Salivary Glands Diseases

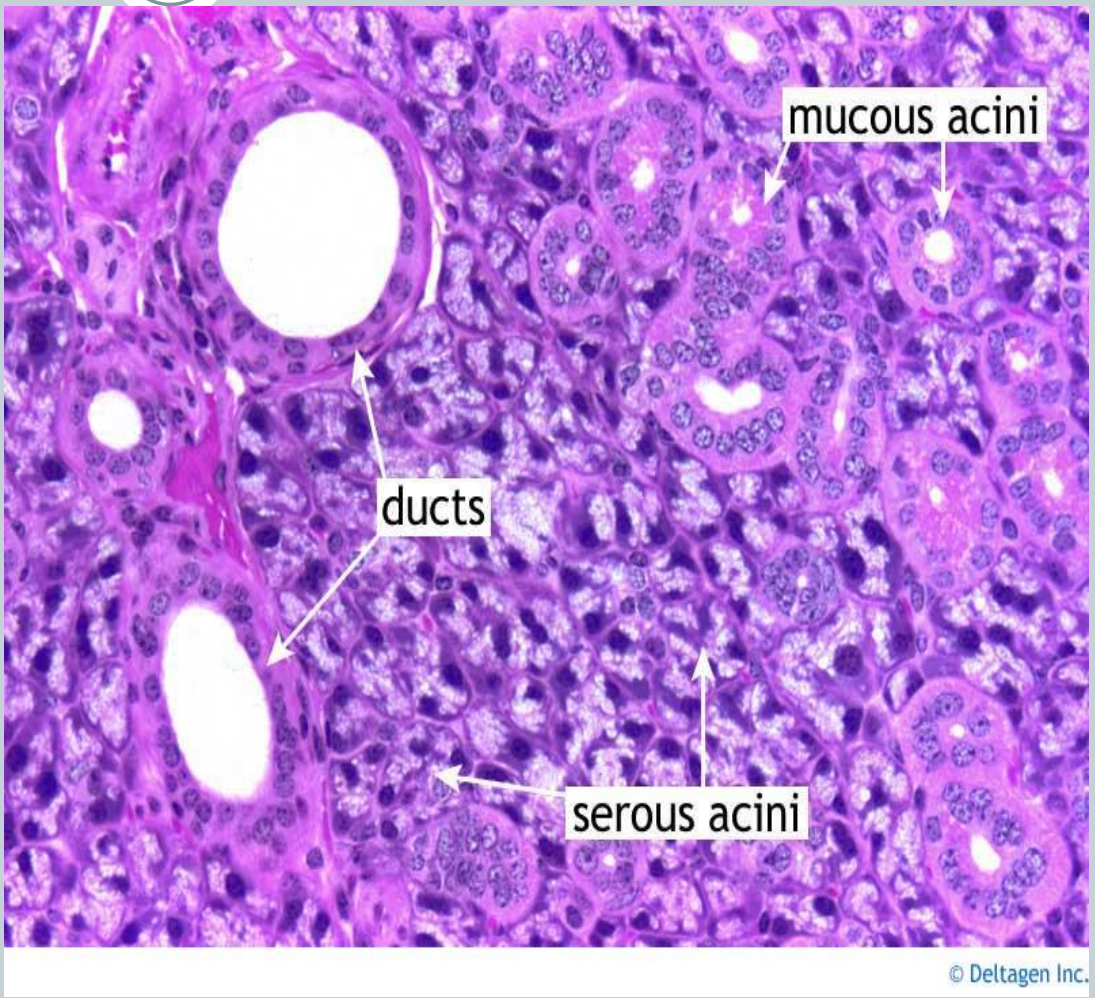
Embryology

- The parotid gland are the first to develop, followed by the submandibular gland, and finally the sublingual gland.
- Parenchymal tissue (secretory) of the glands arises from the proliferation of oral epithelium.
- The stroma (capsule and septae) of the glands originates from mesenchyme that may be mesodermal or neural crest in origin.

Acinar cells of Salivary Glands

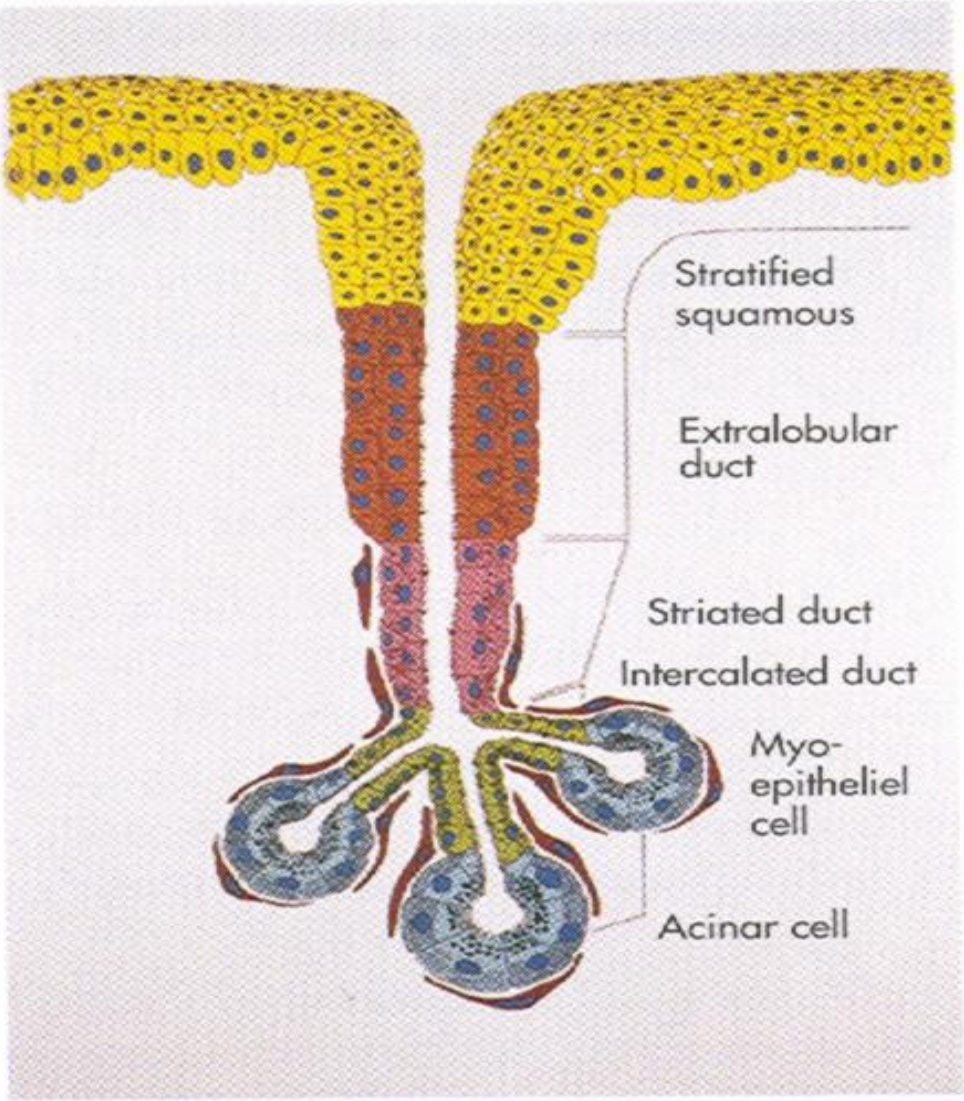
Classified as either:

- Serous cells: produce a thin watery secretion
- Mucous cells: produce a more viscous secretion



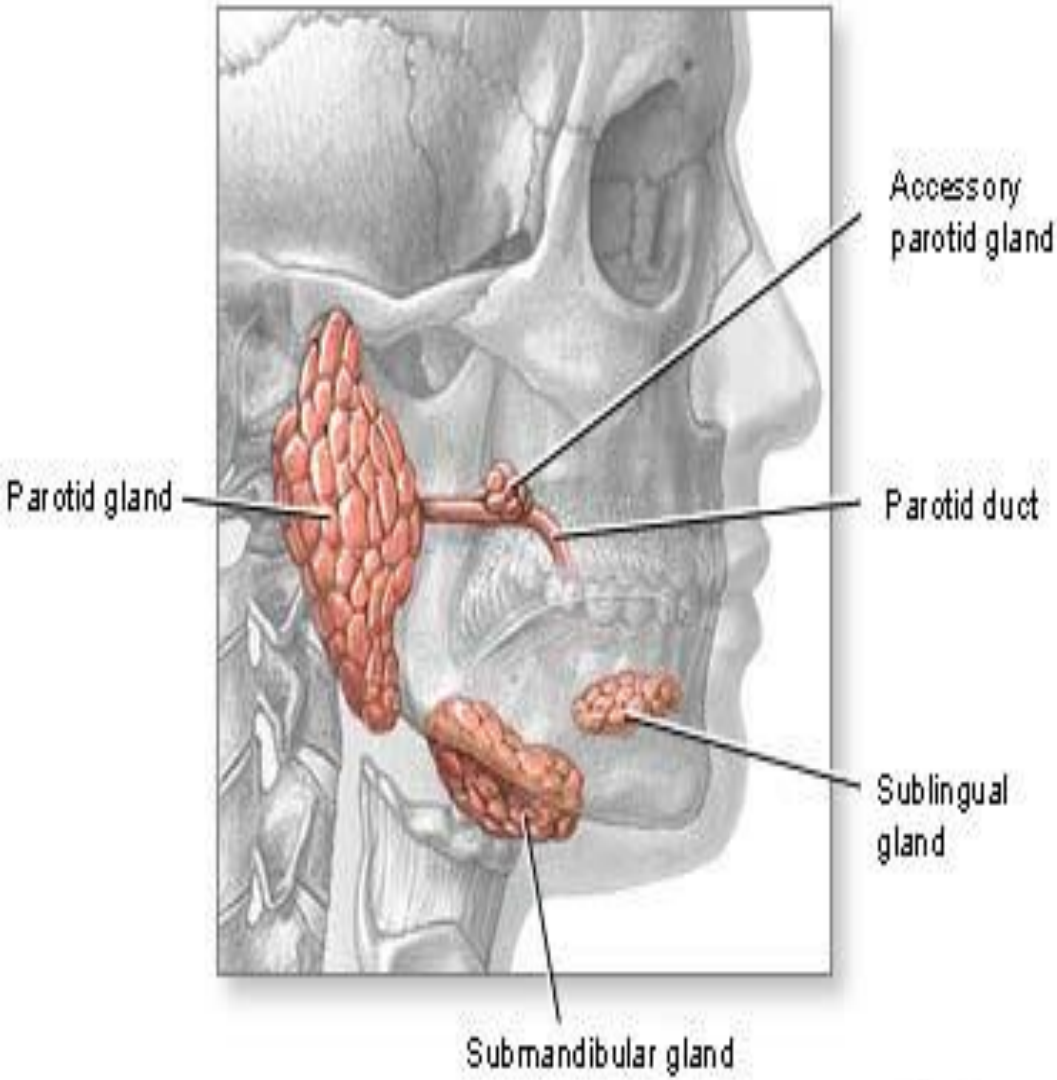
Salivary gland secretory unit

- Composed of terminal acini
- Intercalated, striated and excretory ducts
- Myoepithelial cells



- Major SG are paired structures and include the parotid, submandibular and sublingual

- Parotid: serous
- Submandibular: mucous & serous
- Sublingual: mucous



Minor groups of salivary glands may be found in the lips, cheeks, tongue, floor of the mouth, palate, and all are liable to undergo the same pathological change as the major groups.

Salivary Function

- Aid in mastication, deglutination & swallowing.
- Salivary lysozyme, IgA and other antibacterial substances protect against caries and oral cavity infections.
- Saliva also aids in speech.

Physiology

- **Physiologic control of the SG is almost entirely by the autonomic nervous system; parasympathetic effects predominate.**
- **If parasympathetic innervation is interrupted, glandular atrophy occurs.**
- **Normal saliva is 99.5% water**
- **Normal daily production is 1-1.5 L**

Investigative methods for determining of S.G lesions:-

- **1- SIALOMETRY:** MEASURE THE AMOUNT OF SALIVA PRODUCED IN A CERTAIN TIME.
- **2- SIALOCHEMISTRY:** MEASURE THE COMPOSTION OF SALIVA.
- **3- SIALOGRAPHY:** BY INTRODUCE THE IODINE CONTAINING CONTARST MEDIUM THROUGH THE OPENING OF THEIR DUCT.
- **4- SCINTIGRAPHY:** USING RADIOISOTOPE(FOR DETERMINING S.G FUNCTION).
- **5- SONOGRAPHY:** ULTRASONIC, FOR S.G LESIONS
- **6- CYTOLOGY.**
- **7- BIOPSY .**

Classification of S.G diseases:

1- Obstructive: Calculi , Cystic

2- Infections: Bacterial , Viral

3- Degenerative: Radiation, Sjogren's syndrome

4- Functional disordres

5- Neoplasm

Obstructive Salivary Gland Disorders

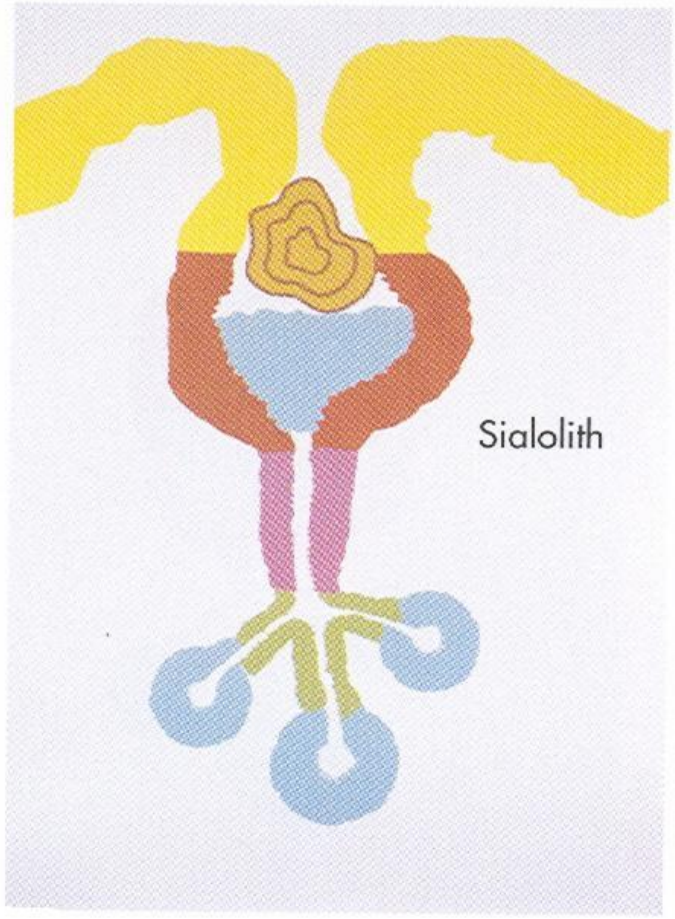
- Sialolithiasis
- Mucous retention/extravasation cysts

Sialolithiasis

- Sialolithiasis results in a mechanical obstuction of the salivary duct
- Is the major cause of unilateral diffuse parotid or submandibular gland swelling

- The **exact** pathogenesis of sialolithiasis remains unknown.
- Thought to form via….

