ODONTOGENIC TUMORS
PART-1

BY-

Dr. Vishakha Lal

CONTENT

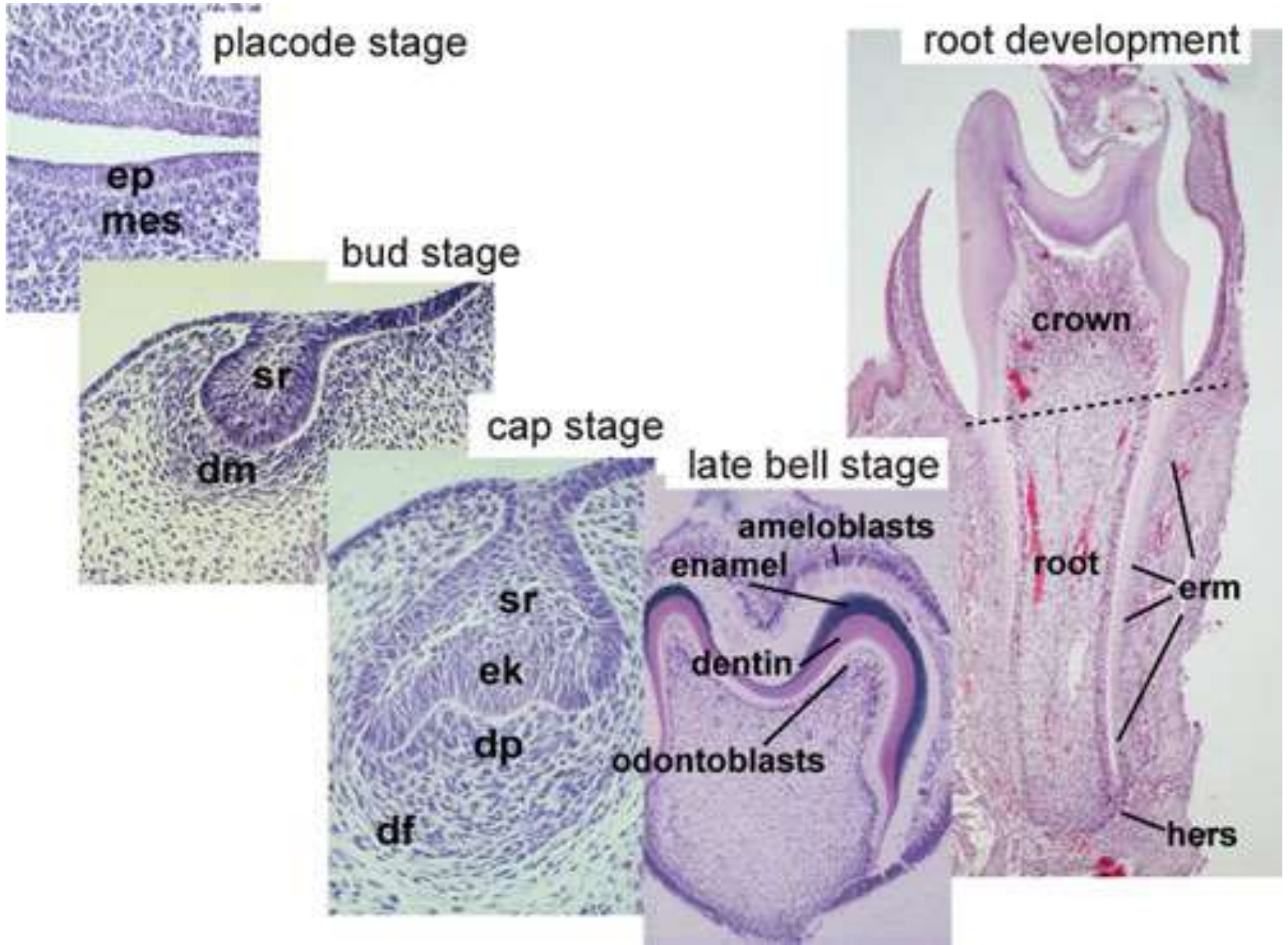
- Introduction
- Tooth Development
- Origin of Odontogenic Tumor
- Classifications
- Overall Treatment Plan

INTRODUCTION

- The word tumor means a mass of tissue that is formed by an accumulation of abnormal cells.
- Odontogenic tumor is define as “a group of neoplasm & tumors-like malformations arising from cells of odontogenic apparatus & their remnants”.
- In other words, odontogenic tumors arise from odontogenic tissues.

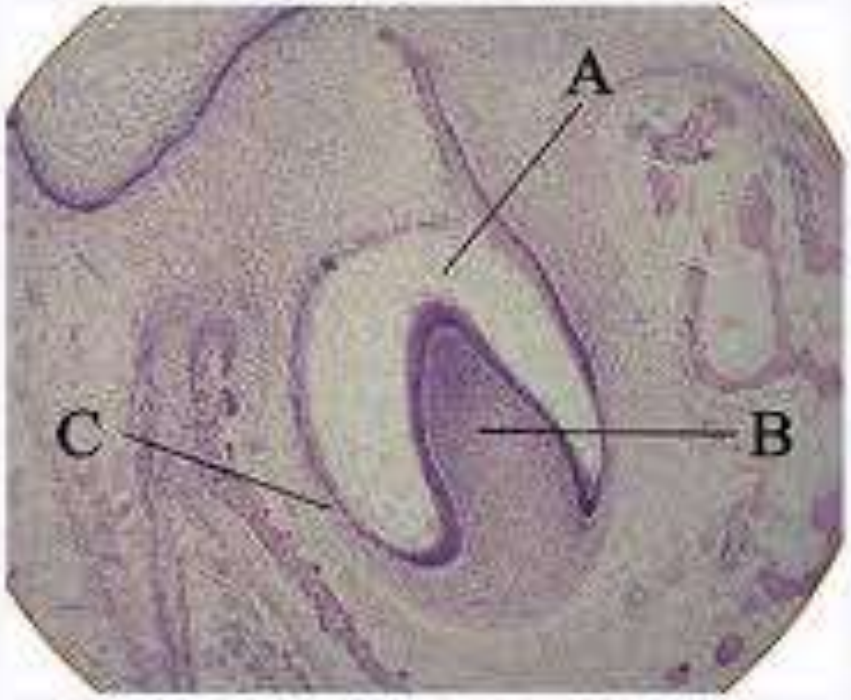
- Odontogenic tumors comprise a complex group of lesions with varied histopathological and clinical features.
- Some tumors are true neoplasms, while some are hamartomas (developmental malformations).
- Some are composed only of odontogenic epithelium, while many are mixed i.e. both epithelium and mesenchyme, while some are composed only of mesenchyme

TOOTH DEVELOPMENT



- Sr- serrate reticulum
- Dm- dental mesenchyme
- Ek- enamel knot
- Dp- dental papilla
- Df- dental follicle
- Erm- epithelial cell rest of malassez
- Hers- hertwig epithelial root sheath.

- Tooth formation is a complex process that involves both epithelial and connective tissues.
- There are three major tissue components involved in odontogenesis: the enamel organ, the dental papilla, and the dental follicle.
- The enamel organ is an epithelial structure that is derived from oral ectoderm.
- The dental papilla and dental follicle are connective tissue structures that are considered ectomesenchymal in nature because they are also partly derived from the neural crest cells.



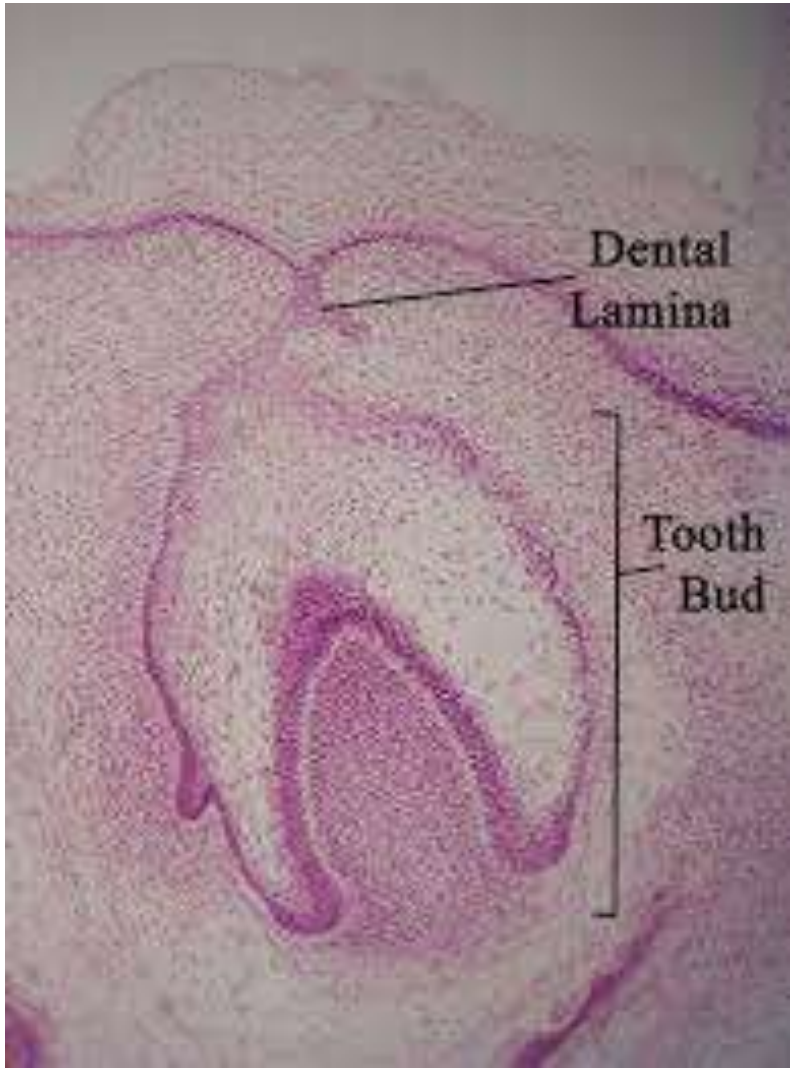
Histologic slide showing a tooth bud.

A: enamel organ

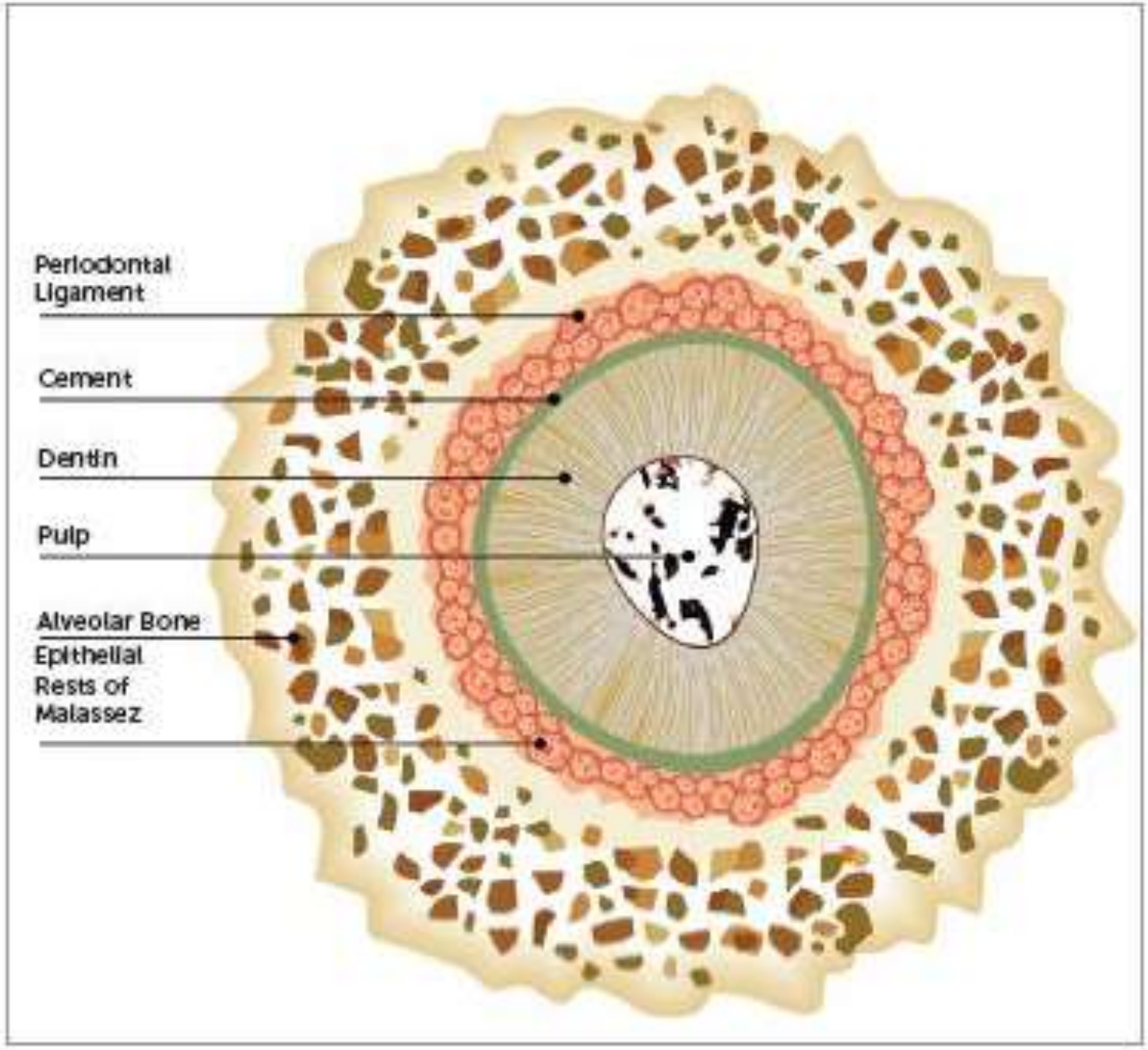
B: dental papilla

C: dental follicle

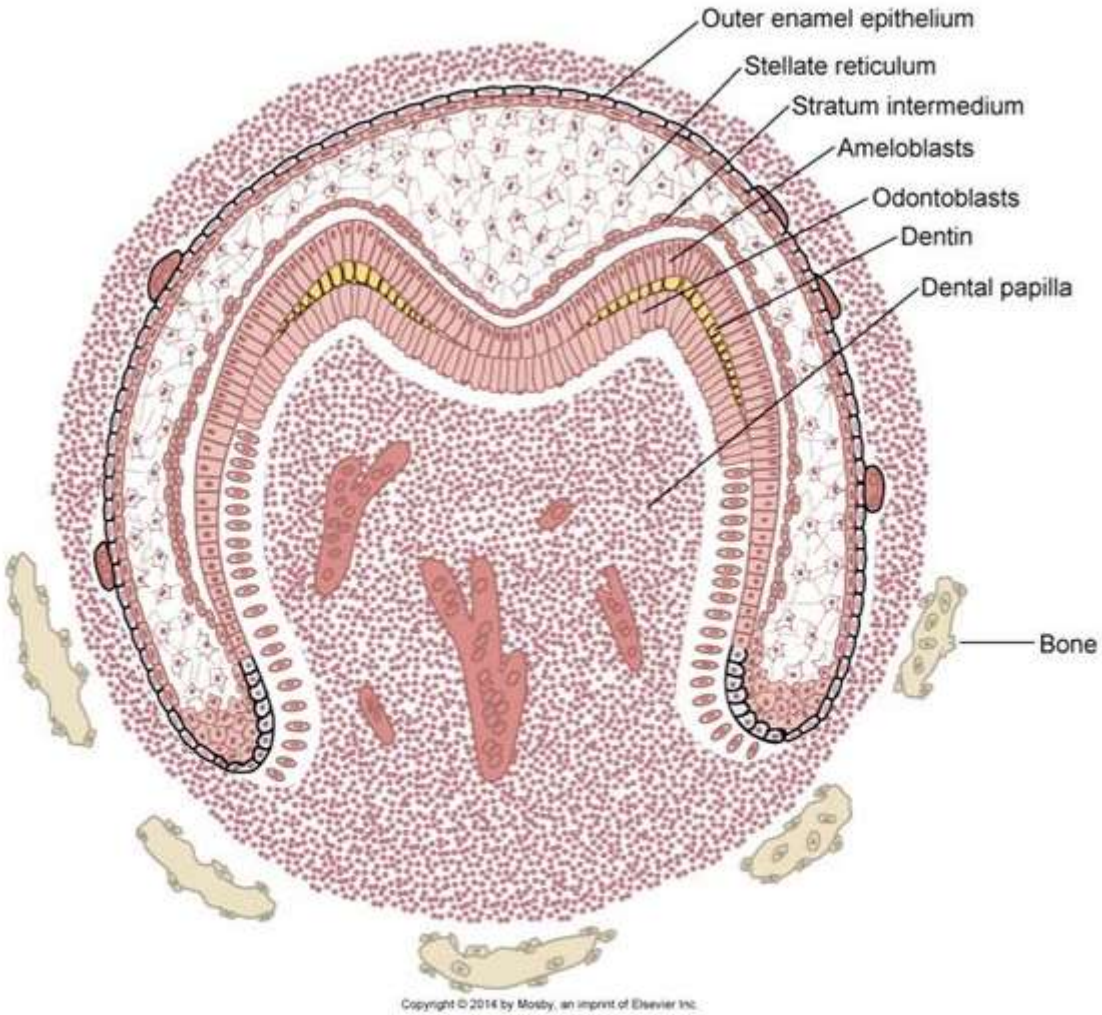
- For each tooth, odontogenesis begins with the downward proliferation from the oral surface mucosa of the epithelium known as the dental lamina.
- This epithelium gives rise to the enamel organ, a cap-shaped structure that subsequently evolves into a bell shape corresponding to the future shape of the crown of the tooth.
- After the formation of the enamel organ, the cord of dental lamina epithelium from the surface mucosa will normally fragment and degenerate.



