbances , trauma
CONDYLAR HYPOPLASIA	**Congenital :** associated with **Mandibulofacial dysostosis** & **Hemifacial Macrosomia**. **Acquired:** due to disturbances of growth center of the condyle due to trauma, radiation or **Rheumatoid arthritis**
BIFID CONDYLE	Double-headed mandibular condyle **Anteroposterior bifid condyle :** due to **trauma in childhood.** **Mediolateral bifid condyle :** due to **abnormal muscle attachment**. 
BONY EXOSTOSIS	**Torus platainus:** bony protuberance in the midline of the vault of the hard palate **Might have many shapes [flat, nodular, lobular, spindle]**  **Torus Mandibularis:** bony protuberance on the lingual aspect of the mandible **above the mylohyoid line in the region of the premolars**. [mostly bilateral] 
HEMI FACIAL HYPERTROPHY	unilateral enlargements of the face due to **increased neurovascular supply of the affected side** of the face [asymmetry of the face with malocclusion & deviation of the towards the unaffected side] 

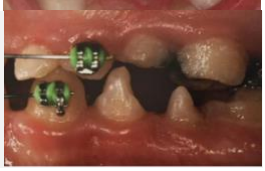
HEMIFACIAL ATROPHY	Atrophic changes affecting one side of the face. The **mouth & nose are deviated toward the defective side.** The overlying skin often exhibit dark pigmentation	
VRANIOFACIAL DYSOSTOSIS (CROUZEN SYNDROME)	Premature closing of the cranial sutures. Brachycephaly (short head) Scaphocephaly (Boat-shaped head) Trigonocephaly (Triangle-shaped head) Proptosis Maxilla is underdeveloped resulting in a mid-face hypoplasia.	
MANDIBULOFACIAL DYSOSTOSIS (TREACHER-COLLINS SYNDROME)	Hypoplastic zygoma +narrow face with depressed cheek & downward slanting of palpebral fissures. Underdeveloped mandible with retruded chin	 
CLEIDO CRANIAL DYSOSTOSIS	Patient has the ability to **appose the shoulders to near the midline of the chest**. **Frontal & occipital bossing with enlarged head**. primary dentition retained into adulthood+ **Supernumerary teeth**	
EAGLE SYNDROME (STYLOHYOID SYNDROME)	Slender bony projection that originate from inferior aspect of temporal bone vague facial pain, especially during swallowing. **Dysphagia**, dysphonia, otalgia, headache, dizziness & **Transient ischemic attack**	

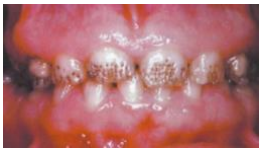
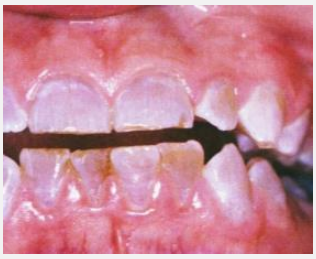
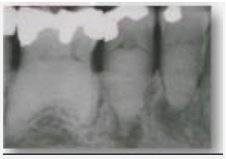
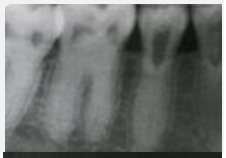
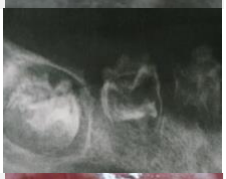
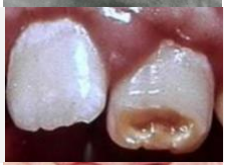
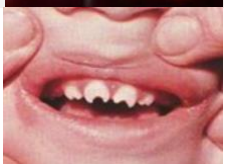
DEVELOPMENTAL ALTERATION IN THE NUMBER OF THEETH

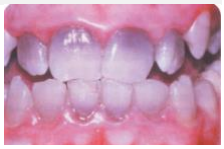
ANDONTIA	**TOTAL LACK OF TOOTH DEVELOPMENT** **ASSOCIATED WITH ECTODERMAL DYSPLASIA [SKIN, HAIR, NAIL OR SWEAT GLANDS FAIL TO DEVELOP]**
HYPODONTIA	Lack of development of one or more teeth From most to least commonly missing teeth : Third molar, second premolar & then lateral incisors. Usually seen in **Ehlers -Danlos, Down, Turner's syndrome**
OLIGODONTIA	Lack of development of **6 or more teeth.**
HYPERDONTIA [SUPERNUMERARY TEETH]	Mostly in the maxilla Most common site is maxillary **incisor area between centrals (Mesiodens),** followed by accessory **fourth molar & often called (Distomolar)** A supernumerary tooth situated lingually or buccaly to the molar teeth is called (Paramolar). usually seen in **Cleido Cranial dysplasia & Gardner's syndrome**
NATAL TEETH	Erupted decidous tooth at birth - mostly the mandibular incisors.
NEO NATAL	Erupted decidous tooth that appears in the first 30 days of life - mostly the mandibular incisors.

MICRODONTIA	Teeth are smaller than normal – assocciated with **hyodontia [more in F]** **True generalized microdontia:** seen in Down's syndrome & Pituitary dwarfism. **Relative generalized microdontia**: when jaws are larger than normal, but teeth are of normal size **Isolated microdontia** : mainly involve **maxillary laterals (Peg -shaped lateral) & third molar.**
MACRODONTIA	Teeth are larger than normal – associated with **hyperdontia [more in M]** **True generalized macrodontia**: in **Pituitary Gigantism**
GEMINATION	Extra wide crowns due to **development of two crowns from one tooth germ** **More in the maxilla** **Single root canal**
FUSION	**union of two adjacent tooth germs by dentin during development.** **More in the mandible** **Separate canals** Incisors & canines are most commonly affected by gemination & fusion If normal tooth count → the condition is gemination If tooth count is missing one → the condition is fusion
CONCRESCENCE	**Union of roots of two or more normal teeth by cementum alone** Most in posterior maxillary region
ACCESSORY CUSPS	**Talon cusps:** on lingual aspect of maxillary incisors. **Cusps of Carabelli:** on p**alatal surface of the mesiolingual cusp of maxillary permanent molars**. **Dens evaginatus:** A cusp -like of enamel located in the central groove or lingual ridge of the buccal cusp of permanent premolar or molar teeth **Dens Invaginatus (Dens in Dente) :** Deep surface invagination of the crown that is lined by enamel.
ENAMEL PEARLS	Localized bulge of enamel Mostly in molars
CERVICAL ENAMEL EXTENSION	buccal surface of the root, overlying the bifurcation. Most in mandibular molars
TAURODONTISM	molar with elongated crown & apically placed furcation of the roots, resulting in an enlarged rectangular coronal pulp chamber. Associated with : Ectodermal dysplasia, Klinefelter's syndrome , Down's syndrome
DILACERATION	Sharp bend or angulation of the root - results from **trauma during tooth development** (before 4 years of age). **Mostly affect maxillary anterior teeth which prevent its normal eruption.**
GLOBODONTIA	Gigantic globe-shaped teeth . Associated with **hearing loss** Diagnostic features of **Otodental syndrome**.
LOBODONTIA	Cuspid & premolars have fang-like cusps.



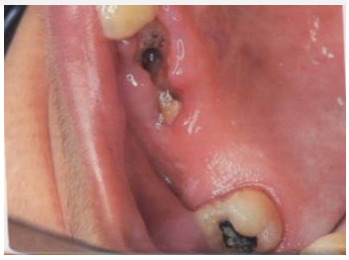


AMELOGENESIS IMPERFECTA	 hereditary defects of the enamel formation has 14 differnet subtypes can be : **Hypoplastic=** inadequate deposition of enamel matrix. **Hypocalcified =** defect in the maturation **Hypomaturation =** Enamel matrix is normal, but no significant mineralization occurs.
DENTINOGENESIS IMPERFECTA	Hypomineralized dentin - Normal appearance of enamel , but is weekly attached & tends to chip away from the dentin easily.  **Oblitrated pulp chamber & stunted roots.** **crowns of molars are bulbous with short roots**. Tooth is uniformly **brownish or purplish & abnormally translucent** **Type I:** It occurs in patients affected with **osteogenesis imperfecta** **Type II:** called **(Hereditary Opalescent Dentin).** **Type III:** Called Brandy wine type.
SHELL TEETH	Varient of dentinogenesis imperfecta mostly in deciduous teeth.
DENTIN DYSPLASIA (ROOTLESS TEETH)	 **Type I (Radicular Dentin Dysplasia)** : Permanent molars have characteristic **W - shaped roots with pulp obliteration.**  **Type II (Coronal Dentin Dysplasia):** Oblitrated pulp chamber& canals, Roots are normal in shape , **Pulp stones**
REGIONAL ODONTODYSPLASIA (GHOST TEETH)	 Teeth show marked decrease in radiodensity (Ghost teeth). Enamel & Dentin are very thin & indistinct. Pulp chambers are extremely large with occasional pulp stones
TURNER'S HYPOPLASIA	 seen in permanent teeth **secondary to periapical inflammatory diseases or traumatic injury of the deciduous teeth**. Resulting in focal areas of white, yellow or brown discoloration Mostly seen in **permanent premolars & maxillary centrals**
SYPHILITIC HYPOPLASIA	 Congenital syphilis → Hutchinson's Incisors [a screw-driver shape & constricted incisal edge with hypoplastic notch.] + Mulberry Molars [disorganized surface anatomy that resembles a mulberry.]

CONGENITAL ERYTHROPOIETIC PORPHYRIA	Teeth shows marked **red-brown discoloration that exhibits red flourescence when exposed to UV light.**
HYPER BILLIRUBINEMIA	sharp dividing line separating green portion (formed during hyper billirubinemia) from normal colored portion (formed after normal level of billirubin is restored). 

INFLAMMATORY BONE CONDITIONS

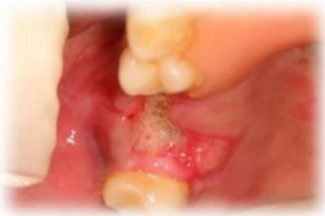
DIVIDED BROADLY INTO : OSTEITIS , OSTEOMYELITIS AND PERIOSTITIS

DISEASE	**Characteristic features**
ALVEOLAR OSTEITIS (DRY SOCKET)	*Postoperative pain in and around extraction site, which increases in severity 1-3 days after extraction* 

- Caused by either failure of a blood clot to form in the socket, or premature loss or disintegration of the clot

Failure of a clot to form may be due to:

1. Excessive extraction trauma
2. Limited local blood supply
3. Excessive use of Local anesthesia and excessive irrigation of the alveolus after extraction
4. Radiotherapy
5. Smoking
6. Oral Contraceptives



Risk factors:

1. Previous experience of Alveolar Osteitis
2. Deeply impacted mandibular third molar
3. Poor oral hygiene
4. **Active or recent history of acute ulcerative gingivitis or pericoronitis associated with tooth to be extracted**.
5. Immuno-compromised individuals

In cases where an adequate blood clot forms it might :

1- Get washed away by excessive mouth rinsing

2- disintegrate prematurely due to fibrinolysis of the clot most likely as a result of infection

- highest incidence of dry socket follows the extraction of *impacted lower third molars.*

Dry socket content:

- **Food debris, saliva**, and **bacteria** collect in the empty socket, the **bone** of which becomes **infected and necrotic.**

- **Healing is extremely slow**

Clinical Features:

- **Severe pain** developing a few days after the extraction.
- **foul tasting** and smelling decomposing food debris which can be washed away to reveal the **denuded bone lining the cavity.**

Prevention:

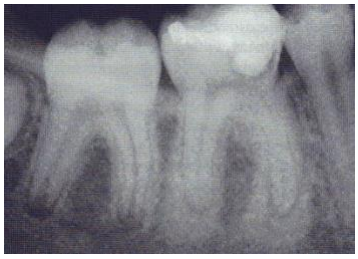
- Avoid excessive trauma + Confirm the presence of blood clot after exo
- Encourage patient to stop or limit smoking in the immediate post op period.
- Advice patient to avoid vigorous mouth rinsing for the first 24 hrs post exo
- Preop administration of antibacterial mouthwash

Management

A dry socket will heal with time - Local therapy therefore aims at keeping the area clean allowing connective tissue to fill in defect.
wound irrigation and intra alveolar dressing (antibacterial, topical anaesthetic or combination)

FOCAL SCLEROSING (CONDENSING) OSTEITIS

ASYMPTOMATIC
RESULTS FROM LONG TERM LOW GRADE IRRITATION
INCREASED RADIO OPACITY AT THE APEX OF THE TOOTH
TREATMENT:
AFFECTED TOOTH SHOULD BE TREATED OR EXTRACTED
BIOPSY TO RULE OUT METASTATIC MALIGNANCY.



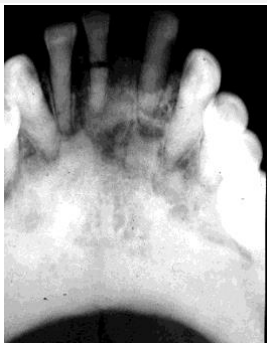
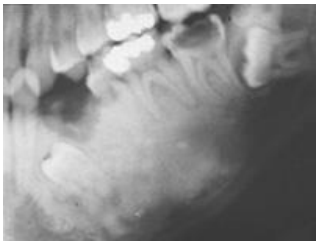
ACUTE SUPPURATIVE OSTEOMYELITIS

Caused by nearby infection [extraction , PA infection etc] → infection spreading through the jaw
Mandible is more commonly affected than maxilla [because of it's poor blood supply]
necrotic bone (a sequestrum) which is bathed in pus becomes separated from the surrounding vital bone

- After 10-14 days sufficient bone resorption may have occurred to produce *irregular, moth-eaten areas of radiolucency.*

Treatment

1- *Bacterial sampling & culture → Vigorous antibiotic treatment.*
2- *Drainage + Debridement*
3- *Remove source of infection if possible.*
4- *Sequestrectomy*
5- *Hyperbaric oxygen*

CHRONIC SUPPURATIVE OSTEOMYELITIS	*Inadequately treated acute osteomyelitis* Chronic suppuration and discharge of pus through one or more intraoral or extraoral sinuses. *Radiolucency with focal areas of opacity [Moth eaten appearance]* ***Treatment:*** Sequestrectomy / Decortications if necessary 
CHRONIC FOCAL SCLEROSING OSTEOMYELITIS	*diffuse sclerosing lesions of the mandible due to spread from low-grade infection/inflammation such as a periapical granuloma or periodontal diseases .* ***Treatment:*** *Elimination of the source of inflammation (exo or endo).* ✓
DIFFUSE SCLEROSING OSTEOMYELITIS	*Asymptomatic , sometimes vague pain & foul smell could be experienced* ***Cotton wool appearance*** *Treatment: eliminate source of infection but sclerotic areas remain radiographically* *Cotton wool appearance DD:* ✓ *Paget's disease* ✓ *Osteopetrosis* ✓ *cementoma* ✓ *Late stage of FD* 
CHRONIC OSTEOMYELITIS WITH PROLIFERATIVE PERIOSTITIS (GARRE'S OSTEOMYELITIS, PERIOSTITIS OSSIFICANS)	***mandible in children and young adults*** ▪ *Bony hard swelling on the outer surface of the mandible.* ▪ *Overlying mucosa and skin normal* *Radiographically : Concentric layers (Onion skin appearance)* *Treatment: eliminate source of infection*
Osteoradionecrosis	*Infection may spread rapidly through the irradiated bone, resulting in extensive osteomyelitis / necrosis of the bone + sloughing of the overlying oral and facial soft tissues* ***Treatment*** ▪ *Removal of necrotic bone* ▪ *Hyperbaric treatment*

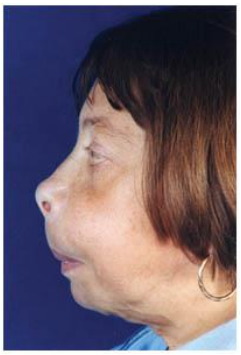
Osteochemonecrosis	*Associated with bisphosphonate administration for the treatment of osteoporosis and osteopenia, Paget's disease and Multiple myeloma* • *Painless exposed bone* ***Treatment*** • *Prevention of infection is paramount* • *Surgery Increases risk of further necrosis* • *Hyperbaric treatment- Not effective* ***Palliative treatment*** ▪ *Identification of patients at risk* ▪ *Avoid extractions*

METABOLIC BONE CONDITIONS

PAGET'S DISEASE [OSTEITIS DEFORMANS]

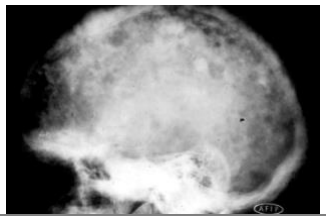
ABNORMAL AND UNCONTROLLED INCREASE IN THE OSTEOCLASTIC AND OSTEOBLASTIC ACTIVITY OF THE BONE CELLS OF OLDER ADULTS RESULTING IN :

- **LARGER BUT WEAKER BONES,**
- **EXTENSIVE PAIN**
- **INCREASE TENDENCY TO DEVELOP MALIGNANT BONE NEOPLASM**



LUMBER VERTEBRAE, PELVIS, SKULL AND FEMUR ARE THE MOST COMMONLY AFFECTED BONES
[ONLY A SMALL PERCENTAGE AFFECTS THE JAWS]

- **NEUROLOGIC COMPLAINTS [HEADACHE + AUDITORY OR VISUAL DISTURBANCES] ****
- **FACIAL PARALYSIS****
- **VERTIGO ****
- **WEIGHT BEARING BONES OFTEN SHOW BOWING DEFORMITY, RESULTING IN WHAT IS DESCRIBED AS SIMIAN (MONKEY- LIKE) STANCE.**
- **PROGRESSIVE INCREASE IN HEAD CIRCUMFERENCE → RESULT IN A " LION-LIKE" FACIAL DEFORMITY (LEONATOSIS OSSEA)**