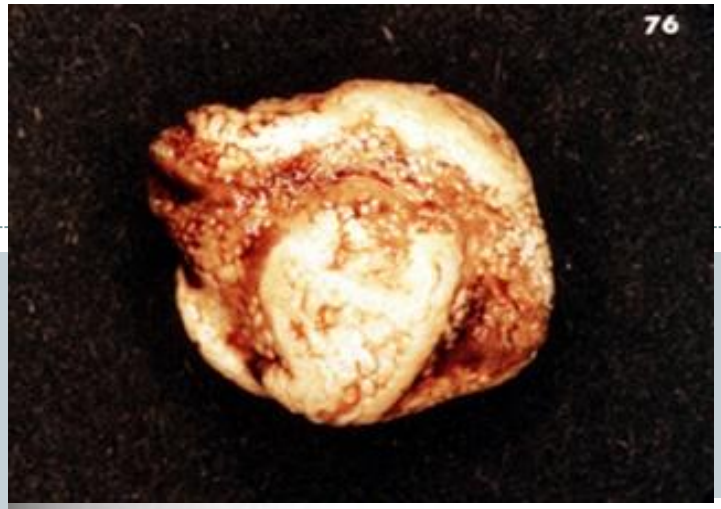
  an initial organic nidus(debries) that progressively grows by deposition of layers of inorganic and organic substances.
- May eventually obstruct flow of saliva from the gland to the oral cavity.

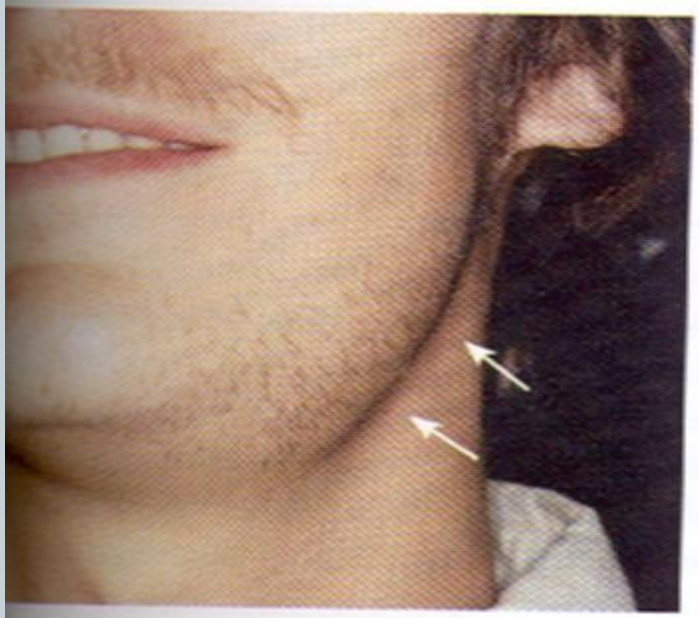


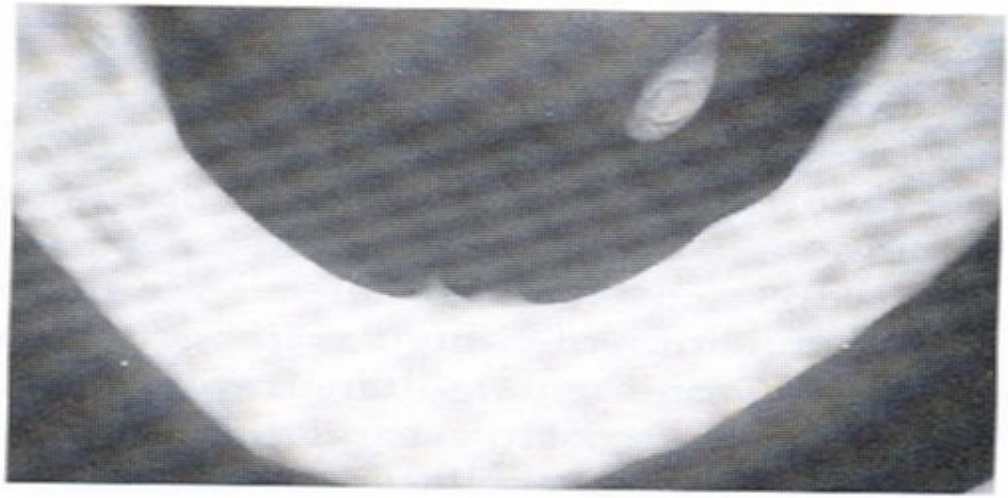
Sialolithiasis. Sialoliths obstruct the flow of mucin as they slowly enlarge.

Stone Composition

- **Organic; often predominate in the center**
  - **Glycoproteins**
  - **Mucopolysaccarides**
  - **Bacteria!**
  - **Cellular debris**
- **Inorganic; often in the periphery**
  - **Calcium carbonates & calcium phosphates in the form of hydroxyapatite**







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Submandibular sialolithiasis. **A,** Swelling below the mandible *(arrows)*, indicative of mucus retention and sialadenitis of the submandibular gland. **B,** Occlusal radiograph disclosing an oval stone in Warthin duct.

Acute ductal obstruction may occur at meal time when saliva producing is at its maximum, the resultant swelling is sudden and can be painful.

Gradually reduction of the swelling can result but it recurs repeatedly when flow is stimulated.

This process may continue until complete obstruction and/or infection occurs.

THE SUBMANDIBULAR GLAND IS THE MOST COMMON SITE OF INVOLVEMENT, AND 80% TO 90% OF SIALOLITHS OCCUR IN THIS GLAND

.

THE PAROTID GLAND IS INVOLVED IN 5% TO 15% OF CASES, AND 2% TO 5% OF CASES OCCUR IN THE SUBLINGUAL OR MINOR SALIVARY GLANDS.

IT IS BELIEVED THAT THE HIGHER RATE OF SIALOLITH FORMATION IN THE SUB-MANDIBULAR GLAND IS DUE TO:

(1) THE TORTUROUS COURSE OF WHARTON'S DUCT,

(2) HIGHER CALCIUM AND PHOSPHATE LEVELS (THICK VISCOUS SECRETION)

(3) THE DEEPENED POSITION OF THE SUBMANDIBULAR GLANDS,WHICH LEAVE THEM PRONE TO STASIS.

PATIENTS WITH SIALOLITHS MOST COMMONLY PRESENT WITH A HISTORY OF ACUTE, PAINFUL AND INTERMITTENT SWELLING OFTHE AFFECTED MAJOR SALIVARY GLAND.

STASIS OF THE SALIVA MAY LEAD TO INFECTION,FIBROSIS, AND GLAND ATROPHY.

FISTULAE, A SINUS TRACT, OR ULCERATION MAY OCCUR OVER THE STONE IN CHRONIC CASES.

Standard care includes analgesics, antibiotics, and antipyretics, as necessary. Surgical intervention for drainage is sometimes required.

Stones at or near the orifice of the duct can often be removed transorally by manipulation, but deeper stones require surgery.

Mucocele

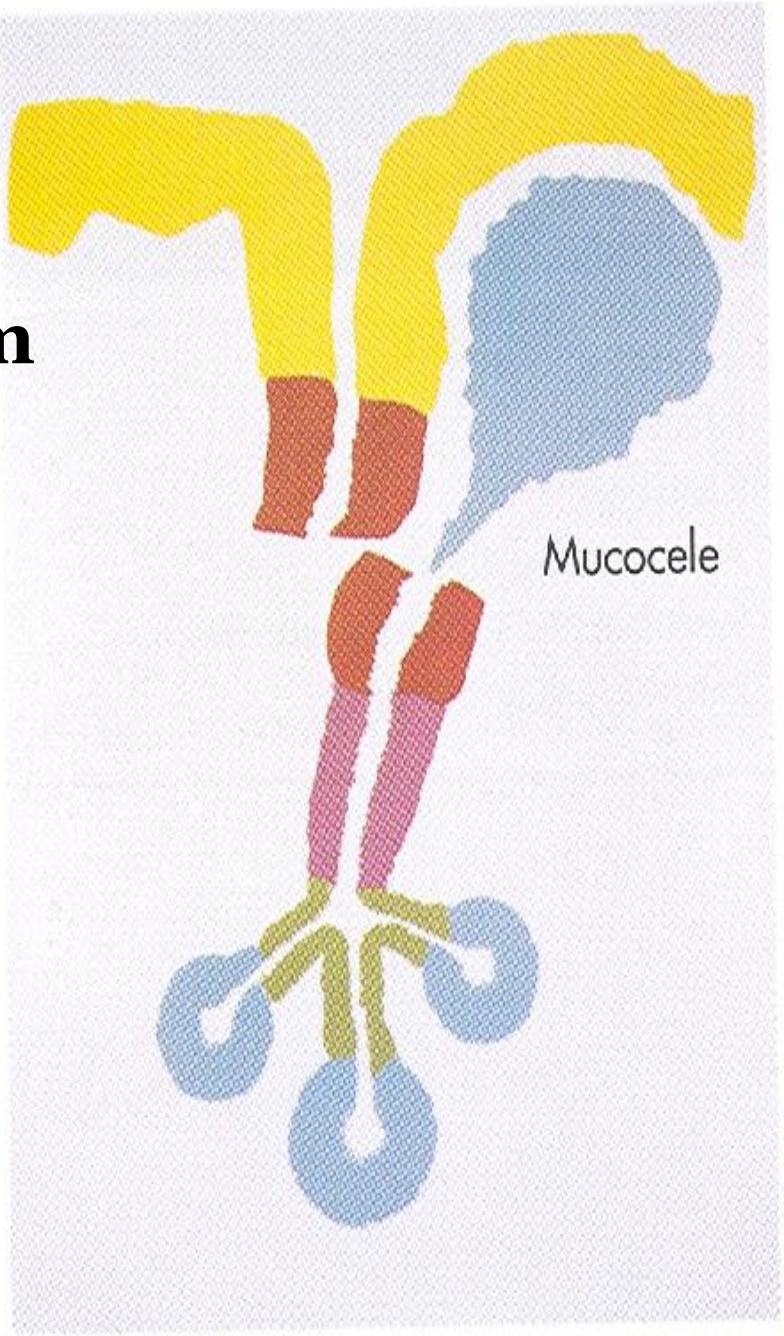
- Mucus is the exclusive secretory product of the accessory minor salivary glands and the most prominent product of the sublingual gland.
- The mechanism for mucus cavity development is extravasation or retention

- Mucoceles, exclusive of the irritation fibroma, are most common of the benign soft tissue masses in the oral cavity.
- *Muco*: mucus , *coele*: cavity. When in the oral floor, they are called ranula.

Extravasation

Is the leakage of fluid from the ducts or acini into the surrounding tissue

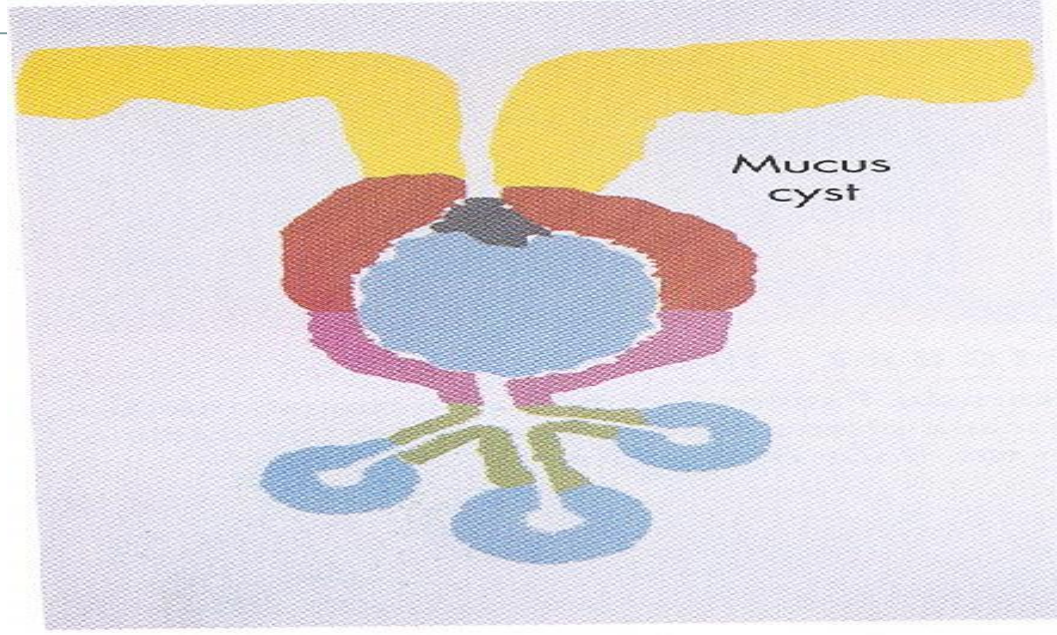
***Extra*: outside, *vasa*: vessel**



Retention

-Narrowed ductal opening that cannot adequately accommodate the exit of saliva produced, leading to ductal dilation & surface swelling