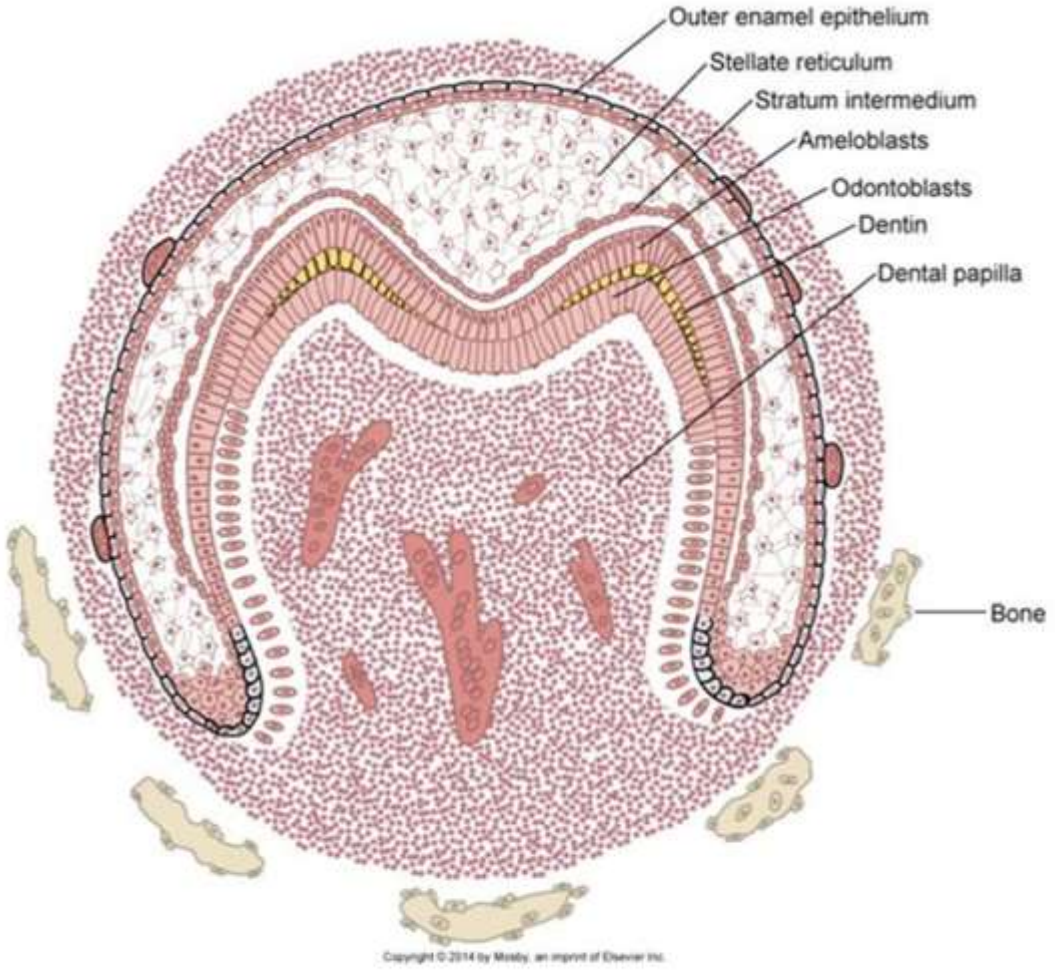
- However, small islands of this epithelium (rests of the dental lamina) will remain after tooth formation and may be found within the gingival soft tissues and superficial alveolar bone.
- These primitive dental lamina remnants are believed to be capable of giving rise to several types of developmental odontogenic cysts and tumors.



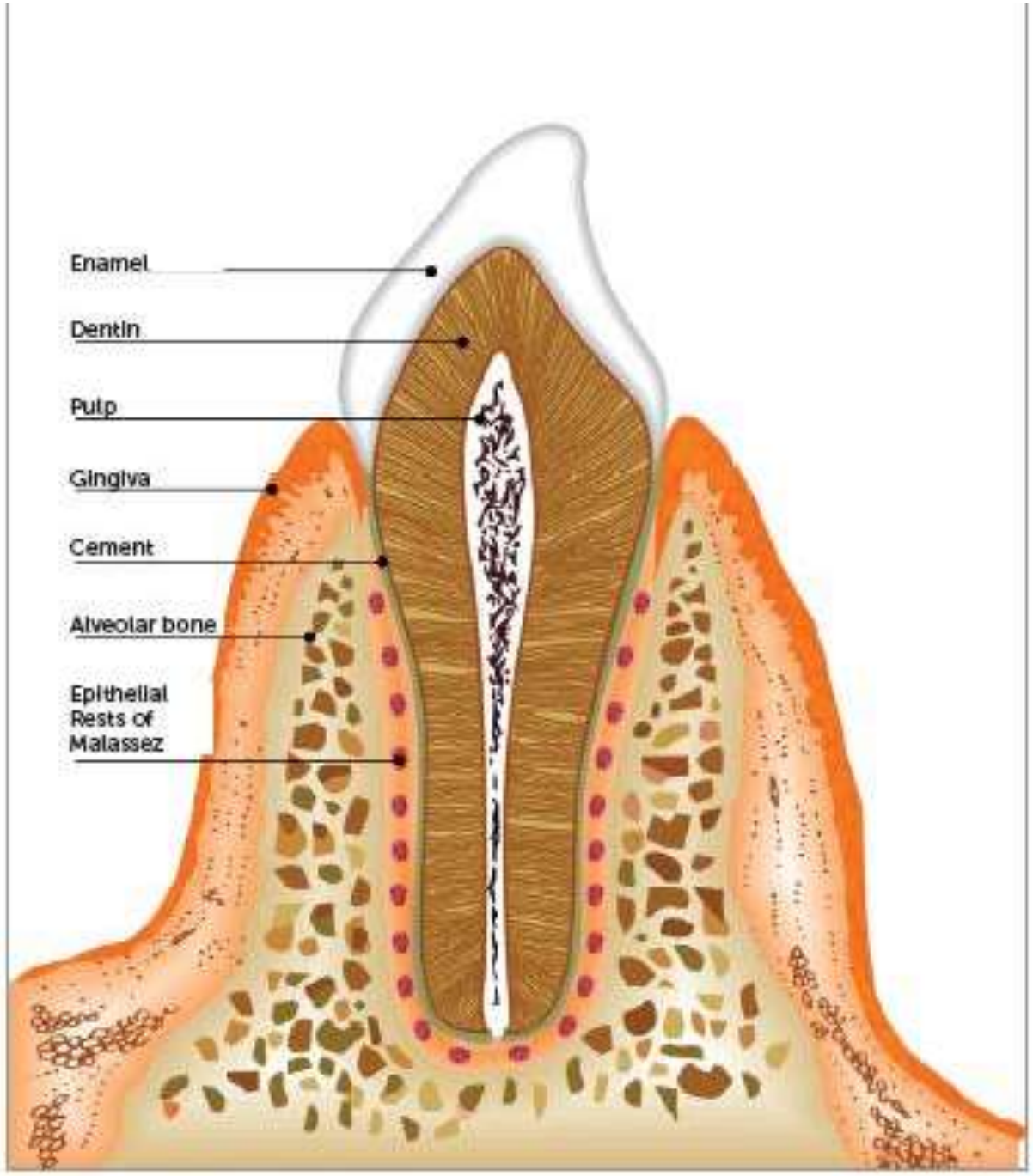
- The enamel organ has four layers of epithelium.
- The innermost lining layer (on the inside of the “bell”) is known as the inner enamel epithelium and will become the ameloblastic layer that forms the tooth enamel.
- Adjacent to this is a flattened row of epithelial cells known as the stratum intermedium.
- Next is a broad layer of loosely arranged cells known as the stellate reticulum.
- The outermost layer of the enamel organ is called the outer enamel epithelium.



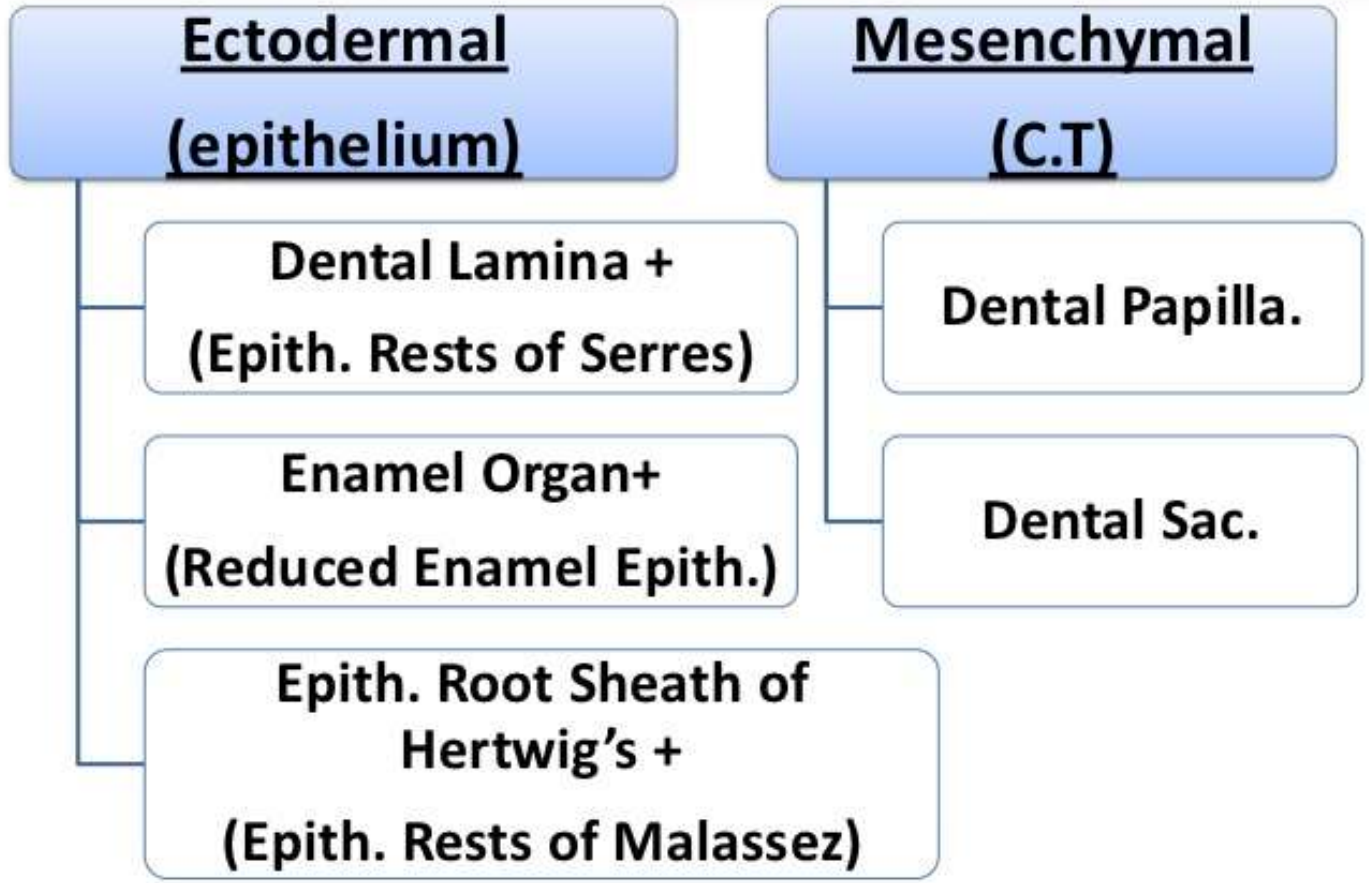
- Surrounding the enamel organ is loose connective tissue known as the dental follicle.
- Filling the inside of the bell-shaped enamel organ is immature connective tissue known as the dental papilla.
- Contact with the enamel organ epithelium induces the differentiation of a peripheral layer of specialized cells in the dental papilla, which are known as odontoblasts.
- The odontoblasts are the dentin-forming cells and are located adjacent and parallel to the ameloblasts.
- As the odontoblasts begin to form the dentin of the tooth, they in turn induce the ameloblasts to begin enamel formation.



- After crown formation has begun, a thin layer of enamel organ epithelium (Hertwig's root sheath) will proliferate downward and provide the stimulus for odontoblastic differentiation in the root area of the tooth.
- This epithelial extension later becomes fragmented, but will leave behind small nests of epithelial cells (Malassez rests) in the periodontal ligament.
- The Malassez rests are believed to be the source of epithelium for most periapical cysts but generally are not believed to give rise to odontogenic neoplasms, except possibly for the rare squamous odontogenic tumor.



The Origin of Odontogenic Tumors (Odontogenic Tissues)



CLASSIFICATION

By WHO-

A. TUMORS OF ODONTOGENIC EPITHELIUM: -

1. Ameloblastoma
2. Calcifying epithelial odontogenic tumor
3. Adenomatoid odontogenic tumor
4. Squamous odontogenic tumor
5. Clear cell odontogenic tumor

B. TUMORS OF ODONTOGENIC EPITHELIUM & MESENCHYME WITH / WITHOUT DENTAL HARD TISSUE FORMATION: -

1. Ameloblastic fibroma
2. Ameloblastic fibrosarcoma
3. Ameloblastic fibro odontoma
4. Odontoameloblastoma
5. Odontoma – Compound & Complex

C. TUMORS OF ODONTOGENIC MESENCHYME WITH / WITHOUT DENTAL HARD TISSUE FORMATION: -

1. Odontogenic fibroma
2. Odontogenic myxoma
3. Cementoblastoma
4. Granular cell odontogenic tumor

- **WHO CLASSIFICATION- 2017**

A.Malignant odontogenic tumors

1. Ameloblastic carcinoma
2. Primary intraosseous carcinoma
3. Sclerosing odontogenic carcinoma
4. Clear cell odontogenic carcinoma
5. Ghost cell odontogenic carcinoma
6. Odontogenic carcinosarcoma
7. Odontogenic sarcomas

B. Benign odontogenic tumors

1. Ameloblastoma
2. Ameloblastoma, unicystic type
3. Ameloblastoma, extraosseous/ peripheral type
4. Metastasizing (malignant) ameloblastoma
5. Squamous odontogenic tumour
6. Calcifying epithelial odontogenic tumour
7. Adenomatoid odontogenic tumour
8. Ameloblastic fibroma

9. Primordial odontogenic tumour
10. Odontoma
11. Odontoma, compound type
12. Odontoma, complex type
13. Dentinogenic ghost cell tumour
14. Odontogenic fibroma
15. Odontogenic myxoma/
    myxofibroma
16. Cementoblastoma
17. Cemento-ossifying fibroma

TREATMENT PLAN

Investigations:

- **Routine Blood Examination**
- **Radiographs**

  Orthopantomogram
  - Occlusal Radiograph
  - Lateral Oblique view of mandible
  - CT scan
- **Biopsy**

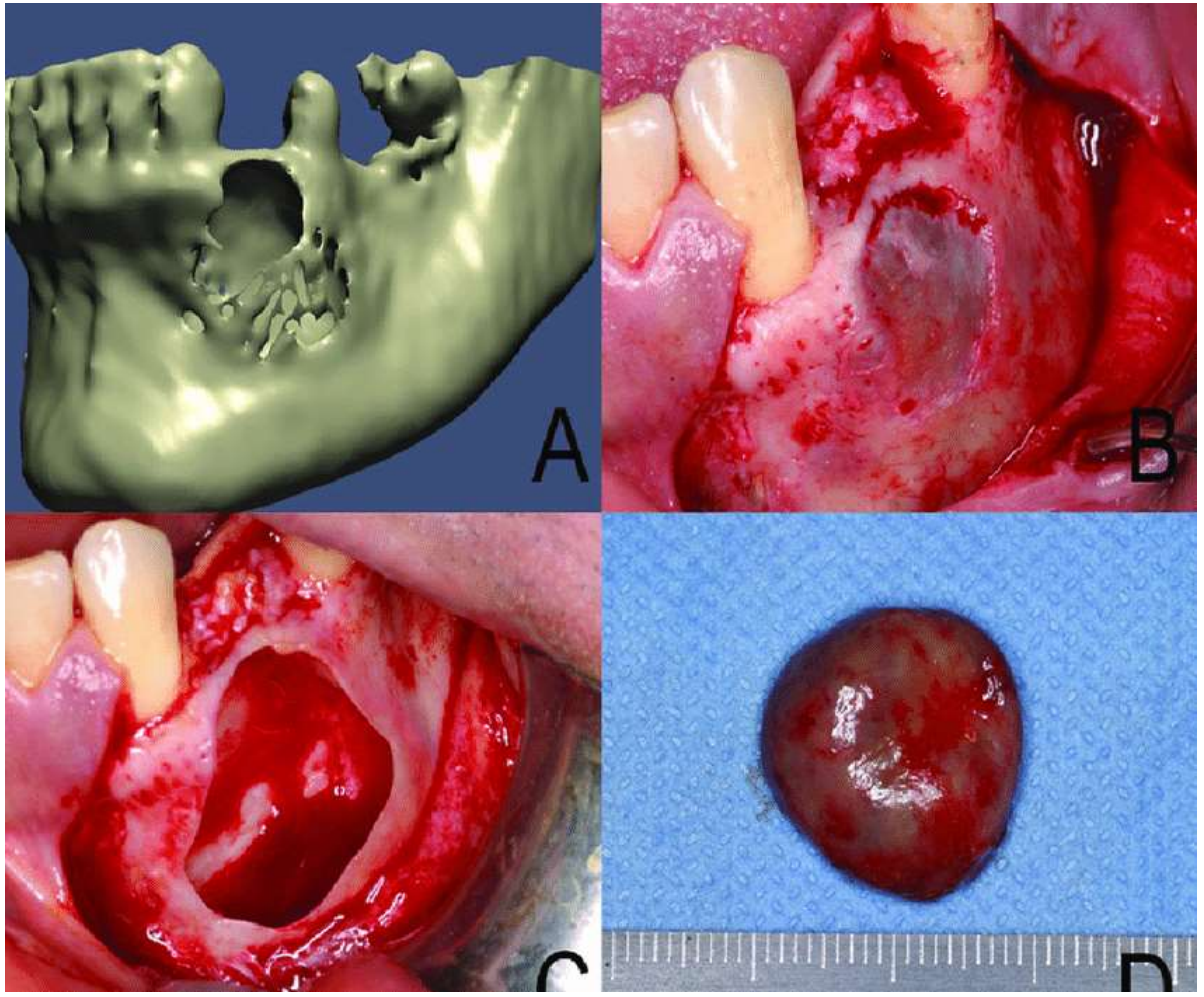
- **TREATMENT PLAN** is divided into conservative and radical therapies as discussed by **Williams TP in 1993 and Feinberg SE et al., in 1996**.
- Because of its slow growth and tendency to local invasion of bone and soft tissue, high rate of recurrence is common if the tumor is not adequately treated.
- **The various modalities are-**

1. Curettage
2. Enucleation and Marsupalisation
3. Cryotherapy
4. Irradiation
5. Cauterization
   a. Chemical Cauterization
   b. Electro Cauterization
6. En Bloc excision
7. Radical resection or segmental resection
8. Reconstruction

Curettage: Curettage involves eradication of the macroscopically visible mass of tumor by scraping procedure.

- Due to high rate of recurrence curettage is considered to be least desirable form of treatment modalities in the management of the ameloblastoma.

<u>Enucleation</u>: Enucleation allows for the cystic cavity to be covered by a mucoperiosteal flap and the space fills with the blood clot, which will eventually organize and form normal bone.



Cryotherapy: Cryotherapy is a technique of using extreme rapid cooling to freeze and thereby destroy tissues.