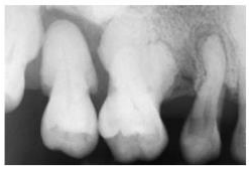
- **PATIENTS WEARING FULL DENTURES MAY COMPLAIN OF DIFFICULTY WEARING THEM AND REQUIRE FREQUENT CHANGES + WIDENING OF ALVEOLAR RIDGE + FLATTENED PALATAL VAULT**
- **INCREASED SPACING AND LOOSENING OF TEETH**

RADIOGRAPHICALLY :

EARLY STAGE : DECREASE BONE DENSITY AND ALTERED TRABECULAR PATTERN , PARTICULARLY IN SKULL (OSTEOPOROSIS CIRCUMSCRIPTA)

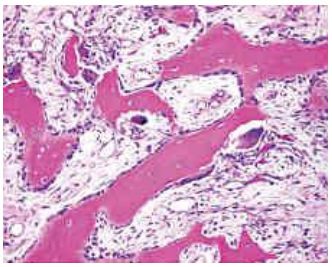
LATE STAGE : COTTON WOOL APPEARANCE

TEETH HAVE ROOT RESORPTION + HYPERCEMENTOSIS



- **BONE SCINTIGRAPHY: IF MANDIBLE IS AFFECTED: MARKED UPTAKE FROM CONDYLE TO CONDYLE (BLACK BEARD OR LINCOLIN'S SIGN)**

- ✓ **ELEVATED LEVELS OF SERUM ALKALINE PHOSPHATASE AND URINARY HYDROXYL PROLINE.**
- ✓ **- NORMAL SERUM CALCIUM AND PHOSPHOROUS LEVELS.**



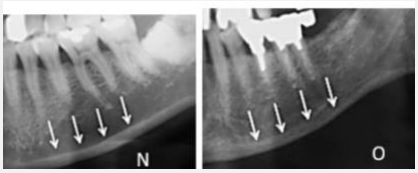
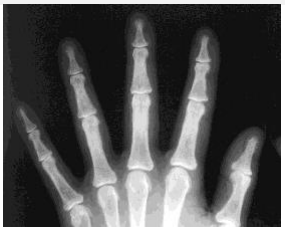
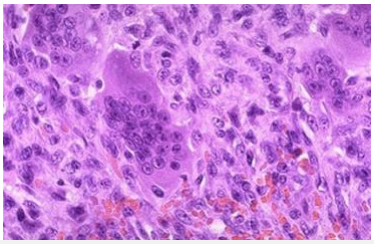
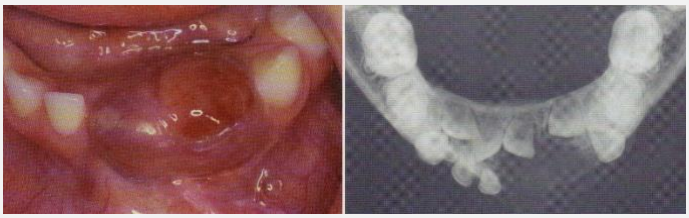
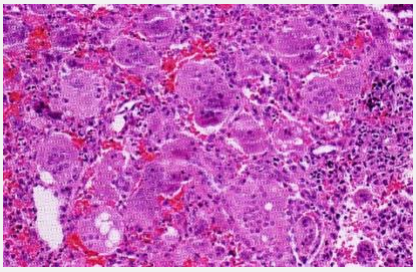
A CHARACTERISTIC MICROSCOPIC FEATURE : REVERSAL LINES WHICH REPRESENTS ALTERNATING RESORPTIVE AND FORMATIVE PHASE OF THE BONE , THIS RESULT IN (JIGSAW PUZZLES) OR (MOSAIC APPEARANCE) OF THE BONE.

MANAGEMENT :

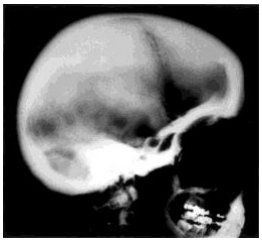
- ➢ **BONE PAIN :TX ASPIRIN OR ANOTHER ANALGESICS.**
- ➢ **NEUROLOGIC COMPLICATIONS SUCH AS DEAFNESS OR VISUAL DISTURBANCES MAY RESULT FROM BONY ENCROACHMENT ON CRANIAL NERVES PASSING THROUGH SKULL FORAMINA.**
- ➢ **USE OF PARATHYROID HORMONE ANTAGONIST SUCH AS CALCITONIN AND BISPHOSPHONATES CAN REDUCE BONE TURN OVER**

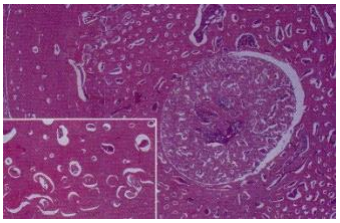
DIFFICULT EXTRACTION OF GROSSLY HYPERCEMENTOSED TEETH, EDENTULOUS PATIENTS REQUIRES NEW DENTURES PERIODICALLY.

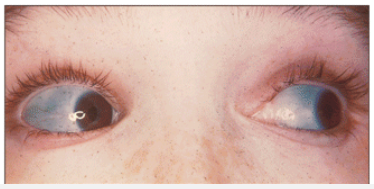
DEVELOPMENT OF OSTEOSARCOMA IS A RECOGNIZED COMPLICATION ESPECIALLY IN PELVIS AND LONG BONES.

OSTEOPORISOS	**↓ density of bone & ↓ quantity of bone.** defective quality not quantity of bone - defective quantity of bone in severe cases. **Mostly postmenopausal women** **Radiograph:** increased radiolucency of bone, the cortex is thinned, and there are more marrow spaces with thin trabeculae. **mandible reduced to a thin fragile strip of bone** 
HYPERPARATHYROIDISM	raised serum calcium, PTH and ALP, but **low serum Phosphorous** • Subperiosteal resorption of bone of fingers. ▪ In severe cases **(Oseitis fibrosa cystica):** multilocular radiolucent cyst-like areas are seen. ▪ Large destructive radiolucency may be present which is indicative of **giant cell tumor of hyperparathyroidism (Brown tumor).** Microscopically : Extensive **hemosiderine** deposits cause the lesion to appear as a brown tumor.  
CENTRAL GIANT CELL GRANULOMA (GIANT CELL LESIONS; GIANT CELL TUMOR)	**Mainly anterior part of the mandible + crosses the midline** Asymptomatic [chance radiographical lesion]  **Unilocular RL can be mistaken as PA granuloma** **Multilocular RL can be mistaken as ameloblastoma** **Microscopically : multinucleated giant cells + foci of osteid + RBC extravasation** **TX: curettage [high chance of recurrence]** **Aggressive lesions : Corticosteroids, calcitonin & IFN-α2a**  ***DD of GC lesions :*** ✓ **Osteoclastoma (giant cell tumour)** ✓ **"Brown tumor" of hyperparathyroidism** ✓ **Cherubism** ✓ **Aneurysmal bone cyst**

OSTEOPETROSIS "MARBLE BONE DISEASE"	Marked increase in bone density due to failure in osteoclast function Infentile osteopetrosis Begins in infancy → breathing & hearing difficulties, due to oversized facial and mastoid bones, followed by functional defects in ocular & trigeminal nerves as they compressed by sclerosis of foramina of base of skull. • **Replacement of bone marrow with dense bone which lead to pancytopenia → pts die because of bone marrow depletion** Adult osteopetrosis = asymptomatic Sinuses are reduced in size + cranial plate is thickened Microscopically : bone is dense & sclerotic, with most of marrow spaces replaced with bone
OSTEOGENESIS IMPERFECTA	**inability of the bone matrix to fully mineralize** multiple broken bones blue sclera of the eyes dentinogenesis imperfecta **short deformied extremities + All patients have spinal scoliosis.** **Microscopically :** increased number of osteoblasts, osteclasts and osteocytes with decreased mineral content

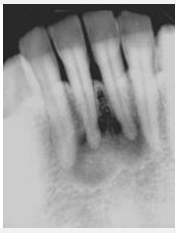
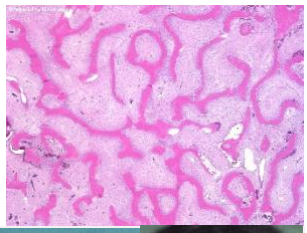




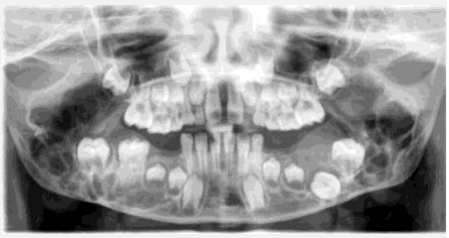


BENIGN FIBRO OSSEOUS LESIONS

– FIBROUS TISSUE REPLACING BONE

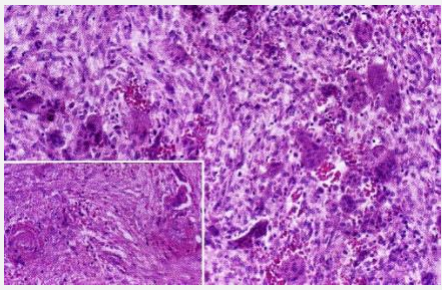
DISEASE	**Characteristic features**
PERIAPICAL CEMENTO-OSSEUS DYSPLASIA (PERIAPICAL CEMENTOMA)	Multiple lesions affecting the **lower anterior region** **Mostly in black females** Asymptomatic + teeth are vital No tx needed 
FLORID CEMENTO-OSSEUS DYSPLASIA	**Black women** **Involves all 4 quadrants of the jaws** Dentulous and edentulous areas are involved **Treatment :** **Asymptomatic :** periodic recall with maintenance of good oral hygiene **Symptomatic**: infection can lead to chronic osteomyelitis → give ABX [but they are ineffective] best is to do **Saucerization of dead bone and cementum**
FIRBOUS DYSPLASIA	**Mostly are monostotic affecting one bone only** **Polyostotic affecting 3/4 of entire skeleton is called Jaffe type.** Polyosotic FD also have **multiple area of cutaneous pigmentation** + **hyperfunction of one or more endocrine glands** . [McCune Albright syndrome] Mandibular lesions are truly monostotic, while **maxillary lesions often involve adjacent bones, such as zygoma, sphenoid and occiput. [Craniofacial FD]** Diagnostic radiographic feature is a fine "**ground glass**" **Microscopically :** Irregularly shaped woven bone trabeculae - not connected with each other. **Treatment** : Cosmetic correction after skeletal bone maturation 
CHERUBISM	Bilateral expansion of the posterior mandible [chubby facial appearance] **Maxillary involvement causes → " eye upturned to heaven" appearance.** 

Radiographically : *Multilocular expansile radiolucencies*



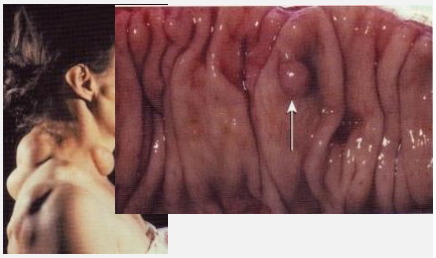
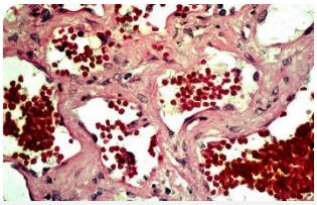
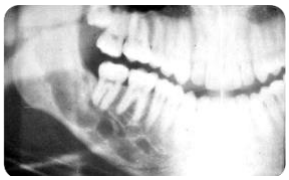
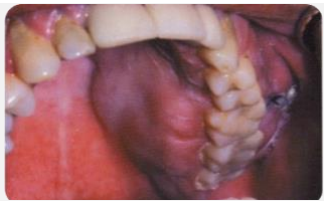
Miscroscopically :

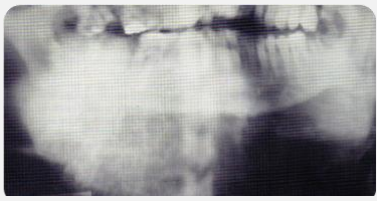
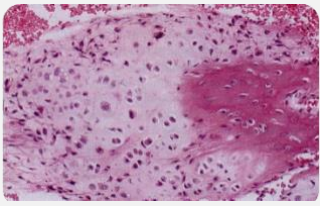
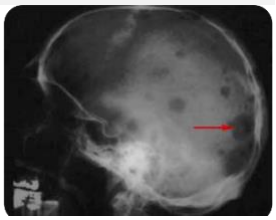
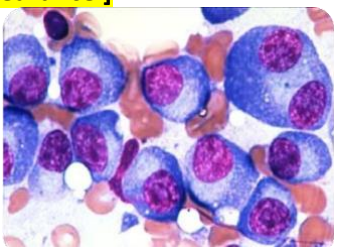
Multi nucleated giant cells
Characteristic feature = Eosinophilic cuffing surrounding small blood vessels.(characteristic)

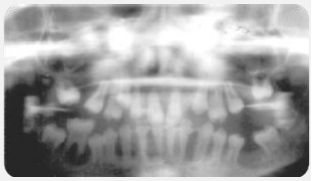
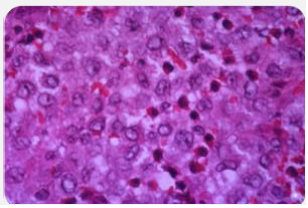
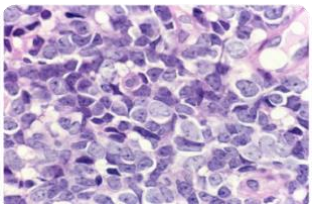
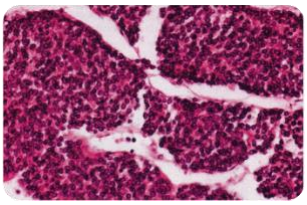


Treatment = Curettage
Radiation therapy is contraindicated because of the risk of development of post irradiation sarcoma.

NEOPLASTIC BONE LESIONS

DISEASE	CHARACTERISTIC FEATURES
OSTEOMA	**Osteomas are usually solitary** **Multiple osteomas** of the jaws occur as a feature of **Gardner syndrome** **Gardner's syndrome =** Polyposis coli + multiple jaw osteomas + Epidermal/sebaceous cysts + Multiple impacted supernumerary 
OSTEOBLASTOMA & OSTEOID OSTEOMA	**Osteoid Osteoma:** Contain tumor **nidus with a concentration of peripheral nerves** → ***significant pain " relieved by Aspirin".*** **OO< 2cm , OB > 2cm**
Ossifying (cemento-ossifying) fibroma	**Resembles fibrous dysplasia but it very well demarcated** **Occurs in premolar molar region** **fibrous dysplasia is homogeneously radio-opaque with a ground-glass appearance and poorly defined margins** **Ossifying Fibroma appears as a unilocular mixed radiolucent and radio-opaque lesion with well-defined borders.** **Ossifying fibroma has calcified bodies**
HEMANGIOMA	**Radiograph : honey comb appearance** **Aspiration will reveal fresh blood** **Most hemangiomas of bone are of the cavernous type**  
OSTEOSARCOMA	**Commonest primary malignant tumor of bone but is relatively rare in the jaws**. Osteosarcoma incidence is increased in : Paget's disease, retinoblastoma , radiation therapy 

	bony hard swellings of the buccal & lingual cortices, with or without pain & often associated with separation of teeth & parasthesia in mental nerve area.  Some appear as soft tissue epulides termed as **" Juxtacortical OS"** **Radiographically :** ○ **Symmetrical widening of PDL space in adjacent teeth.** ○ **spiking root resorption** ○ **" a sun burst pattern"** ○ **Triangular elevation of periosteum (Codman's triangle).**  **Microscopically :** abnormal osteoid formation by malignant osteoblasts TX: Preoperative chemotherapy, followed by radical surgical resection followed by post-operative chemotherapy.
MYELOMA	**composed of plasma cells and involves multiple bone [multiple myeloma] – causes high levels of immunoglobin [IgG]**  paraproteins or 'M' components appear in serum Bence Jones Proteins in urine **amyloid deposition in tongue causing macroglossia** **characteristic radiographic appearance = sharply demarcated, round or oval osteolytic lesions [punched-out appearance]** **Micrscopically :** Monotonus sheets of **myeloma cells** - resemble mature plasma cells  Tx: chemotherapy + Bone marrow transplant
LANGERHANS CELL HISTIOCYTOSIS	**Hand-Schuller-Christian syndrome** multifocal eosinophilic granulomas involving the craniofacial bones, orbit, and posterior pituitary skull defects exophthalmos diabetes insipidus The disseminated form of Langhans cell histiocytosis is **Letterer-Siwe disease**. [in infants and children under 2 years of age and has a high mortality]

	Multiple eosinophilic granuloma [a type of langerhanz cell histiocytosis] → teeth appear **floating in air.** **Microscopically : Birbeck granules** Tx: Intra lesional corticosteroids (localized). Chemotherapy (dissiminated)  
EWING SARCOMA	**Slight to moderate fever, leucocytosis & increase ESR." Misdiagnosed with ostomyelitis".** pain with rapid swelling + loosening of teeth + parasthesia **radiograph :** The involved bone appears "moth- eaten" + The periostium often has a lamellar layering referred to as an "onion-skin" reaction**.** **Microscopically :** neuroectodermal cells ***Tx:*** **Combined Surgery, radiotherapy & muti drug chemotherapy.** **Prognosis depend on anatomic location of the lesion. "pelvic lesions has poorest prognosis**  

