CYSTS OF THE JAW AND SOFT TISSUES

Definition: it is a pathological cavity lined by epithelium containing fluid or semi-fluid (true cyst).

If the cyst not lined by epithelium it is pseudo- cyst.

Classification of cyst:

I-Odontogenic cysts:

1) Developmental:

a- Odontogenic keratocyst.

b- **Dentigerous cyst.**

c- Eruption cyst (soft tissue cyst).

d- Calcifying odontogenic cyst (COC, Gorlin cyst)

e- Lateral periodontal cyst.

f- Gingival cyst (soft tissue cyst).

2) Inflammatory cysts:

a- Radicular (Apical, lateral or residual).

b- Paradental.

II- Non-odontogenic cysts:

a) Naso-palatine cyst (cyst of palatine papilla and incisive canal cyst).

b) Median palatal cyst.

c) Naso-labial cyst (soft tissue cyst).

d) Globulo-maxillary cyst.

III- Pseudo-cysts:

a) Traumatic bone cyst.

b) Aneurysmal bone cyst. **c) Static bone cyst.**

IV- Soft tissue cysts:

a) **Salivary mucoceles (mucous extravasasion cyst, mucous retention cyst and ranula).**

b) **Dermoid and epidermoid cysts.**

c) **Thyroglossal tract cyst.**

d) **Lymphoepithelial cyst.**

General features of cysts:

***Origin:** in case of true cysts:

- **Odontogenic cysts:** arising from epithelial remnants of odontogenic epithelium (e.g.: epithelial rests of Serres, reduced enamel epithelium or epithelial rests of malassaz).

- **Non odontogenic cysts:** epithelial remnants other than tooth forming cells.

*** Pathogenesis:**

- Proliferation of epithelial remnants due to unknown cause except in case of radicullar and paradental cysts, epithelial proliferation occur due to inflammation.

-As the proliferation continues, the cells in the centre of the mass degenerate and liquefy because they become away from their source of nutrition (capillaries and tissue fluids in connective tissue).

- This creates an epithelial lined cavity filled with fluid.

*** Clinically:**

Age: second and third decades **(**middle age) except:

- Inflammatory radicular cysts occur at any age but more in adults.
- Eruption cysts occur in children.
- Gingival cysts of new born occur in new born.
- Gingival cysts of adult occur in adults over 40 years.

Site: mandible more than maxilla.

When present in mandible, it occurs more posteriorly.

When occur in maxilla, they present more in the anterior region.

Symptoms:

1- In case of intra-osseous cysts:

-Cysts are symptomless and discovered by routine x-ray.

- Cysts are painless unless infected (except aneurysmal bone cyst which is painful and tender upon motion).

- Cysts are slowly growing.

2- In case of soft tissue cysts:

- Painless and slowly growing.

- Soft, fluctuant and dome shape.

- It may be doughy in consistency if it contains keratin.

- Its colour may be **normal** (e.g. retention cyst), **bluish** in colour (e.g. extrvasated mucocele, ranula and eruption cyst) or **white** in colour (e.g. gingival cyst of new born due to presence of keratin).

- The cysts may be covered with normal skin (e.g. lymphoepithelial and thyroglossal tract cyst).

* **Histopathological:** in case of true cysts:

Epithelial lining:

- In most cases it is stratified squamous epithelium (keratinized or non-keratinized).

- Respiratory epithelium (pseudo-stratified ciliated columnar epithelium).

Fibrous connective tissue wall: it consists from fibroblasts and collagen fibres.

Content: obtained through aspiration:

- Water, electrolytes, degenerated epithelial cells.

- It may contain keratin (semi-fluid).

* **Mechanism of cyst expansion:**

1- **Local bone resorption** due to release of prostaglandin.

2- **Osmotic pressure** because the cyst content is hypertonic and the cyst wall act as a semi-permeable membrane leading to movement of fluid from tissue into the cyst lumen.