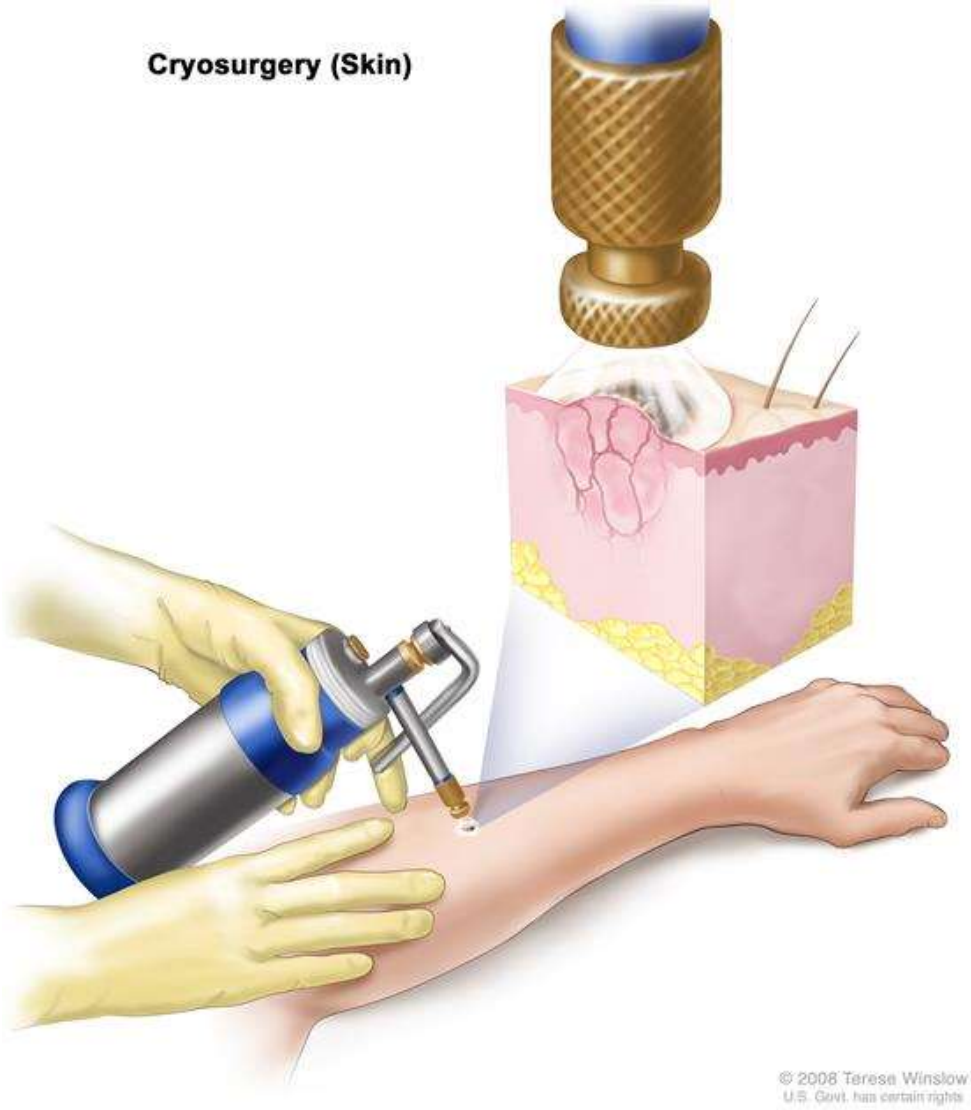
Rapid cooling to temperatures below freezing point produces a localized destructive effect than slow freezing which causes generalized tissue necrosis.

The aim of cryosurgery is to eliminate the invasive bone lesion without radical surgery.

This permits treatment of the bone by devitalizing it and maintaining its inorganic matrix.

- There are four basic cryosurgery methods for use in the maxilofacial region:
    - Probe
    - Probe plus water soluble jelly
    - Liquid nitrogen coil.
    - Liquid nitrogen spray.
- Probe plus water jelly and liquid nitrogen spray have been the most common freezing methods applied to the bone lesions of the jaws.

- Liquid nitrogen spray is a potent and rapid freezing method that reaches a temperature of –198 C within few minutes.
- It can be used to treat large irregular cavities in the jaw but care should be taken to avoid necrosis of the surrounding soft tissue.
- Temperature ranges from -20 C to -180 C. At these temperatures, the tissues, capillaries small arterioles, and venules undergo cryogenic necrosis.
- This is caused by the dehydration and denaturation of lipid molecule.
- Post-operative complications of cryosurgery in bone, such as sequestrum formation, pathologic fracture, and oedema have been reported.



- **Irradiation**: It is used for inoperable tumors especially those in the posterior maxilla.
- Patients receive 3000 rad of primary irradiation for 2 weeks or 5000 rad for 5 weeks.
- It is not used commonly as its use in past years has been associated with a considerable occurrence of radiation induced sarcoma.

Cauterization:

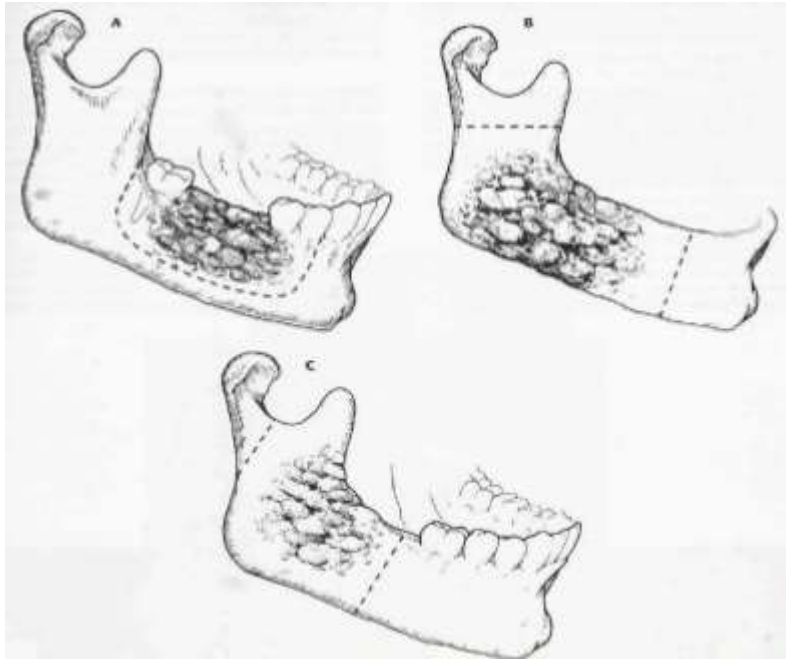
- **Chemical Cauterization**: Curettage is supplemented with chemical cauterization of the tumor bed. The bed of tumor is cauterized with concentrated carbolic acid.
- Use of ***Cornoy's*** solution is also recommended for fixing the tissue in the tumor bed.
- It is given by Culter and Zollinger inn 1933.
- It contains
    - Ferric chloride: 1g
    - Absolute Alcohol: 6ml
    - Chloroform: 3ml
    - Glacial Acetic Acid: 1ml

Electro cauterization: Electro cauterization is the induction of heat from an alternating current source.

- Heat achieves denaturation of protein which results in coagulation of large areas of tissue.
- The cautery point is touched to the haemostat causing sealing of the vessel with the action of heat.
- It causes tissue destruction producing a burning smell and smoke during application.
- It is an effective method which gives better results along with curettage.

<u>En Bloc excision</u>: Intraoral or extraoral en bloc excision of the tumor at a distance of 1 to 2cms beyond the radiographic margins is an effective method of treatment.

- It maintains the continuity of bone at the level of lower border of the mandible.
- The dense cortical bone of the lateral and medial borders of the mandible is excised approximately 2 cm for solid and multicystic lesion and 1 to 1.5 cm for unicystic and peripheral lesions.



Intraoral Block excision: The incision should be made in the mucosa so as to include any part that may have been involved by a fulminating tumor producing an intra-oral lesion, or which involve the gingiva after an incomplete excision.

- Supplementary incisions may be made to turn flaps so that the bone may be resected beyond the wound margin.
- Drill holes are then placed to outline the osteotomy, by means of a long shanked Hanahan drill.
- The osteotome is used to complete the cuts, after which the segment in which the tumor is contained is removed without cutting.
- The excision includes not only the tumor but also some of the surrounding bone.

Extra oral block excision: If the sizable piece of the jaw has to be sacrificed and if this can be done without perforating the oral mucosa, a block excision may be combined with an immediate bone graft.

- After the mandible is exposed through a sub mandibular incision, the block of bone is to be removed is outlined by means of drills and severed completely with a thin bladed osteotome.
- A massive bone graft from the crest of the ilium is then fitted into the bone cavity and attached by means of one or two trans circumferential stainless steel wires.
- This method is preferred if posterior part of ramus is involved.

Radical resection or Segmental resection: It is considered to be the most effective method of treatment of tumor.

- Mandibular excision, by resection without continuity defect (RsCD) or block resection with continuity defect (RcCD) should be performed.
- A wider excision with atleast 2 cms away from the radiographic margins is advisable.
- The inferior alveolar nerve should be sacrificed if it lies within the lesion. If the surgical plan includes nerve grafting, it is best to perform the procedure at the time of resection weather bone reconstruction is immediate or delayed.
- A thin inferior border of the mandible preserved in an RsCD may fracture if a reconstruction plate is not placed to support the segment.
- Retention of an inferior border less than 1 cm in thickness is not practical and RcCD should be performed.

Reconstruction: The segmental defect that is produce by the mandible resection remains a much discussed problem of reconstructive surgery.

- The decision for immediate or delayed reconstruction is influenced by the technical difficulty of primary reconstruction and its frequently dubious value.
- The universal reconstruction plate has been tested in clinical use. Both steel and titanium plates are available, all are bendable in three dimensions, and all can be adapted to the contour of the mandible without significant loss of their biotechnical properties.
- In case of involvement of condylar neck an expandable screw head system (THRP = Titanium Hollow Reconstruction Plate) is currently being developed.
- Bone grafts can be use for reconstruction.

QUESTIONS

1. What is neoplasm and difference between neoplasm and tumor?
2. What are the characteristics of benign and malignant tumors?
3. What is the difference between a cysts and a tumor?
4. Describe the tooth development with deformities occurring in each stages?
5. Reichart's classification of odontogenic tumor?
6. What is the difference between carcinoma, sarcoma, fibroma, myxoma and odontoma?
7. What are the blood investigation in dentistry and its importance?
8. Explain biopsy and its type?
9. What is coryon's solution and its use?
10. What is iodoform dressing and its use?

THANK YOU

BE SAFE BE AT HOME AND STUDY!!

ODONTOGENIC TUMORS
PART-2

BY-

Dr. Vishakha Lal

TUMORS OF ODONTOGENIC EPITHELIUM

AMELOBLASTOMA

INTRODUCTION

- Ameloblastoma is defined as being a tumor that is usually unicentric, non-functional, intermittent in growth, anatomically benign and clinically persistent.-by **Robinson.**
- It is a benign tumor that is usually unicentric, intermittent in growth, anatomically benign and clinically persistent.-WHO
- Ameloblastoma is also known as Adamantinoma, Adamantoblastoma, Multilocular cyst.

- Ameloblastoma is a locally aggressive, epithelial benign odontogenic neoplasm having a close resemblance to the enamel organ.
- Most common odontogenic tumour.
- Ameloblastoma is a true neoplasm of enamel organ type tissue which does not undergo differentiation to the point of enamel formation.
- It is a tumour which is present by birth.
- It is an arch type of a neoplasm where the neoplastic component is epithelium only without contribution from the ectomesenchyme.

PATHOGENESIS:

- Ameloblastoma may be derived from

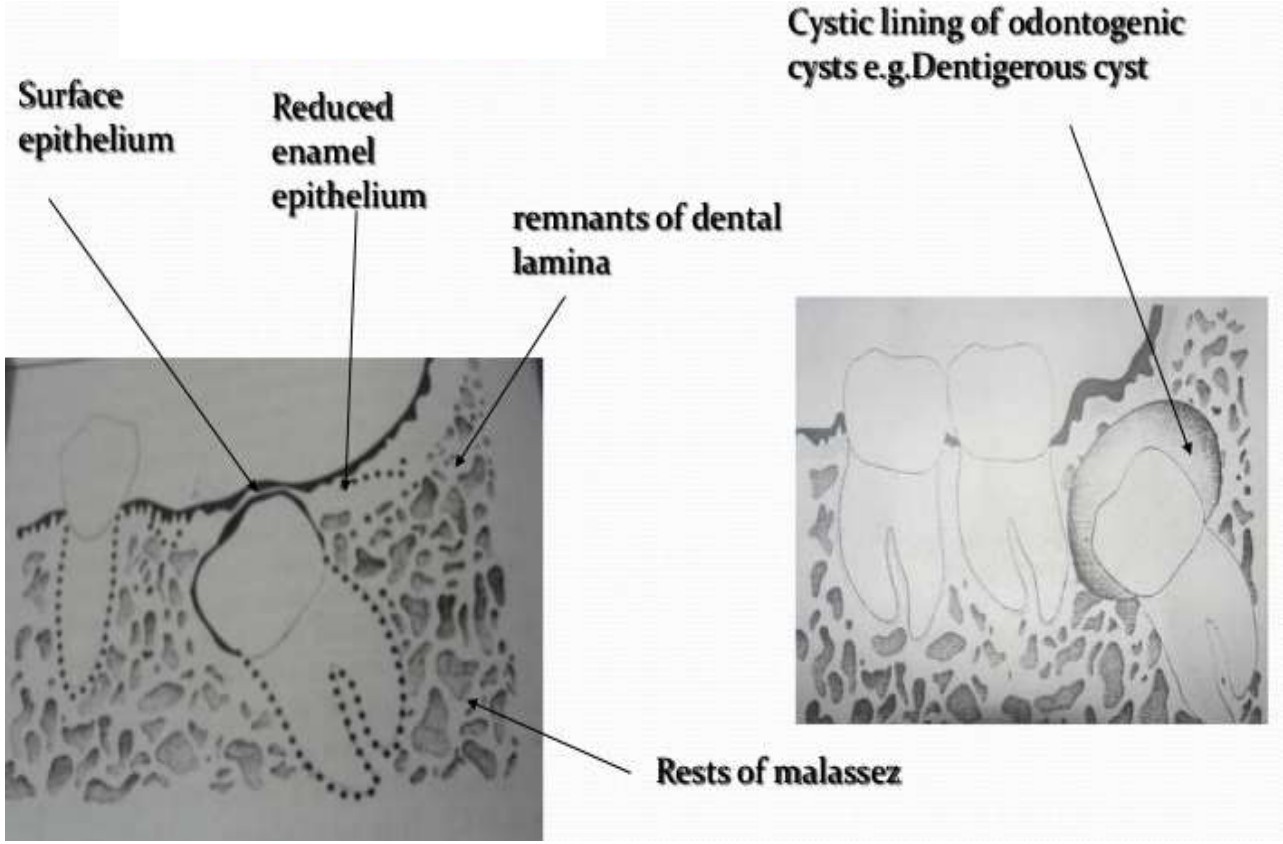
a) Cell rest of enamel organ, either remnants of dental lamina or remnants of Hertwig's sheath, the epithelial rest of Malassez.

b) Epithelium of odontogenic cyst, particularly the dentigerous cyst and odontomas.

c) Disturbances of developing enamel organ.

d) Basal cells of the surface epithelium of the jaws

e) Heterotopic epithelium of other parts of the body; especially the pituitary gland.



Occurs in 3 different types with differing clinical, radiological and histological features.

1. CONVENTIONAL / MULTICYSTIC
2. UNICYSTIC
3. PERIPHERAL

CLINICAL FEATURES- CONVENTIONAL / MULTICYSTIC

- Age incidence: 3rd & 4th decades.
- Gender incidence: Slightly more in males.
- Site predilection: 80% ameloblastomas occur in posterior mandible, followed by maxillary molar region.
- Signs & symptoms: Slowly growing, painless, hard bony swelling or expansion of jaw.
- Thinning of cortical plates produces “Egg shell crackling”.
- Other symptoms – Tooth mobility root resorption and paresthesia if inferior alveolar nerve is affected.

RADIOLOGICAL FEATURES:

- Typically rounded, well defined multilocular radiolucency with scalloped margins.
- When loculations are large, the appearance is called as “SOAP BUBBLE” appearance.
- When loculations are smaller, the appearance is called “HONEY COMBED” appearance.
- Buccal & lingual cortical plates are expanded.
- Roots of adjacent teeth displaced / resorbed.
- As it spreads through medullary spaces, radiographic margins are not accurate indication of bone involvement.

DIFFERENTIAL DIAGNOSIS: -

1. ODONTOGENIC KERATOCYST
2. FIBROUS DYSPLASIA
3. OSSIFYING FIBROMA
4. CENTRAL GIANT CELL GRANULOMA.

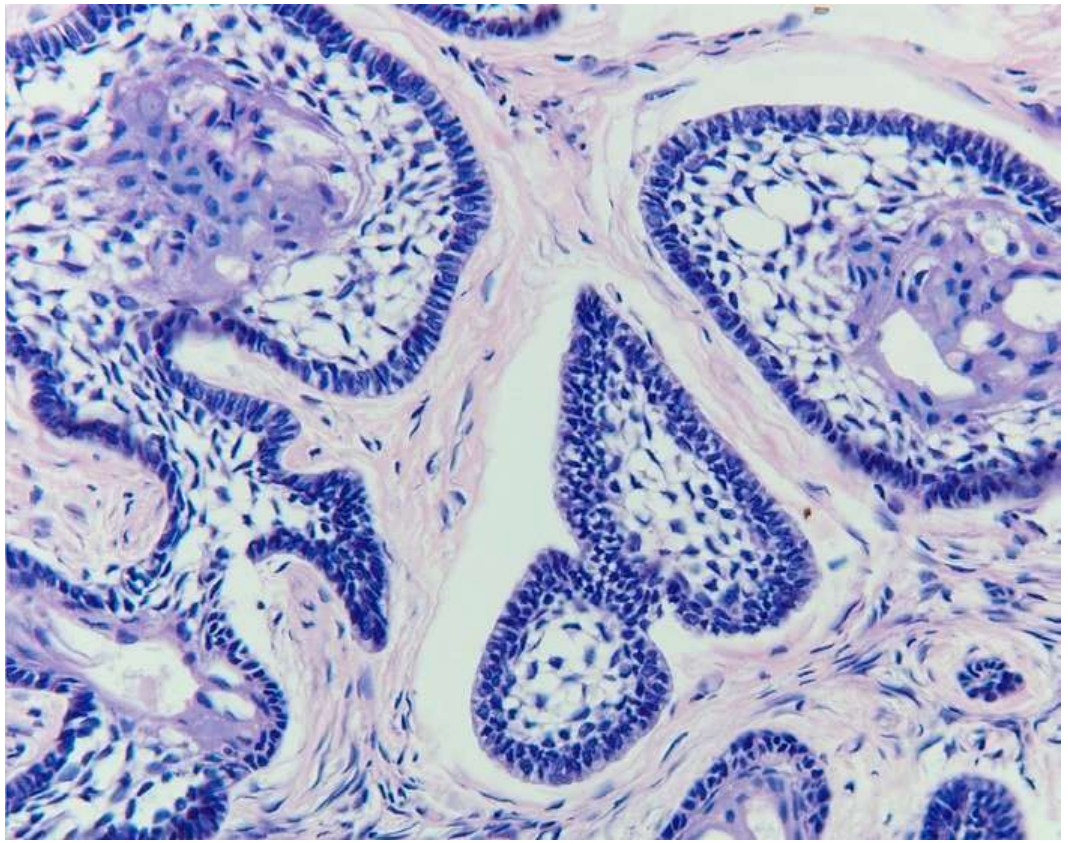
HISTOPATHOLOGICAL FEATURES: Many subtypes are seen.