-Less common phenomenon



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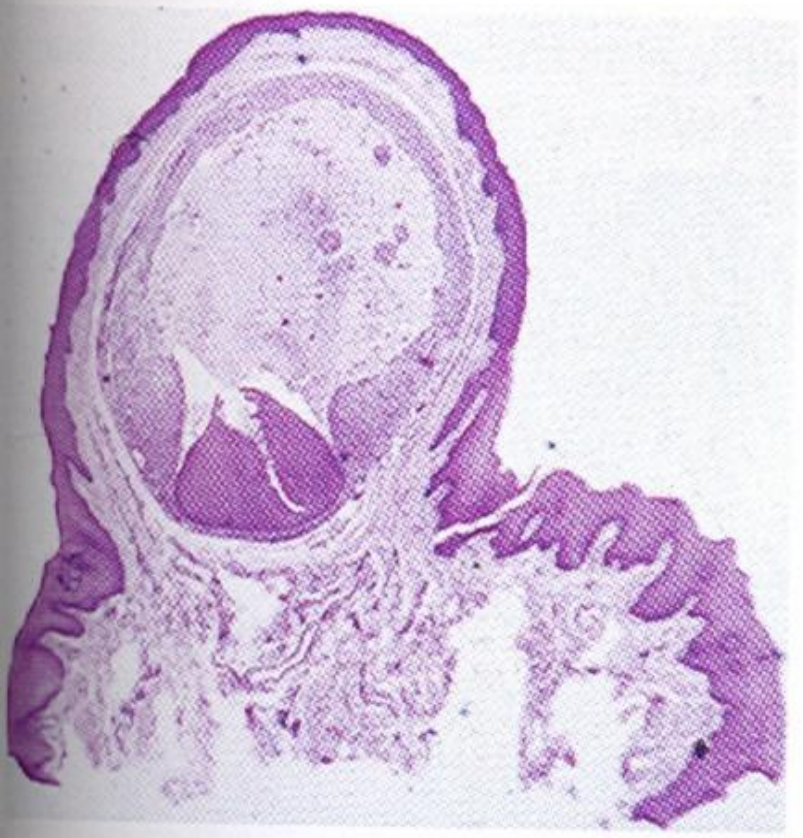
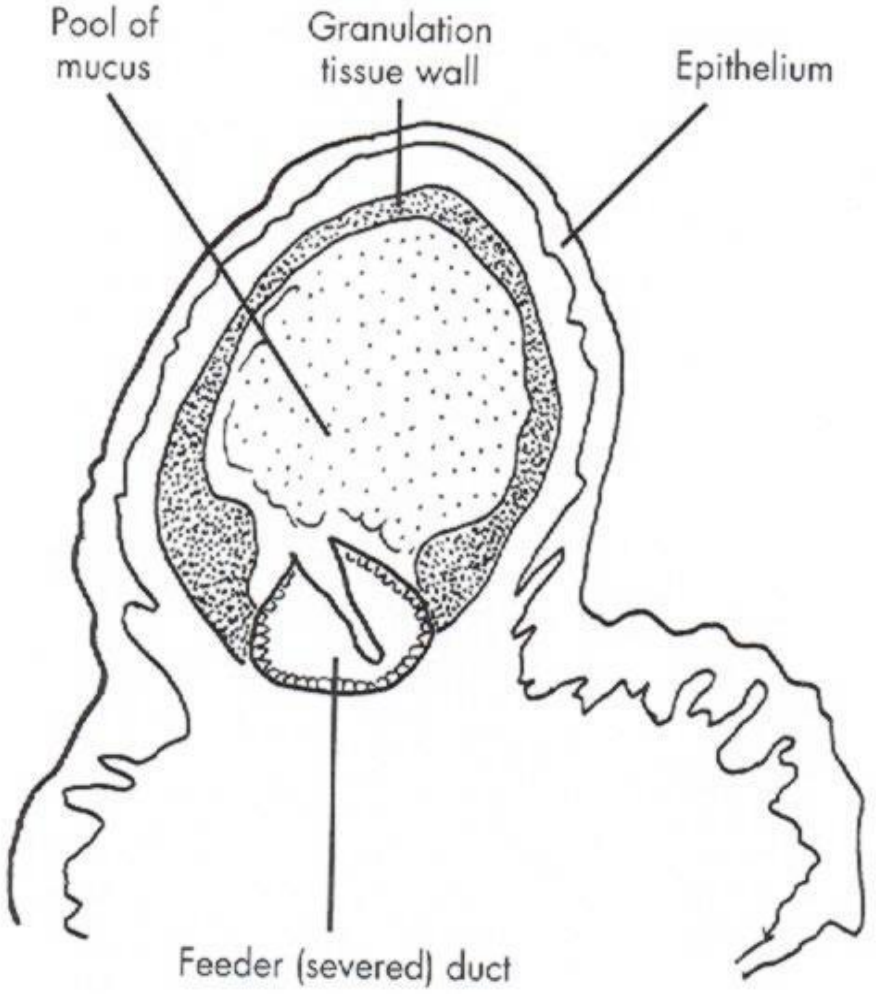
Mucus retention cyst. A, Some are hypothesized to arise as ductal dilatations fro obstruction by mucus plugs. **B,** Other salivary mucus cysts are thought to occur as isolated blind cysts.

- Consist of
- a circumscribed cavity in the connective tissue and submucosa producing an obvious elevation in the mucosa





Mucocele. Microscopic appearance showing pooled mucin, a granulation tissue wall, distended overlying epithelium, and remnants of the severed feeder duct.

- The majority of the mucoceles result from an extravasation of fluid into the surrounding tissue after traumatic break in the continuity of their ducts.

- Lacks a true epithelial lining.

Ranula

- Is a term used for mucoceles that occur in the floor of the mouth.
- The name is derived form the word *rana*, because the swelling may resemble the translucent underbelly of the frog.

Ranula

- **Although the source is usually the sublingual gland,**
  - **may also arise from the submandibular duct**
  - **or possibly the minor salivary glands in the floor of the mouth.**

- Presents as a blue dome shaped swelling in the floor of mouth (FOM).
- They tend to be larger than mucoceles & can fill the FOM & elevate tongue.
- Located lateral to the midline, helping to distinguish it from a midline dermoid cyst.

Bacterial sialadenitis:

Bacterial infections of the salivary glands are most commonly seen in patients with reduced salivary gland function.

The reduction of salivary flow results in diminished mechanical flushing, which allows bacteria to colonize the oral cavity and then to invade the salivary duct and cause acute bacterial infection.

Although

sialoliths occur more frequently in the submandibular glands,

Bacterial sialadenitis occurs more frequently in the parotid glands.

The submandibular glands may be protected by the high level of mucin in the saliva, which has potent antimicrobial activity.

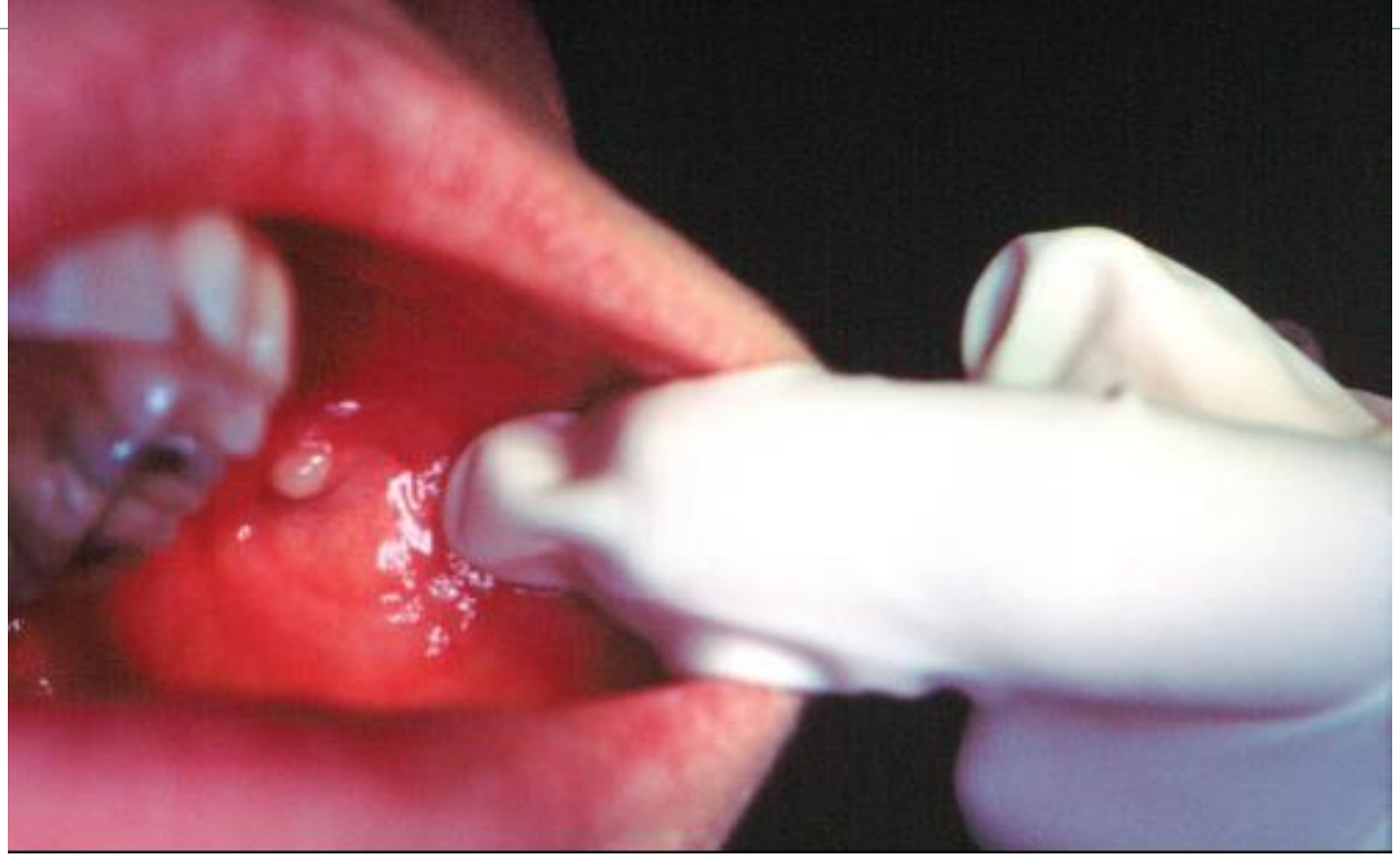
Anatomy may also play a protective role; tongue movements tend to clear the floor of the mouth and protect Wharton's duct.

In contrast, the orifice of Stenson's duct is located adjacent to the molars, where heavy bacterial colonization occurs.

Treatment:
If a purulent discharge is present, intravenous administration of a penicillinase-resistant antistaphylococcal antibiotic is indicated.

Sialadenitis

Acute infection more often affects the major glands than the minor glands



The expression of purulence from Stenson's duct seen in this patient is one of the signs of acute parotitis. Culture and sensitivity testing will produce guidance to appropriate antibiotics.

Viral Infections

Mumps (Epidemic parotitis):

Mumps is caused by a ribonucleic acid (RNA) Paramyxovirus & is transmitted by direct contact with salivary droplets.

Mumps occurs in children between the ages of 4 and 6 years.
The incubation period is 2 to 3 weeks; this is followed by salivary gland inflammation and enlargement, preauricular pain, fever, malaise, headache, and myalgia.

The majority of cases involve the parotid glands, but 10% of the cases involve the submandibular glands alone. The skin over the involved glands is edematous. Swelling is usually bilateral and lasts approximately 7 days.

Immune Conditions:

Sjögren's syndrome (Primary & secondary):

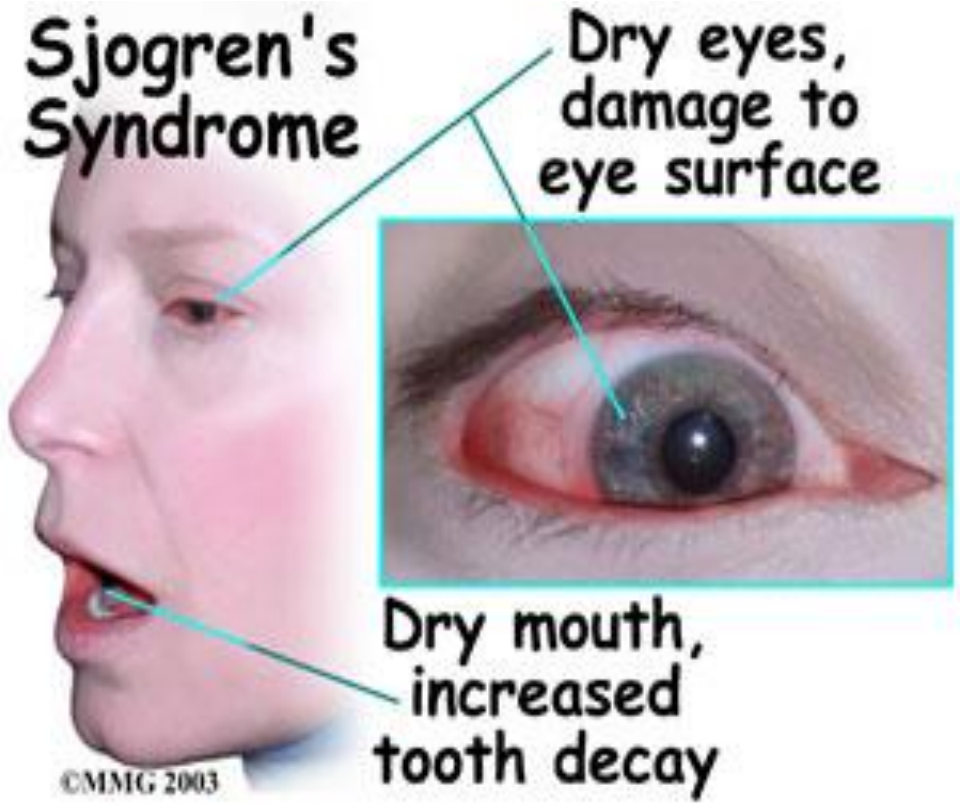
Sjögren's syndrome (SS) is a chronic autoimmune disease characterized by symptoms of oral and ocular dryness and lymphocytic infiltration and destruction of the exocrine glands.

patients also frequently experience arthralgias, myalgias, peripheral neuropathies, and rashes.

