inflamed appears erythematous and edematous.
- The lips, tongue, buccal mucosa, palate, pharynx, and tonsils may also be involved.
- Shortly, yellowish, fluid-filled vesicles develop.
- These vesicles rupture and form shallow, ragged, extremely painful ulcers covered by a gray membrane and surrounded by an erythematous halo.

Histopathology
- The herpetic vesicle is an intraepithelial blister filled with fluid.
- The infected cells are swollen and have pale eosinophilic cytoplasm and large vesicular nuclei, described as *'ballooning degeneration,'* while others characteristically contain intranuclear inclusions known as *Lipschütz bodies.*
- Lipschütz bodies are eosinophilic, ovoid, homogeneous structures within the nucleus, which tend to displace the nucleolus and nuclear chromatin peripherally. The displacement of chromatin often produces a peri-inclusion halo.
- Cytoplasm of the infected cells forms giant cells.
- The subjacent connective tissue is usually infiltrated by inflammatory cells.
- When the vesicle ruptures, the surface of the tissue is covered by exudates made up of fibrin, polymorphonuclear leukocytes, and degenerated cells.
- The lesions heal by peripheral epithelial proliferation.

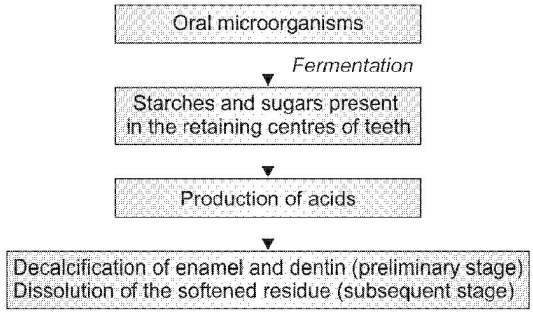
Diagnosis
- Cytologic smear, tissue biopsy and isolation of the virus.
- Smears are stained with Wright's, and Giemsa stain. Pap stain demonstrates balloon cells, multinucleated giant cells and intranuclear inclusions.
- It is difficult to differentiate between HSV and varicella-zoster virus (VZV) by cytological procedures.

Secondary HSV infection
- Factors that may lead to reactivation of the latent HSV virus:
  - Exposure to sunlight ("fever blisters")
  - Exposure to cold ("cold sores")
  - Peripheral tissue injury from trauma or sunburn
  - Stress, or
  - Immunosuppression
- Upon reactivation → HSV spreads along the nerves to sites on the oral mucosa and skin where they destroy the epithelial cells and induce the typical inflammatory response → characteristic lesions of recurrent infection.
- Recurrent herpetic stomatitis → manifests clinically as an attenuated form of the primary disease.
- It is usually seen in adult patients.
- Sites of development for the recurrent lesions → either at the site of primary inoculation or in the adjacent area supplied by the involved ganglion.

2. Enumerate malignant salivary gland tumors. Write in detail about mucoepidermoid carcinoma.

MALIGNANT SALIVARY GLAND TUMORS

1. Acinic cell carcinoma
2. Mucoepidermoid carcinoma
3. Adenoid cystic carcinoma
4. Polymorphous low grade adenocarcinoma
5. Epithelial-myoepithelial carcinoma
6. Basal cell adenocarcinoma
7. Sebaceous carcinoma
8. Papillary cystadenocarcinoma
9. Mucinous adenocarcinoma
10. Oncocytic carcinoma
11. Salivary duct carcinoma
12. Adenocarcinoma
13. Malignant myoepithelioma
14. Malignant mixed tumor
15. Squamous cell carcinoma
16. Undifferentiated carcinoma



Miller assigned an essential role to three factors

1. Oral microorganisms
2. Carbohydrate substrate
3. Acid

Questions unanswered by Miller

1. Predilection of specific sites on a tooth
2. Initiation of smooth surface caries
3. Why some populations are caries free?
4. Phenomenon of arrested caries

4. Dens Invaginatus

Synonyms

- Dens in dente
- Dilated composite odontome

Definition

- The 'dens in dente' is a developmental variation which is thought to arise as a result of an invagination in the surface of tooth crown before calcification has occurred.