1. FOLLICULAR
2. PLEXIFORM
3. ACANTHOMATOUS
4. GRANULAR CELL
5. DESMOPLASTIC
6. BASAL CELL TYPE
7. CLEAR CELL TYPE

- Common to all is the presence of neoplastic ameloblasts with palisaded appearance and reverse polarisation

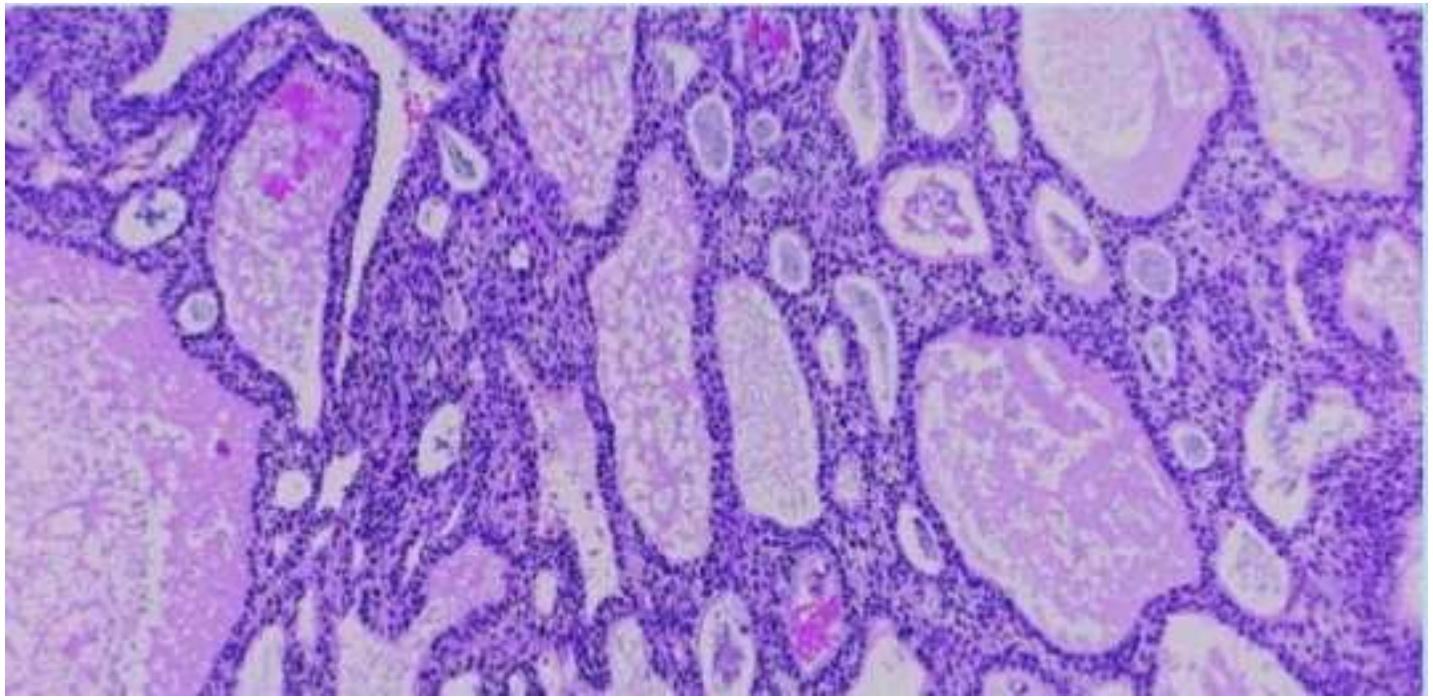
AMELOBLASTOMA (FOLLICULAR)

- Islands of epithelium resemble dental organ surrounded by mature connective stroma.
- Individual follicles show central mass of stellate reticulum like cells surrounded by a single peripheral layer of ameloblast like cells.
- Nuclei of peripheral cells are reversely polarized.
- Within the islands, cyst formation is common.



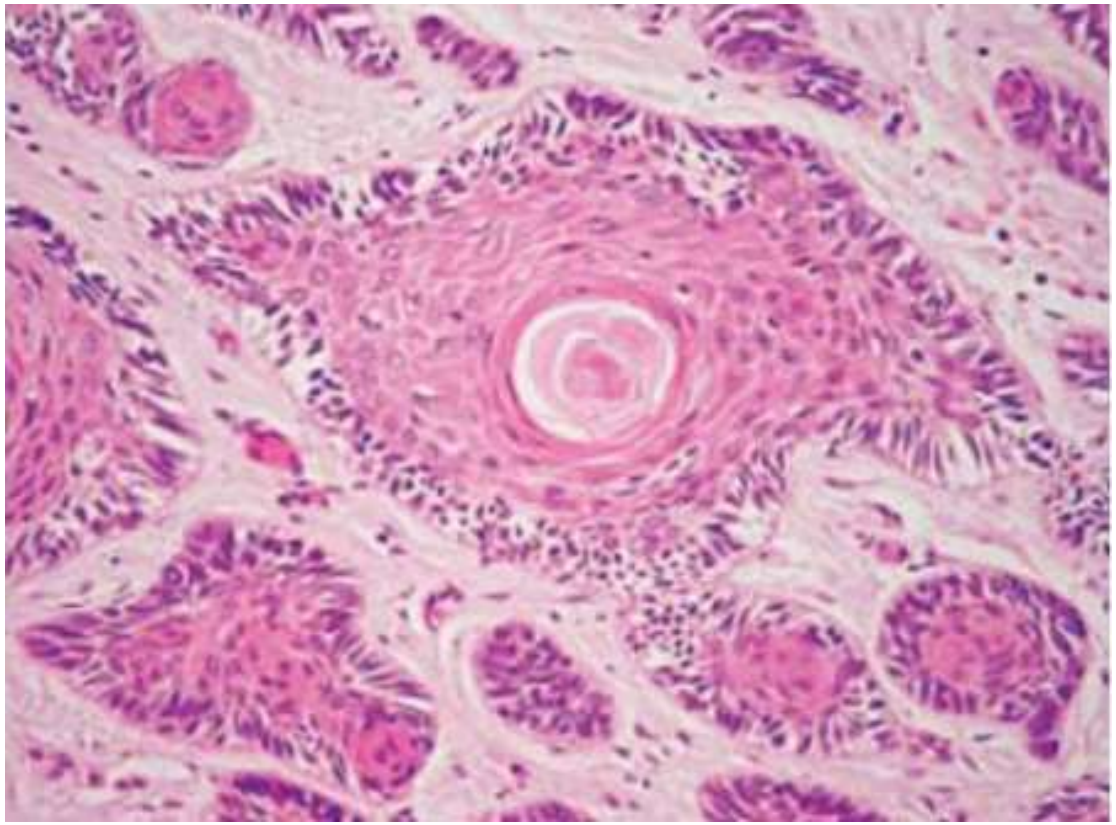
AMELOBLASTOMA (PLEXIFORM)

- Instead of islands, long, anastomosing cords and occasional sheets of epithelial cells bounded by columnar / cuboidal cells.
- Cells within cords are more loosely arranged than peripheral cells. Supporting stroma is loose and vascular.
- Cyst formation occurs, not inside follicles, but in surrounding stroma.



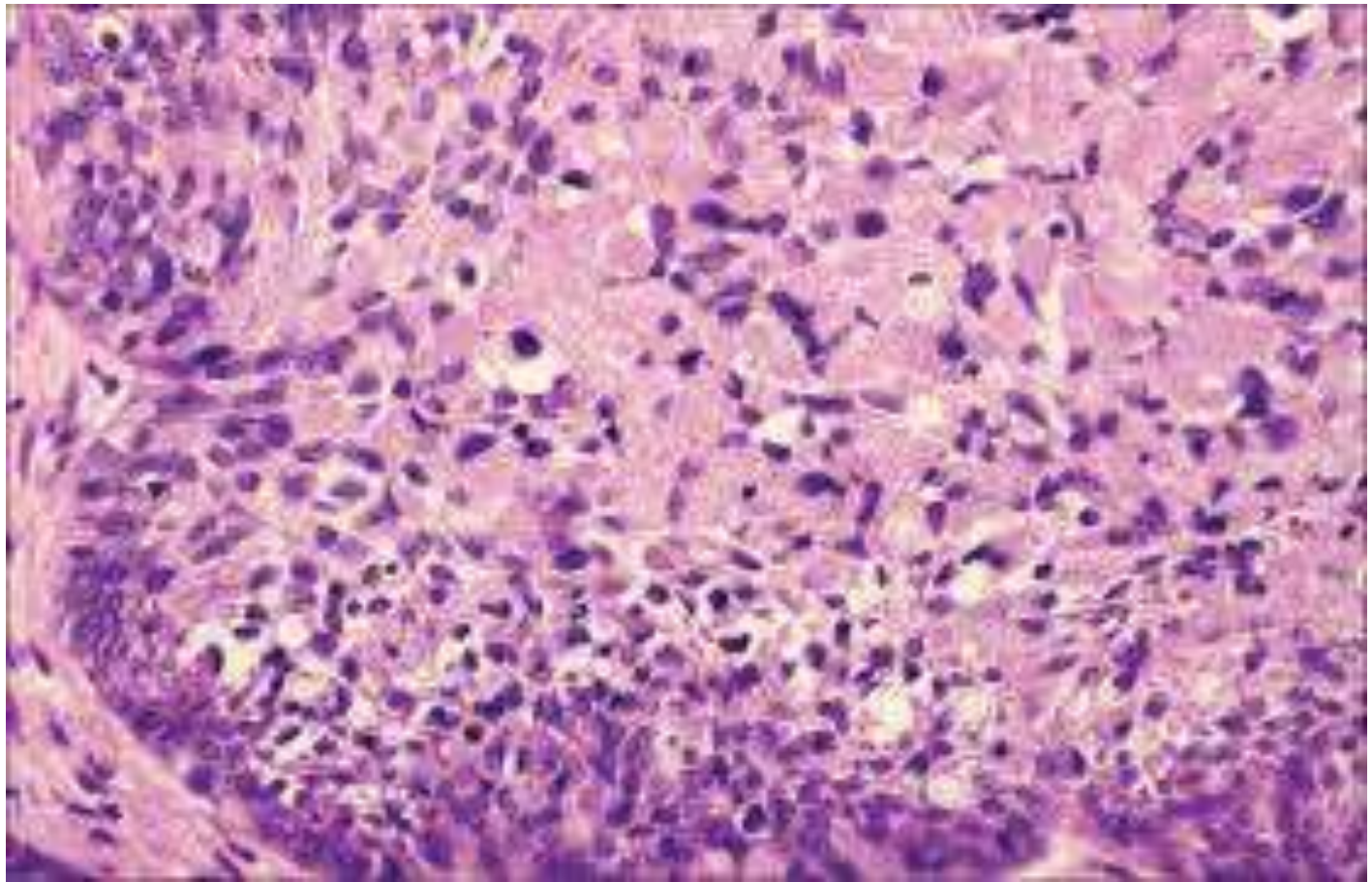
AMELOBLASTOMA (ACANTHOMATOUS)

- Central area of follicles show extensive squamous metaplasia, often associated with keratin formation.
- DOEAS NOT INDICATE A MORE AGGRESSIVE COURSE OF TUMOR.
- Can be confused with squamous cell carcinoma.



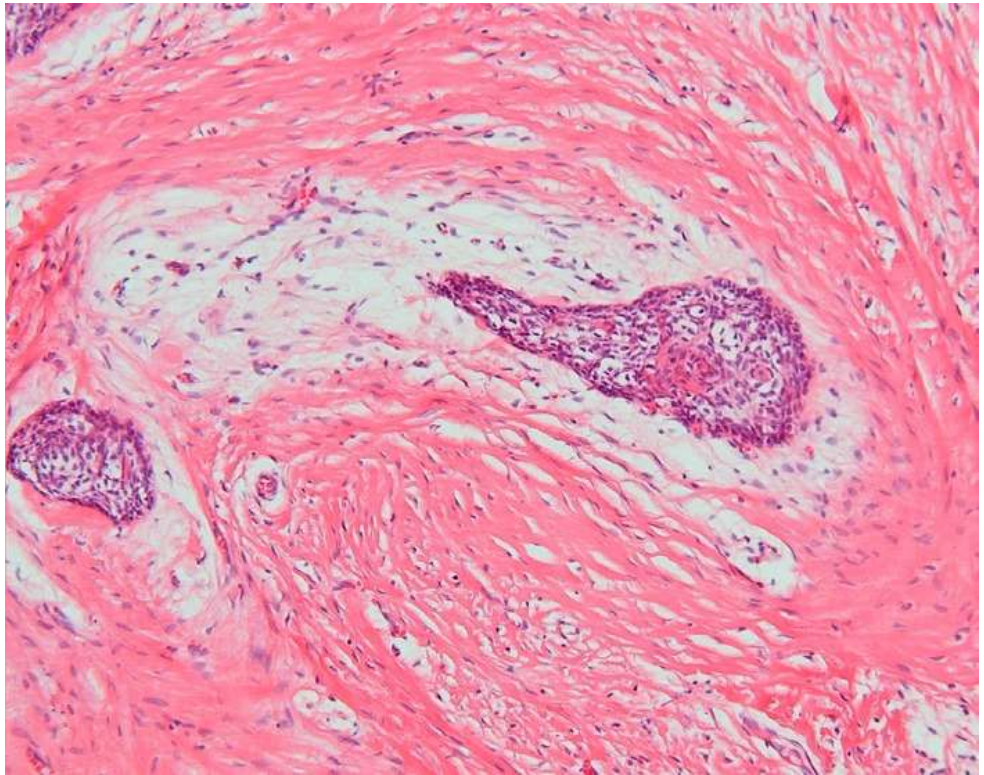
AMELOBLASTOMA (GRANULAR CELL)

- Follicles / sheets of cells show granular cell change.
- These cells have abundant cytoplasm filled with eosinophilic granules.
- Seen in younger persons and appears to be more aggressive clinically.



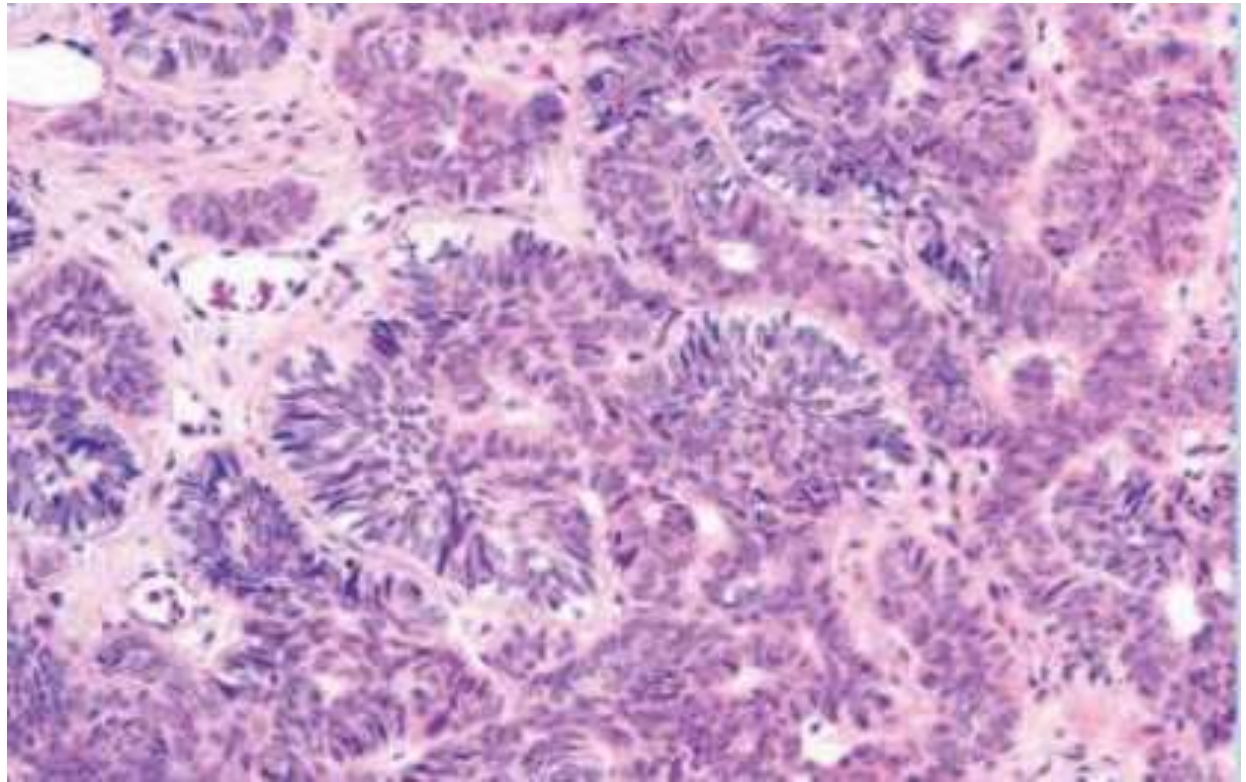
AMELOBLASTOMA (DESMOPLASTIC)

- This variant is composed of small islands / cords of odontogenic epithelial cells surrounded by a dense, collagenized stroma.
- Peripheral ameloblast like cells are missing / inconspicuous around the islands / cords.
- Occurs in anterior jaw and radiologically looks like a fibro-osseous lesion due to mixed opacity & lucency.



AMELOBLASTOMA (BASAL CELL)

- Least common type.
- Composed of nests / sheets of hyperchromatic basaloid cells.
- No stellate reticulum present centrally and peripheral cells tend to be cuboidal rather than tall columnar.



AMELOBLASTOMA-UNICYSTIC

- Controversy, whether it arises de novo or as neoplastic transformation of odontogenic cyst lining.
- Usually arises in a Dentigerous cyst
- Can be associated with impacted molar

CLINICAL FEATURES:

- Age incidence: Young individuals. Usually occurs at 16 to 20 years
- Gender incidence: males.
- Site predilection: 90% cases occur in post mandible.
- Signs & Symptoms: Asymptomatic swelling of jaws.
- Many lesions contain a tooth inside.