3- **Increase hydrostatic pressure:** the movement of fluid into cyst lumen result in increase in hydrostatic pressure that lead to cyst expansion in unicentric ballooning pattern.

4- **Active epithelial growth:** only in case of odontogenic keratocyst: the epithelial lining exhibits great mitotic activity leading to folding and projection into cancellous bone spaces resulting in multicentric expansion.

Expansion of cyst occurs by deposition of new subperiosteal bone leading first to **hard bony swelling**, then more expansion leads to bone resorption **(egg-shell cracking)** and eventually complete bone resorption result in **soft fluctuant swelling.**

* R**adiographically:**

In case of intra-osseous cysts:

-Well defined radiolucent area with radio opaque margin.

- It may be unilocular or multilocular (honey comb or soap bubble appearance).

- It may be associated with an unerupted tooth.

In case of soft tissue cysts:

Negative in x-ray.

* T**reatment:**

- In case of intra bony cysts:

- Inoculation.

- Marsupilization in case of large cysts.

- Open and close in case of traumatic bone cyst.

- In case of soft tissue cyst:

- Excision (surgical removal).

- **No treatment:** in case of:

  - Eruption cyst.
  - Gingival cyst of new born.
  - Static bone cyst.

I-ODONTOGENIC CYSTS

1) Developmental cysts

a- Odontogenic keratocyst

(Primordial cyst)

It may be solitary or multiple when associated with **basal cell naevus syndrome (Gorlin-Goltz syndrome).**

Origin: it occurs in place of tooth owing to cystic degeneration of its enamel organ.

Histopathology:

Epithelial lining is: thin, keratinized stratified squamous epithelium that resting on flattened basement membrane.

Keratin may be parakeratin or orthokeratin.

Fibrous connective tissue wall: thin and free from inflammatory cells.

Content: keratin which is thick and cheesy similar to pus but without offensive odour.

	Parakeratotic odontogenic cyst	**Orthokeratotic odontogenic cyst**
Basal cells	Well defined columnar with polarized and palisaded nuclei	Cuboidal with rounded nucleus
Surface	Corrugated with shedding of keratin in the lumen	Smoothed surface
Granular cell layer	Not present	present
Basement	Budding with separation of	Smooth

membrane	daughter cysts (satellite cysts)	
Behaviour	More aggressive	Less aggressive
Recurrence rate	High	low

Causes of recurrence of odontogenic kerato cyst:

- Thin wall is easily fragmented.
- High proliferation rate of epithelial cells (high mitotic rate).
- Budding of epithelium into connective tissue in case of parakeratotic cyst.
- Presence of daughter cysts which may be left after surgical removal.
- Projection of the cyst along the cancellous spaces.

Radiographically:

- Unilocular or multilocular (soap bubble or honey comb appearance) radiolucent areas with radio-opaque margin.

- Crown of an unerupted tooth may be present.

b) Dentigerous cyst

(Follicular cyst)

Dentigerous means 'containing tooth'.

The cyst is attached to the neck of unerupted tooth (mainly maxillary canine and mandibular third molar).

Origin:

Reduced enamel epithelium (remnant of enamel organ) after complete crown formation.

Pathogenesis: accumulation of fluid between the reduced enamel epithelium and the crown of the tooth.

Histopathologically:

Epithelial lining:

-Thin, non-keratinized stratified squamous epithelium.

- Mucous cell metaplasia may occur.

- Focal thickening of epithelial lining occur that protruding into the cystic cavity.

Fibrous connective tissue wall:

- free from inflammatory cells.
- Contain cholesterol clefts and islands of odontogenic epithelium.

Contents: yellowish fluid that contain many cholesterol crystals.

Radiographically: it is related to the crown of unerupted tooth.

It may be central, lateral or circumferential.

Complications: untreated dentigerous cyst may result in the following:

1- Transformation of the focal thickening of epithelial lining into an ameloblastoma.