- The most common primary tumors reported as metastasizing to the jaws are **carcinomas of the breast, bronchus, prostate, thyroid and kidney**
- **Most metastatic tumors are osteolytic** but carcinomas of **prostate & breast**, may be **osteoblastic** and appear radiographically as an area of **radiopacity rather than radiolucency**
- common sites for metastases to the oral mucosa are the **gingiva or alveolar mucosa, followed by the tongue**.
- **Common feature of metastatic tumors = anaesthesia of the lip** due to involvement of the inferior **dental** nerve**," numb-chin syndrome".**

CYSTS

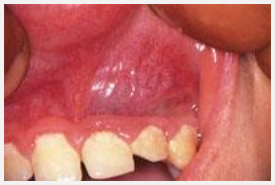
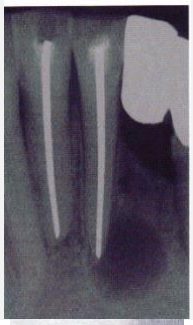
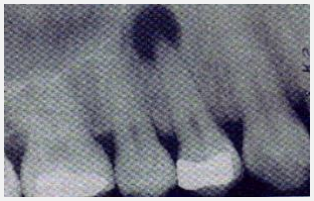
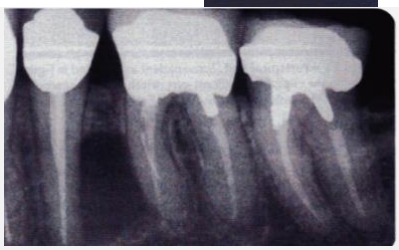
Cysts can be :

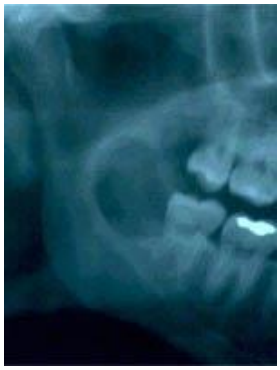
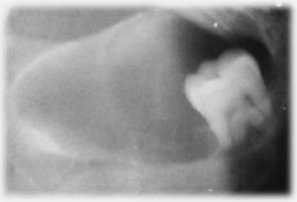
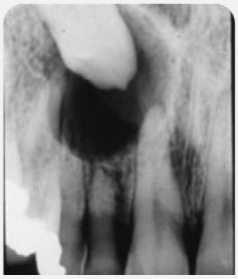
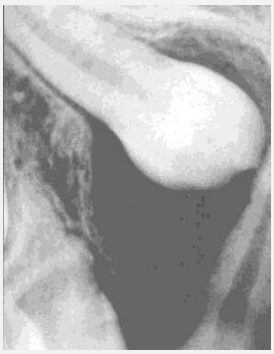
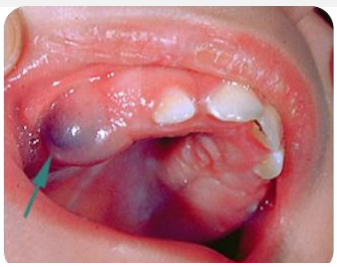
- Epithelial lined (True cysts)
- Non –epithelial lined (pseudocysts)

Cysts		
Inflammatory	**Developmental**	
1- Radicular : a consequence of PA pathology [apical , lateral , residual] 2- Paradental cyst	**Odontogenic**	**Non odontogenic**
	1- Dentigerous 2- Eruption 3- OKC 4- Lateral Periodontal 5- Gingival 6- Glandular	• Nasopalatine duct cyst • Nasolabial cyst • Median Palatal

CYST ORIGIN	CYSTS
RESTS OF MALASSEZ	PA cyst Residual cyst
REDUCED ENAMEL EPITHELIUM – REE	Dentigerous cyst Eruption cyst
DENTAL LAMINA	OKC Lateral periodontal cyst Gingival cyst of adult Dental lamina cyst of newborn Glandular cyst
UNCLASSIFIED	Paradental

INFLAMMATORY CYST

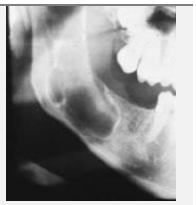
CONDITION	CHARACTERISTIC FEATURES
RADICULAR CYST	Most common cyst Always associated with apex of **non vital tooth** **Consequence of PA pathology** Small cyts ➔ asymptomatic Large cyst → bony expansion + discharge through a sinus **Eggshell crackling on palpation** **Sometimes can perforate the cortex and produce a bluish submucosal swelling**  **RG=** round or oval radiolucency at the apex that is continuous with the LD + peripheral radio opaque margin  ** if the margin is very radio opaque = indicates chronicity of the lesion  Tx= enucleation
RESIDUAL CYST	Radicular cyst that remained in the jaw following extraction of the involved tooth 
LATERAL RADICULAR CYST	RARE - Due to extension of inflammation from the pulp into the periodontium by the lateral canals Commonly misdiagnosed with lateral periodontal cyst **[lateral periodontal cyst is associated with a vital tooth , lateral radicular cyst is associated with non vital tooth]** 

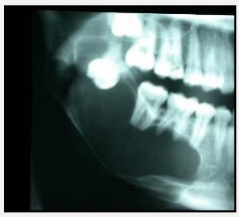
Inflammatory collateral cyst/ *paradental cyst* or *mandibular infected buccal cyst*	near the **cervical margin** on the **lateral root surface** of a ***vital* tooth** Develops **subsequent to periodontitis or pericoronitis** (partially erupted third molar) RG = Well **defined radiolucency on the lateral root surface** DD= • Developmental lateral periodontal cyst • Inflammatory lateral radicular cyst • Odontogenic keratocyst Tx: extraction A/O curettage 
DENTIGEROUS CYST	odontogenic cyst that ***encloses part or all of the crown of an unerupted tooth*.** caused by fluid accumulation between the reduced enamel epith. & the enamel surface asymptomatic unless large and inflamed **attached to CEJ & arises in the follicular tissue covering the fully formed crown of the unerupted tooth** most to least common teeth affected : *mandibular third molar* → maxillary permanent canine → maxillary third molar → mandibular premolars**.** RG = well defined radiolucency surrounding the crown of an unerupted tooth Has 3 types : Central [most common] - Lateral - Circumferential Tx: enucleation **Epithelial neoplasm such as: Ameloblastoma, Mucoepidermoid carcinoma & squamous cell carcinoma can arise in dentigerous cyst**   
ERUPTION CYST	surrounds a tooth's crown that has erupted through bone but not soft tissue Mastication will induce hemorrhage in an eruption cyst causing "Eruption Hematoma" Tx: no treatment, because they spontaneously rupture as a result of normal mastication OR surgical exposure of the crown of tooth is done to allow its eruption 

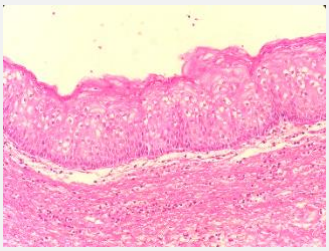
Q: explain the hypertonicity of the cyst content in radicular cysts ? because it contains degenerating epithelia, inflammatory cells, tissue components and serum proteins

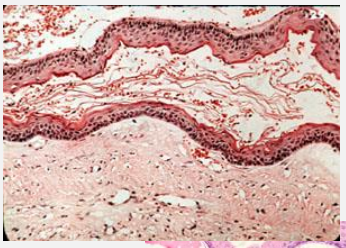
DEVELOPMENTAL CYST(ODONTOGENIC)

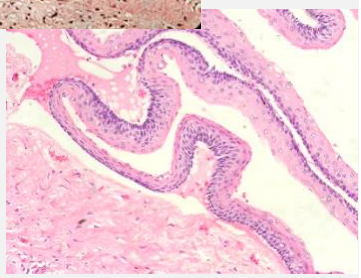
CONDITION	CHARACTERISTIC FEATURES
Odontogenic keratocyst / keratotic odontogenic tumor	Most common site is **posterior body and ramus of the mandible** Has very high growth potential and can become very large causing bone destruction Very high recurrence rate **Unlike Radicular & dentigerous cysts which tend to expand in a **unicentric ballooning pattern**, **Keratocyst enlarge predominantly in an antero- posterior direction** & can reach large sizes without causing gross bony expansion. **Accidentally discovered by routine radiographic examination** ▪ **Multiple OKC are one of the consistent features of the Nevoid Basal Cell Carcinoma Syndrome (Gorlin-Goltz Syndrome)** RG = Well-defined solitary lesion or as multilocular/polycystic radiolucencies Many present in apparent dentigerous relationship associated with unerupted third molar, but the crown is usually separated from the cyst cavity. **MS =** 1. A thin, **uniform lining of parakeratinized squamous epith**. 2. A palisaded layer of **colouminar or cuboidal basal cells**. 3. Corrugated layer of parakeratin on its luminal surfaces. 4. Focal separation of epithelial lining from the adjacent C.T **5.** The cystic lumen contains variable amount of desequamated parakeratin **& gray /white cheesy materials [keratinous debris]** 6. **Remanant of dental lamina, microcyst formation, satellite "daughter" cyst present in capsule wall**. DD= • Dentigerous cyst • Ameloblastoma

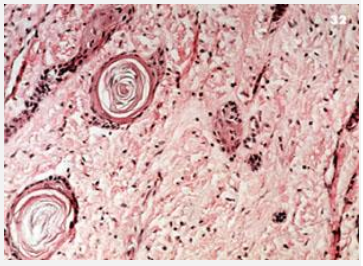


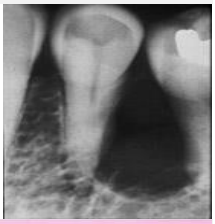
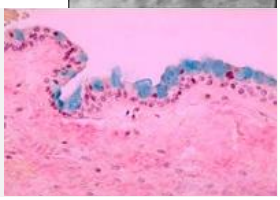










	• Odontogenic myxoma • Non-odontogenic lesions eg. central giant cell granuloma Tx: Surgical enucleation or in severe cases surgical resection.
LATERAL PERIODONTAL CYST	Mainly in canine premolar region **Vital tooth** *polycystic "**Bortryoid odontogenic cyst**" can be seen which represents simultaneous cyst changes in multiple adjacent rests of dental lamina*. **Tx: enucleation** 
GLANDULAR ODONTOGENIC CYST	Variable number of small glandular structures or microcysts within the lining epith **goblet-like mucous secreting cells** 

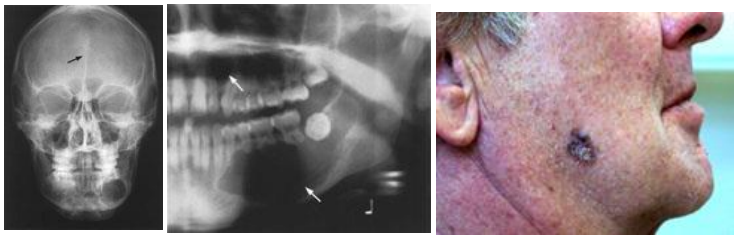
Q**: mention reasons of OKC growth and expansion in a specific manner?**

1. Hydrostatic forces
2. Keratocyst contents are hypertonic
3. Active epithelial growth
4. Production of bone resorbing factors
5. Accumulation of mural squames

Q**: what causes the high recurrence rate of OKC?**

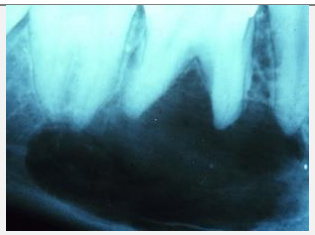
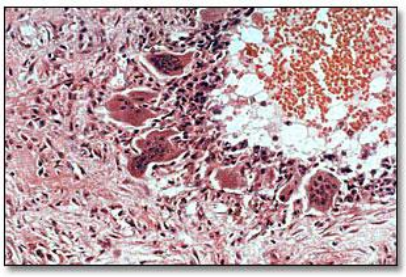
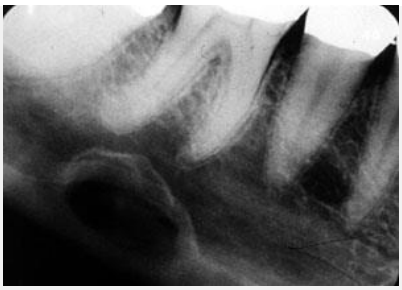
1. Thinness of the cyst wall & its low tensile strength & rupture→ retention of fragments of torn lining.
2. Presence of daughter cysts in cyst wall.
3. Focal separation of epith. Lining from underlying C.T make surgical removal very difficult.

Gorlin goltz syndrome :

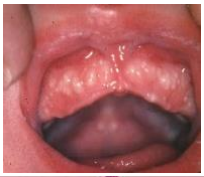
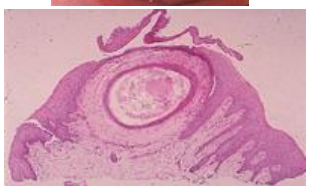
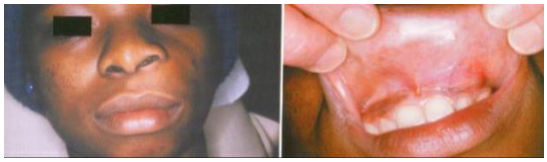
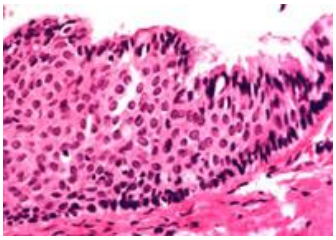
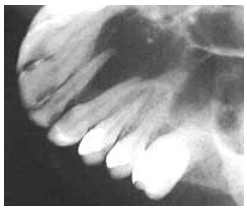


1- Multiple OKC of jaws.
2- Multiple Basal cell carcinoma of skin.
3- Bifid ribs & vertebral deformities.
4- Calcification of Falx cerebri.
5- Palmer & planter dyskeratosis.
6- Frontal bossing.
7- Hypertelorism.
8- Ovarian fibromas.

NON EPITHELIAL PRIMARY BONE CYSTS

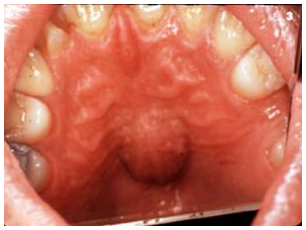
CONDITION	CHARACTERISTIC FEATURES
SOLITARY BONE CYCT **SIMPLE OR TRAUMATIC OR HEMORRHAGIC BONE CYST**	in premolar & molar regions of mandible. Rough bony-walled cavity devoid of any detectable soft tissue lining. The cavity is **empty** or with little clear or blood stained fluid. Rapid healing follow surgical exploration & cyst resolve spontaneously with time. RG = Scalloping around & between roots of standing teeth 
ANEURYSMAL BONE CYCT (ABC)	Rare, arise in posterior part of the body or angle of the mandible RG= Multilocular radiolucency with a **characteristic ballooned-out appearance** due to gross cortical expansion. MS= • Numerous, **non-endothelial lined blood-filled spaces** • **Multinucleated giant cells** & evidence of old & recent hemorrhage Can be produced by **Fibrous Dysplasia** or **Central Giant cell granuloma Or trauma** 
STAFNE'S IDOPATHIC CAVITY	Round or oval well-demarcated radiolucency between premolar region & angle of jaw just <u>below inferior dental canal.</u> Sialography is useful in identification RG: Saucer-shaped depression or concavity of varying depth on lingual aspect of the mandible. 

DEVELOPMENTAL CYSTS

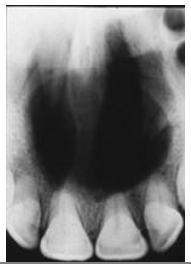
CONDITION	CHARACTERISTIC FEATURES
EPSTIEN'S PEARLS	As the palatal shelves meet & fuse in the midline to form secondary palate, small epithelia may become entrapped leading to a cyst **anterior part of median palatal raphe**
BOHN'S NODULES	Arise from epithelial remnants of the minor salivary gland of palate → **cysts** present scattered over **hard palate & near soft palate** cluster of 206 cysts are observed **Keratin-filled cyst** **Tx: No treatment is required [** self Healing within several weeks as the covering epith degenerates, the cyst rupture onto mucosal surface & eliminate their keratin contents]  
NASOLABIAL CYST (NASOALVEOLAR CYST, KLESTADT CYST)	IN THE UPPER LIP LATERAL TO THE MIDLINE. **CONSIDERED AS "FISSURAL" CYST ARISE FROM EPITHELIAL REMNANT ENTRAPPED ALONG THE LINE OF FUSION** OF MAXILLARY, MEDIAL & LATERAL NASAL PROCESSES**.**  **OR IT IS THOUGH TO DEVELOP FROM** MISPLACED EPITHELIA OF THE NASOLACRIMAL DUCT BECAUSE OF THEIR SIMILAR LOCATION & HISTOLOGY. CLINICALLY: **SWELLING OF THE** UPPER LIP LATERAL TO THE MIDLINE, RESULTING IN ELEVATION OF THE ALA OF THE NOSE**.** **N**O RADIOGRAPHIC PICTURE IS SEEN FOR THIS CYST, SINCE IT IS IN THE SOFT TISSUE.  MS = **RESPIRATORY EPITHELIUM [PSEUDOSTRATIFIED COLOMINAR CILIATED EPITHELIUM WITH GOBLET CELLS]** **TX: SURGICAL EXCISION OR MARSUPIALIZATION**
GLOBULOMAXILLARY CYST	**USED TO BE CONSIDERED A FISSURAL CYST BUT NOW CONSIDERED OF** ODONTOGENIC ORIGIN **BETWEEN MAXILLARY LATERAL INCISOR &CUSPID TEETH [CANINE]** **WELL-CIRCUMSCRIBED UNILOCULAR RADIOLUCENCY AS AN** INVERTED PEAR BETWEEN & APICAL TO THE TEETH 

MEDIAN PALATAL CYCT

CAUSED BY EPITHELIA ENTRAPPED ALONG THE LINE OF FUSION OF THE LATERAL PALATINE SHELVES OF MAXILLA.
DIFFICULT TO DISTINGUISH FROM NASOPALATINE DUCT CYST**, SINCE MOST MEDIAN PALATAL CYSTS MAY REPRESENTS POSTERIORLY POSITIONED NASO-PALATINE DUCT CYST.**

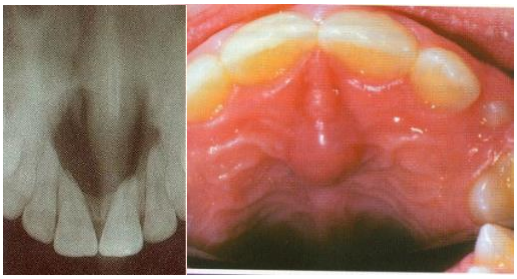


ASYMPTOMATIC **- FLUCTUANT SWELLING OF THE** MIDLINE OF THE HARD PALATE
RG= WELL- CIRCUMSCRIBED RADIOLUCENCY IN THE MIDLINE OF THE HARD PALATE.