RADIOLOGICAL FEATURES:

- Typically seen as well defined, unilocular ‘lucency, many times surrounding the neck of impacted 38 or 48 – impossible to distinguish from dentigerous cyst.
- Occasionally, may be seen unassociated with teeth – then they nay be diagnosed as OKC or a radicular cyst.
- May be corticated
- Roots may be displaced in premolar region.

DIFFERENTIAL DIAGNOSIS:

1. Odontogenic cysts like – Dentigerous, OKC, radicular etc.
2. Odontogenic tumors like – Ameloblastoma, AOT, CEOT etc.

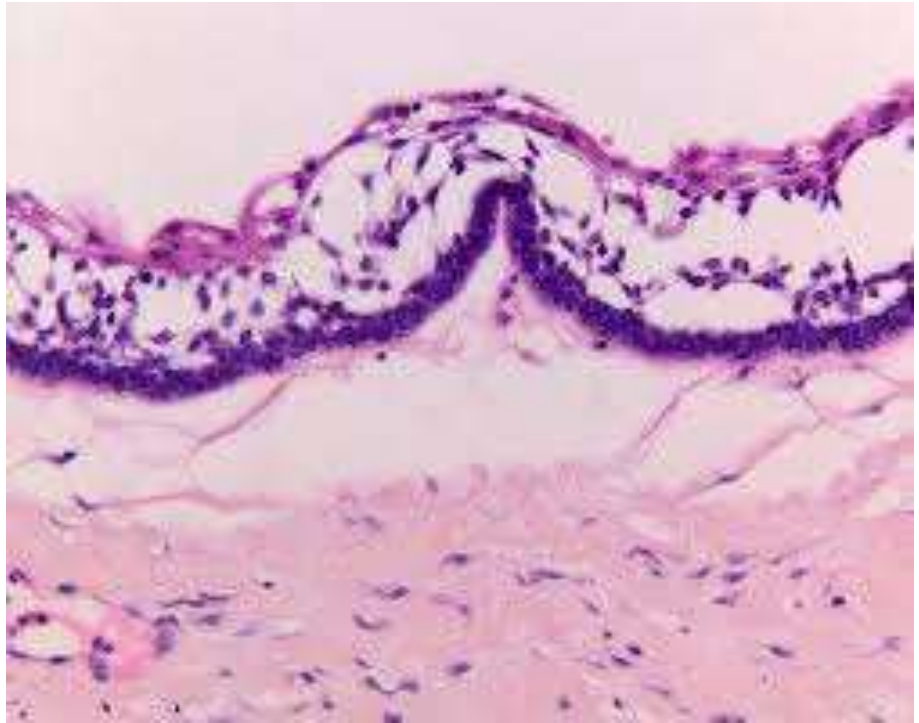
HISTOPATHOLOGICAL FEATURES:

- Dense uniform fibrous connective tissue
- Fluid filled lumen
- Lining made up of hyperchromatic, palisaded basal cells showing reverse polarization
- Rest of the layers resemble stellate reticulum
- Types of Unicystic Ameloblastoma-

1. Luminal U.A.
2. Intra-luminal U.A.
3. Mural U.A.

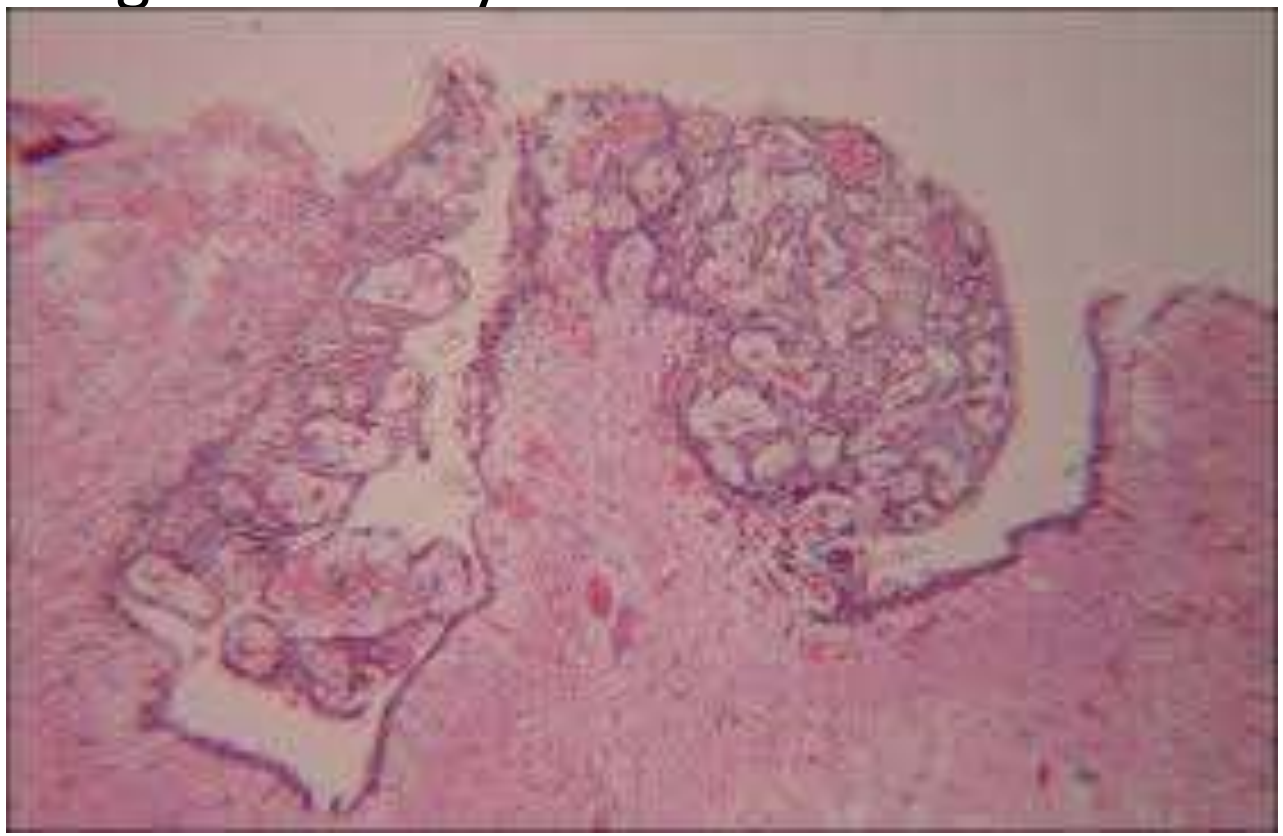
LUMINAL U.A.

- Tumor is confined to luminal surface of cyst.
- Seen as fibrous cyst wall with lining comprised totally / partially of ameloblastic epithelium, showing a basal layer of columnar / cuboidal reversely polarized cells.
- Overlying epithelial cells are loosely adhesive, resembling the stellate reticulum of dental organ.



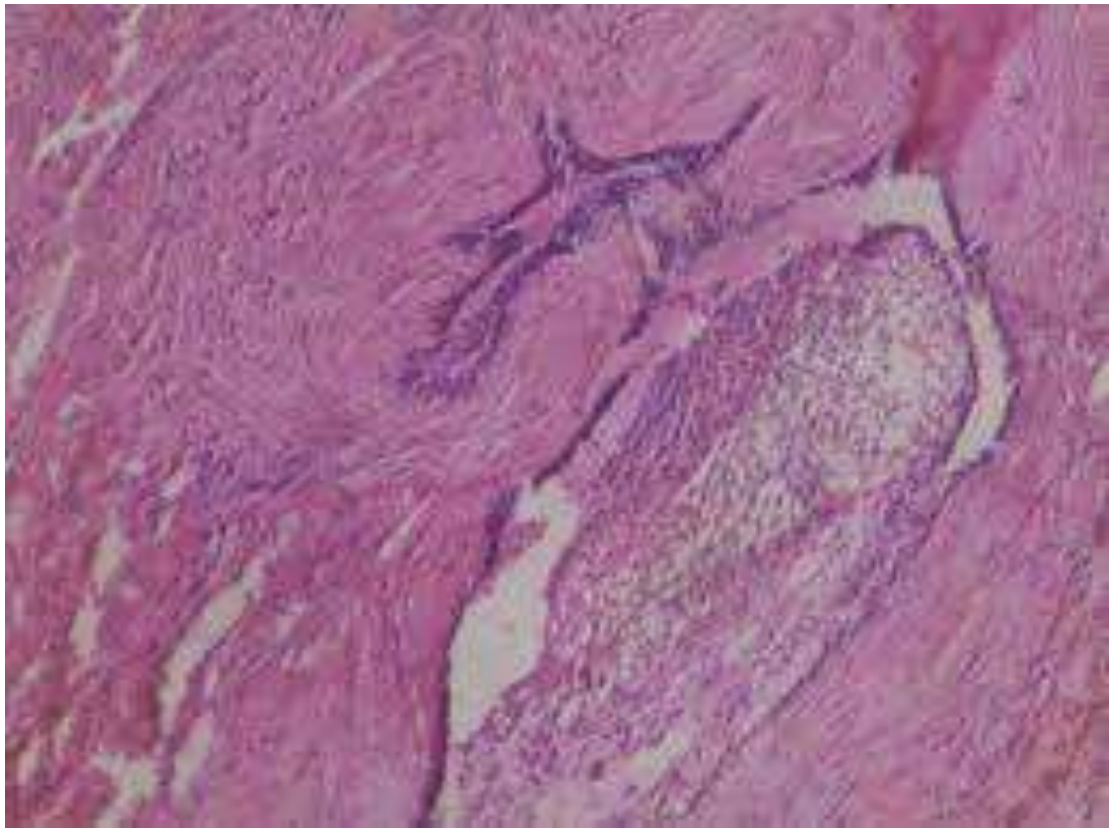
INTRALUMINAL U.A.

- This variant shows the tumor from cyst lining protruding into the lumen of cyst.
- Intraluminal projections resemble plexiform ameloblastoma in most cases, though not always.



MURAL U.A.

- In this type, the fibrous wall of the cyst is infiltrated with typical follicular / plexiform ameloblastoma.
- Believed to be more aggressive than other two variants.



AMELOBLASTOMA-PERIPHERAL

- Typically presents as non ulcerated, sessile / pedunculated gingival mass.
- These tumors are extraosseous and therefore occupy the lamina propria underneath the surface epithelium but outside of the bone.

Clinical Features

- Age: Wide age range but most occur during middle-age
- Location: Posterior gingival/alveolar mucosa is involved most frequently.
- Firm, sessile nodule, Normal coloration, if arises from surface epithelium, may be ulcerated
- Slight predilection for the mandible.
- The buccal mucosa has been the site in a few reported cases.

Radiographically:

- A few cases have shown superficial erosion of alveolar bone

Histologic Appearance:

- Histologically, these lesions have the same features as the intraosseous forms of the tumor.
- Islands of ameloblastic epithelium are observed in the lamina propria; follicular patterns are the most common; acanthomatous pattern may be seen.
- In 50 % of the cases the tumor connects with the basal cell layer of the surface epithelium

Differential diagnosis:

- Must be differentiated from other more common gingival swellings.

- **<u>TREATMENT:</u>**
- Can vary from simple enucleation to curettage to en bloc resection.
- As lesion spreads through medullary spaces, simple enucleation can leave islands of tumor within the jaws, leading to recurrence.
- Marginal resection is the optimal method.
- Rarely can undergo malignant transformation.

CALCIFIYING EPITHELIAL ODONTOGENIC TUMOR (CEOT)

INTRODUCTION

- It is a locally invasive epithelial. Locally aggressive like ameloblastoma.
- Neoplasm characterized by the development of intra- epithelial. Structure probably of an amyloid-like nature.
- This amyloid-like structure may become calcified & liberated into the surrounding stroma.
- Also called ‘Pindborg’ tumour
- Rare, < 1% of all tumours

- **ORIGIN OF CEOT**
- Arises from rests of dental lamina or reduced enamel epithelium
- Tumor cells strongly resemble stratum intermedium of dental organ.
- Central & peripheral types

CLINICAL FEATURES-

- Age incidence: 3rd to 5th decades.
- Sex incidence: Equal.
- Site predilection: 75% cases occur in posterior mandible.
- Signs & symptoms: Asymptomatic, slowly growing swelling.
- Maxillary lesions can cause nasal, sinus & eye symptoms
- Peripheral appears as a small, sessile mass, often without calcification

RADIOLOGICAL FEATURES:

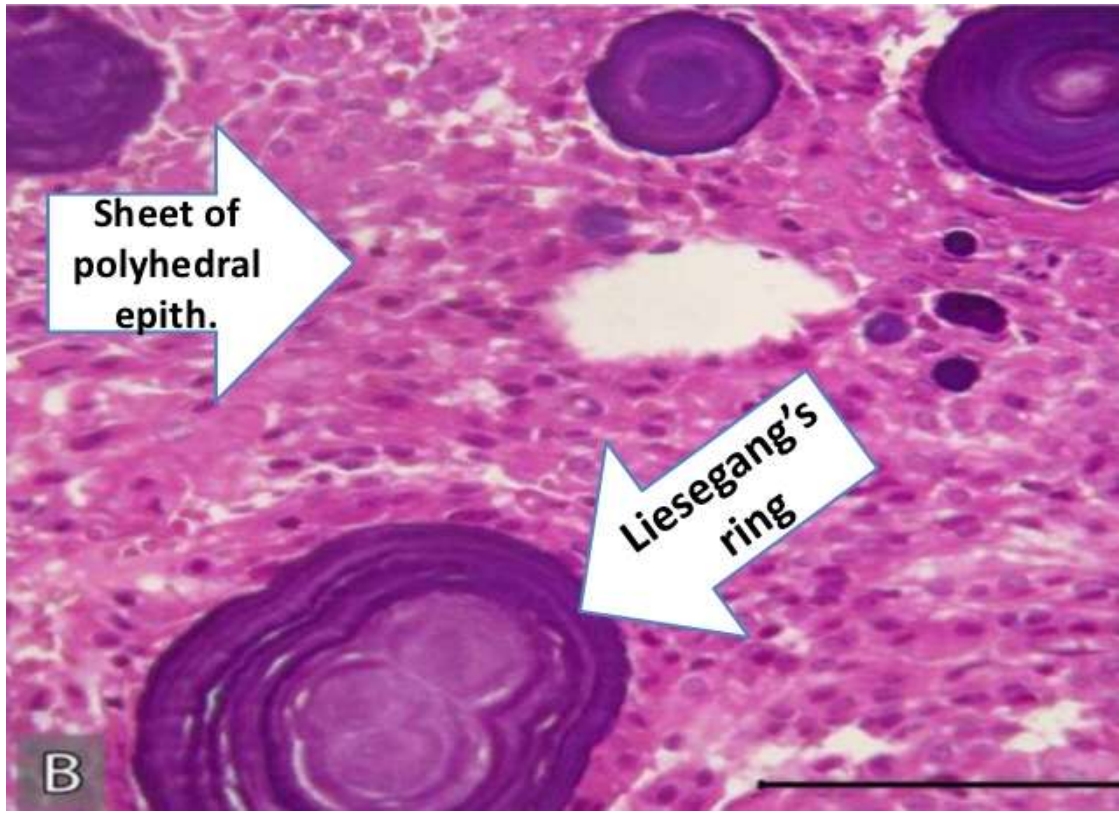
- Commonly appears as a well defined, scalloped, unilocular /multilocular ‘lucency, usually associated with an impacted tooth.
- Lesion may also show presence of scattered radiopaque material within the ‘lucency.
- Radiolucent with flecks of radio-opacities
- Less commonly appears as a mixture of radio-opaque & radiolucent areas
- Indistinct line of demarcation

DIFFERENTIAL DIAGNOSIS:

1. Odontogenic cysts like dentigerous, OKC, etc.
2. Odontogenic tumors like Ameloblastoma, etc.
3. Other bony lesion like Central giant cell granuloma, Aneurismal bone cyst etc.
4. Ameloblastic fibro-odontoma

HISTOLOGICAL FEATURES:

- Tumor shows discrete islands / sheets of polyhedral epithelial cells in a fibrous stroma.
- Nuclei show lot of size variation, even giant nuclei can be seen.
- Tumor islands also enclose large areas of eosinophilic, amorphous, amyloid like material.
- The cell outlines of tumor epithelial cells are distinct and intercellular bridges may be noted.
- The amyloid like material usually calcifies to form concentric rings (LEISEGANG RINGS).



ADENOMATOID ODONTOGENIC TUMOR (AOT)

INTRODUCTION

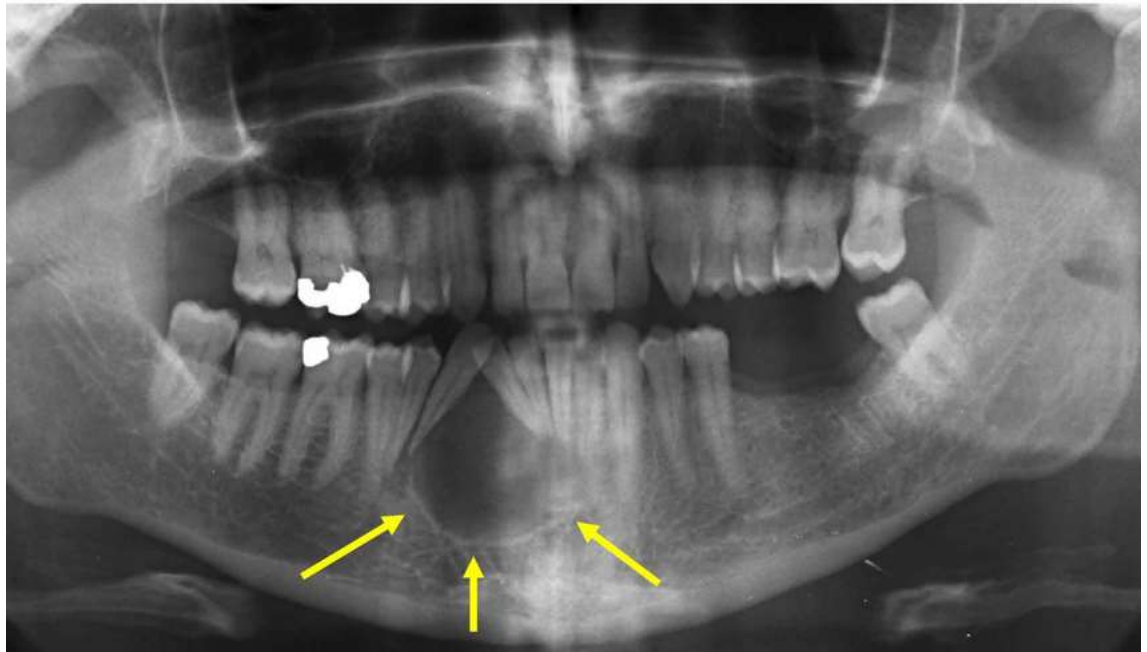
- An odontogenic tumour arising from odontogenic epithelium, around the crowns of un-erupted anterior teeth in young patients with duct structures & with varing degrees of inductive changes in the Connective Tissue stroma.
- Biologically non-aggressive
- Earlier, believed to be a variant of Ameloblastoma with glandular elements and was referred to as ADENOAMELOBLASTOMA.
- Its believed that the lesion is a (Hamartomatous) in nature.
- **Origin:**-Enamel organ & its remnants(Reduced E.E)

CLINICAL FEATURES:

- Age incidence: Young individuals, 1st & 2nd decades.
- Sex incidence: More in females, twice more.
- Site predilection: Anterior aspect of maxilla.
- Signs & symptoms: Small, asymptomatic lesion.
- Discovered accidentally during routine dental X-ray examination to ascertain cause for unerupted tooth.
- Larger lesions cause jaw expansion

RADIOLOGICAL FEATURES:

- Typical well defined unilocular ‘lucency attached to an impacted / unerupted tooth, usually canine (FOLLICULAR VARIETY).
- ‘Lucency extends past cervical region & must be distinguished from dentigerous cyst.
- Extrafollicular – well defined ‘lucency not related to unerupted tooth.
- In both cases, ‘lucency may contain snowflake like radio opacities.