2- Carcinomatous transformation of the epithelial lining into muco-epidermoid carcinoma.

3- Expansion with destruction of bone leading to pathological fracture.

c) Eruption cyst

It is a superficial dentigerous cyst occurs in soft tissues of alveolar mucosa over a tooth about to erupt.

It involves deciduous teeth or permanent molars (teeth with no predecessors).

d) Calcifying odontogenic cyst
(COC, Gorlin cyst)

It is a developmental odontogenic lesion that may be cystic or solid resembling neoplasm.

Histopathology:

Epithelial lining:

- The basal cell layer is cuboidal or columnar with polarized palisading nuclei (ameloblast-like cells).
- Over the basal cells, there is stellate-reticulum like cells (loose cells).
- There are swollen eosinophilic cells (**ghost cells**)
- Ghost cells may be **keratinized, calcified** or drop to the connective tissue capsule with **foreign body reaction** around them.

Fibrous connective tissue wall: contain dysplastic dentine.

Content: proliferating epithelial cells.

Radiographically: radiolucent area with radioopacities (**salt and pepper appearance**) with crown of un-erupted tooth.

e) Developmental lateral periodontal cyst

It is non-inflammatory developmental cyst present lateral to the root of a **vital** tooth.

Origin: remnants of dental lamina.

Site: mandibular premolar-canine region.

Histopathologically: its epithelial lining is thin layer of stratified squamous epithelium supported by fibrous connective tissue capsule.

f) Gingival cyst

Origin: remnants of dental lamina.

***Gingival cyst of new born (Bohn's nodules, Epstein' pearls):**

Clinically: small, discrete, whitish nodules on the alveolar ridge or the midpalatine raphae of a new born baby.

Histopathologically: thin epithelial lining with the lumen is filled with desquamated keratin.

***gingival cysts of adults:** arise more commonly on the gingival mandibular premolar region.

Histopathologically: very thin, flattened squamous epithelium which in most cases non-keratinized.

2) Inflammatory cysts

a) Radicular cyst

It may be apical, lateral or residual.

Origin: epithelial rests of malassez.

Pathogenesis:

- Inflammatory hyperpasia of the epithelial remnants following death of the pulp.
- Apical cyst arises from a pre-existing granuloma.

- Lateral cyst, arises due to irritation of the periodontal ligament through lateral root canal of pulpless tooth.

- Residual cyst, it is the cyst left in the jaw after the extraction of the affected tooth.

Histopathologicaly:

Epithelial lining:

- In most cases it is stratified squamous epithelium which in case of newly formed cyst hyperplastic and appear as anatomising strands. While in fully formed cyst (mature cyst) it is thin, regular and flattened.

- Pseudo-stratified ciliated columnar epithelium in periapical cysts of maxillary teeth.

- Dystrophic calcification may be present in epithelium as well as in connective tissue wall.

- Hyaline bodies **(Rushton bodies)** in the epithelial lining. They are thin, linear, hairpin or slightly curved eosinophilic bodies.

Fibrous connective tissue wall:

- In case of newly formed cyst, it is well vascularized and contain large number of chronic inflammatory cells. While, in case of fully formed cyst (mature cyst), it is less vascularized with few inflammatory cells.

- Degenerated plasma cells **(Russel bodies)** may be present.

- Cholesterol clefts with aggregations of multinucleated foreign body giant cells close to it.

- Collection of foam cells (lipid-filled macrophage) is present.

Contents: watery, straw coloured (yellow) fluid.

It contains cholesterol crystals, serum protein, inflammatory cells and degenerated epithelial and connective tissue cells.

Radiographically: round or ovoid radiolucent area with radio-opaque margin which may be:

- **Apical:** present at the root apex.

- **Lateral:** present at the lateral surface of the tooth.
- **Residual:** present in place of extracted tooth.

b) Paradental cyst

It is the cyst related to partially erupted third molars.

Origin: reduced enamel epithelium.