Etiology

- Several causes have been proposed.
- Increased localized external pressure
- Focal growth retardation
- Focal growth stimulation in certain areas of the tooth bud.
- Radicular variety of 'dens in dente'is said to usually result from an infolding of Hertwig's sheath.

Clinical Features

- The permanent maxillary lateral incisors are the teeth most frequently involved
- Appears to represent simply an accentuation in the development of the lingual pit.
- The maxillary central incisors are sometimes involved.
- The condition is frequently bilateral.
- Radicular variety of 'dens in dente' takes its origin within the root after development is complete.
- The term 'dens in dente,' originally applied to a severe invagination that gave the appearance of a tooth within a tooth, is actually a misnomer, but it has continued in usage.
- In the mild form, there is a deep invagination in the lingual pit area, which may not be evident clinically.

Radiographic Features

- It is recognized as a pear-shaped invagination of enamel and dentin with a narrow constriction at the opening on the surface of the tooth and closely approximating the pulp in its depth.
- The more severe forms of 'dens in dente' may exhibit an invagination that extends nearly to the apex of the root.

5. Keratoacanthoma

- A lesion which clinically and pathologically resembles squamous cell carcinoma.
- Keratoacanthoma is a relatively common low-grade malignancy that originates in the pilosebaceous glands.
- It is considered to be a variant of invasive squamous cell carcinoma.

Etiology

- The definite cause of this lesion remains unclear though studies support sunlight as an important etiologic factor.
- Industrial workers exposed to pitch and tar have been well established as having a higher incidence of keratoacanthoma.
- Trauma, human papillomavirus (specifically types 9, 11, 13, 16, 18, 24, 25, 33, 37, and 57), genetic factors and immunocompromised status also have been implicated as etiologic factors.
- Recent studies identified that up to one-third of keratoacanthomas harbor chromosomal aberrations such as gains on 8q, 1p, and 9q with deletions on 3p, 9p, 19p, and 19q.

of mucinous, chondroid, fibrous and osseous areas
  - Reserve cell in intercalated duct
  - Mixture of ductal and myoepithelial elements
- Cytogenetic abnormalities
  - Chromosome region 12q13–15
  - PA gene mapped to chromosome 8q12

Clinical Features

- *Age* → 4th to 6th decades, children and adolescents
- *Gender* → F > M
- *Site* → parotid (most common); submandibular; minor salivary glands of palate (most common site for intraoral location), lips, cheek, tongue and floor of the mouth.
- *Clinical presentation* →
  - Asymptomatic, slow-growing, discrete mass that can grow to large sizes if left untreated.
  - Pleomorphic adenoma of the parotid gland → 90% cases involve the lower pole of the superficial lobe of the gland, about 10% of the tumors arise in the deeper portions of the gland.
  - Palatal tumors → located lateral to the midline.

Pathology

- Morphological diversity is the hallmark of mixed tumor
- Mixture of cellular elements (glandular epithelium and myoepithelial cells) in mesenchyme like background
- Ratio varies
  - Highly cellular with a little stroma
  - More stroma with a few cellular elements
  - Varies from tumor to tumor and within different areas of same tumor
  - Foote and Frazell (1954) categorized
    1. Principally myxoid
    2. Equal proportions of cellular and myxoid components
    3. Predominantly cellular
    4. Extremely cellular
- ***Epithelium***
  - Ducts
  - Small nests
  - Sheets and anastomosing cords
  - Duct-like structures resemble the normal SG intercalated ducts with lumina lined by single layer of cells
  - Ducts vary in size, shape, number and distribution—contain eosinophilic PAS +ve epithelial mucins
  - Myoepithelial cells form thick collar around the ducts
  - Some myoepithelial cells appear as angular or spindle-shaped cells
  - Some cells appear round and demonstrate eccentric nuclei—resemble plasma cells—predominantly seen in minor SGs.
- ***Stromal changes***
  - Mainly product of myoepithelial cells (myxoid/chondroid/myxochondroid)
  - Or due to metaplasia
  - Extensive accumulation of mucoid material (CT mucins) between tumor cells myxomatous/mucoid appearance
  - Vacuolar degeneration of cells in myxoid areas chondroid appearance-rounded cells lying in lacunae within mucoid material resembling hyaline cartilage
- Some areas show eosinophilic hyalinized material—represents the basal lamina of myoepithelial cell
- Some areas show foci of squamous cell with keratin pearl formation
- Sebaceous cells and oncocytic cells
- Fat and osteoid
- Some areas show cribriform structures
- More myoepithelial elements—myoepithelial predominant pleomorphic adenomas/cellular adenomas/myopeitheliomas (Fig. 2.1).