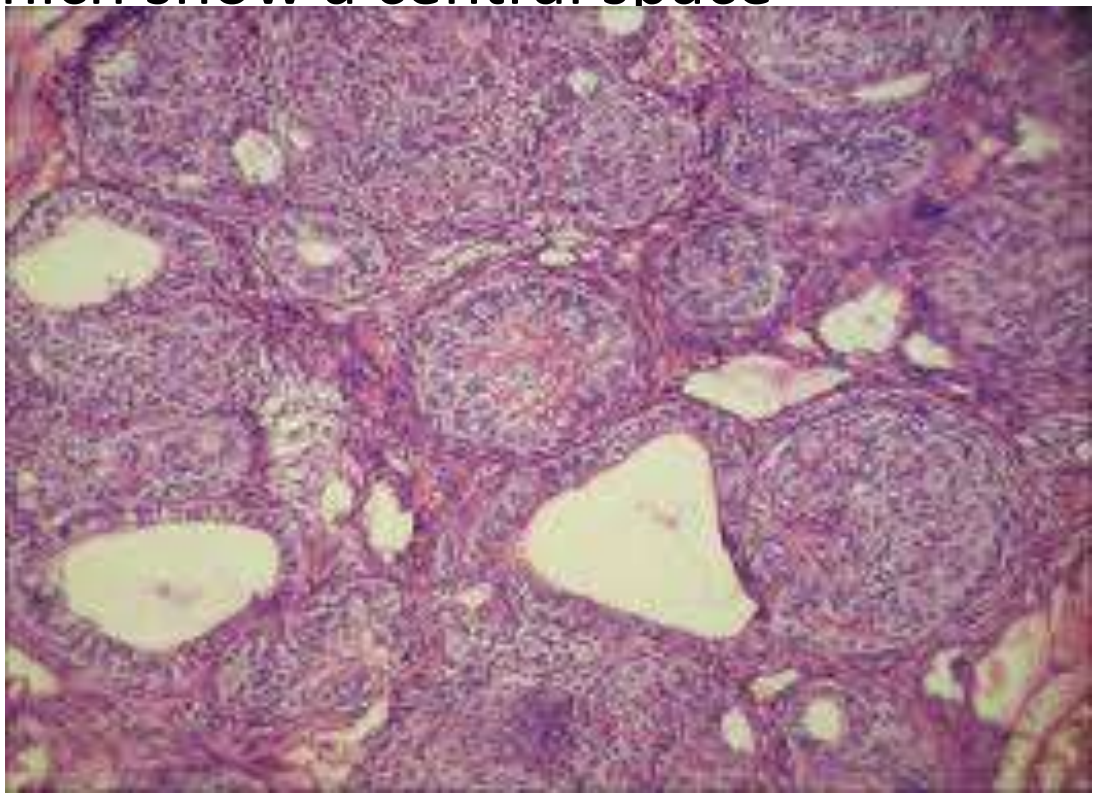
DIFFERENTIAL DIAGNOSIS: -

- Radiographic appearance can suggest following lesions for provisional diagnosis –

1. Unicystic ameloblastoma
2. CEOT
3. COC (calcifying odontogenic cyst)

HISTOLOGICAL FEATURES:

- Lesion is composed of spindle shaped epithelial cells that form sheets, strands or whorls in a scanty stroma.
- Rosette like structures may show a central space which may be empty or contain some eosinophilic amyloid like material.
- Tubular duct like spaces are also seen which show a central space surrounded by reversely polarized cells.
- Foci of calcifications may be seen



ODONTOGENIC GHOST CELL TUMOR

INTRODUCTION

- Also known as calcifying odontogenic cyst or gorlin cyst
- A rare, well circumscribed solid or cystic lesion with a wide spectrum of histological features & contains ghost cells & spherical calcifications.
- Associated with odontomas.
- Mostly occurs as solid, non-cystic lesion called odontogenic ghost cell tumour

Clinical Features:

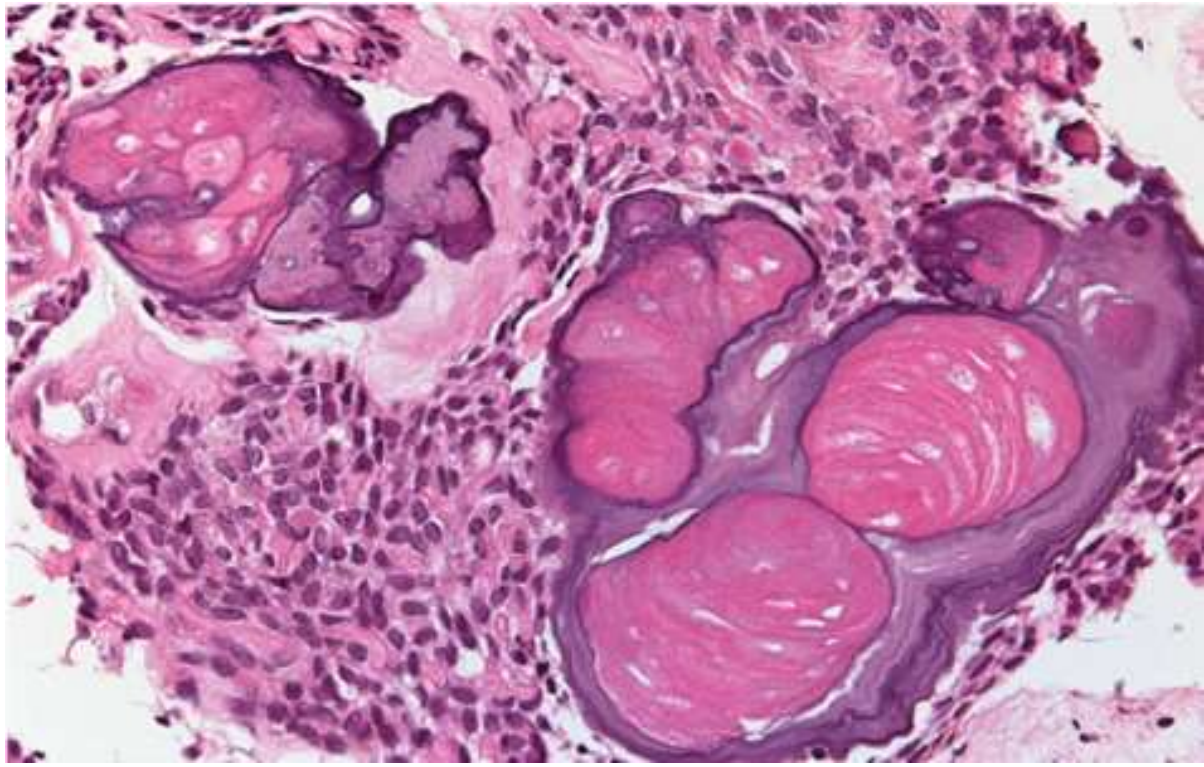
- Age: 2nd decade
- Site: Common in areas anterior to molars, maxilla more than mandible
- Intraosseous/extraosseous
- Sign and symptoms: Intraosseous causes expansion of cortical plates
- Usually painless

Radiographical Features

- Well defined unilocular radiolucency
- Flecks of radio-opacities which may be irregular calcifications or tooth- like structures
- 1/3rd cases associated with unerupted canine
- Root resorption & divergence

Histological Features:

- Cystic/Solid
- Epithelium resembles that of ameloblastoma
- Outer layer of palisaded columnar cells
- Inner layer resembles stellate reticulum
- Eosinophilic epithelial cells without nuclei Histopathology referred to as ‘ghost cells’ like Spherical calcifications.



SQUAMOUS ODONTOGENIC TUMOUR

INTRODUCTION

- Rare benign odontogenic neoplasm that may be clinically aggressive.

Clinical Features:

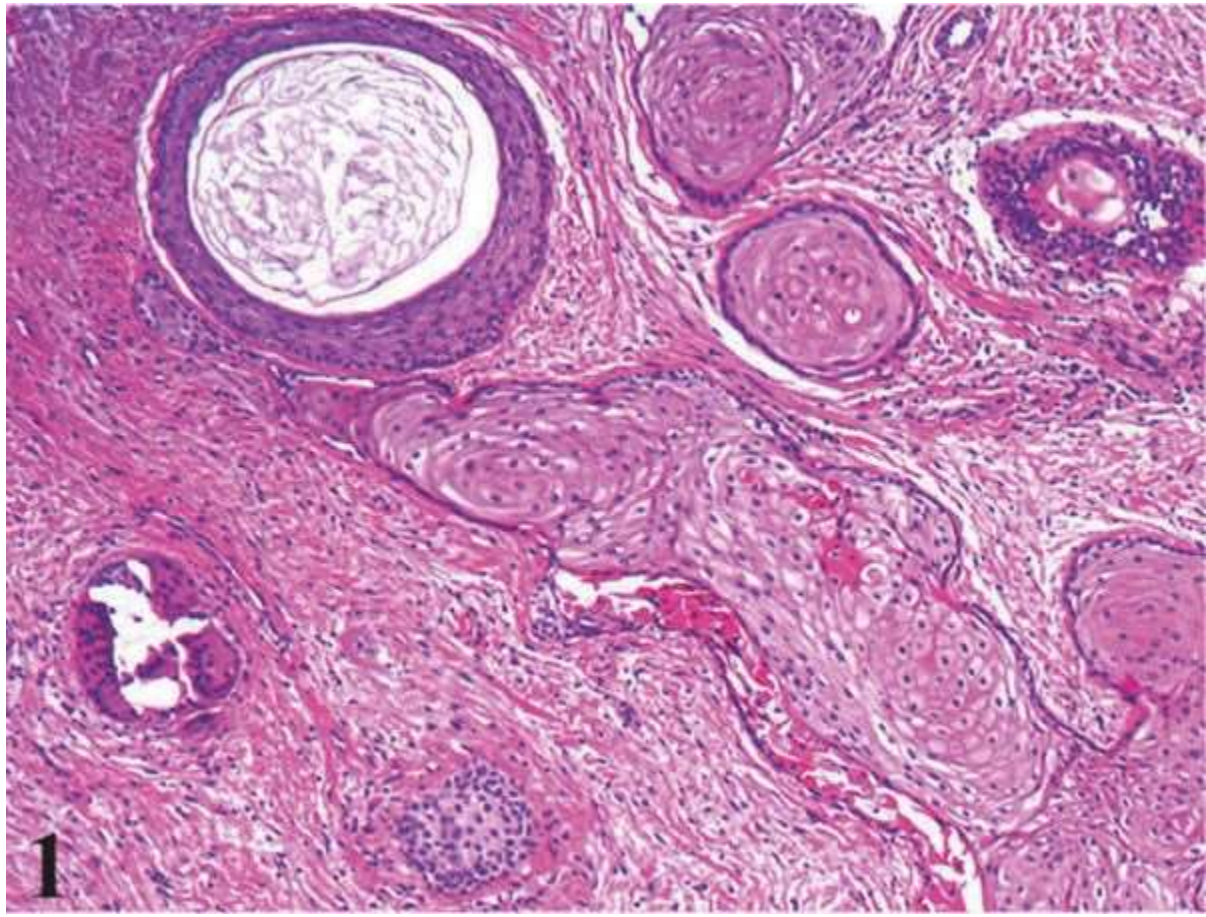
- Age: Peak incidence in 3rd decade
- Site: Anterior to molars
- Signs and symptoms: Presents as painless swelling with loosening of teeth
- Slow growing

Radiographical features:

- Small lesions have Unilocular radiolucency
- Large are multilocular
- Indistinct borders
- Displaces teeth is seen

Histological Features:

- Islands of normal appearing stratified squamous epithelium
- Islands may have microcyst formation in the centre
- Spherical or irregular shaped calcifications



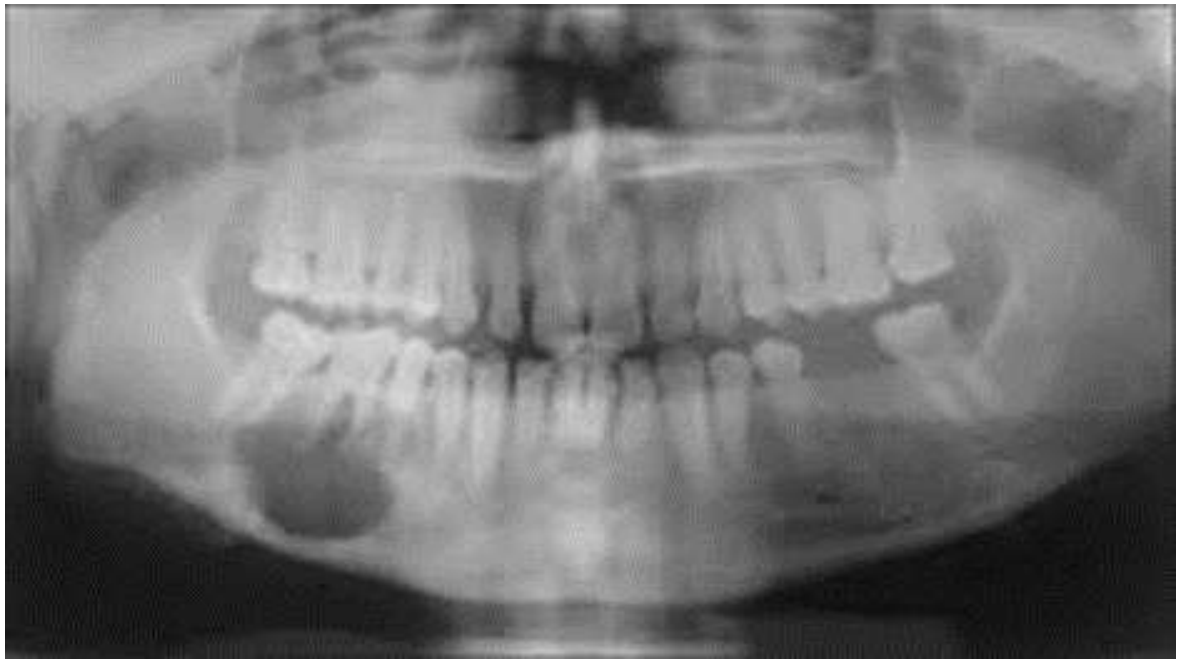
MIXED ODONTOGENIC TUMOR
AMELOBLASTIC FIBROMA

INTRODUCTION

- A circumscribed lesion located over un-erupted molars in young patients consisting of odontogenic epithelium & connective tissue
- **Clinical features:**
- Age: Younger patients, average age of 14 yrs
- Site: Common in mandible, molar areas, 75% associated with un-erupted tooth
- Sign and symptoms: Slow growing
- Small are asymptomatic, larger ones cause swelling

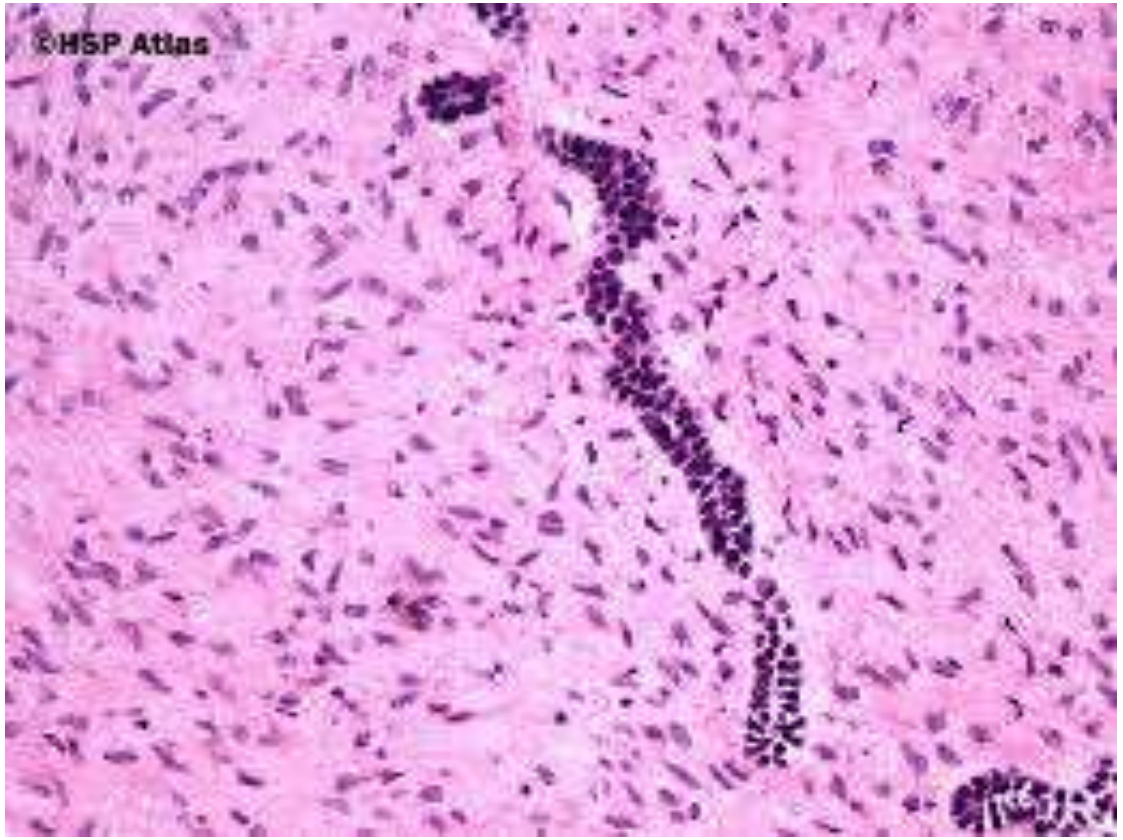
Radiographical features:

- Well defined Unilocular/Multilocular radiolucency



Histopathological features:

- Thin stands & cords of odontogenic epithelium
- Background of embryonic connective tissue
- Zones of hyalinization
- Focal areas of calcification



ODONTOMA

INTRODUCTION

- A malformation in which all dental tissues are represented in more orderly pattern of tooth-like like structures
- Most common odontogenic tumour in west
- Hamartomatous (not true neoplasm) lesion commonly associated with unerupted teeth & composed of enamel, dentin, pulp & cementum in either recognizable tooth shapes (compound) or a solid, gnarled mass (complex)

CLASSIFICATION:

- Odontomas are further sub classified into

1. COMPOUND ODONTOMA
2. COMPLEX ODONTOMA

- Both occur with equal frequency.
- Compound – composed of multiple, small, tooth like structures.
- Complex – composed of conglomerate mass of enamel and dentin with no anatomic relationship to tooth.