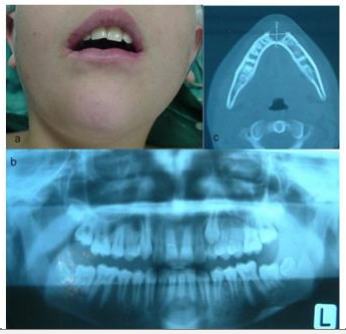
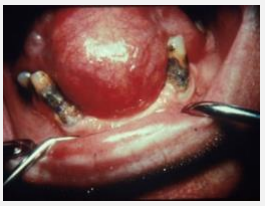
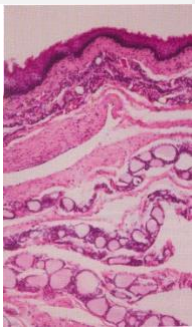
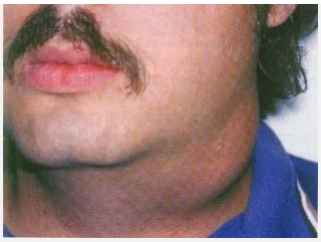
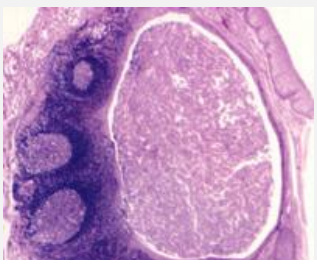
TX:
SURGICAL REMOVAL

NASOPALATINE DUCT CYST(INCISIVE CANAL CYST)

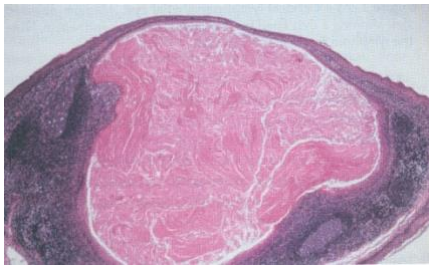


MOST COMMON NON-ODONTOGENIC CYST **OF ORAL CAVITY**
CAUSED BY CYSTIC DEGENERATION OF THE EPITHELIAL REMNANT OF THE NASOPALATINE DUCT
SWELLING OF THE ANTERIOR PALATE
RG= WELL-CIRCUMSCRIBED RADIOLUCENCY **(ROUND OR OVAL) IN OR** NEAR THE MIDLINE OF THE ANTERIOR MAXILLA BETWEEN & APICAL TO THE CENTRAL INCISORS.
** DIFFICULT TO DISTINGUISH FROM A LARGE INCISIVE FORAMEN [NORMAL SIZE OF INCISIVE FORAMEN IS MAX 6 MM]
A RADIOLUCENCY THAT IS 6MM OR SMALLER IN THIS AREA → NORMAL FORAMEN, UNLESS OTHER CLINICAL SIGNS & SYMPTOMS ARE PRESENT.

NASOPALATINE DUCT CYST MAY DEVELOP IN SOFT TISSUE OF INCISIVE PAPILLA WITHOUT BONY INVOLVEMENT [CYST OF INCISIVE PAPILLA] → BLUISH DISCOLORATION AS A RESULT OF FLUID CONTENTS IN THE CYST LUMEN.
MS= DEPENDS ON THE VERTICAL POSITION OF THE CYST :
CYST IN THE SUPERIOR ASPECT OF THE CANAL **NEAR NASAL CAVITY → RESPIRATORY EPITH**
CYSTS IN THE INFERIOR PORTION NEAR THE ORAL **→ SQUAMOUS EPITH**
CYST WALL ALSO CONTAINS NEUROVASCULAR BUNDLE
TX: SURGICAL ENUCLEATION + BIOPSY

MEDIAN MANDIBULAR CYST	**USED TO BE CONSIDERED A FISSURAL CYST BUT NOW CONSIDERED OF** ODONTOGENIC ORIGIN **RG = MIDLINE RADIOLUCENCY** BETWEEN & APICAL TO THE MANDIBULAR CENTRAL INCISORS **WITH** CORTICAL EXPANSION 
DERMOID CYST	Occur in the midline of mouth region & represents the **minimal manifestation of Tratoma/Dermoid cyst/Epidermoid cyst spectrum.** Tx: surgical removal 
THYROGLOSSAL DUCT CYST	Caused by **epithelial remnant of the thyroglossal duct** [as the thyroid gland descends from it's origin in the tongue to it's final position] Develops in the **midline & may occur anywhere from the foramen cecum area of the tongue to the substernal notch -** In most cases the cyst develop **below hyoid bone**. Painless, fluctuant movable swelling - **moves vertically during swallowing or protrusion of the tongue.** **MS=** Thyroid tissue may occur in cyst wall. Tx: Siistrunk procedure Q**: what represents the remnant of the thyroid gland on the tongue?** The foramen cecum 
CERVICAL LYMPHOEPITHELIAL CYST (BRANCHIAL CLEFT CYST)	**Caused by remnant of the 2nd branchial clefts during 4th week of gestation.** **Or from cystic changes in parotid gland epith. That become entrapped in the upper cervical lymph node during embryo life.** Soft fluctuant mass located in the **upper lateral neck** along the **anterior border of the sternocleidomastoid muscle.** MS= **Cyst wall =** lymphoid tissue with germinal center formation Tx: surgical removal  

ORAL LYMPHOEPITHELIAL CYST	**MICROSCOPICALLY SIMILAR TO** CERVICAL LYMPHO EPITHELIAL CYST**, BUT MUCH SMALLER IN SIZE** **WHITE OR YELLOW & OFTEN CONTAINS CREAMY OR CHEESY KERATINACEOUS MATERIALS IN THE LUMEN.** **ASYMPTOMATIC & AFFECT THE** FLOOR OF THE MOUTH MS = OF LYMPHOID TISSUE IN THE CYST WALL WITH GERMINAL CENTER FORMATION. **TX: SURGICAL REMOVAL**

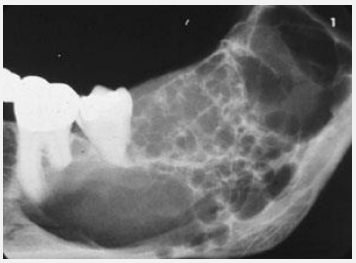


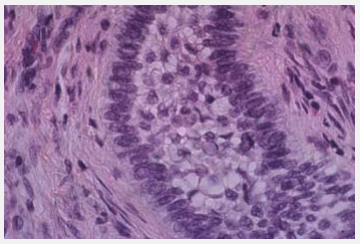
To differentiate the median palatal cyst from other cystic lesion of the maxilla:

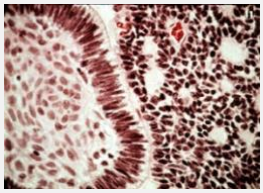
1. Symmetrical along the midline.
2. Ovoid or circular.
3. Located posterior to palatine papilla.
4. **Not associated with non-vital teeth**.
5. No microscopic evidence of large NV bundles, hyaline cartilage or minor salivary glands in the wall of the cyst.

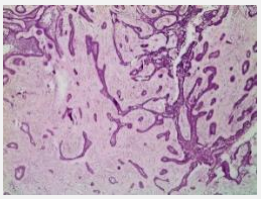
ODONTOGENIC TUMORS

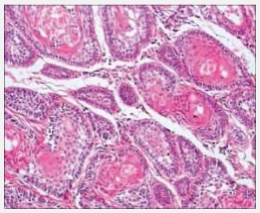
CONDITION	CHARACTERISTIC FEATURES
AMELOBLASTOMA	Most common **Odontogenic epithelial** tumor **Arise from remnants of dental lamina, reduced enamel epithelium , rest of Malassez, basal cell layer overlying surface epithelium** locally invasive, but does not metastasize. **Three types of Ameloblastoma:** **A. Common (Follicular, Polycystic) Ameloblastoma.** **Posterior mandible and ascending ramus** **Most common type** Characteristic feature: **"Eggshell crackling"** because ameloblastoma can expand the bony cortices, but due to their slow growth the periosteum can produce a thin shell of bone . RG= **Multilocular radiolucency or soap bubble appearance** **MS =** Epithelial processes composed of **well-organized single layer of Ameloblast-like cells with "Reversed polarity"** which surround loosely arranged **polyhedral or angular cells resembling stellate reticulum.** **Histologic patterns are:** **1. Follicular Pattern:** ➢ **Most prevalent, resembling the *earlier stages of tooth development*.** ➢ Palisaded ameloblast-like cells with reversed polarity + centrally a stellate reticulum-like cells + microcysts. **2. Plexiform Pattern:** ➢ **Epithelium in "fishnet" or mesh arrangement.** **3.Acanthomatous Pattern:** ➢ Central epithelial cells transform into squamous cells that produce keratin within individual cells or in the form of **keratin pearls.** **4. Granular cell Pattern:** ➢ sheets of large **eosinophilic granular cells**.

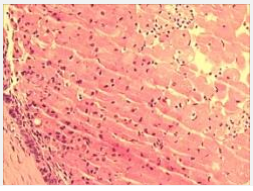




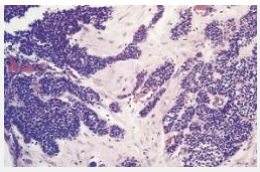






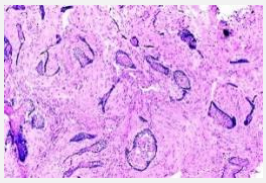


5. Basal cell Pattern:



- darkly stained cells with little evidence of palisading at periphery.
- They have mistaken for basal cell carcinoma.

6. Desmoblastic Pattern:

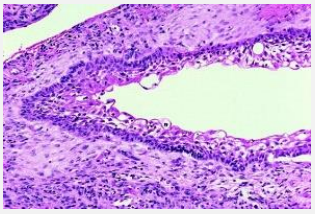


- The epithelial component is widely separated by fibrous tissue that is dense & **scar-like.**
- has a **mixed radiolucent/radiopaque radiographic appearance that resembles Fibro-osseus lesions**
- It is more difficult to treat, because it penetrates the surrounding bone trabeculae & remains undetected**.**

[*These histological variants do not affect tumor behavior]*

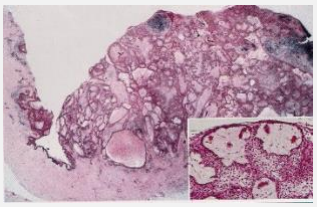
B. **Unicystic Ameloblastoma:** large unilocular cyst commonly associated with the crown of an impacted tooth [mostly **with a severely displaced mandibular third molar]**

RG =unilocular radiolucency with well-demarcation & even corticated

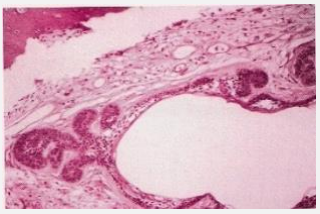


Three histological variants:

1. **Luminal Unicystic Ameloblastoma:** fibrous C.T capsule surrounding a large fluid-filled lumen + **cytoplasmic vacuolization**.

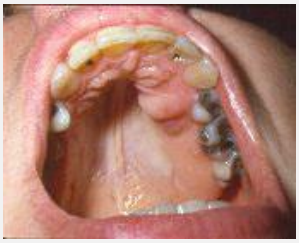


2. **Intraluminal Unicystic Ameloblastoma:**One or more nodules of ameloblastoma project from cyst lining to the lumen **mostly of plexiform type**



3. **Intramural Unicystic Ameloblastoma:** The fibrous cyst wall is infiltrated by typical ***follicular or plexiform*** **ameloblastoma**

C. **Peripheral Ameloblastoma [least common]**



Rare, **Limited to the soft tissue of the posterior gingiva**
Resemble Pyogenic granuloma or fibroma

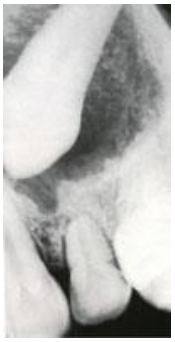
RG = Only superficial saucerization of the cortical plate**.**

Tx of all Ameloblatsomas : Local excision to Block resection

ADENOMATOID ODONTOGENIC TUMOR (AOT)

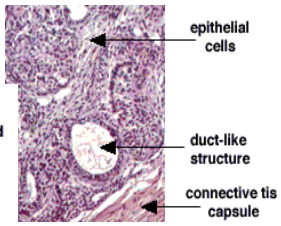
ORIGINATES FROM REDUCED ENAMEL EPITHELIUM
RG= **UNILOCULAR RADIOLUCENCY WITH WELL-CORTICATED BORDERS THAT** SURROUND THE CROWN OF IMPACTED TOOTH (CUSPID)**, LIKE** **DENTIGEROUS CYST & THE DIFFERENCE BETWEEN THEM ARE:**

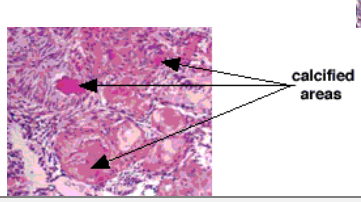
- RADIOLUCENCY EXTENDS APICALLY BEYOND CEJ.
- **THE PRESENCE OF** FLECKS OF RADIOPACITIES (SNOWFLAKE).



MS=

- **EPITHELIA IN** DUCTAL LIKE PATTERNS **[**MICROCYSTS **RESEMBLING** DUCT CUT IN CROSS SECTION (THEY ARE NOT DUCTS & ARE NEVER SEEN CUT LONGITUDINALLY) **LINED BY CELLS SIMILAR TO AMELOBLASTS**.
- SPHERICAL CALCIFICATION





TX: ENUCLEATION

CALCIFYING EPETHELIAL ODONTOGENIC TUMOR (PINDBORG TUMOR) CEOT

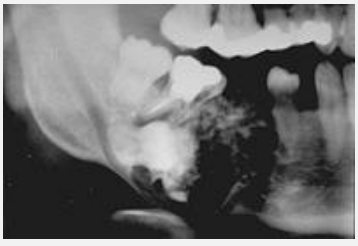
Originats from dental lamina A/O REE
could be mistaken for a poorly differentiated carcinoma.
Affects posterior body of the mandible

MS=
squamous & clear cells that
spherical calcification
amyloid staining & hyaline deposits
lack of stromal inflammatory reaction
Concentric spherical calcifications (Liese-gang ring calcifications) **

It differs from ameloblastoma by:

- **of epithelial cells do not resemble ameloblasts.**
- **contains spherical diffuse calcification**

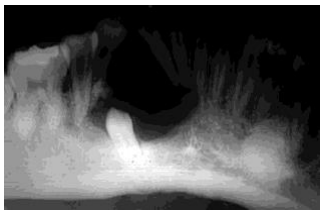
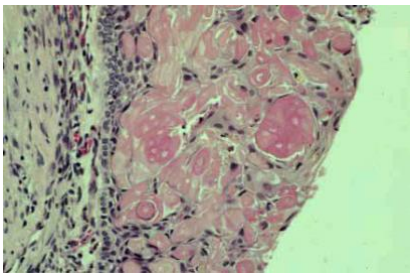
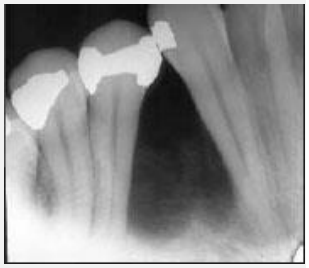
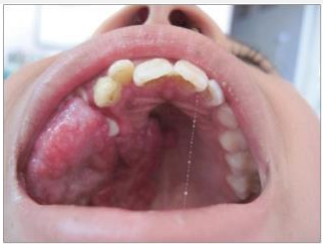
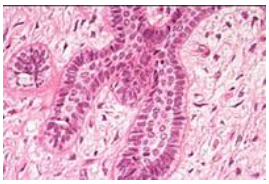
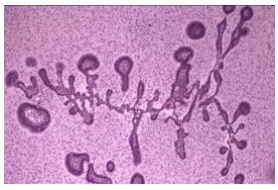
RG= uni or multi locular radiolucency with **scalloped margins with flecks of calcified structure around crown of impacted mand. molar**