The etiology of SS is thought to be autoimmune, and there is no cure.

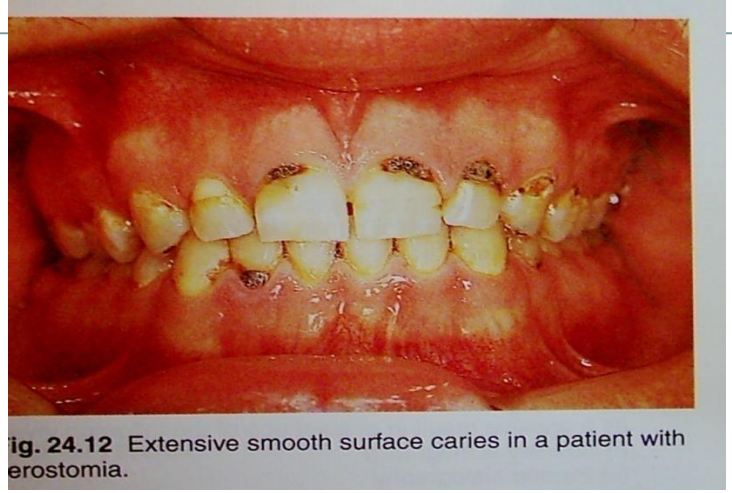
Patients with secondary SS have salivary and/or lacrimal gland dysfunction in the setting of another connective-tissue disease.

Primary SS is a systemic disorder that includes both lacrimal and salivary gland dysfunctions without another autoimmune condition.



The oral mucosa appear red,dry, shiny & wrinkled & stick to the finger or mirror during examination

The tongue appear red, atrophy of papillae & the dorsum of tongue become lobulated



ig. 24.12 Extensive smooth surface caries in a patient with erostomia.

Treatment of xerostomia:

1-Preventive Therapy:

The use of topical fluorides in a patient with salivary gland hypofunction is absolutely critical to control dental caries.

2-Symptomatic Treatment:

Water is by far the most important. Patients should be encouraged to sip water throughout the day

•3-Salivary Stimulation:

•Local or topical stimulation:

Chewing will stimulate salivary flow effectively.

Sialadenosis

- Non-specific term used to describe a non-inflammatory non-neoplastic enlargement of a salivary gland, usually the parotid.
- May be called sialosis
- The enlargement is generally asymptomatic
- Mechanism is unknown in many cases.

a. Hormonal disturbances “endocrine sialendosis”
b. Nutritional “nutritional mumps”

Malnutrition: acinar hypertrhophy

Functional Disorders

- Sialorrhea (Increase in saliva flow) (Ptyalism)
  - **Psychosis, mental retardation, certain nuerological diseases, rabies, mercury poisoning**
- Xerostomia (Decrease in saliva flow) (Aptyalism)
  - **Mumps, sarcoidosis, Sjogrens syndrome, lupus, post-irradiation**

Salivary gland tumours:

Benign Tumors
Malignant Tumors

The majority of salivary gland tumors (about 80%) arise in the parotid glands.

The submandibular glands account for 10 to 15% of tumors, and the remaining tumors develop in the sublingual or minor salivary glands.

Approximately 80% of parotid gland tumors and 50% of submandibular gland tumors are benign.

In contrast, more than 60% of tumors in the sublingual and minor salivary glands are malignant.

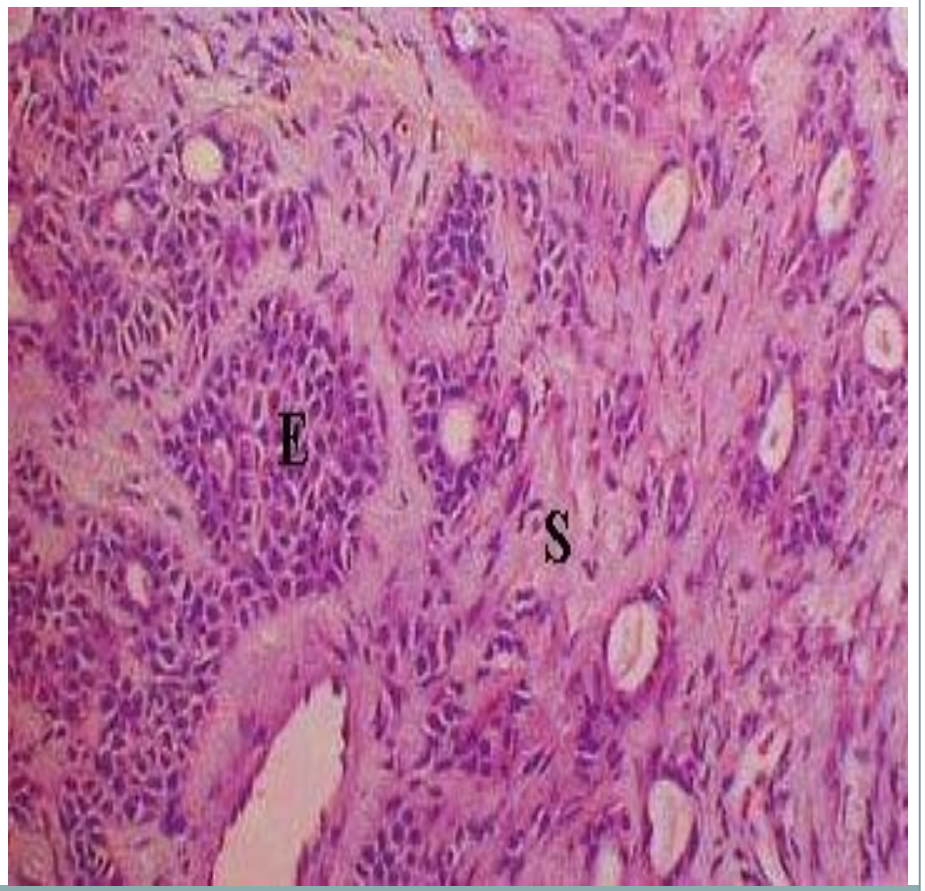
Benign Tumors:

1-Pleomorphic adenoma:

It is often called a mixed tumor because it consists of both epithelial and mesenchymal elements.

The pleomorphic adenoma is the most common tumor of the salivary glands; overall, it accounts for about 60% of all salivary gland tumors.

This tumor presents as a well-defined slow growing mass in the tail of the parotid gland and treated surgically.



pleomorphic adenoma contains both epithelial (E) and stromal (S) components.

Pleomorphic Adenoma

CLINICAL FEATURES:

- PA accounts for 80% of all **parotid** gland tumors,50% of submandibular tumors and 25% of sublingual tumors
- PA is encountered in patients of 30-50 years age
- PA is a painless , slow growing tumor ,no fixation to deeper tissue, skin rarely ulcerated
- PA intraorally , in the **palate** (minor gland) , appear as a soft to slightly firm swelling without any **ulceration**.

Pleomorphic adenoma of Palate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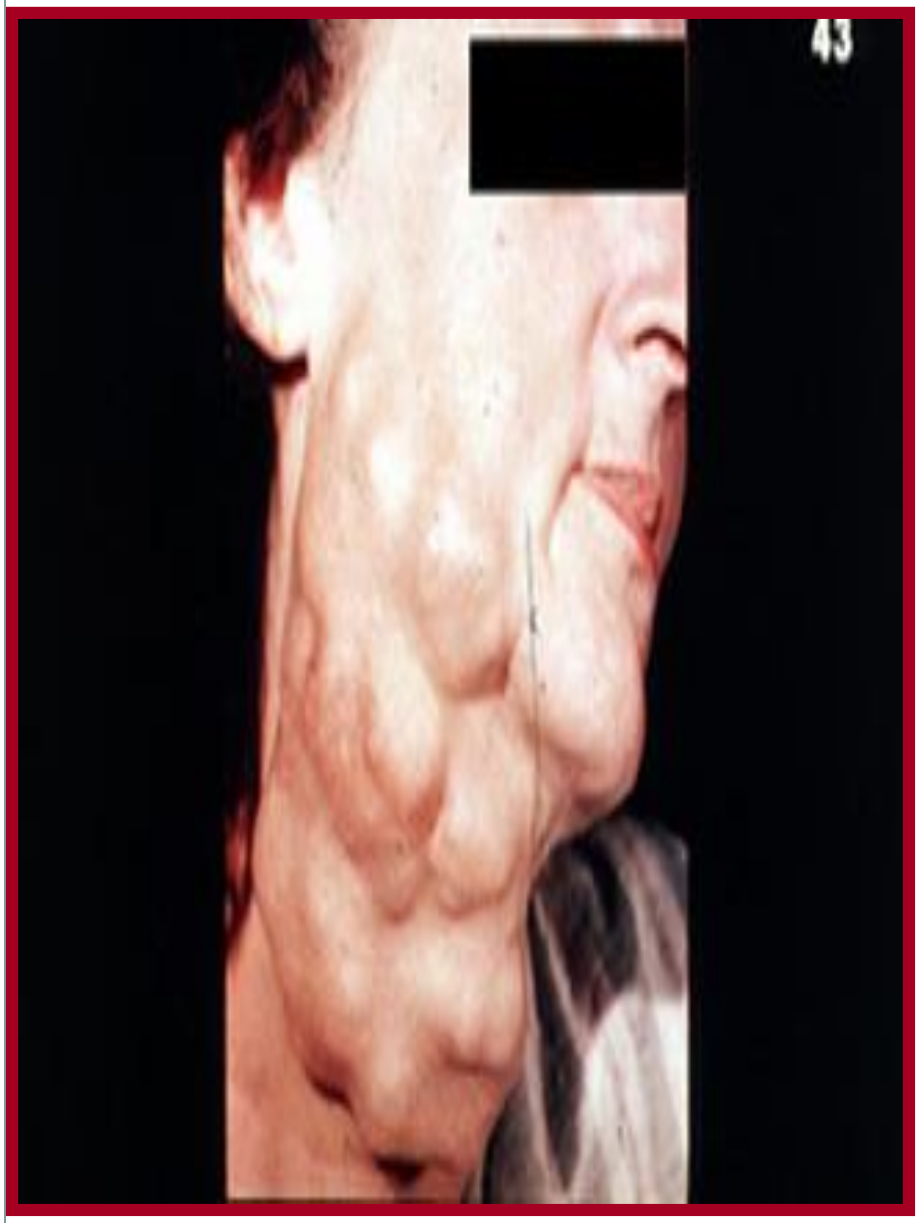
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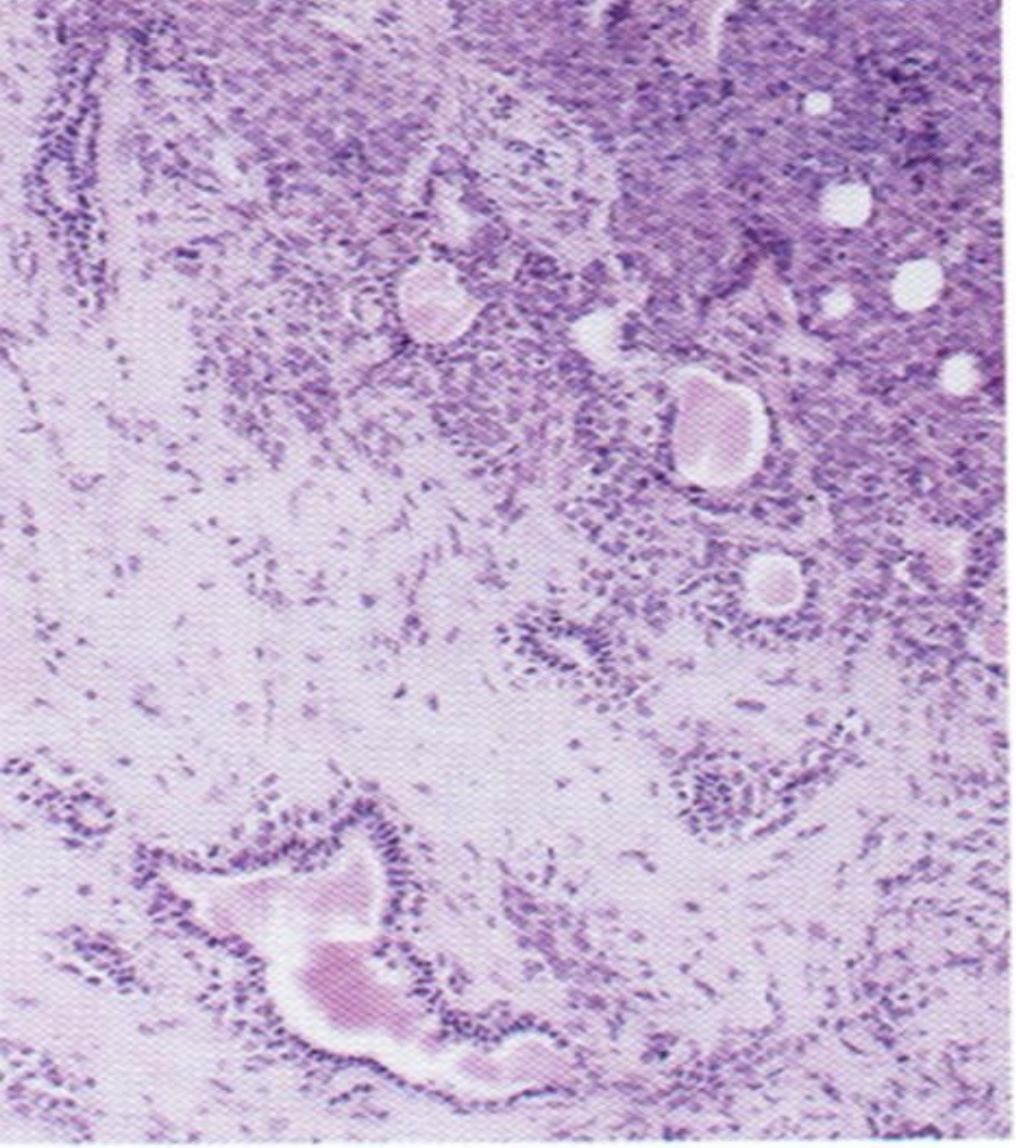
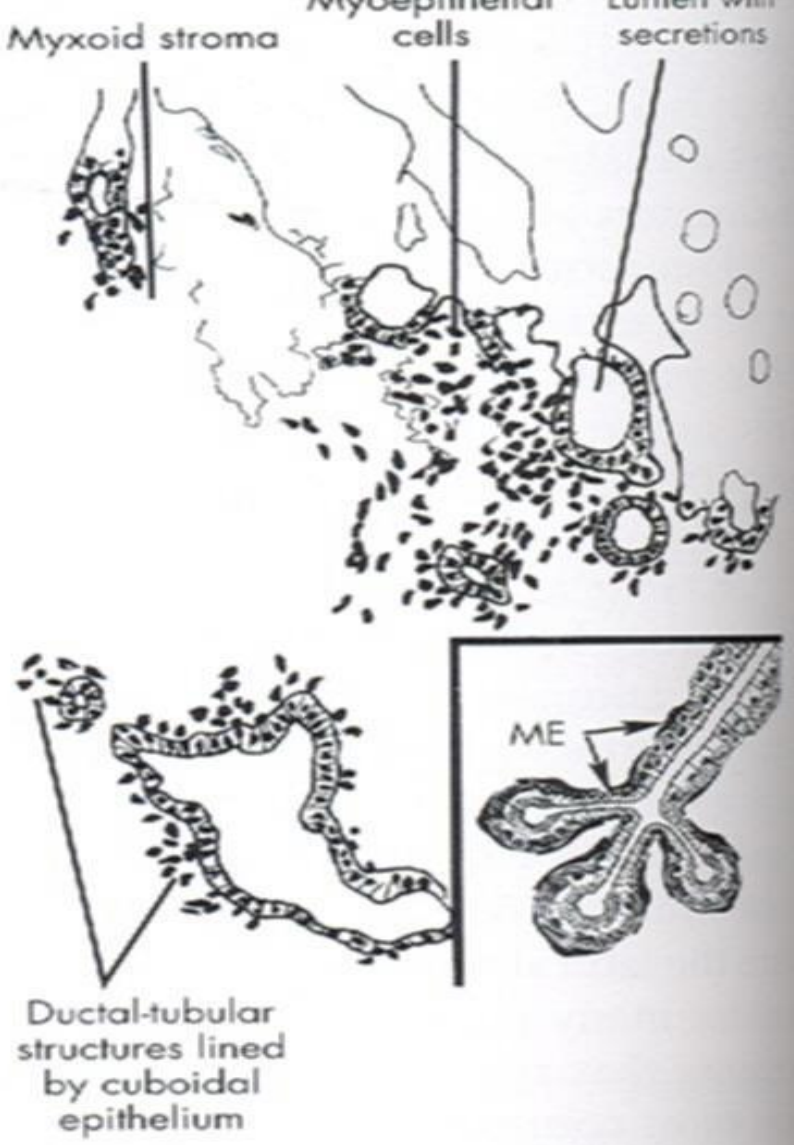
HISTOPATHOLOGY:

- In PA there is presence of a pronounced fibrous capsule. This is the most important histological feature when distinguishing between the benign and the malignant tumors
- Some lesions of the long standing lesions are multinodular and each nodule is surrounded by the fibrous capsule.
- The tumor cells showe wide variation of the cells involved that is why the name pleomorphic has been given.
- The most prominent pattern contains the ductal and the myoepithelial cells

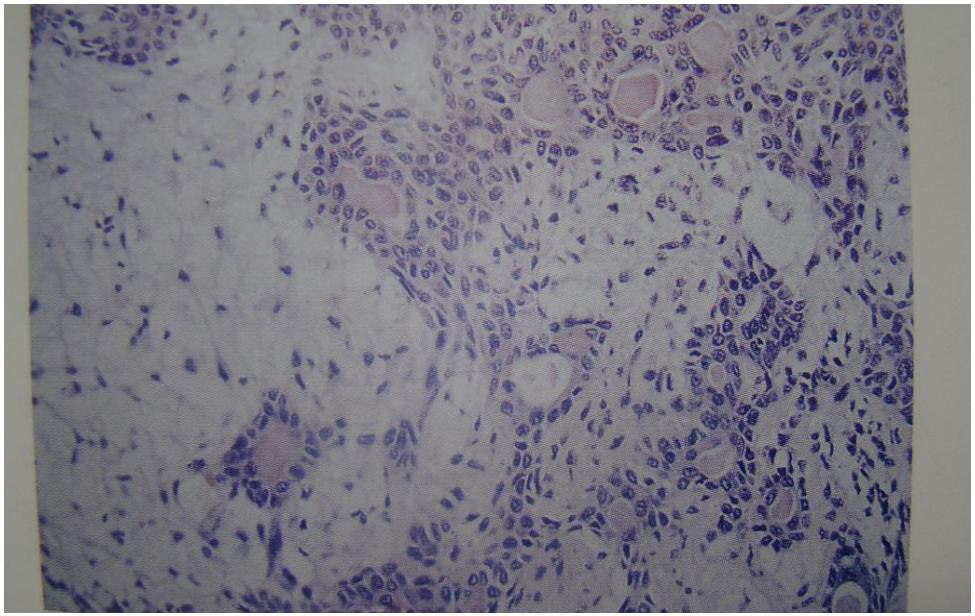
- **Sheets of the myoepithelial cells loose theire typical spindle shape becoming polygonal with eccentric nuclei with hyalinized cytoplasm.**
- **Although PAs are well capsulated it uncommon for the tumor cells to perforate the capsule and creating new tumor foci.**
- **There is less than 1% chances of malignant transformation for those which have undergone recurrences. The tumors are termed as**

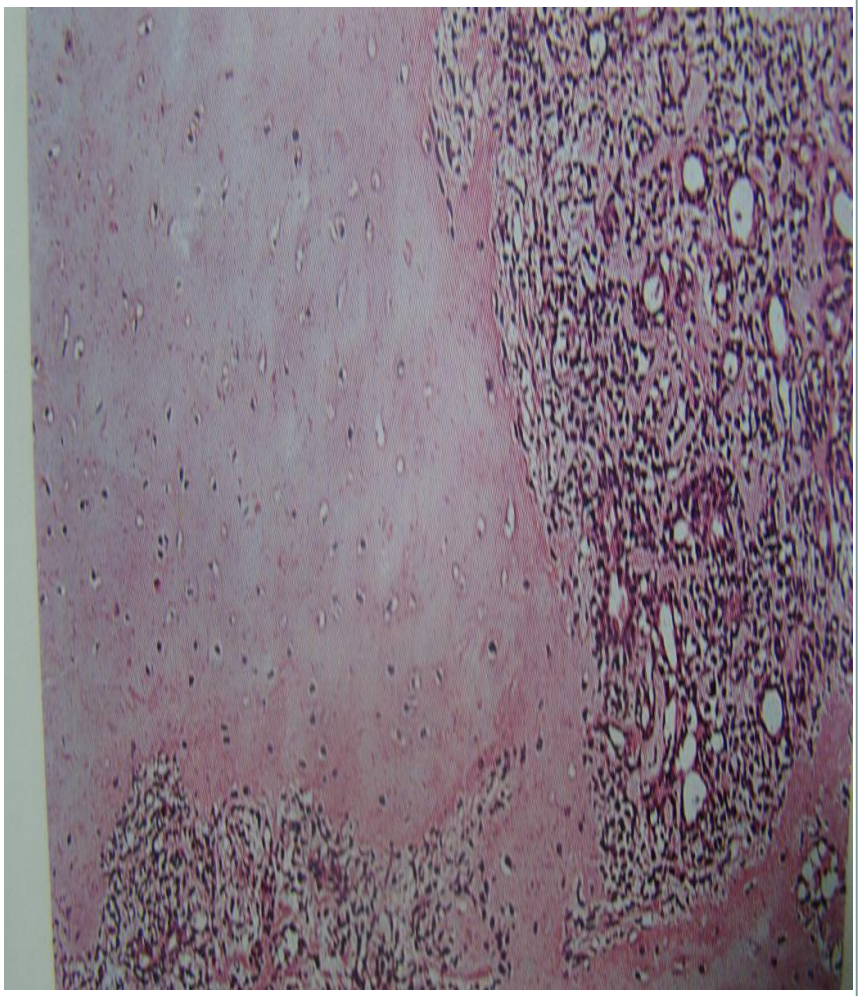
  Carcinoma ex. Pleomorphic adenoma.





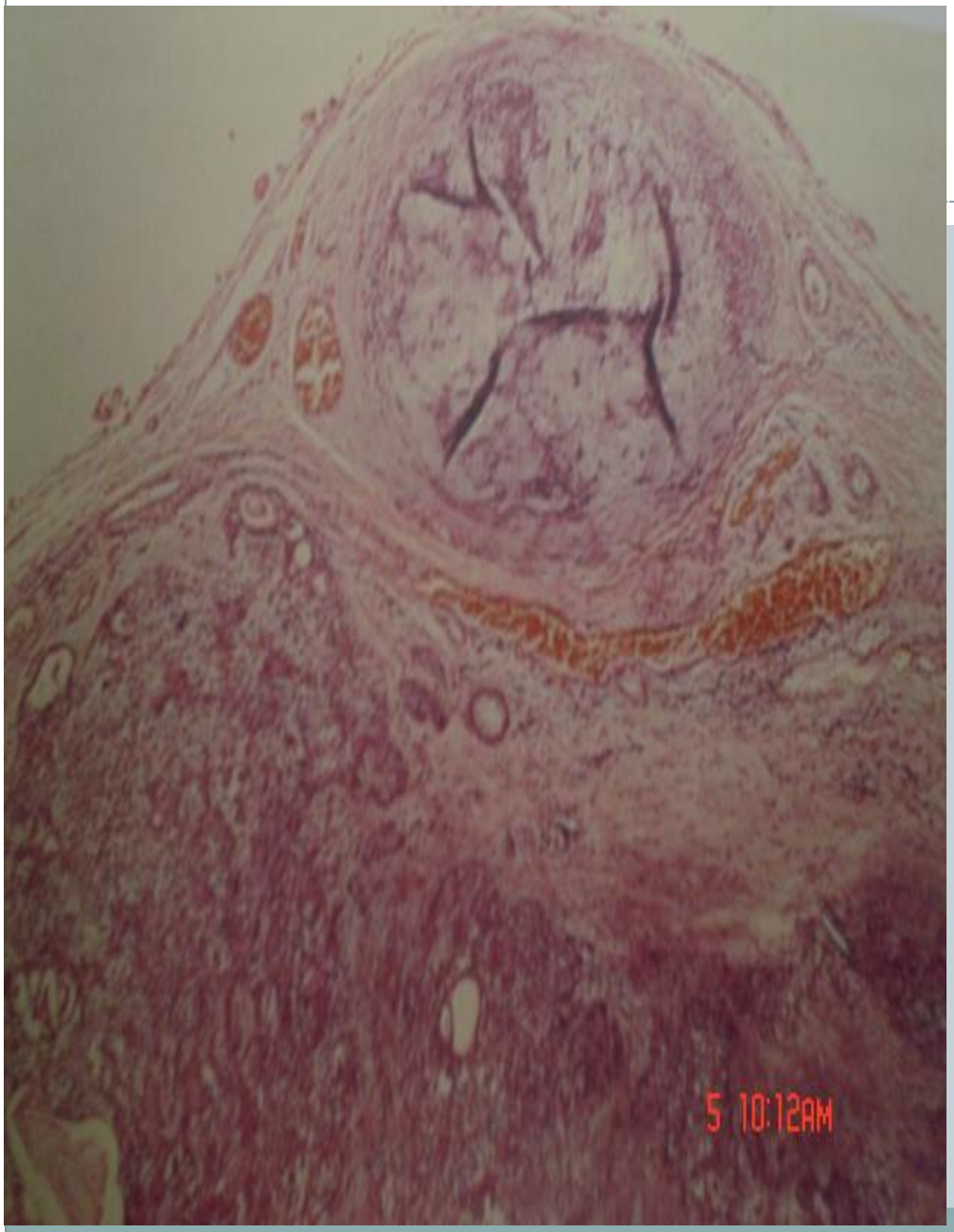
eomorphic adenoma. Ductal structures are lined by cuboidal cells. Myoepithelial cells *(ME)* elongated and become loosely dispersed in the connective tissue stroma.