CLINICAL FEATURES : -

- Age incidence: First 2 decades.
- Sex incidence: None.
- Site predilection: Anterior maxilla.
- Signs & symptoms:Mostly asymptomatic, small, seldom exceeding the size of tooth missing in the region.
- Larger lesions may cause jaw expansion.

RADIOLOGICAL FEATURES:

ODONTOMA (COMPOUND)

- This type is composed of multiple, small tooth like structures.
- The entire mass appears surrounded by a radiolucent rim.
- An unerupted tooth is usually associated with both types of odontomes which impedes normal eruption of the tooth.

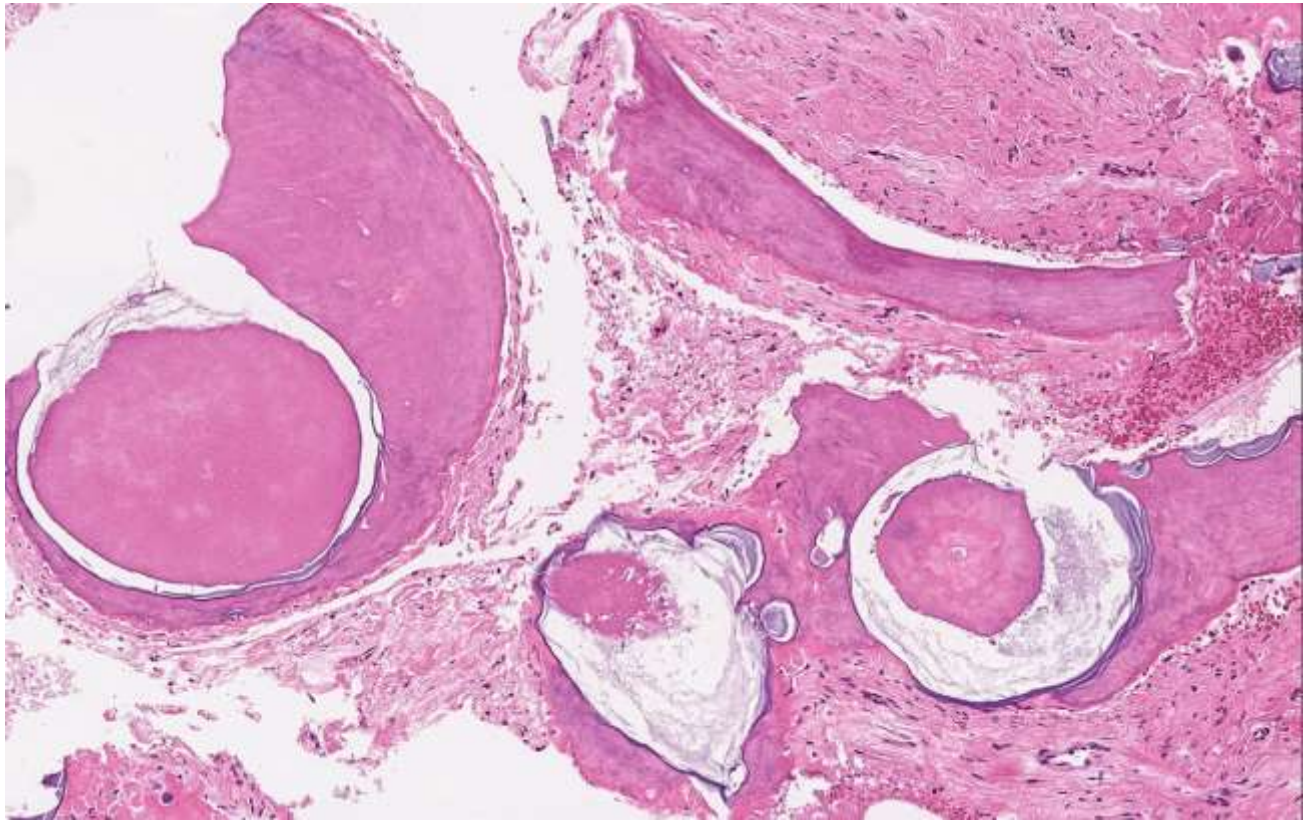
ODONTOMA (COMPLEX)

- Complex odontoma comprises of a single conglomerate mass of tooth like material.
- It bears no anatomic resemblance to any tooth.
- Appears as a ‘opaque mass surrounded by a narrow ‘lucent rim.

HISTOLOGICAL FEATURES:

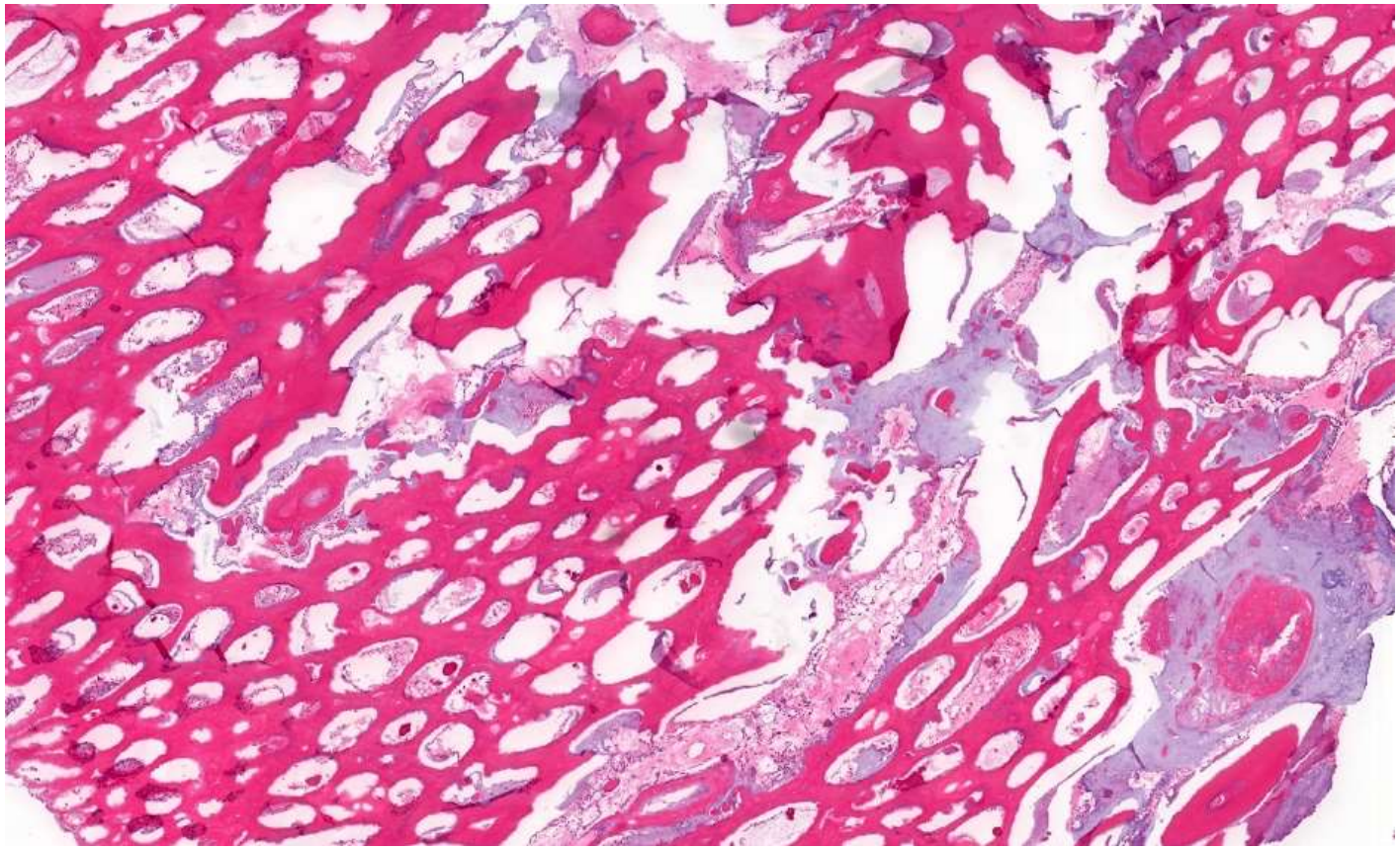
ODONTOMA (COMPOUND)

- Microscopically, it shows discrete tooth like denticles in a fibrous stroma.
- Being a decalcified specimen, enamel appears as spaces around normal looking dentin and pulp which bear normal anatomic relationship to each other.



ODONTOMA (COMPLEX)

- Consist of largely tubular dentin enclosing clefts / hollow circular spaces that contained enamel prior to decalcification.
- Thin layer of cementum sometimes may be present at the periphery.



AMELOBLASTIC – FIBRO ODONTOMA

INTRODUCTION

- Expansile growth in young patients containing soft tissue components of ameloblastic fibroma & hard tissue components of complex odontoma.
- Greater potential for growth & destruction
- Differs from odonto-ameloblastoma

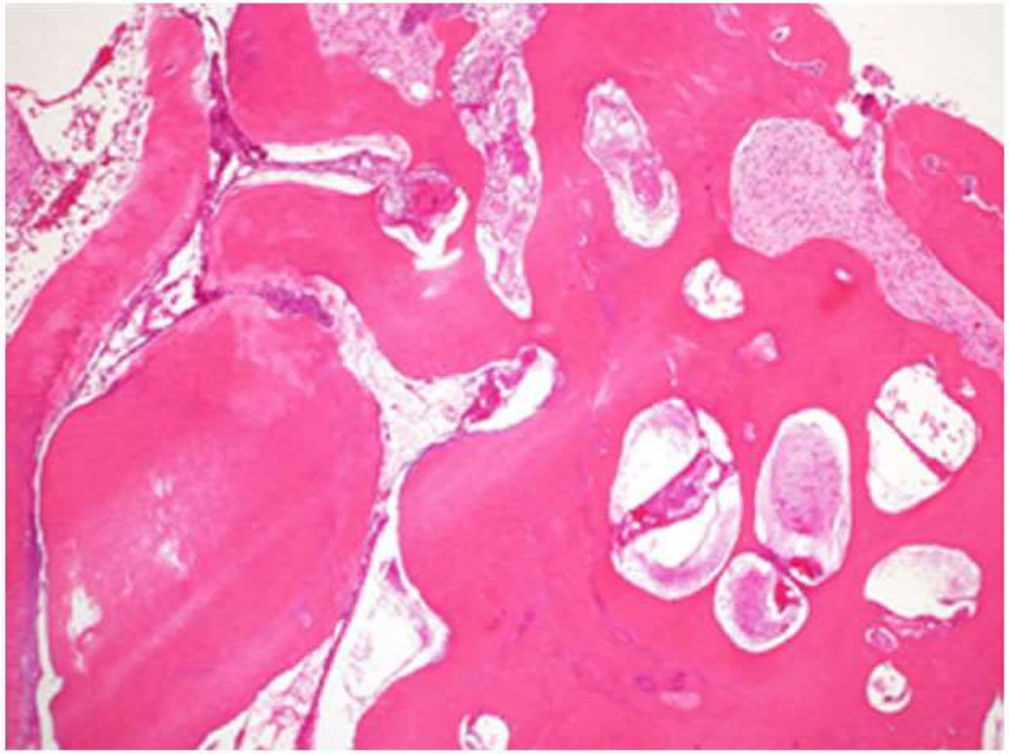
Clinical Features:

- Age: First & second decade
- Site prediction: Common in post mandible
- Signs and symptoms: Presents as slow growing swelling
- Usually in area of un-erupted tooth
- Pain is rare

Radiographic Features:

- Unilocular, well circumscribed, mixed radiopaque & radiolucent lesion.
- Opacities are usually diffuse & nodular
- May contain an impacted tooth
- Variable amount of calcifications with radio-density of a tooth structure.

- **<u>Histopathologic Features:</u>**
- Soft tissue component resembles ameloblastic fibroma
- Strands & cords of epithelium resembling dental lamina
- Background of embryonic CT containing fibroblasts
- Hard tissue component is mature or immature form of complex odontoma.



QUESTIONS

1. Describe in details Ameloblastoma?
2. Describe in details Pindborg tumor?
3. Describe in detail AOT?
4. Describe in detail odontoma?
5. Make a chart of treatment plan for all the tumors?
6. Make a chart of clinical features, radiographic features and histological features of different types of ameloblastoma?
7. Make a chart of radiographic features of all tumors?

THANK YOU

BE SAFE BE AT HOME AND STUDY!!

ODONTOGENIC TUMORS
PART-3

BY-

Dr. Vishakha Lal

MESENCHYMAL ODONTOGENIC TUMOURS

ODONTOGENIC FIBROMA

INTRODUCTION

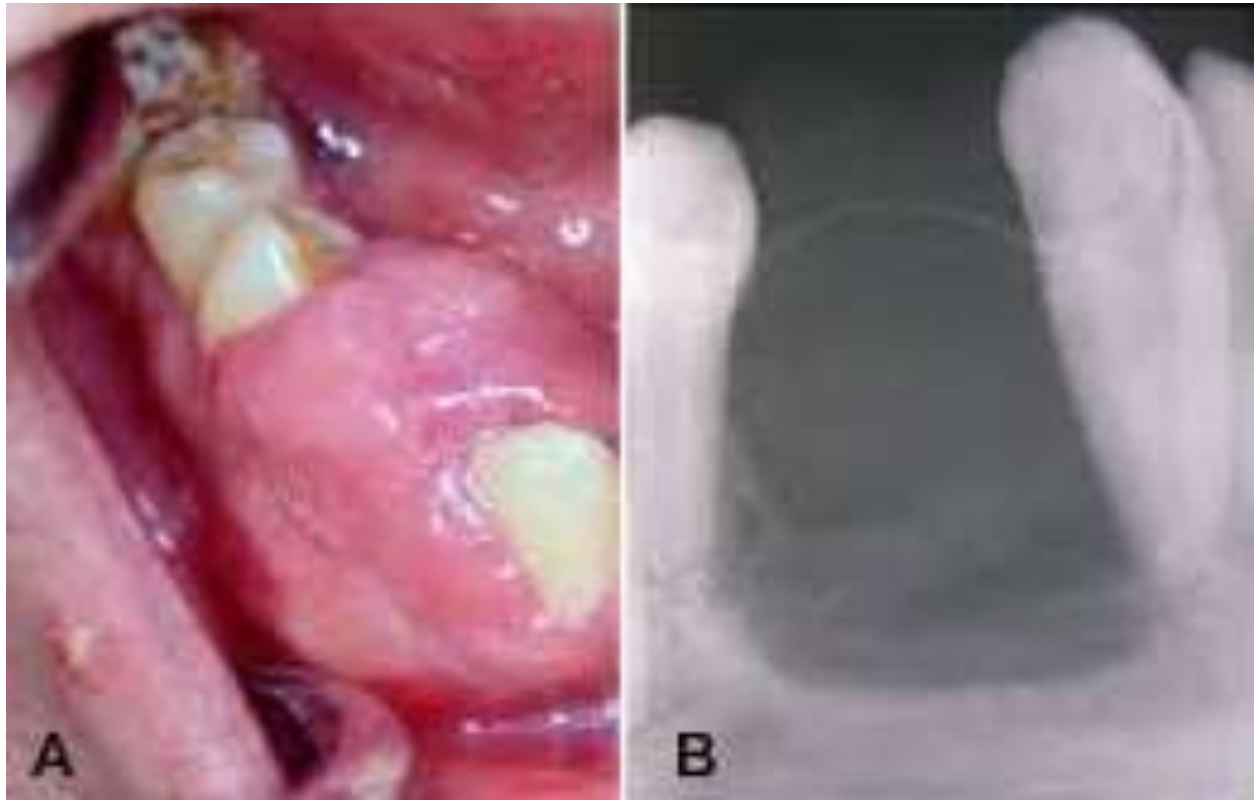
- Benign neoplasm derived from connective tissue of odontogenic origin containing islands & strands of odontogenic epithelium & calcifications
- Central & Peripheral
- Peripheral: Common, Extra-osseous

Clinical Features

- Uncommon
- Wide range of age 4-80 yrs
- 2.2:1 female: male
- Asymptomatic swelling
- Maxillary lesions are common anterior to molars
- Mandibular common in molar region

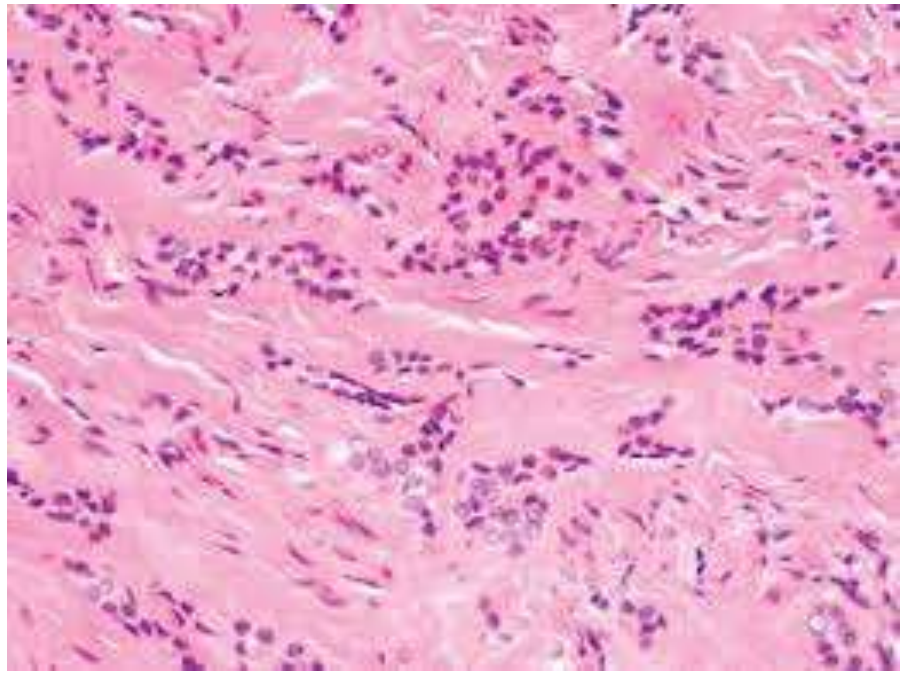
Radiographic Features:

- 1/3rd associated with un-erupted tooth
- Non-specific unilocular well circumscribed radiolucency, sclerotic border
- Radio-opaque flecks may be seen
- Larger lesions can be multilocular
- Root resorption/divergence.