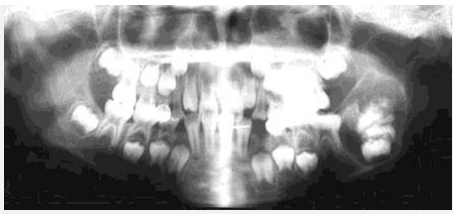
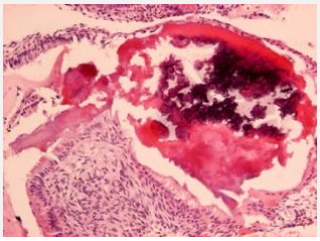
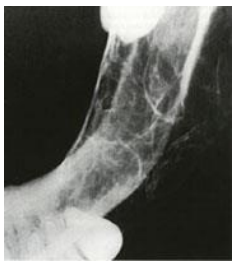
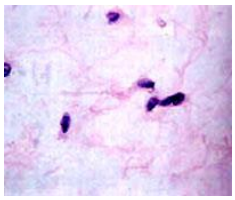
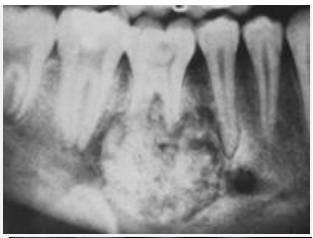
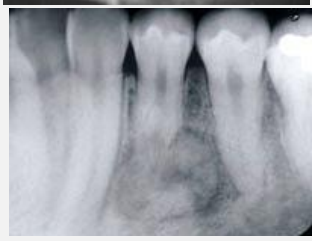


Differential Diagnosis:

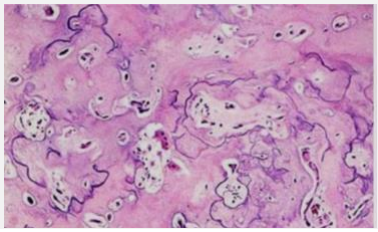
- *Dentigerous cyst*
- *Adenomatoid odontogenic tumor*
- *Ameloblastic Fibroodontoma*

Tx: resection including a margin of normal tissue
Q**: which stain is used to detect amyloid?** Congo red or Thioflavin T stains

Calcifying odontogenic cyst/ tumor (GHOST CELL CYST)	**contains "ghost cells" & "Spherical calcification"** It affects mostly areas **anterior to the first molar** **RG=** Unilocular radiolucency containing flecks of indistinct radiopacities + **Associated with unerupted tooth (mostly canine)**  MS= outer layer of palisaded cells & an inner layer of stellate reticulum **Enlarged eosinophilic keratinized , epithelial cells without visible nuclei "ghost cells" within the stellate reticulum + multiple calcifications** **Tx:** enucleation for cystic lesion More aggressive tx for solid lesion 
SQUAMOUS ODONTOGENIC TUMOR	**anterior to the molars of either jaw** **Triangular Unilocular radiolucency - close to the roots of erupted teeth.**  TX: curettage and extraction of involved tooth Local curettage & exo of involved tooth. **usually misdiagnosed as ameloblastoma, resulting in unnecessary radical surgery.**
AMELOBLASTIC FIBROMA	**TRUE BIPHASIC TUMOR** **May represent the early developing stage of Ameloblastoma** **Unilocular or multilocular radiolucency with impacted tooth in mandibular or maxillary molar area**   **MS=** odontogenic epithelia resembelling **dental lamina & the Cap & Bell stages of early odontogenesis.** **Zones of hyalinization are often surrounding the epithelial component of the lesion." Juxtaepithelial"**  **TX: enucleation [**lesion is well-encapsulated & easily separated from the surrounding] ***Recurrence is high due to inadequate initial removal of what are frequently multilocular lesions***

AMELOBLASTIC FIBRO-ODONTOMA	**RG= Well- circumscribed** uni or multilocular RL with **variable amount of calcification** with unerupted tooth  MS = general features of Ameloblastic fibroma but contains **enamel & dentin matrix** . More calcified lesions show **mature dental structures** (as **rudimentary tooth or conglomerate masses** of enamel and dentin)  TX: curettage
ODONTOGENIC MYXOMA	**derived from embryonic C.T (ectomesenchyme)** **RG =** Multilocular radiolucency with "Soap bubble" or "Honey comb" Pattern.  The radiolucent defect may contain **thin, wispy trabeculae of residual bone which often arranged at right angles to one another** MS= **Widely separated spindle or angular-shaped cells against a background of mucoid, ground substance**. In the periphery, the myxomatous tissue penetrates the bone →difficulty in removing the lesion.  misdiagnosed histologically with: **Chondromyxoid fibroma or, myxoid neurofibroma** TX: Small Myxoma → Curretage with careful periodic evaluation Large myxoma → Block resection, **Because of the gelatinous nature of the lesion, it is important to remove an intact specimen to reduce the chance of recurrence**.
CEMENTOBLASTOMA	cementum-like tissue growing in continuity with the apical layer of a molar or premolar that produces expansion of cortical plates & **pain [diagnostic feature]**  **molar/premolar area of mandible with lesions attached to the apical 1/3 of the vital root.** **RG =**Unilocular well-demarcated **radiolucency or mixed radiolucent/radiopaque or completely radiopaque** **Root resorption.**  **MS= unmineralized cementum matrix** that are continuous with the normal cementum layer of the tooth roots. Periodontal ligament follows the bulbous periphery of the lesion.

reversal lines which is indicate extensive remodeling during growth of the lesion.
Central region has MNGC

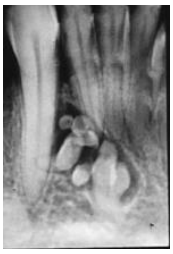


TX ; enucleation

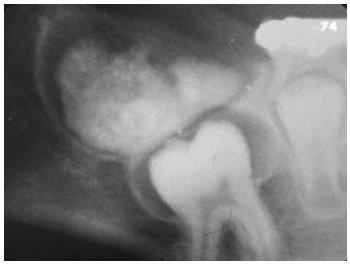
ODONTOMA

Most common odontogenic tumor
Hamartomatous lesion found over unerupted teeth, containing enamel, dentin, pulp & cementum in either recognizable teeth shape (Compond) or as a solid mass (complex).

A. **Compound odontoma:** anterior maxilla - over the crowns of unerupted teeth or between the roots of erupted ones. **Contains radio opaque structures that resemble miniature teeth**

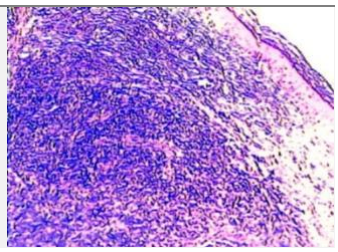
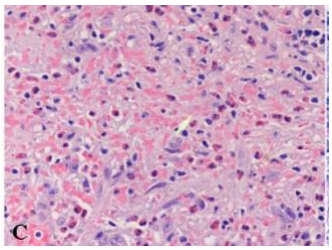
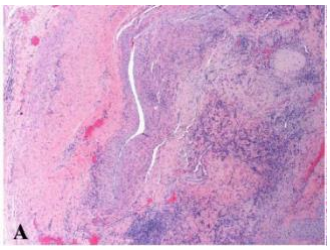
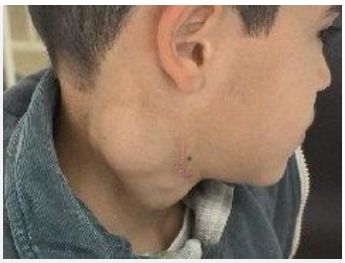


B. **Complex odontoma:** posterior mandible – over impacted teeth – appears as solid radio opaque mass

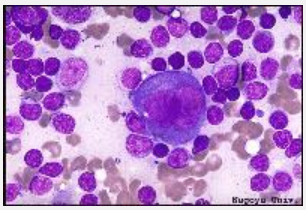


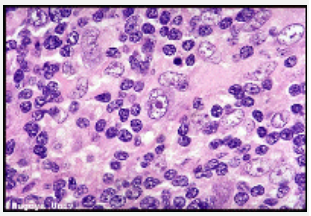
TX: enucleation

LYMPHOID LESIONS

CONDITION	CHARACTERISTIC FEATURES
LYMPHOID HYPERPLASIA	**starry sky appearance** **enlarged germinal center with mitosis & macrophages** 
Angiolymphoid hyperplasia with eosinophilia (ALHE)	**Subcutaneous nodules - Rare inside the oral cavity , <u>mostly in the head & neck region</u>** **Aggregates of lymphocytes and eosinophils <u>+ Blood eosinophilia</u>** **DD:** • Minor Salivary gland lesions • Lipoma or Schwannoma • Eosinophilic Granuloma **TX: excision or intralesional steroid injections**  
HODGKIN'S LYMPHOMA	Affect **bone or soft tissue** [rarely affects oral cavity] **<u>Painless enlargement of lymph nodes</u>** Within oral cavity causes **Unilateral tonsillar enlargement**  **Ann Arbor Staging System:** • **Stage I** : **single lymph node region** or **single extranodal site.** • **Stage II : 2 or more lymph nodes region on the same side of diaphragm** or **localized involvement of an extra nodal site and one or more lymph node.** • **Stage III : lymph node regions of both sides of the diaphragm**, + localized **involvement of an extra nodal organ or site IIIE** or **spleen IIIS or both IIISE** • **Stage IV : Diffuse or disseminated** involvement of one or more **distant extra nodal organ** **Sub classification:** **A:** Without Symptoms **B:** With systemic symptoms

MS =
Reed Sternberg cells [large cells & bilobed nucleus]





Classic HL comprises 4 entities: (Likes - Bulter Histo. Classification)

- **Lymphocytic –rich = most favorable diagnosis.**
- **Nodular Sclerosis = most common form**
- **Mixed cellularity**
- **Lymphocytic depletion** =least favorable prognosis**.**

TX:

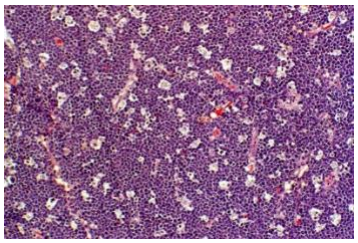
- **External Radiotherapy**
- **Chemotherapy**

NON HODGKINS LYMPHOMA

Histiocytic type (least favorable prognosis)
Most common extra nodal site is **GIT**
Head & neck is the second most common site (Waldeyer's Ring)

Histological Types involving head & neck region:

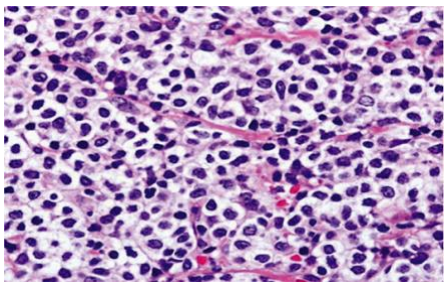
A. Large B cell Lymphoma (Burkitt's Lymphoma) → mostly involves BONE
MS= Starry Sky appearance to the tumor
children and adolescents



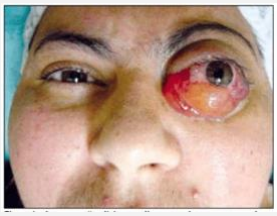
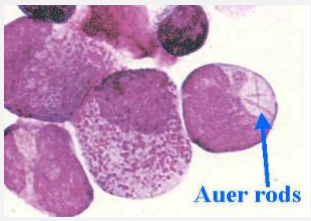
B. T-cell & NK Lymphoma (Midline Lethal Granuloma)

C. Extra nodal Marginal Zone Lymphoma **(Unique; arise in LN present in salivary glands + other mucosal sites in the body)**
Predisposing factors:
- Hashimato's thyroiditis
- Sjogren Syndrome
- H. P gastritis

MS = **Centrocyte-like cells**



TX: chemo and radiotherapy

GRANULOCYTIC SARCOMA(EXTRA MEDULLARY MYELOID TUMOR)	**Auer rods:** crystalline, rod-like , intracytoplasmic acidophilic bodies	 

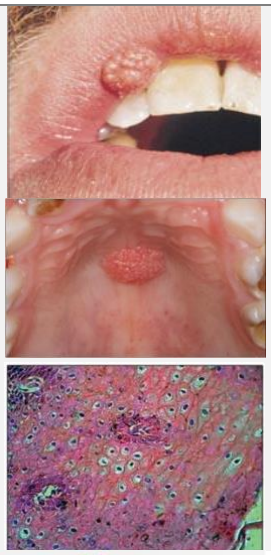
Burkitt's lymphma has three forms:

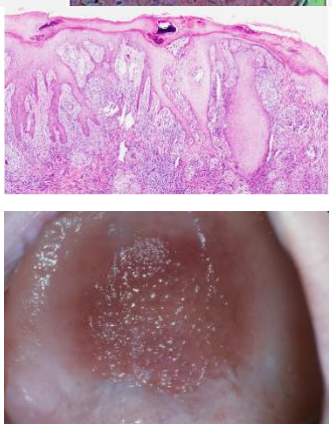
A. Endemic : In Africa – **related to malaria and EBV**
B. Sporadic: In north America & Europe
C. Associated with immuno deficiency

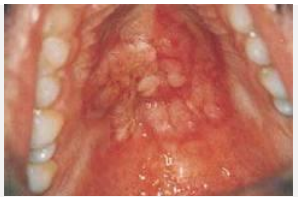
- ✓ **Q: Reed Stenberg cells are seen in** → Hodgkin's lymphoma
- ✓ **Q: unilateral tonsillar enlargement is seen in** → hodgkin's lymphoma
- ✓ **Q: Auer bodies are seen in** → Granulocytic sarcoma
- ✓ **Q: Burkitt's lymphoma mostly affects** → bone [remember B , B]
- ✓ **Q: starry sky appearance is seen in** → Burkitt's lymphoma
- ✓ **Q: centrocyte like cells are seen in** → extra nodal marginal zone lymphoma

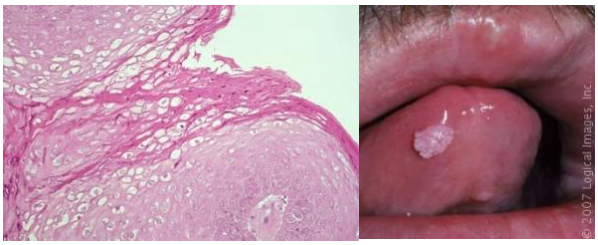
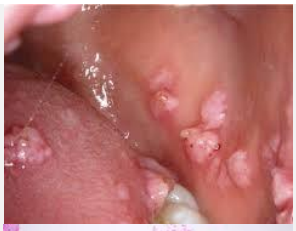
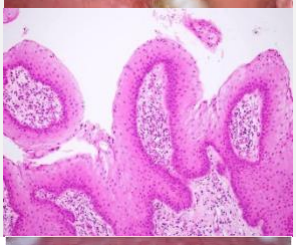
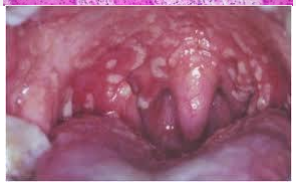
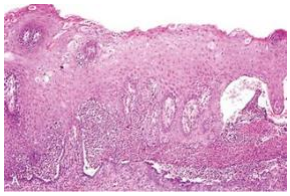
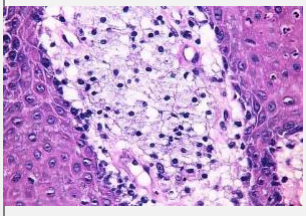
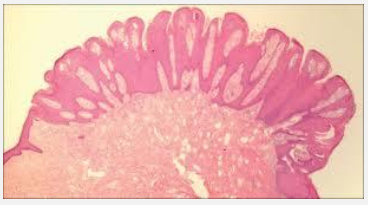
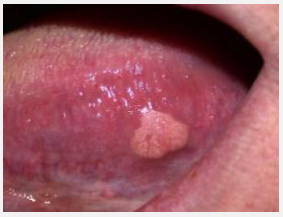
VERRUCA PAPILLARY LESIONS

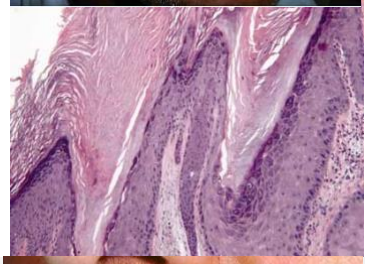
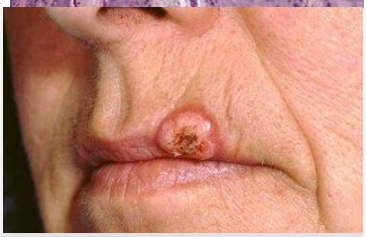
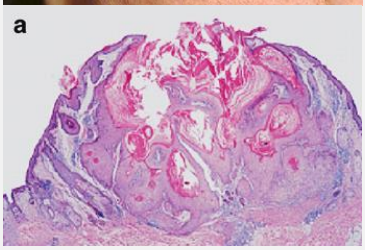
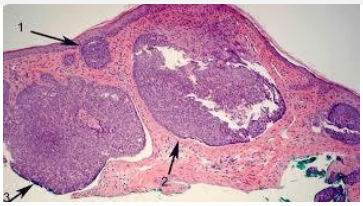
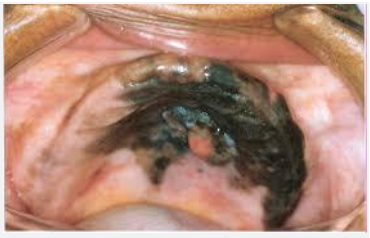
CONDITION	CHARACTERISTIC FEATURES
Squamous papilloma	**Most common of all oral lesions** **Associated with HPV (non- oncogenic types 2,6,11 &37)** **On lip or hard palate** **cauliflower- like surface alteration** **MS=** **Koilocytic cells = virally altered cells [**pyknotic nuclei, surrounded by an edematous or clear zone] **Differential Diagnosis:** ✓ Verruciform xanthoma ✓ Condylomata accuminatum Tx: Surgical excision or Laser ablation
Papillary hyperplasia /palatal papillomatosis	Exclusive in hard palate , always associated with removable prosthesis. Caused by low grade chronic trauma with fungal infection under ill fitting dentures + poor OH **Clinically = cobble-stone appearance [papillary projections]** **MS= Pseudoepitheliomatous hyperplasia-(mimic SCC) ,but with no evidence of dysplasia.** **Differential Diagnosis:** ✓ Nicotina stomatitis ✓ Darrier's disease ** ✓ Squamous papilloma **Tx:** Surgical excision or cryosurgery, microablation or laser ablation
Condylomata latum	**expression of secondary syphilis** **Exophytic, friable, papillary lesions within oral cavity** **Potentially infectious (abundant T pallidum)**