TREATMENT:

- Lobectomy is done in the larger salivary glands.
- Enucleation is not done because of the chances of recurrence (deposition) of exracapsular foci of tumor cells.
- PA of the lip are enucleated as there chances of recurrence are minimal as some normal tissue is also excised with the tumor.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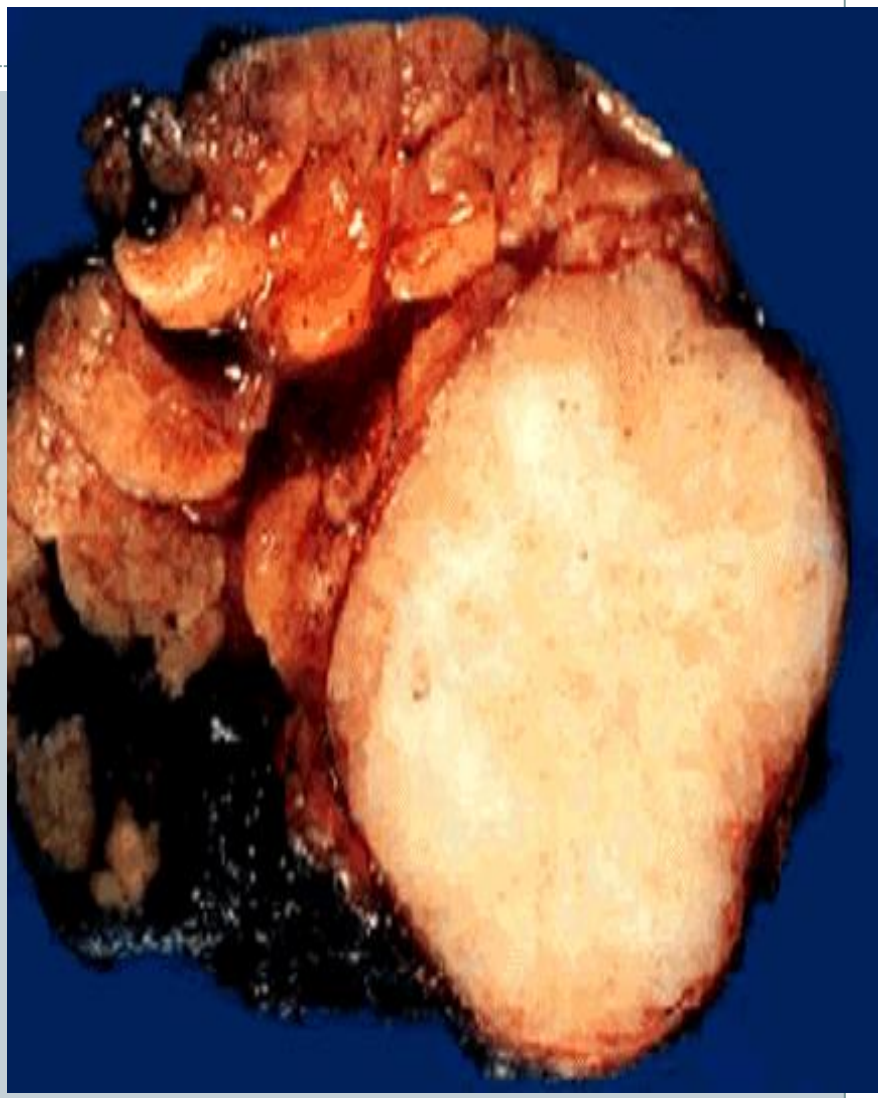
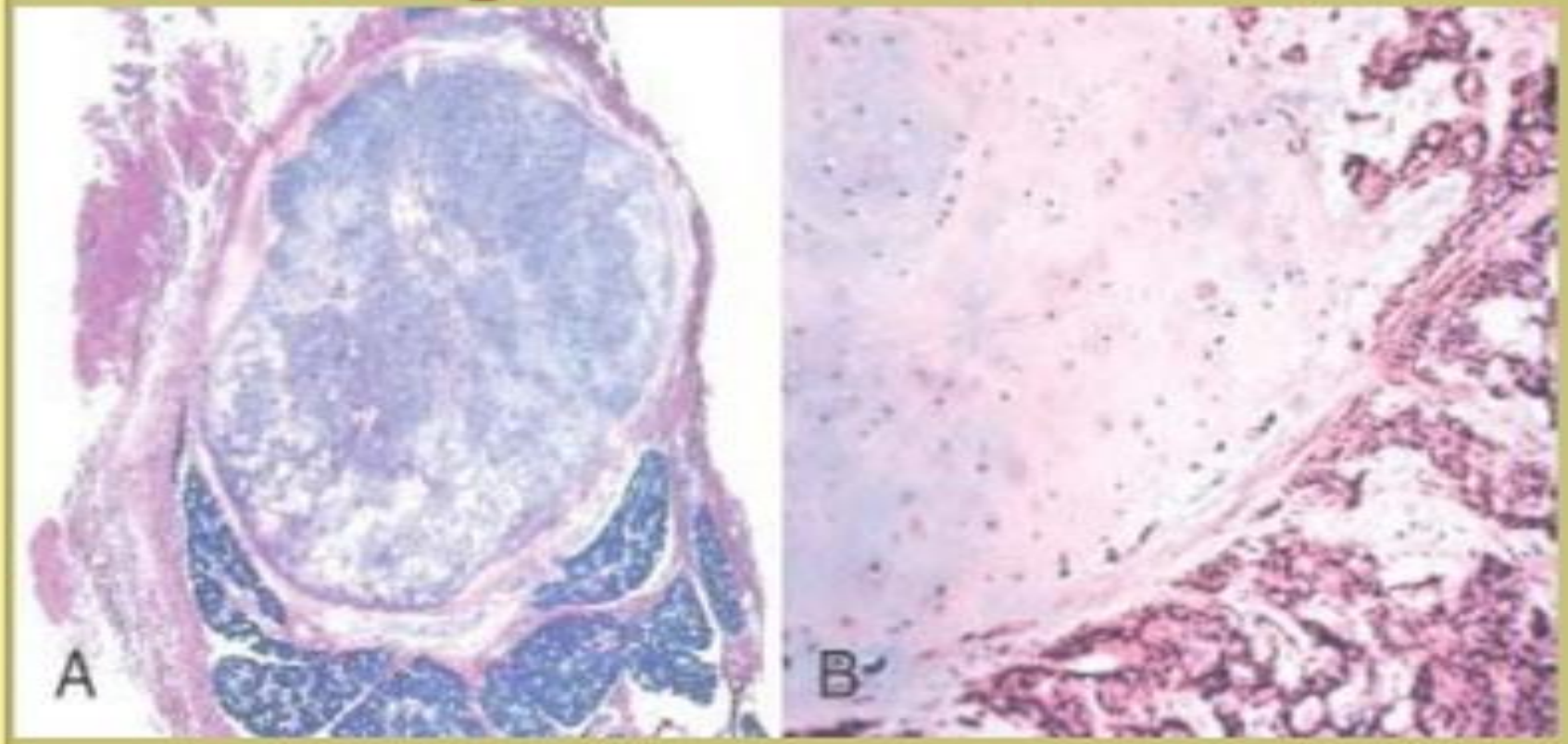


Pleomorphic Adenoma

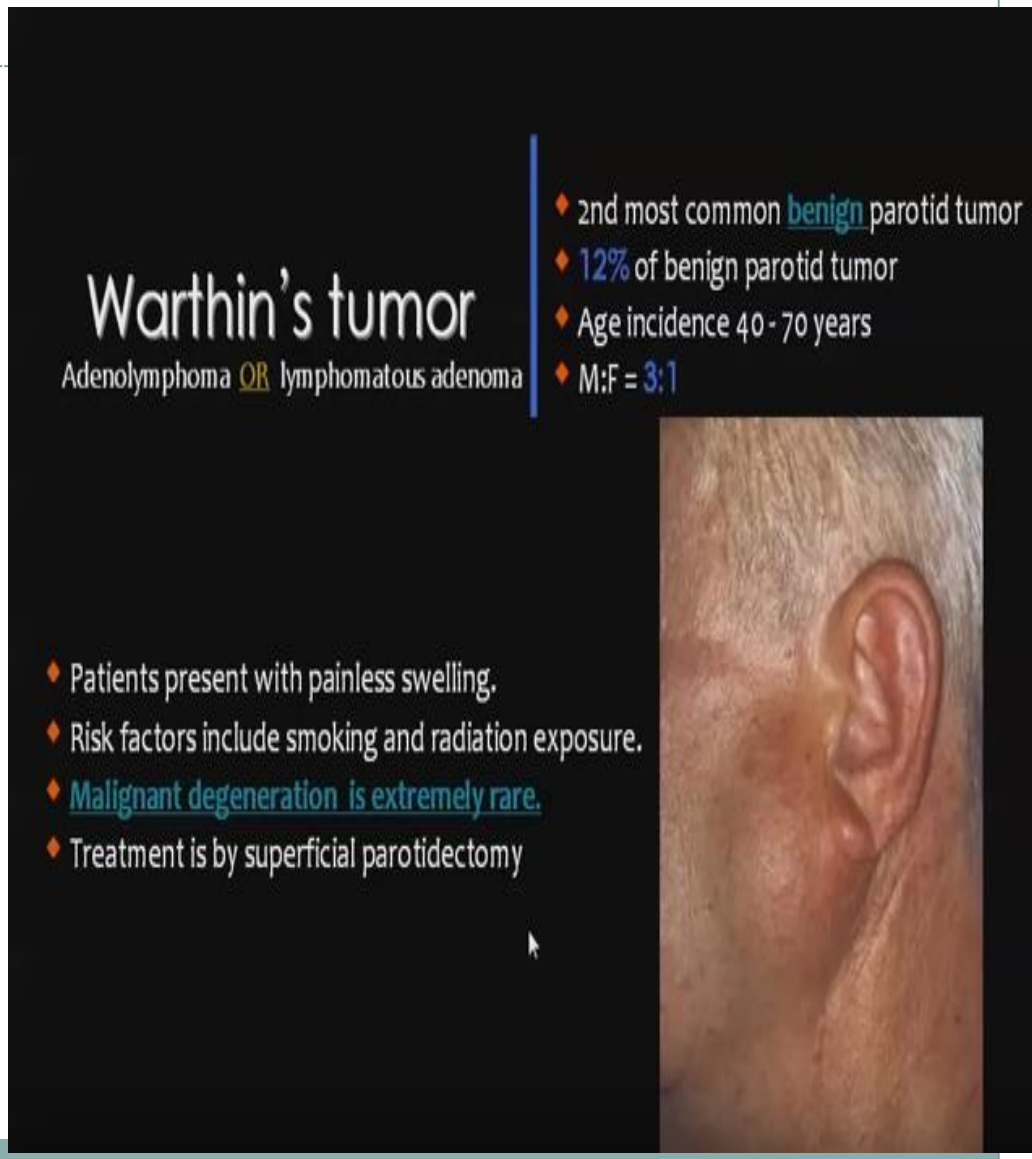


A, Low-power view showing a well-demarcated tumor with adjacent normal salivary gland parenchyma.

B, High-power view showing epithelial cells as well as myoepithelial cells found within a chondroid matrix material.

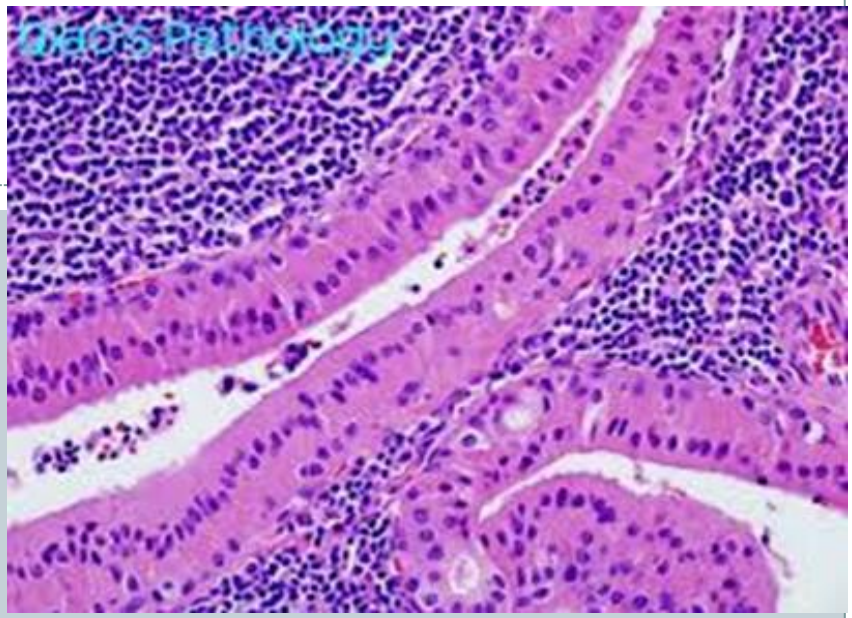
Warthin's Tumor

- **Warthin's tumor (benign papillary cystadenoma lymphomatosum)**
- **the second most common benign tumor of the parotid gland**
- **It accounts for 2-10% of all parotid gland tumors**
- **Bilateral in 10% of the cases**
- **Thought to arise from salivary gland inclusions within lymph nodes.**

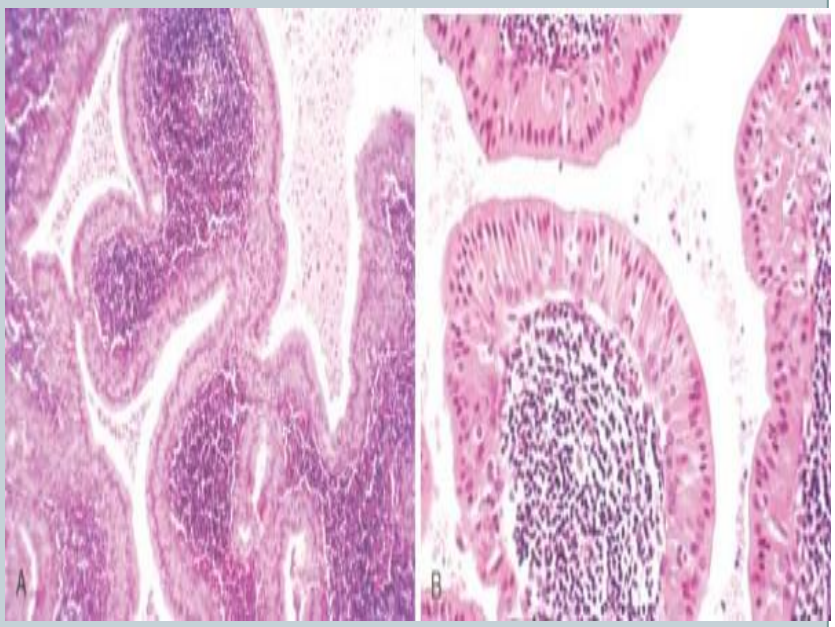


- **Epithelial Component**
  - **Consists of papillary fronds which demonstrate 2 layers of oncocytic epitheilal cells**