Pathogenesis: pericoronal inflammation leads to proliferation of the reduced enamel epithelium covering the unerupted part.

Histopathologicaly: similar to radicular cyst but with more inflammatory cells.

II-NON ODOTOGENIC CYSTS

a) Nasopalatine cyst

(Incisive canal cyst)

Origin: epithelial remnants of the nasopalatine duct.

Histopathologically:

Epithelial lining:

- Stratified squamous epithelium if it is near to the oral cavity.
- Respiratory epithelium (pseudo-stratified ciliated columnar epithelium) if near to the nasal cavity.
- Mucous cells are present.

Fibrous connective tissue wall: it contains large neuro-vascular bundles, mucous glands and chronic inflammatory cells.

Contents: viscous mucoid material.

Radiographically: round or ovoid or **heart –shaped** radiolucency in the midline between or above the roots of the maxillary central incisors.

If the cyst is small in size it may not be distinguished from the incisive canal which does not exceed 6 mm in diameter.

N.B. cyst of the palatine papilla:

- It is a cyst that may be formed at the point of opening of the canal within the palatal soft tissue.

- It is a soft tissue cyst which appears as a bluish fluctuant swelling, then ruptures spontaneously with a discharge of salty fluid.

b) Midline palatal cyst

It is said to be a naso-palatine cyst but developed more posteriorly in the palate.

c) Naso-labial cyst

Origin: epithelial remnants of the lower part of the naso-lacremal duct.

Clinically: it appears as a soft tissue swelling of the upper lip in the canine region below the ala of the nose. The patient may complain from mild nasal obstruction.

Histopathologically:

Epithelial lining: respiratory epithelium or stratified squamous epithelium.

-Mucous cells are present.

d) Globulo-maxillary cyst

Site: it arises between the upper maxillary lateral incisor and canine.

Origin: it may represent odontogenic keratocyst, developmental lateral periodontal cyst or inflammatory radicular cyst

Radiographically: well defined radiolucency with divergence of the maxillary lateral incisor and canine roots producing "**inverted bear-shaped"** appearance.

III-PSEUDO-CYSTS

a) Traumatic bone cyst

- It is called simple, solitary or haemorrhagic bone cyst.
- It is a bony cavity with no epithelial lining and on fluid content.
- It is more common in long bones.

Aetiology: mild trauma.

Pathogenesis: trauma causes bleeding and haematoma, then blood clot breaks down leaving an empty cavity.

Histopathologically: lining: fibrous or granulation tissue.

-The cavity is empty or contains extravasated red cells and haemosiderin.

Radiographically: - In the mandible, it presents above the inferior alveolar canal.

- In the premolar –molar area, it is well defined unilocular radiolucency that project upward between the roots of teeth producing **"scalloped"** contour.

- In the anterior region, it is regular, round or oval in shape.

Treatment: the cavity is opened surgically, irrigated with saline then the walls are scratched to establish bleeding.

b) Aneurysmal bone cyst

Aetiology: unknown.

Pathogenesis: vascular malformation (e.g. arterio-venous shunt) in a pre-existing lesion.

Clinically: - Firm non-pulsating swelling affecting any bone of the skelton especially spine and long bones.

- When affects jaw it is more common in the molar region.
- It is **painful and tender** upon motion.

Histopathologically: It is one of "**central giant cell lesions**" containing large number of multinucleated giant cells aggregated around blood filled spaces, extravasated blood or haemosiderin granules. Osteoid bone may be present.

Radiographically: it is **multilocular radiolucent area** (honey comb or soap-bubble appearance. There is eccentric ballooning out of bone cortex.

At operation: excessive bleeding is encountered (welling up), it resembles a blood-soaked sponge.

c) Static bone cyst

It is also called **Stafne's cyst** or **developmental mandibular salivary gland depression**.

Pathogenesis: ectopic inclusion of part of submanibular salivary gland in the lingual side of the mandible during development.