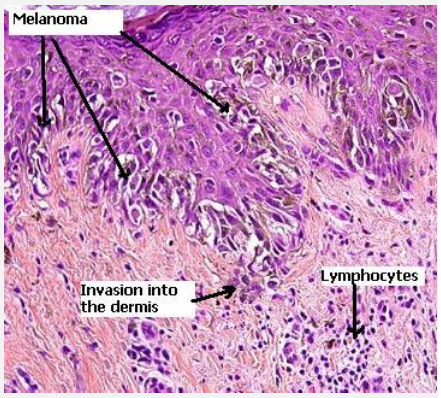
Condylomata accuminatum	**Caused by HPV 6 & 11** **MS= Koilocytes [virally altered cells-** pyknotic nuclei, surrounded by an edematous or clear zone **]** **TX:** Surgical excision or laser ablation 
Focal epithelial hyperplasia (HECK'S DISEASE)	**Caused by low-grade irritation, vitamin deficiency with HPV 13 & 32 infection.** **Nodular soft tissue masses all over mucosal surfaces [same color as adjacent mucosa]** ***MS** = Prominent fusion of epithelial ridges.* **TX:** No particular tx - Spontaneous regression may be seen  
Pyostomatitis vegetans	Pustular form of mucocutaneous disease, mostly in association with **inflammatory bowel diseases.** ➢ **Numerous tiny yellow pustules all over the mouth + small vegetating papillary projections** MS= **Pseudoepitheliomatous hyperplasia** **PMNS & eosinophils infiltrate (consistent findings)** TX: Control of inflammatory Bowel diseases Topical steroids, antibiotics, multivitamins & nutritional supplements**.**  
Verruciform xanthoma	Appears on skin and genitalia as well MS= **Invigilated crypts alternate with papillary extension + Numerous foam or xanthoma cells** **TX:** conservative excision   

Verrucous carcinoma	**Associated with the use of tobacco** **Buccal mucosa (most common) then gingiva (especially mandibular)** **Early lesion:** As verrucous hyperplasia (white, indurated with irregular borders). **Late lesions:** Exophytic with white-gray shaggy surface**.** **MS=** Papillary frond covered with highly keratinized epithelium + bulbous epithelium mass extend into the submucosa with **blunt, pushing margins** **TX:** Surgical excision + radiotherapy [excellent prognosis because it is highly differentiated + no metastesis]  
Keratoacanthoma	**Squamo-proliferative lesion** in sun-exposed skin & sometimes at mucocutaneous junction On skin: It originates **within pilosebacious apparatus** Fully developed lesion: contain a core of keratin surrounded by a concentric collar of raised skin or mucosa. If lesions not removed, spontaneous regression occur and the central keratin mass is exfoliated **MS= Central keratin plug with overhanging lip of epith.** **Pseudoepitheliomatous hyperplasia - Mimic SCC** **Differential Diagnosis :** • Molluscum contagiosum • Solar keratosis • Verruca vulgaris **Tx:** Surgical excision with careful follow up (excellent prognosis)  
Basal cell carcinoma	" pearly nodule" Ms= Nests of hyperchromatic but uniform basaloid cells + cleft-like retraction spaces 
Malignant melanoma	Usually appear as **black or brown patches** Mucosal melanoma are common in **India, Japan & Africa**. **Amelanotic melanoma appear red** **Palate & upper alveolar ridge.** **It grows in predictable manner:** ✓ Radial or horizontal growth phase (pre invasive or in situ stage) 

✓ Vertical growth phase (Invasive stage)

Types:

1- **Superficial spreading melanoma** (R growth phase), most common cutaneous melanoma.
2- Nodular melanoma (V growth phase), 1/3 develop in head & neck region
3- **Lentigo maligna melanoma** (R growth phase), develop from Hutchinson's freckles.
4- **Acral Lentiginous melanom**a (R growth phase), most common **inblacks + most common form of <u>oral melanoma</u>**

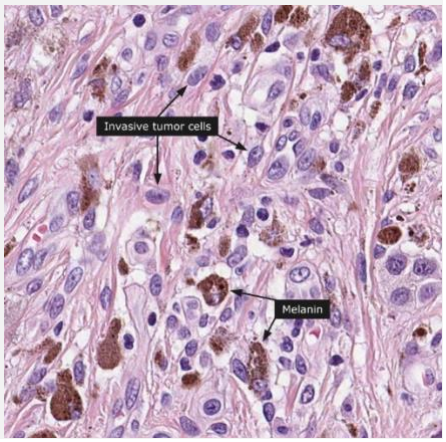


ABCDE system :

- Asymmetry (because of uncontrolled growth pattern)
- Border irregularity (often with notching).
- Color variation
- Diameter (greater than 6 mm)
- Evolving (lesion changes overtime)

MS=

- **Neoplastic melanocytes surrounded by clear halos**
- **Neoplastic melanocytes = round to spindle-shaped that are speckled or intensely pigmented with melanin.**



Tx:

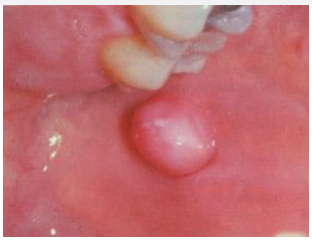
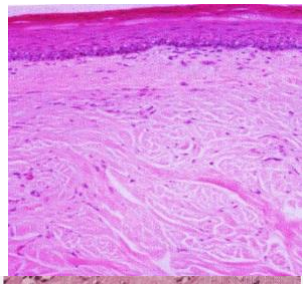
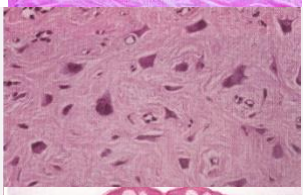
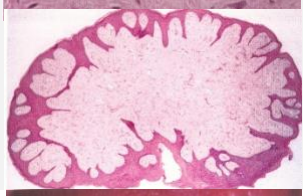
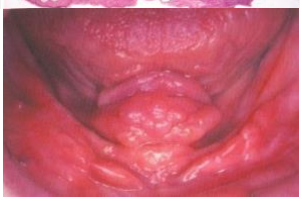
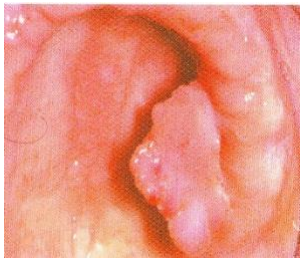
Lesion should be excised , but median survival probably not longer than 2 years.

- **Q: HPV is associated with ?** squamous papilloma , condylomata accuminatum , focal epithelial hyperplasia [heck's disease]
- **Q:Associated with inflammatory bowel disease?** Pyostomatitis vegetans
- **Q: associated with polio sebaceous apparatus?** Keratoacanthoma

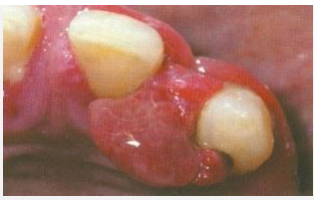
REACTIVE AND NEOPLASTIC SOFT TISSUE LESIONS

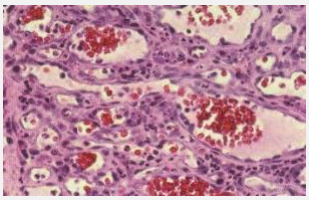
REACTIVE HYPERPLASTIC FIBROUS TISSUE LESIONS

CONDITION	Characteristic features
Fibroma	**Also called (Irritation fibroma, Traumatic fibroma, Fibrous Hyperplasia)** ➢ hyperplasia of **fibrous CT** in response to **local irritation** ➢ mostly on the **buccal mucosa** along the **bite line** or on sites that get frequently traumatized ➢ smooth surface pink nodule [same color as surrounding tissues] MS= - **atrophy of the rete ridges** - Collagen bundles arranged in **radiating, circular or haphazard fashion** **Tx:** surgical excision
Giant cell fibroma	Mostly in the **mandibular gingiva** MS = - **large, stellate fibroblasts** [may contain several nuclei] - rete ridges that appear **narrow & elongated** **Tx:** surgical excision
Epulis fissuratum	**Also called Denture Epulis, Inflammatory Fibrous hyperplasia** ➢ **Caused by irritation from the flange of an ill-fitting denture [mostly facial aspect in anterior region]** ➢ **folds of hyperplastic tissue in the alveolar vestibule** **similar lesion =** Fibro-epithelial polyp or leaf-like denture fibroma on the hard palate beneath a maxillary denture -The edge of the lesion is often serrated & resembles a leaf. **MS =** **Pseudo-epitheliomatous hyperplasia** **hyperplasia of the rete ridges.** **Osteoid or chondroid tissues is observed (osseous & chondromatous metaplasia).** **Tx:** Surgical removal with relining or remodeling the ill-fitted dentures

Pyogenic granuloma





- **Tissue response to local irritation or trauma**
- **Smooth or lobulated mass that is usually pedunculated + ulcerated surface**
- ***More common in maxillary gingiva* -Anterior areas - Facial aspects**
- **painless, although it bleed easily because of extreme vascularity.**

MS=

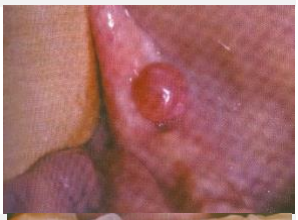
- **Highly vascular proliferation**
- **Numerous endothelium-lined channels that are engorged with r.b.c.**
- **Sometimes these vessels are organized in lobular aggregates (lobular capillary hemangioma)**
- **PMNs are more prevalent near the ulcerated surfaces while plasma cells & lymphocytes are more in deeper areas**

Tx: surgical excision

Pyogenic granulomas of the gingiva frequently develop in pregnant women **[*Pregnancy tumor or granuloma gravidarum*]** - during the **first trimester & their incidence increases up through the 7th. Month of pregnancy**

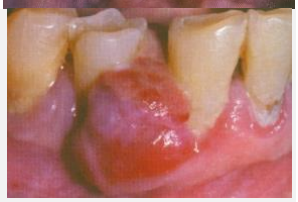
- Related to the increasing levels of **estrogen & progesterone** as the pregnancy progresses – mostly resolves after delivery , if it doesn't → surgical excision [lesion is removed during pregnancy in case it interferes severely with esthetics or function]

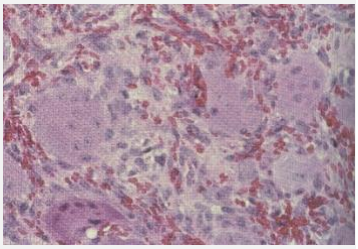
Epulis granulomatosa



Hyperplastic growths of granulation tissue that sometimes arise in healing sockets in response to bony sequestra

Peripheral giant cell granuloma (GIANT CELL EPULIS)



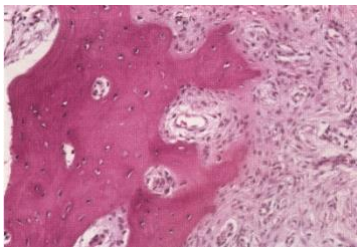


- Does not represent a true neoplasm but a reactive lesion caused by local irritation or trauma.
- **soft tissue counterpart of Central giant cell granuloma.**
- **Resemble pyogenic granuloma but it is more bluish-purple compared with bright red of typical pyogenic granuloma**
- **Cupping resorption of the underlying alveolar bone**

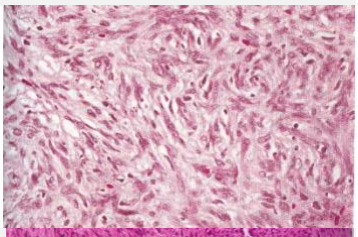
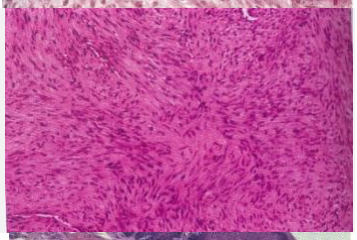
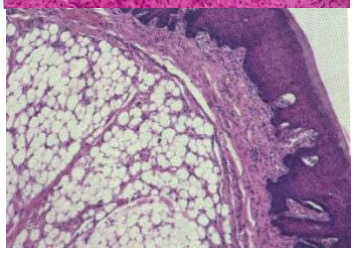
MS=

Multinucleated giant cells + Abundant **hemorrhage** + **hemosiderin deposits**

TX: excision to the underlying bone

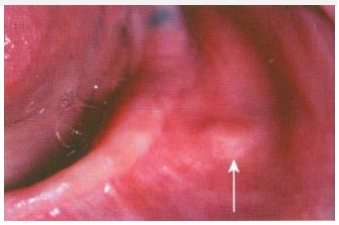
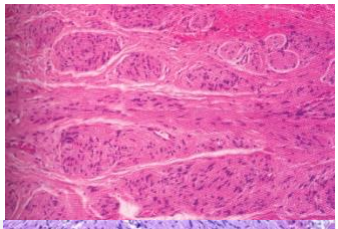
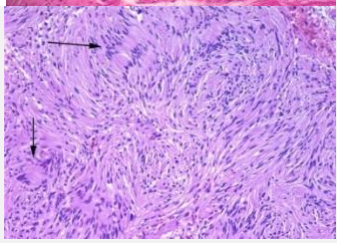
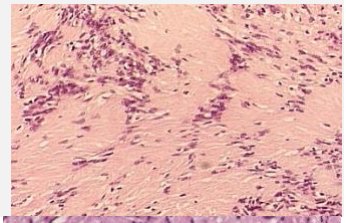
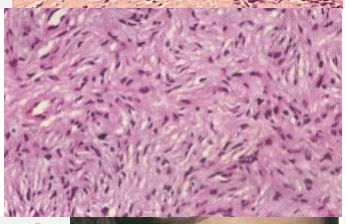
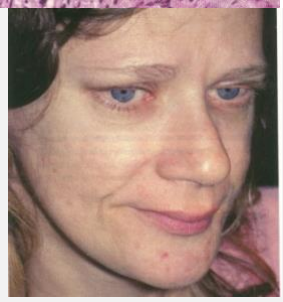
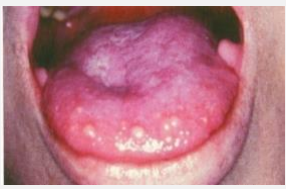
Peripheral ossifying fibroma (OSSIFYING FIBROID EPULIS)	➢ **does not represent a soft tissue counterpart of the central ossifying fibroma.** ➢ **incisor-cuspid region** ➢ **Exclusive on gingiva** **MS =** Fibrous proliferation + mineralized products [may consist of bone, cementum-like material, or dystrophic calcification] TX: excision to the underlying bone	

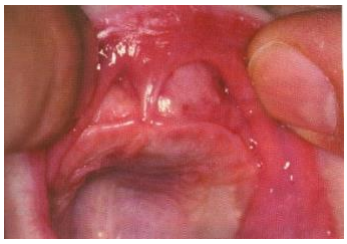
NEOPLASTIC FIBROUS TISSUE LESIONS

CONDITION	Characteristic features	
FIBROUS HISTIOCYTOMA	MS = Tumor cells are arranged in ***storiform* pattern** histiocyte-like cells **xanthoma cells** **Tx: surgical excision**	
FIBROMATOSIS	MS= spindle-shaped cells arranged in **streaming fascicles** **Tx:** wide local excision – has high recurrence rate	
LIPOMA	Some buccal cases are herniation of the buccal fat pad, which occur after surgical removal of third molar MS = Well circumscribed - Lobular arrangement of **mature fat cells** that differ from the surrounding normal fat Types : fibro lipoma – angiolipoma – spindle cell lipoma – myxoid lipoma – pleomorphic lipoma – intra muscular (infiltrating lipoma) Tx : conservative local excision	

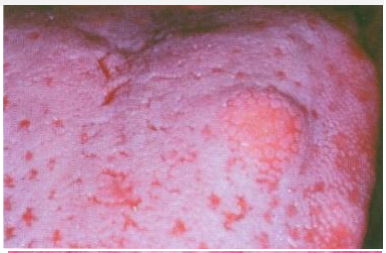
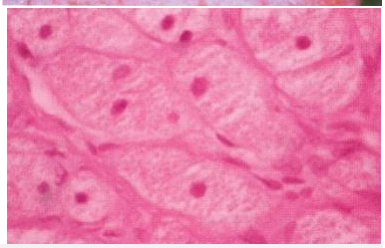
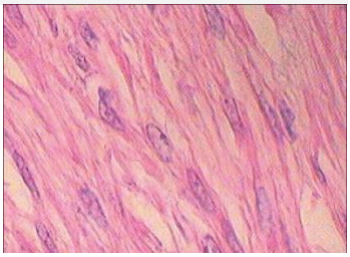
NEURAL TISSUE LESIONS

CONDITION	Characteristic features
TRAUMATIC NEUROMA (AMPUTATION NEUROMA)	➢ proliferation of neural tissue after transaction or other damage to a nerve bundle ➢ ***Smooth-surfaced, non ulcerated nodules mostly in the mental foramen region*** **MS = Haphazard proliferation** of mature, myelinated nerve bundles Tx: surgical excision with a small portion of the associated nerve
NEUROLEMOMA (SCHWANNOMA)	**2 microscopic patterns:** 1. ***Antoni A*:** streaming facicles of spindle – shaped Schwann cells around central acellular areas known as ***Verocay bodies. [Chinese lantern apperance]*** 2. ***Antoni B:*** *random arrangement of spindle cells* ***TX:*** *surgical excision*
NEUROFIBROMA	MS = **spindle-shaped cells with wavy nuclei + mast cells** **TX: excision**
Multiple endocrine neoplasia type 2B (MEN SYNDROMES)	➢ **[Bilateral neuromas of the commissural mucosa]** ➢ **characteristic facial appearance: narrow face, thick lip with averted upper eyelid.** ➢ **Those pts at risk to develop Pheochromocytoma & medullary carcinoma of the thyroid gland** MS = hyperplasia of nerve bundles TX: Prophylactic removal of thyroid gland.