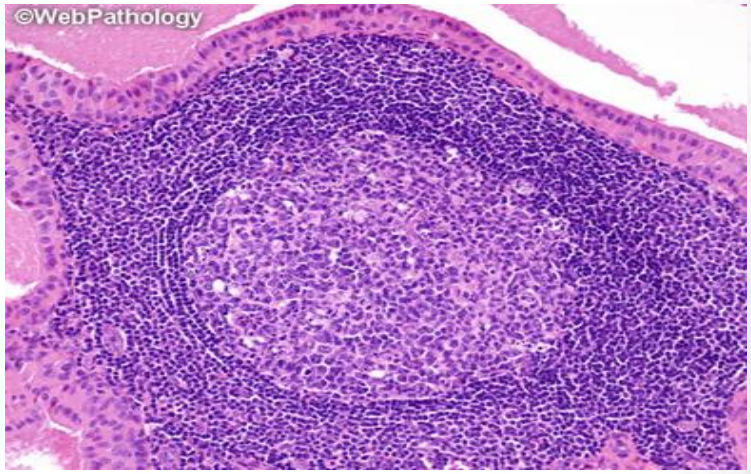
Cytoplasm stains deep pink and shows granularity b/c of an abundance of mitochondria

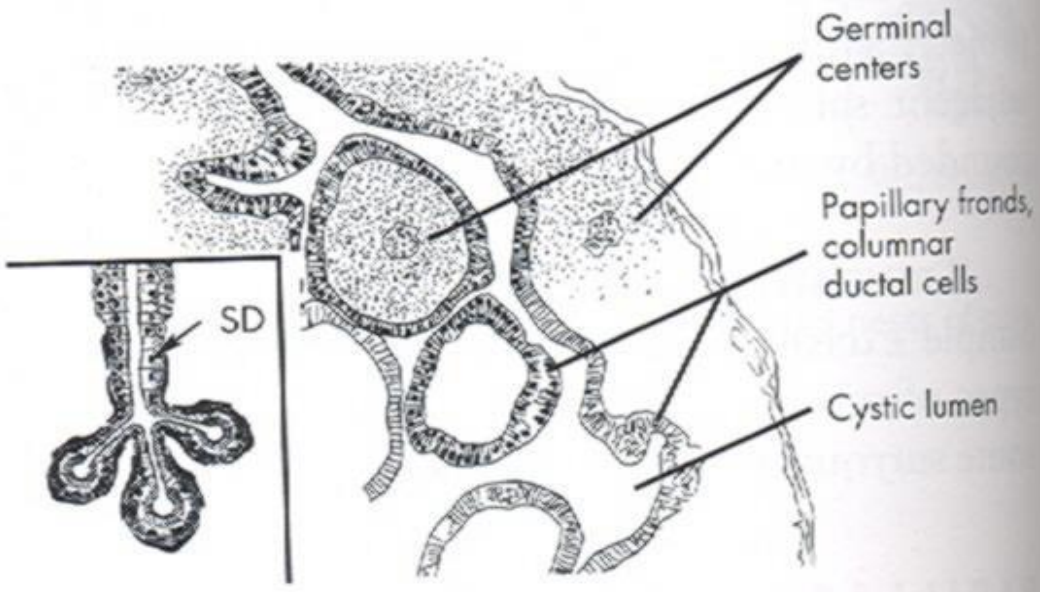


- **Lymphoid Component**
  - **An abundance of this is present**
  - **Occasional germinal centres will be seen**
  - **Lymphoid tissue forms the core or papillary structures**



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





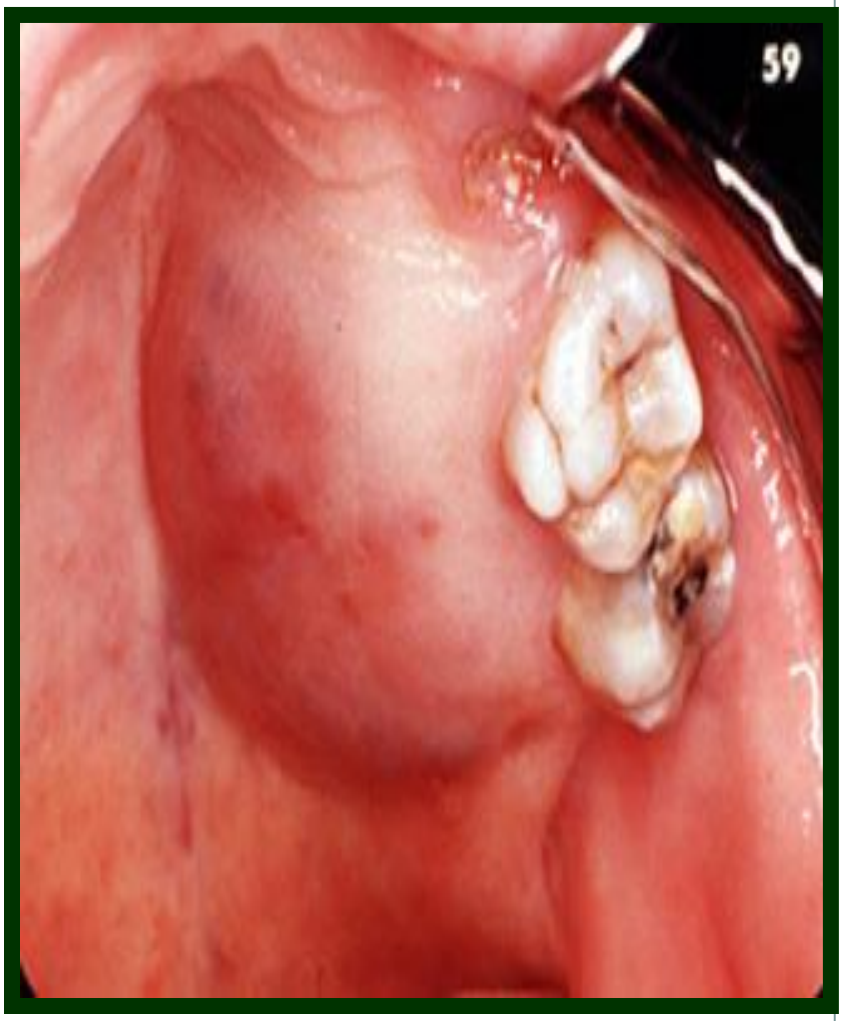
Papillary cystadenoma lymphomatosum. Present are intraluminal projections *(papillary fronds)* with an outer two cell layer covering of eosinophilic ductal cells resembling striated duct cells *(SD)* and central lymphoid follicles, some with *germinal centers.*

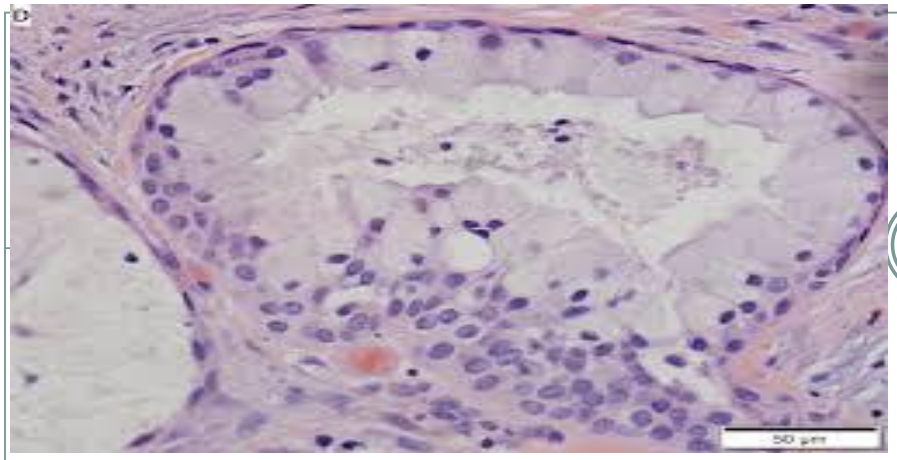
Malignant Tumors:

1-Muco epidermoid carcinoma:

As its name suggests,mucoepidermoid carcinoma consists of both epidermal and mucous cells.

It is the most common malignant tumor of the parotid gland (60 to 90%) and the second most common malignant tumor of the submandibular gland, after adenoid cystic carcinoma.





- MECs contain two major elements:
- mucin-producing cells & epithelial cells of the epidermoid variety

(Epidermoid & Mucinous) components.

- MEC is divided into low-grade (well differentiated).
- High-grade (poorly differentiated).

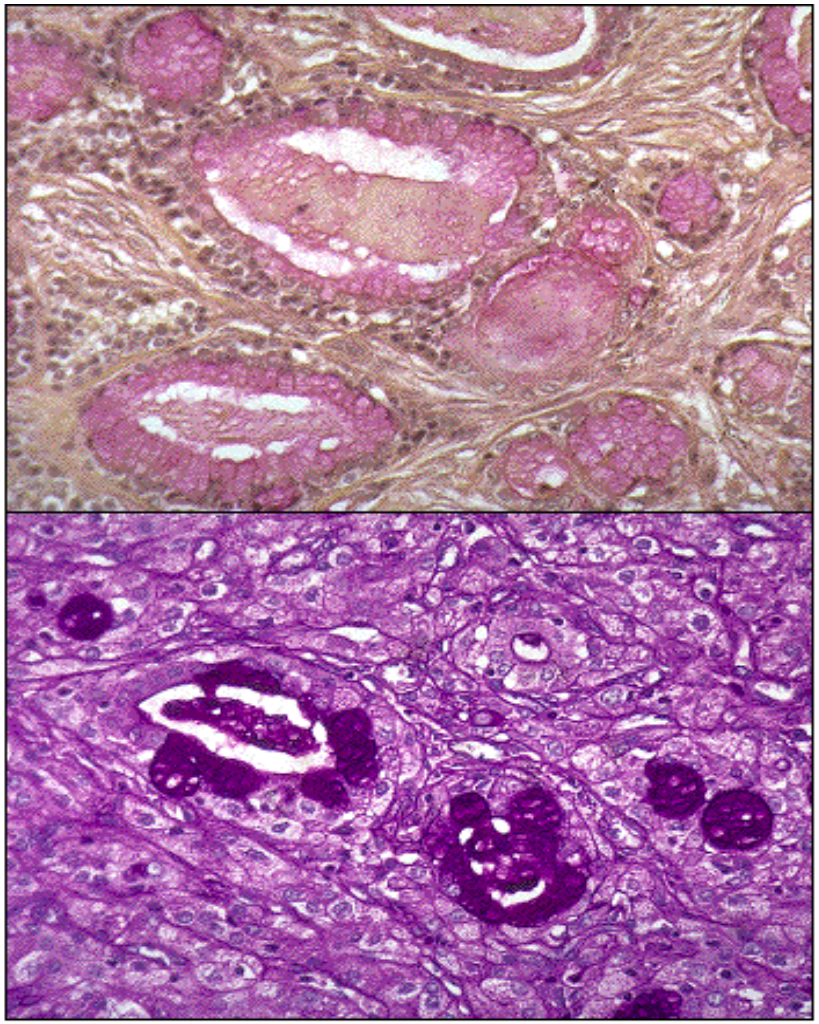
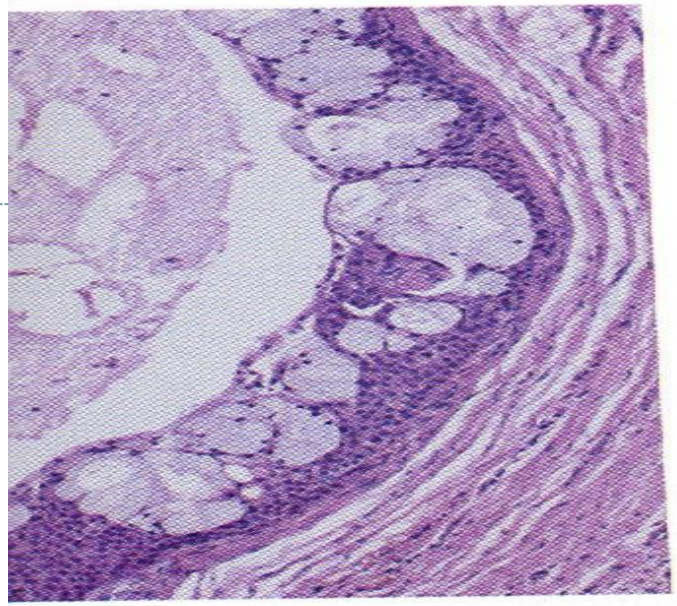
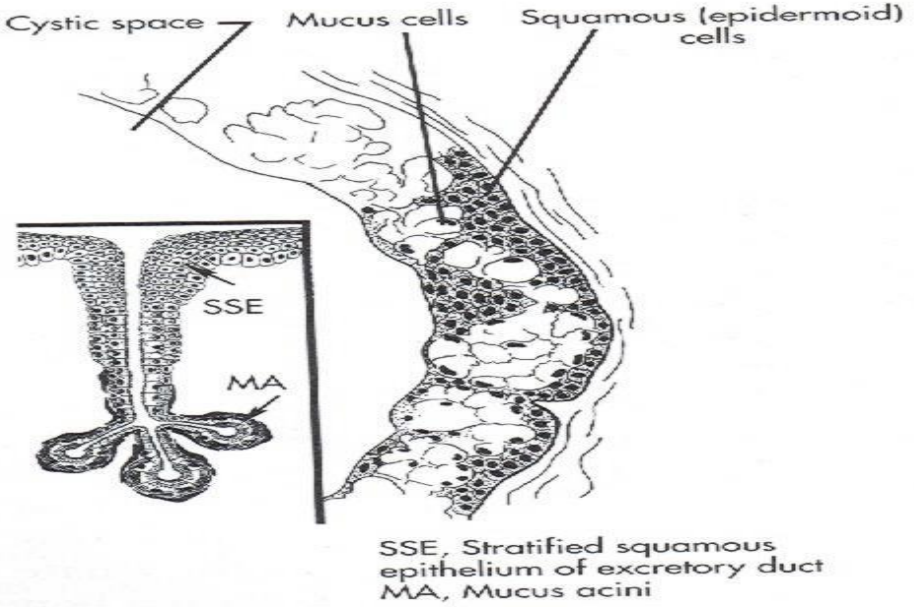