Radiographically: well defined round or ovoid radiolucent area with or without radio-opaque margin present beneath the inferior dental canal immediately anterior to the angle of the mandible.

It is constant in size, site and shape in the same patient, so it is called **static cyst**.

Diagnosis: injection of radio-opaque material in the orifice of duct of the gland in the affected side, then sialogram is done to detect salivary gland tissue in bone.

Complication: malignant transformation of salivary tissue may occur.

IV-SOFT TISSUE CYSTS

a) Salivary mucoceles

*Mucous extravasasion cyst:

It is a pseudo-cyst. It is more common in lower lip minor salivary glands.

Aetiology: trauma to the minor salivary gland excretory duct by for example biting lower lip or cheek.

Pathogenesis: trauma leads to rupture of duct with exravasation of mucous in surrounding tissue.

Clinically: it appears bluish or translucent submucosal swelling.

- The swelling may be followed by decrease in size because of engulfing of the pooled mucin.

Histopathologically: mucin pool surrounded by granulation tissue that is infiltrated by inflammatory cells.

*Mucous retention cyst:

It is a true cyst. It is less common than extravasated cyst.

Pathogenesis: chronic partial obstruction of salivary secretion which may be due to calculus formation.

Clinically: It rarely occurs in lower lip but found in the palate, cheek and floor of the mouth.

- Overlying mucosa is of normal colour.

Histopathologically:

- **Epithelial lining:** ductal epithelial cells.

- **Connective tissue wall:** free from inflammatory cells.

- **Contents:** viscous mucous secretion.

***Ranula:** it is a **clinical term** describes a swelling occurs in the floor of the mouth.

In most cases it is a mucous exravasation cyst.

b) Dermoid and epidermoid cysts

It is a form of cystic teratoma

Origin: it is derived from embryonic germinal epithelium.

Pathogenesis: inclusion of epithelial cells and totipotent cells in the midline between embryonic processes during development.

Clinically: it may occur in any part of the body but more common in the head and neck region.

It occurs in the anterior part of the floor of the mouth.

- When it is present above the mylohyoid muscle it bulge in the floor of the mouth, elevating the tongue with difficulty in eating and drinking.

- When present deep to the mylohyoid muscle, it causes bulging in the submental region

- When present below mylohyoid muscle, a midline swelling of the neck occurs.

Histopathologically:

Epithelial lining: keratinized stratified squamous epithelium.

Connective tissue wall: in case of dermoid cyst it contains sebaceous glands, sweat glands, hair follicles (skin appendages) and teeth.

- In the absence of skin appendages and teeth the cyst is epidermoid cyst.

Contents: keratin.

c) Thyroglossal tract cyst

Aetiology: unknown.

Origin: epithelial remnant of the thyroglossal tract

Pathogenesis: proliferation and cystic degeneration of the epithelial remnant.

Clinically: - it present on one side of the midline.

- It may occur in the floor of the mouth, in the neck or rarely in the tongue.

- When the cyst in the floor of the mouth or the tongue is large, it may cause dysphasia or interfere with eating and speech.

- When present in the neck, it moves on swallowing or extension of the tongue.

Histopathologically:

Epithelial lining: - Stratified squamous epithelium when near to the oral cavity.

- Respiratory epithelium if below hyoid bone.

Connective tissue wall: it contains thyroid tissue.

Complication: malignant transformation.

d) Lympho-epithelial cyst

Origin: remnants of epithelial cells entrapped in cervical lymph nods.

Clinically:

Site: it is present on the lateral side of the neck anterior to the sternomastoid muscle immediately below of the angle of the mandible.

Age: children and young adults.

Histopathologically:

Epithelial lining: stratified squamous epithelium but in some areas pseudo-stratified columnar epithelium may be present.

Connective tissue wall: it is lymphoid tissue with typical lymph node pattern (has a germinal centre).

Content: thin, watery fluid or thick, gelatinous, mucoid material.

GOOD LUCK