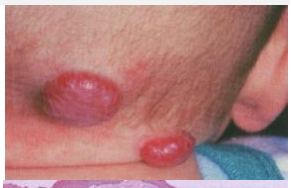
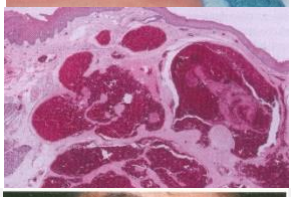
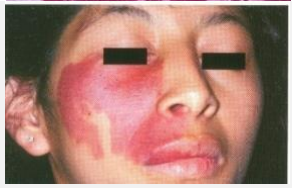
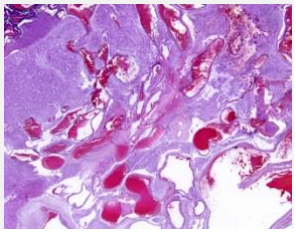








Melanotic neuroectodermal tumor of infancy	➢ **develops during the first year of life & it is of neural crest origin.** ➢ **Maxillary anterior region** ➢ **rapidly expanding mass that is frequently blue or black** ➢ ***"sun ray " radiographic appearance that may be mistaken for osteosarcoma.*** **MS = biphasic population of cells (epithelial & neuroblastic cells) + melanin** 

MUSCULAR LESIONS

CONDITION	Characteristic features
GRANULAR CELL TUMOR	➢ Not derived from muscles [**derived from Schwann cells or neuroendocrinne cells]** ➢ **Mostly on the dorsum of the tongue**  MS = **Large , polygonal cells with pale eosinophilic cytoplasm** **Pseudoepitheliomatous hyperplasia**  **TX=** conservative local excision
CONGENITAL EPULIS (CONGENITAL GRANULAR CELL LESION)	➢ **Mostly on the maxilla - lateral to the midline in the area of developing lateral incisor & canine** **MS = Large , rounded cells with pale eosinophilic cytoplasm** **Pseudoepitheliomatous hyperplasia**
LEIOMYOMA	➢ **Benign tumor of smooth muscle cells** ➢ **Oral leiomyomas are either <u>solid or vascular</u>** **MS = interlacing bundle of smooth muscle cells** 

VASCULAR LESIONS

CONDITION	Characteristic features
HEMANGIOMA	➢ Present at birth as pale macule with threadlike telangeictasias ➢ half of all hemangiomas **will show complete resolution by 5 years of age** MS = plump endothelial cells TX: systemic corticosteroids or Interferon-α  
VASCULAR MALFORMATION	➢ *Portwine stains* are relatively common capillary malformations on face along the distribution of trigeminal nerve**. [Tx =Flashlamp-pulsed dye laser]** ➢ **grow with the patient** MS = do not show endothelial cell proliferation & the channels resemble the vessels of origin  
STURGE WEBER ANGIOMATOSIS	➢ **Portwine stains or *Nevus Flammeus*** ➢ **Epilepsy** **TX: neurosurgery + laser therapy**
LYMPHANGIOMA	➢ Cavernous lymphangioma are more *frequent in anterior 2/3 of the tongue* ➢ "frog eggs appearance" Tx: surgical excision
ANGIOSARCOMAS	➢ **Resemble a simple bruise which may lead to delay in diagnosis** ➢ **Mostly on scalp and forehead**
KAPOSI'S SARCOMA	➢ **Caused by HIV** **Types:** **1) Classic – affects Slavic, Jewish & Italian men, multiple bluish-purple macules on skin of lower extremities.** **2) Endemic (African)** **3) Iatrogenic immunosuppressant-associated – organ transplant pts** **4) AIDS-related.** **Kaposi's sarcoma evolves through 3 stages:** **1. Patch (macular)** **2. Plaque.** **3. Nodular.** **Tx: surgery + radiotherapy**

- ✓ **Q: xanthoma cells arranged in storiform pattern are seen in?** fibrous histocytoma
- ✓ Q**: Antoni A & Antoni B are variants of ?** neurolemmoma [shcwanoma]
- ✓ Q: **Pheochromocytoma & medullary carcinoma of the thyroid gland are seen in?** multiple endocrine neoplasia type 2B
- ✓ Q**: frog egg appearance is seen in ?** cavernous lymphangioma
- ✓ **Q: Pseudoepithelamatous hyperplasia is seen in?**
  1. papillary hyperplasia [palatal papillomatosis]
  2. pyostomatitis vegetans
  3. keratoacanthoma
  4. necrotizing sialometaplasia
  5. epulis fissuratum
  6. Granular cell tumor
  7. Congentinal epulis

ORAL SQUAMOUS CELL CARCINOMA

The most common feature of SCC is ulceration then swelling and pain

Causes of SCC

1- **Smoking** [Main carcinogens in tobacco are **N-nitrosamines** - Pipe and cigar smoking have been linked with carcinoma of the lip , reverse smoking is associated particularly with cancer of the palate]
2- **Alcohol** [usually people smoke and drink at the same time - ethanol can act as a solvent helping harmful chemicals in tobacco to get inside the cells]
**** smoking and alcohol act synergistically to increase the relative risk to 15 times**
3- **Sunlight** [causes SCC of the lower lip – mostly seen in outdoor workers]
4- **Diet and nutrition** [Deficiencies of **iron** and of the antioxidant vitamins A, C, and E increase the risk for oral cancer + anemia like in **Plummer-Vinson or Patterson-Kelly syndrome**]
5- **Dental factors [** ill fitting dentures, poor oral hygiene]
6- **Oncogenic viruses [HSV, HPV 16 & 18, EBV]**
7- **Immunosuppression like HIV**
8- **Chronic candida infections [chronic hyperplastic candidiasis]**

HPV oncogene E6 → inactivates tumor suppressor gene [P53]

HPV oncogene E7 → inactivate retinoblastoma Gene [Rb]

Clinical presentation of SCC

Clinical features raise suspicion of malignancy:

1- persistent ulceration
2- Induration
3- fixation to underlying tissue + bone destruction

enlarged regional nodes do not necessarily indicate metastatic spread they might be only non-specific changes of **reactive hyperplasia**

Metastasis of SCC

✓ **Carcinoma of lower lip** → via superior jugular vein & digastric nodes.

✓ **Oropharyngeal carcinoma** → via jugulo-digastric or retropharyngeal nodes.

Oral SCC might start as asymptomatic erythroplakia, ulceration, white patches → in later stages might become painful causing bone destruction, loosening, displacement of teeth and altered nerve sensations

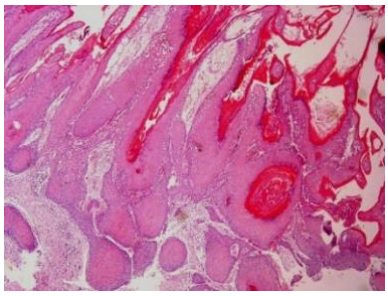
✓ **Distant metastasis** to the Lungs & liver.

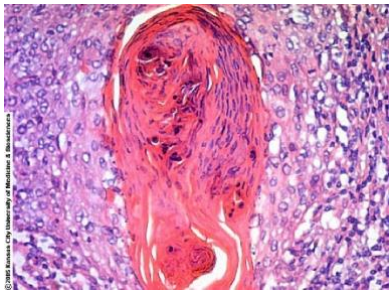
Grading of tumors

Well-differentiated tumors " low grade or grade 1":

- **Squamous Epithelium** + **masses of prickle cells** surrounded by basal cells
- **Intercellular bridges + Keratin pearls**

Nuclear and cellular pleomorphism is not prominent and there are relatively few mitotic figures.





Signs of dysplasia :

1- Loss of polarity of basal cells
2- Drop shaped rete ridges
3- Keratin pearls / dyskeratosis
4- Cellular and nuclear polymorphism
5- Atypical mitotic figures

Mild dysplasia = only the lower 1/3 of epithelium

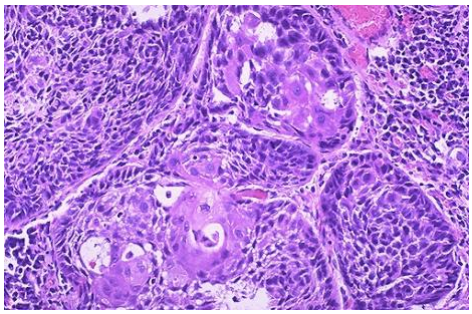
Moderate = middle 3rd of epithelium

Severe = 2/3 of the epithelium

Carcinoma in situ = full thickness of epithelium shows cellular changes but BM is still intact

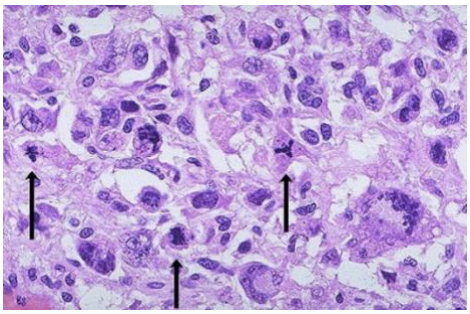
Moderately differentiated tumors" Grade 2 or moderate grade":

less keratinization and more nuclear and cellular pleomorphism and mitotic activity, but are still readily identified as squamous in type



Poorly differentiated tumors " high grade or grade 3"

Keratinization is absent and the cells show **prominent nuclear** and **cellular pleomorphism** and **abundant, often bizarre, mitoses.**



- **Most oral squamous cell carcinomas are extremely locally destructive.**
- SCC has Broad front of invasion (better prognosis), in others separate islands of carcinoma or even individual malignant cells may be seen well in advance of the main growth.
- Bone invasion occurs as a result of local spread:
  A. Edentulous pt → route of entry through crest of the ridge
  B. Dentate pt → route of entry through PDL

Q: The further back in the mouth the tumor, then the worse the prognosis, why? Because they tend **not to be diagnosed** at an early stage + the **rich lymphatic drainage** around the base of the tongue may will aid in metastatic spread.

Q: Carcinomas in females have a better prognosis than carcinomas in males, why? Because they tend to be diagnosed and treated at an earlier stage.

Q: **Age affects prognosis, partly, why?** With increasing age the patient becomes less well able to withstand extensive surgery or radiotherapy + there will be reduction in cell mediated immune response

Staging of tumors [TNM system]

T [size of the primary lesion]	
T0	No evidence of primary site
Tis	Carcinoma in situ
T1	2cm or less in greatest diameter
T2	More than 2cm but less than 4 cm
T3	More than 4 cm
T4 a	Tumor invade cortical bone or extrinsic tongue muscles, or maxillary sinus or skin of face. (Resect able)
T4b	Tumor involve masticator space, pterygoid plate, or skull base and/or encases internal carotid artery (unresectable)
N [extent of metastasis in the regional lymph nodes]	
Nx	Nodes could not be or were not assessed
N0	No regional LN metastasis
N1	Metastasis in **single ipsilateral node 3 cm or less** in greatest dimension
N2A	Metastasis in **single ipsilateral node 3 cm ,but not greater than 6 cm** in greatest diameter
N2B	Metastasis in **multiple ipsilateral node** , none more than 6 cm in greatest diameter
N2C	Metastasis in **bilateral or contralateral nodes, none more than 6 cm** in greatest diameter
N3	Metastasis in a node more than 6 cm in greatest diameter
M [presence or absence of distant metastasis]	
Mx	Distant metastasis was not assessed
M0	No evidence of distant metastasis
M1	Distant metastasis is present

Stage	**TNM classification**	**5 year prognosis**
I	**T1**N0M0	72 %
II	**T2**N0M0	58%
III	**T3**N0M0, or T1, T2, or T3, **N1**M0	45%
IV A	**T4a**N0 or N1M0, or T1,T2,T3 or T4 **N2**M0	22%
IV B	Any T**N3**M0 or **T4b** any NM0	
IV C	Any T Any N & **M1** lesion	

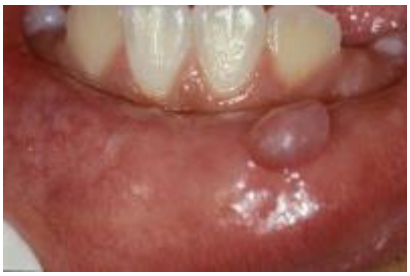
Treatment of SCC

- **Lip Carcinoma:** Wedge resection
- **Intraoral Carcinoma**: Early stage: Surgery &/or Radiotherapy
- **Cervical lymph nodes involvement**: Radical Neck dissection or selective neck dissection.

➢ **Chemotherapeutic agents**: Platinum containing compounds " cisplatin", 5 FU.
➢ **Neoadjuvent chemotherapy could be used initially to shrink the tumor prior to additional therapy.**
➢ **Targeted therapy**: Cetuximab & Panitumomab (monoclonal Abs)

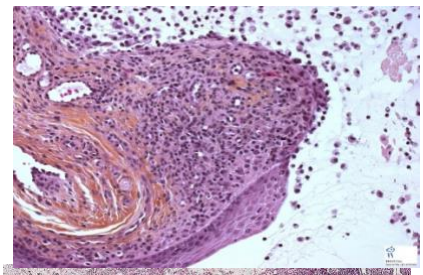
Reactive salivary gland lesions

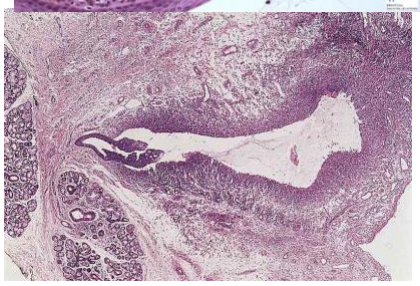
- **Mucocele:** Can be **mucus extravasation phenomenon** or **mucus retention cyst**
- **Ranula** : mucus extravasation phenomenon and mucus retention cyst that occurs specifically in the **floor of the mouth**



MUCOUS EXTRAVASATION PHENOMENONA: Trauma will cause severance of the salivary duct but the acinar cells will continue to secrete saliva into the severed duct → mucous pools into the CT forming a mucocele

- **Most common site for mucous extravasation cyst = the lower lip**
- **Initially the mucoceles are well circumscribed but with repeated trauma they become nodular and firm**





MS =

- Free mucin in connective tissue with no epithelial lining
- The base of the mucocele will reveal feeder duct.

Salivary gland changes (in long standing case) shows:

A. Ductal dilation
B. Chronic inflammation
C. Acinar degeneration
D. Increased fibrosis

DD of mucous retention cyst:

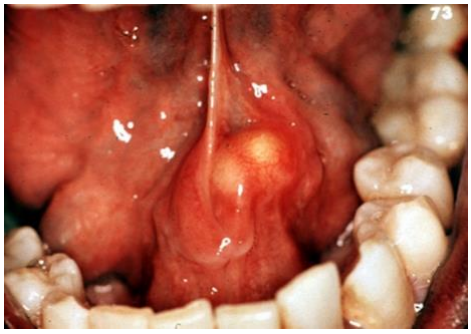
A. **Mucoepidermoid** carcinoma
B. Cavernous **hemangeoma**
C. Blisters seen in some **bullous** and desqumative disease.
D. Soft tissue neoplasms (**neurofibroma & lipoma**)

Treatment:

- Surgical excision with **the feeder gland**.

- Post surgical **parasthesia** might occur

Mucous retention cyst [obstructive sialadenitis]



obstruction of a salivary duct resulting in an **epithelial lining cavity containing mucus**

- The mucus retention cyst could **occur in the major salivary gland**, when they do occur they are **multiple** [**poly cystic disease of the parotid gland]**

- Most common site for mucous retention cyst → floor of the mouth

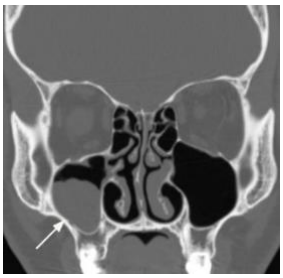
MS =

- The cyst has compressed **ductal epithelial linning**
- **Cyst lumen contains mucin or occasionally a sialolith**

DD of mucous retention cyst:

A. Salivary gland neoplasm
B. Mucus extravasation phenomenon
C. Benign CT neoplasm
D. Dermoid cyst

Treatment : excision with caution of rupturing the cystic sac [damage to the adjacent gland may result in a mucocele formation]



MAXILLARY RETENTION CYST : Due to blockage of antral sero-mucus gland → ductal epithelium lined cystic structure filled with mucin.

- Asymptomatic, appear as hemispheric, homogenous well- defined radiopacity
- **No treatment just observation**

SALIVARY GLAND OBSTRUCTION – SIALOLITH:

- Usually associated with the submandibular gland **– Wharton's duct**
- causes intermittent swelling and pain often at meal times [when there is increased demand for saliva]

Tx: surgical removal of the stone with or without the gland

Gout is the only systemic disease known to cause salivary calculi and these are composed of <u>uric acid</u>

Predisposing factors for sialolith formation:

- increase in water hardness
- smoking
- xerostomia

How a sialolith forms: mucin proteins and epithelial cells will form a nidus for the calcium salts to precipitate over → calcifications will continue and form concentric layers as the sialolith increases in size

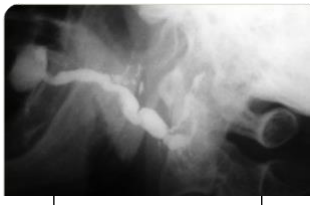
Q: **why is it more common to get sialoliths in the sub mandibular gland?**

Most of SMG calculi are radio-opaque

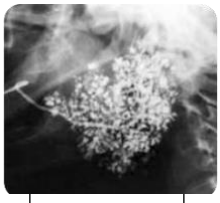
Most of parotid calculi are radiolucent and multiple

1. Saliva more **alkaline**
2. **Higher** concentration of **calcium** and **phosphate** in the saliva
3. **Higher mucus** content
4. **Longer duct**
5. **Anti-gravity flow**

Q: how can calculi/ sialolith be detected?