- Linear/straight/curved hairpin like calcified structures
- Concentrically laminated
- Brittle and fracture
- Hematogenous origin—derived from thrombi in venules of CT which were varicose and strangled by epithelial cuffs
- Recent—secretory product of odontogenic epithelium

- Dystrophic calcification, cholesterol clefts surrounded by dense aggregates of foreign body multi-nucleate giant cells (mural nodules which eventually are extruded out)
- Hemorrhage and hemosiderin pigmentation may be seen—some capsules markedly vascular
- Epithelium can become orthokeratinised —2% cysts and part of the lining
- Metaplastic changes—mucous cells and ciliated cells frequently found
- Islands of squamous epithelium developed from rests of Malassez in a periapical granuloma without cystic transformation—referred as "bay cyst" (Figs 2.2 and 2.3).

SHORT ESSAYS

3. Histopathology of oral submucous fibrosis.

- Oral submucous fibrosis (OSF) is a chronic, progressive, scarring disease, that predominantly affects people of South-East Asian origin.

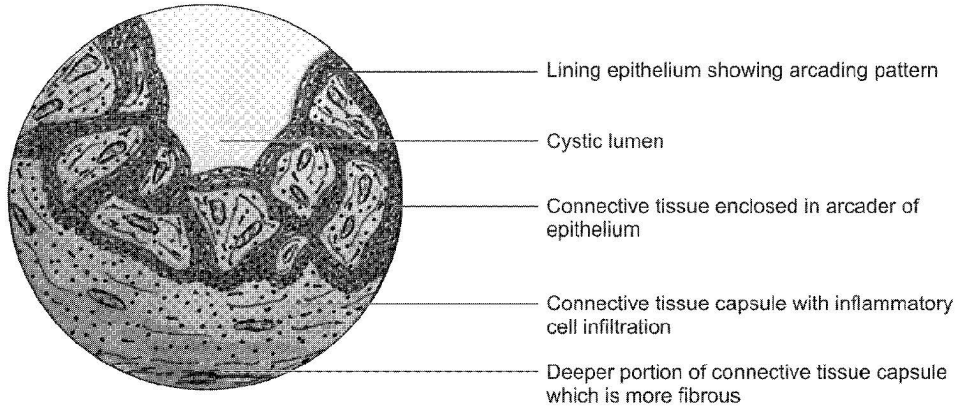


Fig. 2.2: Radicular cyst

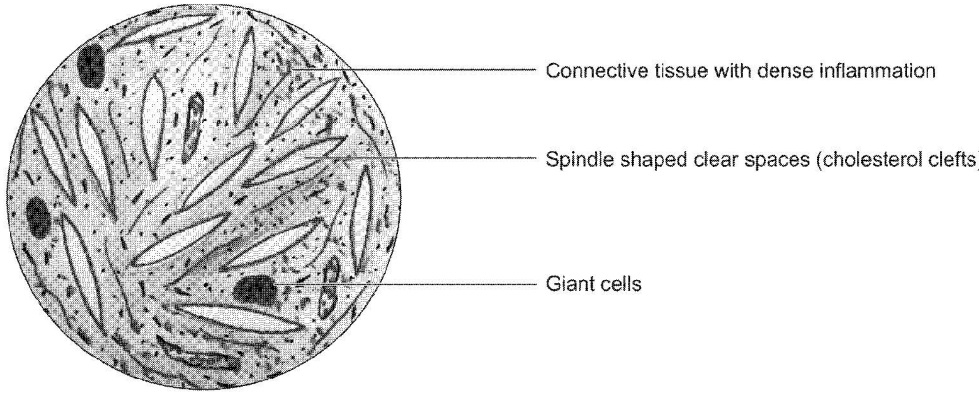


Fig. 2.3: Cholesterol clefts in radicular cyst

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