Histopathological Features

- Stellate fibroblasts
- Fine collagen
- Scattered islands of odontogenic epithelium
- Spherical/Diffuse dystrophic calcifications
- A variant found with Central Giant Cell granuloma.



Differential Diagnosis

- Ameloblastic fibroma
- Odontogenic myxoma
- Desmoplastic fibroma

ODONTOGENIC MYXOMA

INTRODUCTION

- Aggressive intra-osseous lesion derived from odontogenic connective tissue consisting of mucoid substance & undifferentiated spindled mesenchymal cells.

Clinical Features

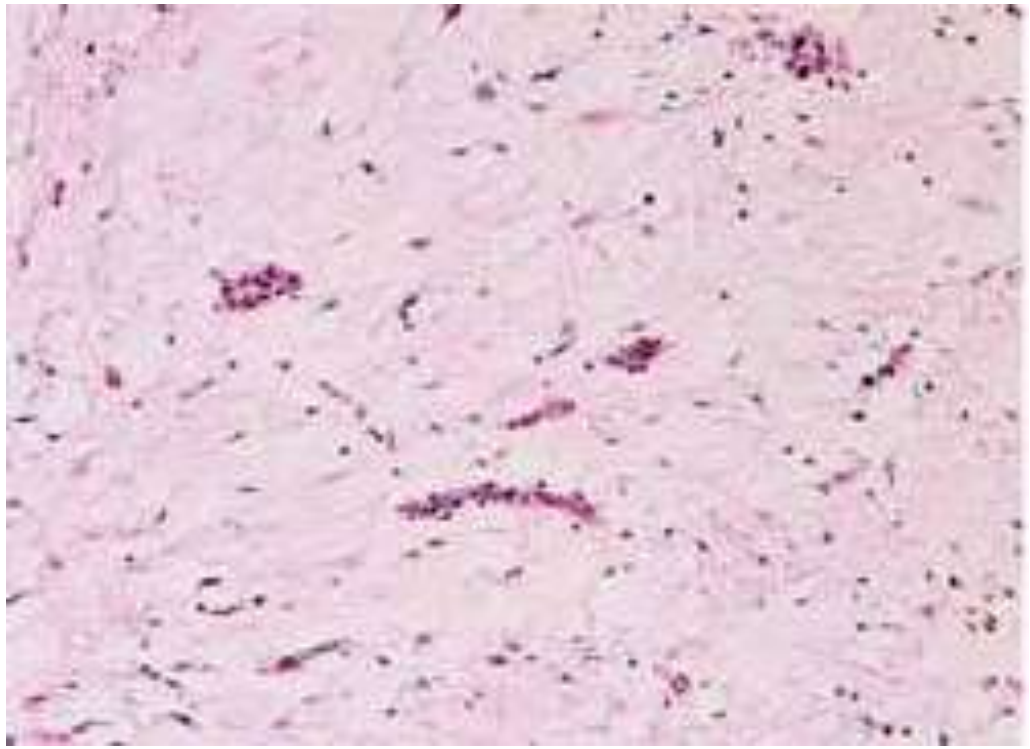
- Uncommon
- Intra-osseous
- Aggressive, may show rapid growth
- More common in mandible
- No sex predilection
- Maxillary may invade the sinus & mandibular into ramus
- Painless, slowly enlarging, displaces teeth

Radiographic Features

- Unilocular/Multilocular radiolucency with “soap bubble” or “honey comb” appearance resembles ameloblastoma
- Root displacement
- Irregular or scalloped margins
- Angular-trabeculations
- Expansion of cortical plates

Histopathologic Features

- Grossly gelatinous loose structure
- Spindled or angular shaped cells
- Background of mucoid (glycosaminoglycans), non- fibrillar ground substance
- At periphery penetrates trabeculae producing islands of residual bone
- Islands of odontogenic epithelium, calcifications, focal areas of blood vessels & collagen may be seen



CEMENTOBLASTOMA

INTRODUCTION

- Benign, well circumscribed neoplasm of cementum- like tissue growing in continuity with the apical cemental layer of a molar or premolar that produces expansion of cortical plates & pain.
- Neoplasm of cementoblasts, only true neoplasm of cementum.
- Histologically it is remarkably similar to osteoblastoma & osteoid osteoma.
- Periodontal membrane separates it from surrounding bone.

Clinical Features

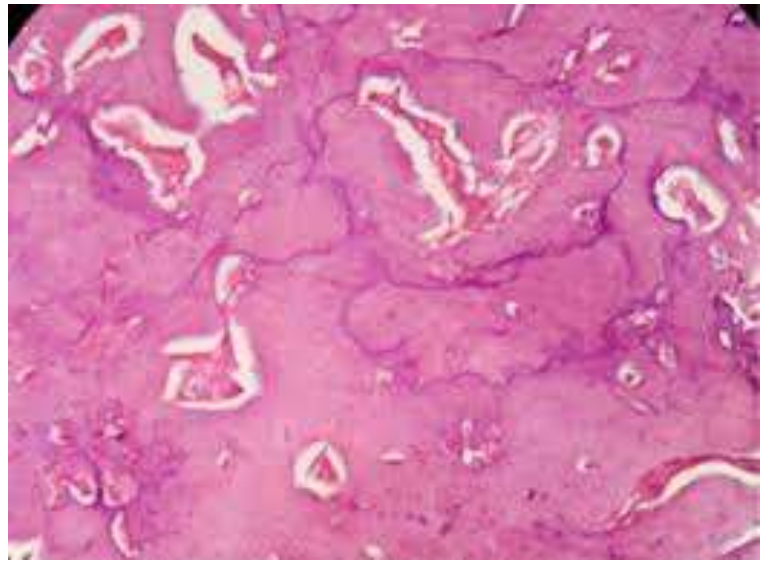
- Uncommon
- 2nd & 3rd decades of life
- 75% occur in mandible
- Molar premolar area, 50% in first molar, attached to apical third of roots
- Expands buccal & lingual cortical plates
- Pain & swelling (in 2/3rd cases)
- Tooth remains vital
- Average size 2cm
- No sex predilection
- More in children & young adults

Radiographic Features

- Unilocular, well demarcated radio-opaque mass fused to one or more tooth roots
- Surrounded by a thin radiolucent rim
- May be completely radiolucent/mixed/opaque
- Root resorption & fusion with the tumour

Histopathologic Features

- Resembles osteoblastoma except that it is continuous with the normal cemental layer of roots
- Eosinophilic matrix rimmed by cementoblasts
- Mineralized areas show reversal lines which indicates extensive remodelling
- Periodontal ligament surrounding the lesion
- Relatively acellular at periphery & more mineralized & vascular in the centre
- Soft tissue areas are cellular & vascular
- Multinucleated giant cells in the cellular zone



ODONTOGENIC MALIGNANCIES

MALIGNANT AMELOBLASTOMA

AND

AMELOBLASTIC CARCINOMA

INTRODUCTION

- Less than 1 % of the ameloblastomas show malignant behaviour with the development of metastases.
- **Malignant ameloblastoma** is a tumor that shows histologic features of the typical (benign) ameloblastoma in both the primary and secondary deposits.
- **Ameloblastic carcinoma** is a tumor that shows cytologic features of malignancy in the primary tumor, in recurrence and any metastases.

Radiographic Features

- With the malignant ameloblastoma, the appearance is similar to the typical solid/multicystic ameloblastoma.
- The ameloblastic carcinoma is often more aggressive with the lesion appearing as an ill-defined radiolucency with cortical destruction

CLEAR CELL ODONTOGENIC CARCINOMA

INTRODUCTION

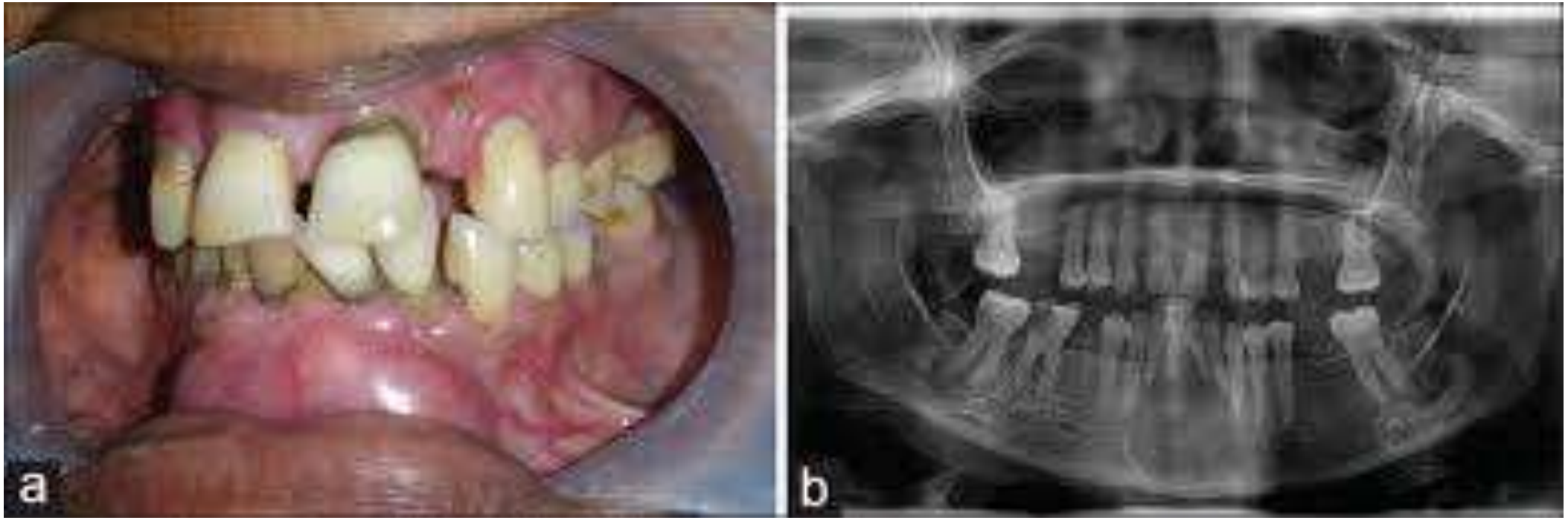
- An aggressive & destructive intra-osseous lesion consisting of poorly differentiated epithelial cells and clear cells.

Clinical Features

- Uncommon
- Painful swelling of anterior mandible
- 5th-7th decade, mean age 58 years
- Female predilection
- Loosening of teeth
- Potentially aggressive, capable of frequent recurrences & metastasis
- Features indicative of odontogenic origin.

Radiographic Features

- shows honeycomb poorly defined radiolucency

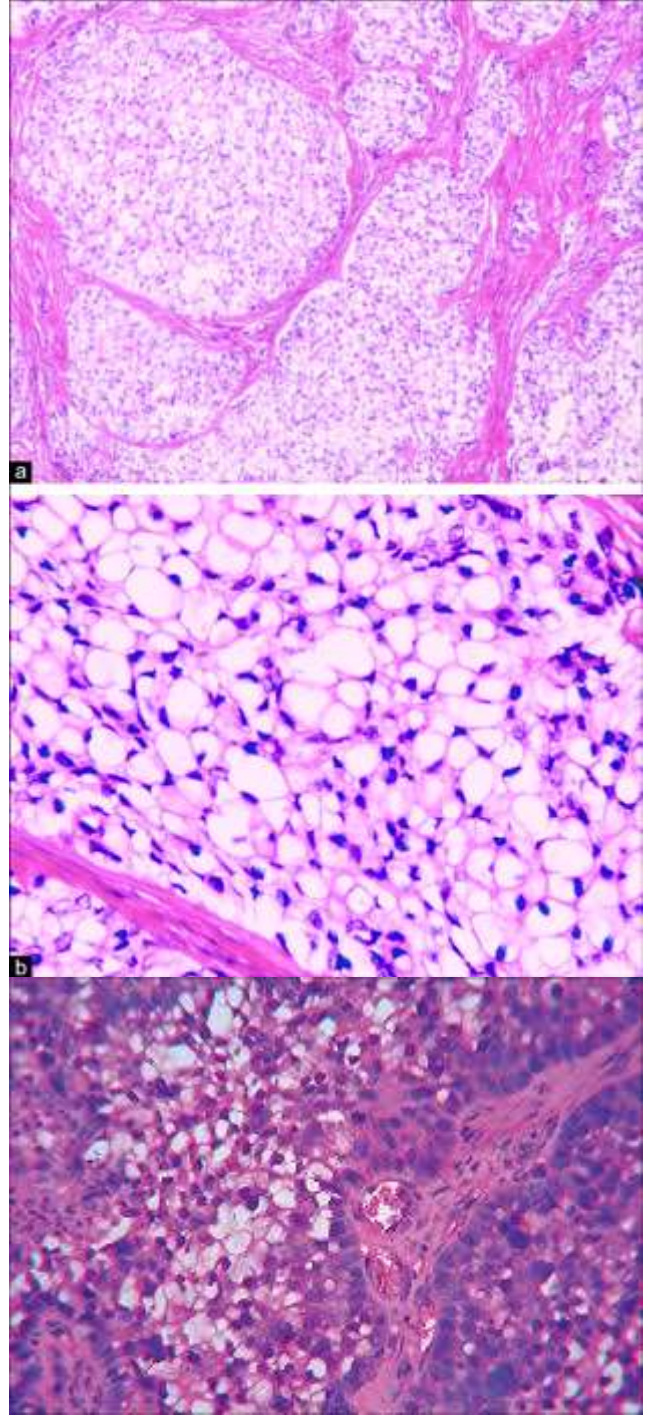


Histopathologic Features

1. Biphasic
2. Mono-phasic
3. Ameloblastomatous

- Biphasic-Nests of cells with clear cytoplasm mixed with cells containing eosinophilic cytoplasm
- Monophasic-Only clear cells
- Ameloblastomatous-Nests of cells showing central cystic change & squamous differentiation

  Peripheral nuclear palisading with reverse polarity



PRIMARY INTRA-OSSEOUS CARCINOMA

INTRODUCTION

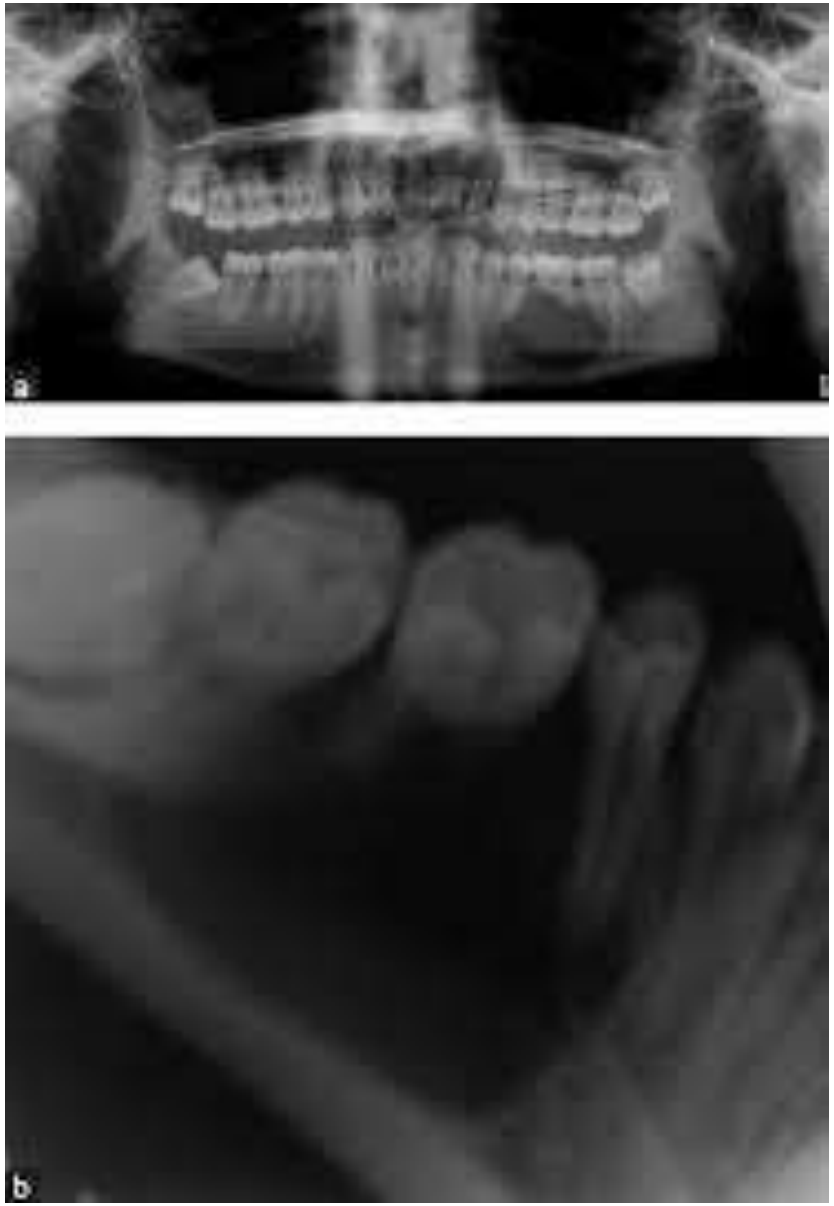
- WHO Definition - A squamous cell carcinoma arising within the jaw, having no initial connection with the oral mucosa, and presumably developing from residues of the odontogenic epithelium.
- Two possible origins

1. Lining of odontogenic cysts
2. From remnants of odontogenic epithelium (arising de novo)

- 2/3rd cases arise from odontogenic cysts
- PIOC occurs only in the jaw bones

Clinical Features

- Male to female ration is 2.2:1
- Mostly in elderly patients above 60 yrs
- Painful swelling
- Bony expansion may be present
- Destroys large areas of bone
- Root resorption
- Sensory disturbances/Neural involvement
- Local/regional metastasizes



Differential Diagnosis

- Acanthomatous ameloblastoma
- Ameloblastic carcinoma
- Squamous odontogenic tumour
- Mucoepidermoid carcinoma

QUESTIONS

1. Make a chart of radiolucent and radiopaque tumor and cyst?
2. Make a chart of pathogenesis of all tumor?
3. Make a chart of clinical features, radiographic features and histological features of all tumor?
4. Make a chart of treatment plan of all tumor?
5. Make a chart of all differential diagnosis with reason of all tumor?
6. Make a chart of all radiographic features showing honey comb appearance, soap bubble appearance and how to differentiate between all these tumor and cyst?

THANK YOU