Sialodochitis



Sjogren's

1- Plain occlusal films [for intra ductal stones]
2- Ct scan
3- Ultrasound
4- Sialography [descriptions]:
   A. Tree in winter → normal parotid gland
   B. Bush in winter → normal sub mandibular gland
   C. Snowstorm / cherry blossom → sjogren's syndrome
   D. Sausage link appearance [dots , blobs] → sialodochitis
5- Radio isotope imaging
6- MRI [gold standard]
7- **Diagnostic Sialendoscopy:** Allows complete exploration of the ductal system, direct visualization of duct pathology- but has risk of perforating the duct and can lead to duct stenosis

Q: how can sialolith be treated ?

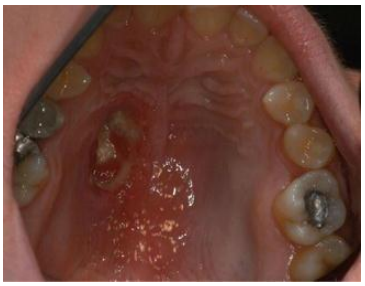
A. No treatment → just give ABX and anti inflammatories and hope for the stone to pass
B. Stone excision → [lithotripsy, interventional sialondoscopy , simple excision]
C. Gland excision →

Q: when can you remove a sialolith transorally? If you can palpate it through the mouth, if you can visualize it on an occlusal radiograph , if it is no more than 2 cm from the punctum

Q: when do you need to remove the gland? If transoral approach fails, intraglandular stones , very posterior stones

Q: how does the epithelium in the gland react to the sialolith? The epithelium shows **squamous and mucus cell metaplasia +** changes to stratified squamous epithelium with goblet cells

NECROTIZING SIALOMETAPLASIA:

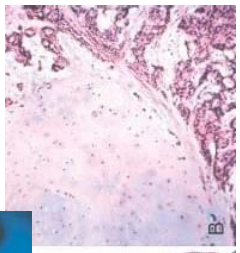
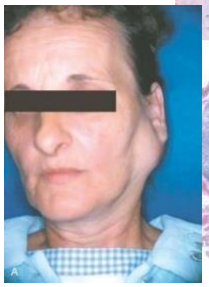
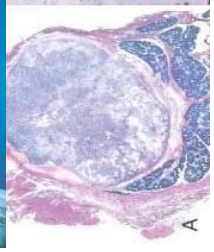
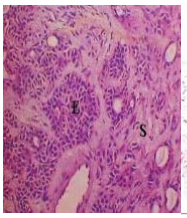
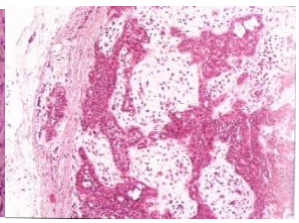


- Caused by ischemia due to LA vasoconstriction - **mostly in the palate**
- large area of epithelium + underlying connective tissue and minor salivary glands become necrotic while the ducts undergo squamous metaplasia [within the ulcer you'll see gray granular lobules which represents the **necrotic minor salivary glands]**
- **MS = pseudoepitheliamatous hyperplasia**
- **self limiting [no tx needed] – heals in 6-8 weeks**

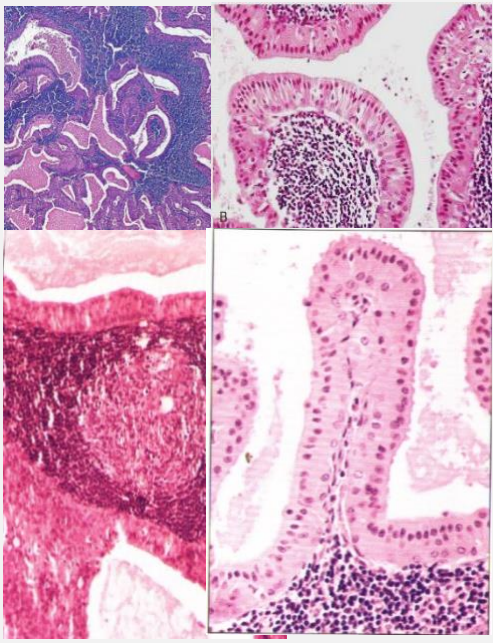
SALIVARY GLAND NEOPLASTIC DISEASES

Tumor	Origin
Pleomorphic adenomas	intercalated duct cells and myoepithelial cells
Oncocytic tumors	striated duct cells
Acinous cell tumors	acinar cells
Mucoepidermoid tumors and squamous cell carcinomas	excretory duct cells

BENIGN SALIVARY GALND TUMORS

CONDITION	Characteristic features
PLEOMORPHIC ADENOMA	➢ **Most common salivary gland neoplasm** ➢ Mostly in the **parotid gland [superficial lobe, most in tail of gland]** followed by **minor salivary glands in the palate** **MS =** • **Epithelial (E) and stromal (S) components.** **Epithelial Components:** Tubular and cord-like or solid sheet arrangements **Stromal [mesenchymal] components:** **Origin:** myoepithelial cells **Loose chondromyxoid stroma + cartilage and Osseous** metaplasia **pseudo-encapsulated [**tumor islands may be found within the fibrous capsule which is **continuous** with main tumor mass & likely to contribute to **recurrence (tumor pseudopodes)]** ➢ **Benign tumor with low risk of malignant transformation** **Tx:** **A. Careful excision [parotidectomy with VII preservation]** **B. Submandibular gland excision** **C. Wide local excision of minor SG**      **CAUTION: With each recurrence there is an increased possibility of malignant transformation.** **Radioresistant, radiotherapy is contraindicated** **
WARTHIN'S TUMOR	Also called **Adenolymphoma; benign papillary cystadenoma lymphomatosum** ➢ **Second most common benign tumor of the parotid gland [Exclusive in parotid gland mainly the tail]** ➢ Bilateral in 10% of the cases ➢ May contain **mucoid brown fluid in FNA** ➢ Positive correlation with **cigarette smoking & EBV.**

- **Dough to cystic mass in the inferior pole of parotid gland adjacent to posterior angle of mandible.**



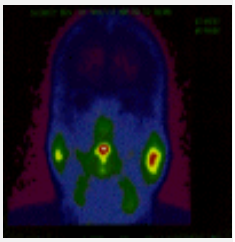
MS =

A. Cystic spaces
B. papillary fronds which demonstrate 2 layers of oncocytic epitheilal cells.(luminal & basal cells)
C. lymphoid tissue with germinal center

Occasionally undergoes squamous metaplasia (may mistakenly diagnose SCC on FNA)

- *Both lymphoid and oncocytic epithelial elements must be present to diagnose Warthin's*

Oncocytes selectively incorporate technetium Tc 99m and appear as hot spots on a radionucleotide scan.

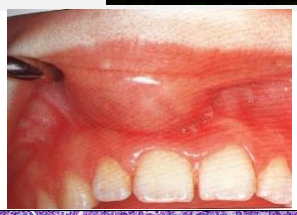


Tx: surgical excision

MONOMORPHIC ADENOMA

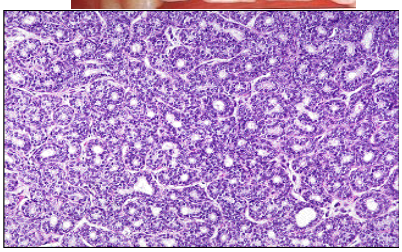
Similar to Pleomorphic Adenoma except **no mesenchymal stromal component [** epithelial component]

- Occurs in minor salivary glands (upper lip)
- 12% bilateral

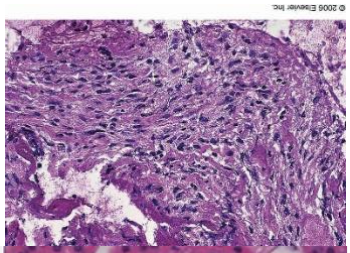


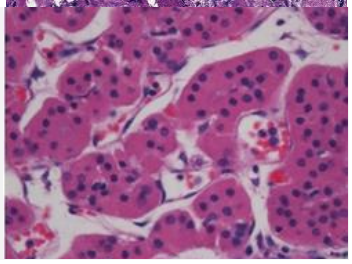
Types:

A. **Basal Cell Adenoma** : mostly in the parotid , but upper lip is the most common intraoral site uniform **basaloid epithelial cells** with a monomorphous pattern



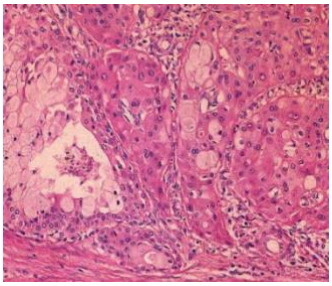
	B. **Canicular Adenoma :** exclusive in the upper lip - **Bilayer strands of basaloid cells that branch & anastamose** A. **Myoepithelioma Adenoma :** just myoepithelial cells Most of them arise within MSG, parotid gland, SMG plasmacytoid or spindle cells
ONCOCYTIC TUMORS	➢ Include **Oncocytoma & oxyphilic adenoma** ➢ **Mainly parotid gland** MS= Polyhydral cells with granular eosinophilic cytoplasm & centrally placed vesicular nucleous Tx = SF parotidectomy

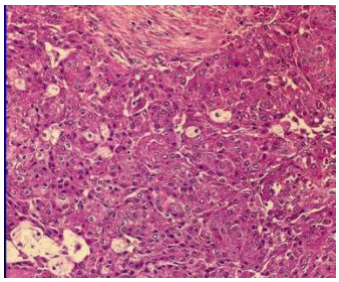


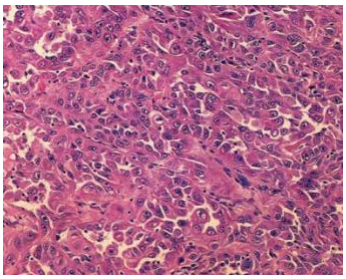


MALIGNANT SALIVARY GALND TUMORS

CONDITION	Characteristic features
MUCOEPIDERMOID CARCINOMA	➢ Most common salivary **malignancy** ➢ **Mostly parotid followed by submandibular & minor glands** MS = • Epidermoid epithelial cells • Intermediate epithelial cells • Mucous secreting epithelial cells **LOW GRADE:** numerous **mucus secreting cells** + **intermediate cells** and **few epidermoid cells with minimal cellular atypia.** **INTERMEDIATE GRADE:** mucus cells but not as numerous as in low grade **HIGH GRADE:** Clusters of proliferating **epidermoid cells** + few mucous cells. **Mistaken for SCC** **Q: how can you differnetuate b/w mucoepideromoid carcinoma and SCC?** By mucin staining **TX:** Stage I & II → Wide local excision Stage III & IV → Radical excision +/- neck dissection +/- postoperative radiation

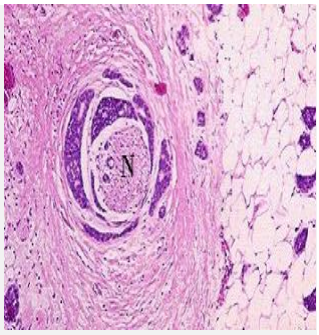




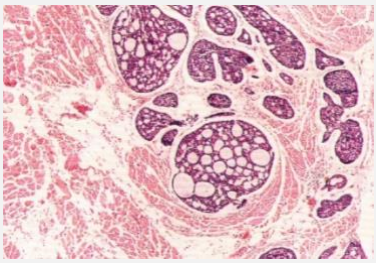


ADENOID CYSTIC CARCINOMA

- second most common malignancy overall and the **first most malignancy of the submandibular gland**
- **characterized by neurotropism [perineural invasion] → leading to recurrences at the skull base after surgical and radiation treatment**



Threehistologic patterns: [patterns may coexist in the same tumor]



- **The cribiform pattern [swiss cheese pattern]** - best prognosis.
- **Tubular pattern** - intermediate prognosis
- **The solid pattern** - poorer prognosis.

Tx: complete local excision [Tendency for perineural invasion → facial nerve has to be sacrificed] + post op radio therapy

ACINIC CELL CARCINOMA

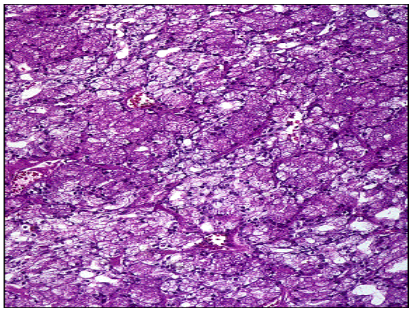
low-grade behavior and has the best survival rate of any salivary malignancy

- **Parotid gland**

Origin: Intercalated duct & reserve cells

- **Second most common parotid and pediatric malignancy**

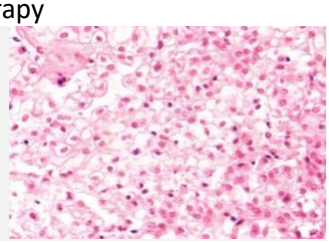
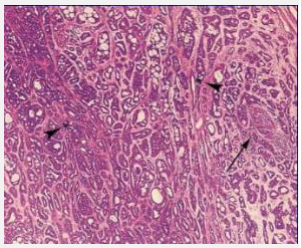
MS= Stained by PAS.
Cells heavily stained [called blue dot tumor]



Bilateral in 3% of patients, <u>making acinic cell carcinoma the second-most common neoplasm, after Warthin's tumor</u>, to exhibit bilateral presentation.

Tx: local excision +/- post op radio therapy

MALIGNANT MIXED SALIVARY GALND TUMORS

CONDITION	Characteristic features
CARCINOMA EX-PLEOMORPHIC ADENOMA	➢ Carcinoma developing in the **epithelial component** of preexisting pleomorphic adenoma ➢ A typical clinical history includes a **longstanding salivary mass that begins to rapidly enlarge** TX : radical excision + neck dissection + post op radio therapy
CLEAR CELL TUMOR	➢ Includes **Clear cell carcinoma & Epimyoepithelial carcinoma** ➢ **Mostly in minor salivary glands** ➢ **Clear cells** TX: local excision 
SQUAMOUS CELL CARCINOMA	➢ **major salivary glands [submandibular glnads]** **Obstructive sialadenitis is predisposing factor.** ➢ **Well to moderately well-differentiated with no evidence of mucin production.** **You must RULE OUT:** • High-grade mucoepidermoid carcinoma • Metastatic SCCA to intraglandular nodes • Direct extension of SCCA
POLYMORPHOUS LOW GRADE ADENOCARCINOMA	➢ **Exclusive in minor salivary glands - second most common malignancy of Minor salivary glands** ➢ **low grade maliganany with low rate of reccurance** ➢ **Origin: Reserve cells in most proximal portion of salivary duct.** **MS = Myoepithelial differentiated cells** **Tx: excision** 

- ***Carcino-sarcoma*** : **True malignant mixed tumor** [carcinomatous and sarcomatous components]
- ***Metastatic mixed tumor*** : Metastatic deposits of otherwise typical pleomorphic adenoma

TNM OF SALIVARY GLAND TUMORS

T [size of the primary lesion]	
T0	No evidence of primary tumor
T1	Tumor 2 cm or less in greatest dimension **without extra-parenchymal extension**
T2	Tumor > 2 cm but not > 4 cm in greatest dimension **without extra-parenchymal extension**
T3	Tumor > 4 cm and/or tumor **having extra-parenchymal extension**
T4 a	Tumor invades **skin, mandible, ear canal and/ or facial nerve**
T4b	Tumor invades **skull base and/or pterygoid plates and /or encase carotid artery**
N [extent of metastasis in the regional lymph nodes]	
Nx	Nodes could not be or were not assessed
N0	No regional LN metastasis
N1	Metastasis in **single ipsilateral node 3 cm or less** in greatest dimension
N2A	Metastasis in **single ipsilateral node 3 cm ,but not greater than 6 cm** in greatest diameter
N2B	Metastasis in **multiple ipsilateral node** , none more than 6 cm in greatest diameter
N2C	Metastasis in **bilateral or contralateral nodes, none more than 6 cm** in greatest diameter
N3	Metastasis in a node more than 6 cm in greatest diameter
M [presence or absence of distant metastasis]	
Mx	Distant metastasis was not or could not be assessed
M0	No evidence of distant metastasis
M1	Distant metastasis is present

Stage	**TNM classification**
I	**T1**N0M0
II	**T2**N0M0
III	**T3**N0M0, or T1, T2, or T3, **N1**M0
IV A	**T4a**N0 or N1M0, or T1,T2,T3 or T4 **N2**M0
IV B	Any T**N3**M0 or **T4b** any NM0
IV C	Any T Any N & **M1** lesion

Salivary Gland Neoplasia Another classification [ABCDs]:

- Architecture
- Biphasic
- Cytology
- Differential

References

- Brad W. Neville, Douglas D. Damm, Carl M. Allen and Angela C. Chi, . Oral and Maxillofacial Pathology, 4th ed.
- Regezi, J. A., Sciubba, J. J., & Jordan, R. C. K. (2003). Oral pathology: Clinical pathologic correlations. St. Louis, Mo: Saunders.

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