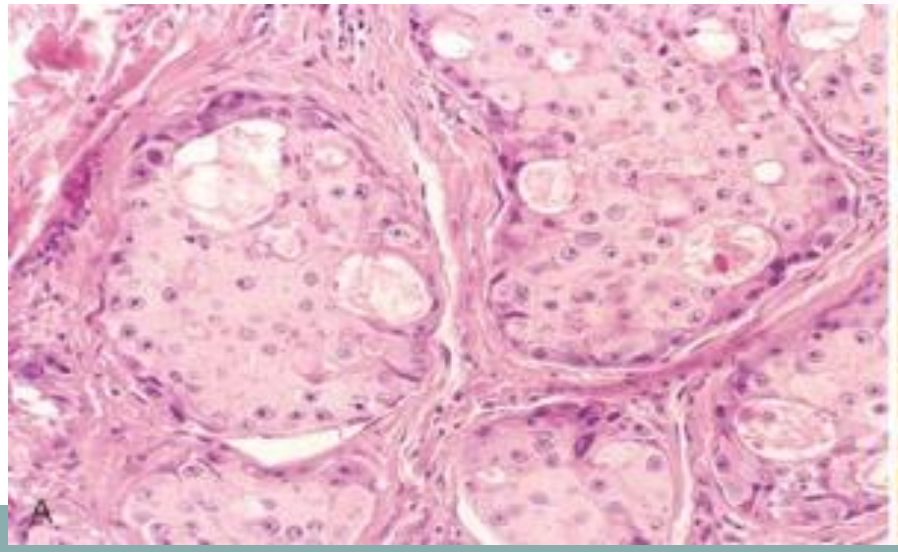
Figure 27. Mucoepidermoid Carcinoma
A: Musicarmine Stain
B: PAS Stain

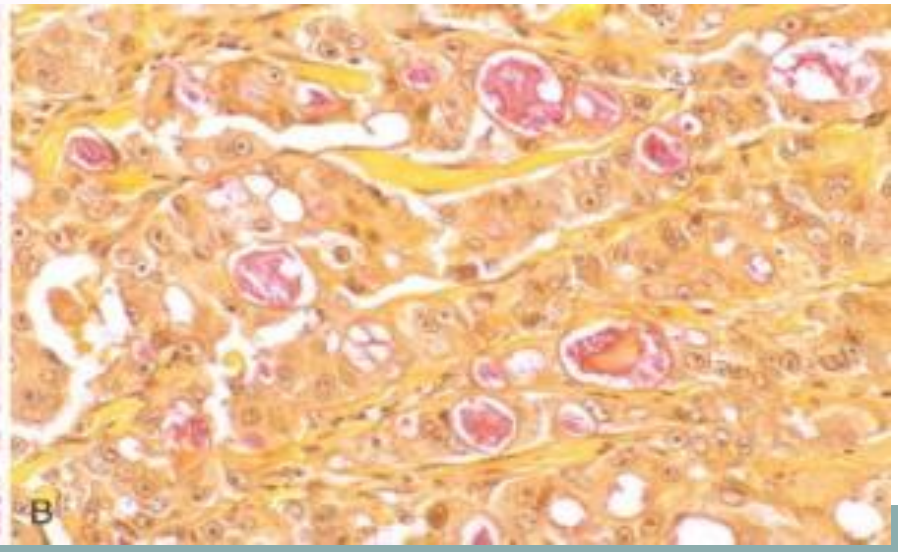




SSE, Stratified squamous epithelium of excretory duct
MA, Mucus acini

ade mucoepidermoid carcinoma. A cystic space is lined by squamous (epidermoid)
l clusters of mucus-secreting cells.





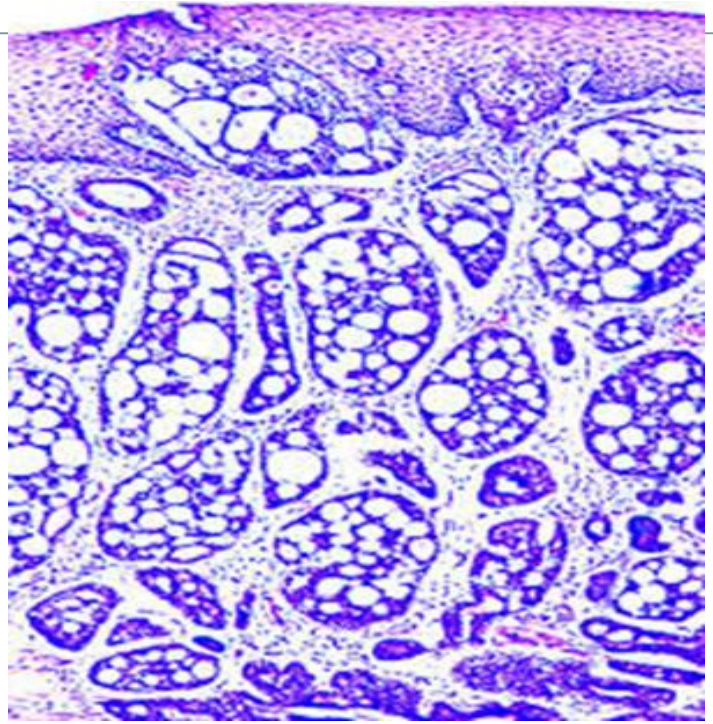
2-Adenoid Cystic Carcinoma

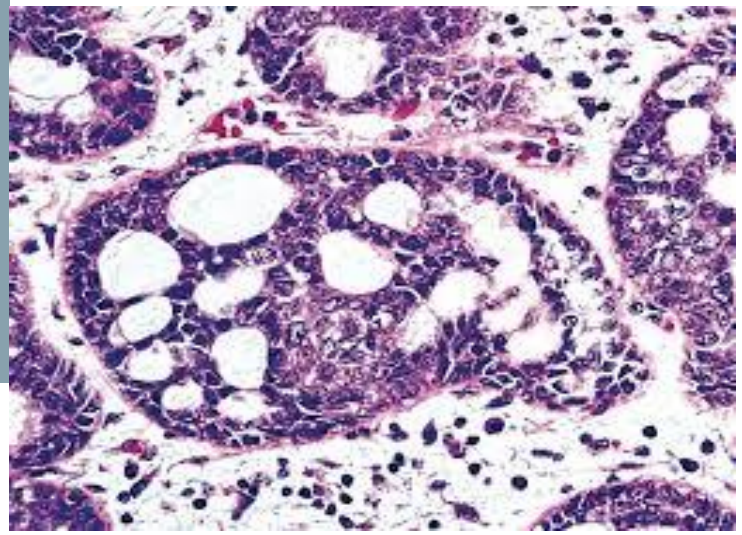
- Adenoid cystic carcinoma with Swiss cheese pattern.
- It is the second-most common malignant tumor of the salivary glands.
- ACC is the most common malignant tumor found in the submandibular, sublingual, and minor salivary glands.

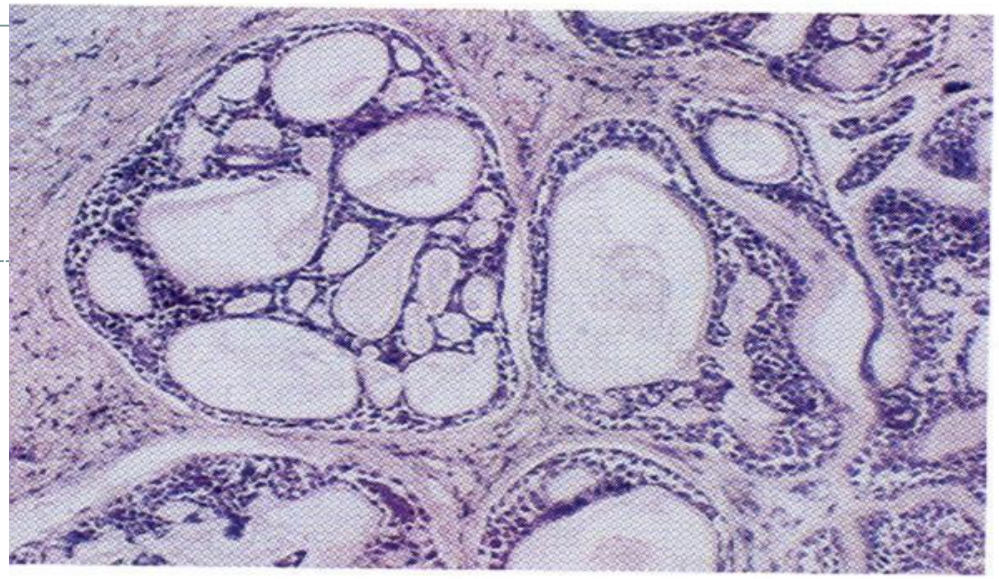
Histopathology:

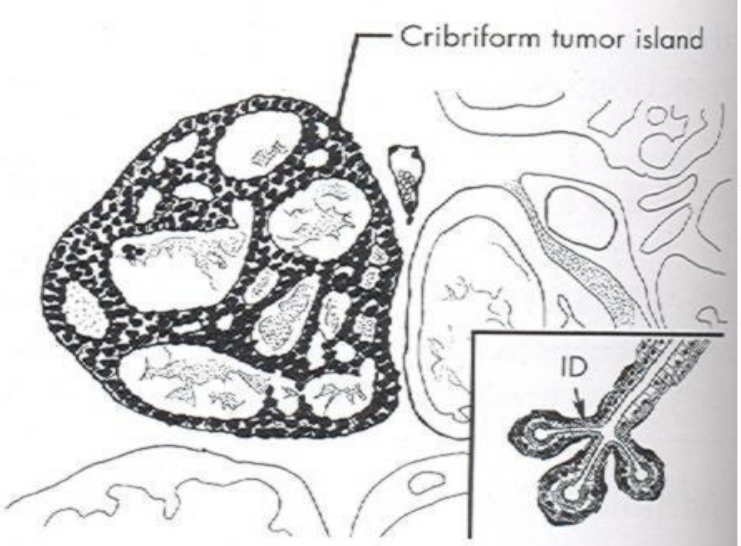
Composed of small, deeply staining uniforcells resemble basal cells, which are arranged in anastomosing cords or duct like pattern with mucoid material in the center.

This produce a typical cribriform pattern.

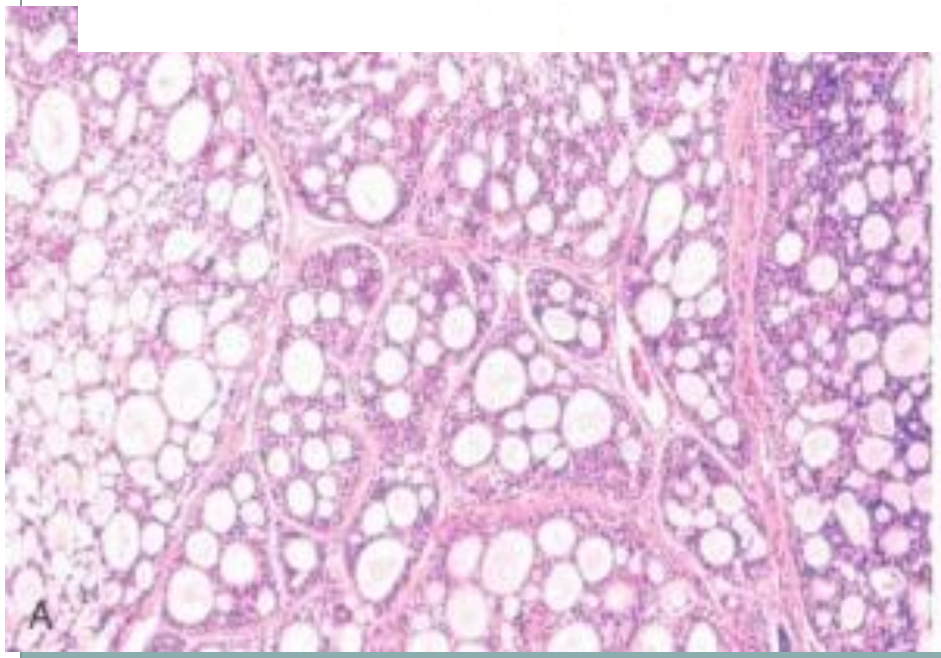


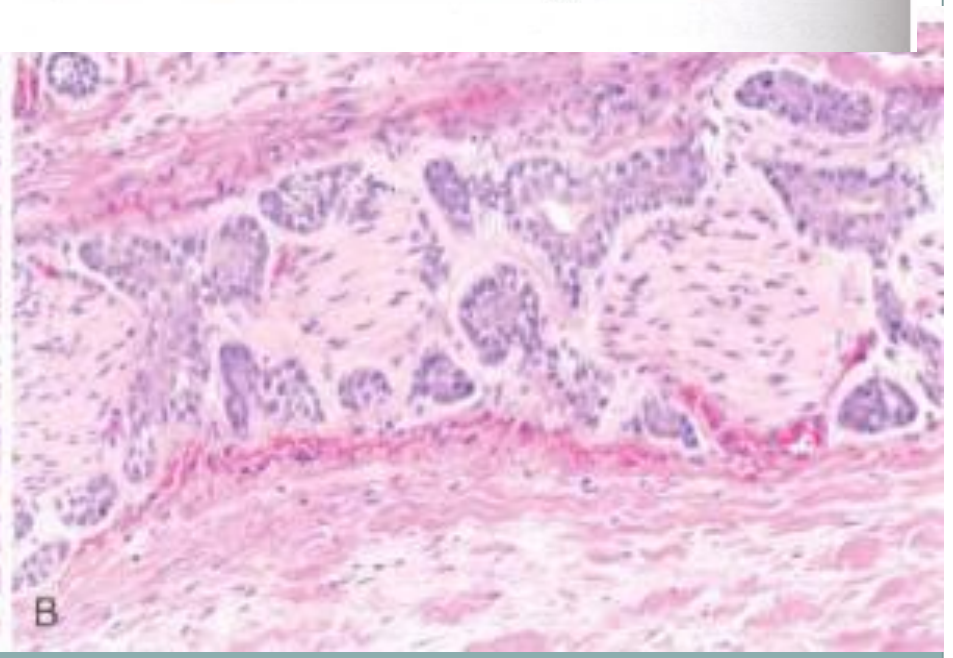


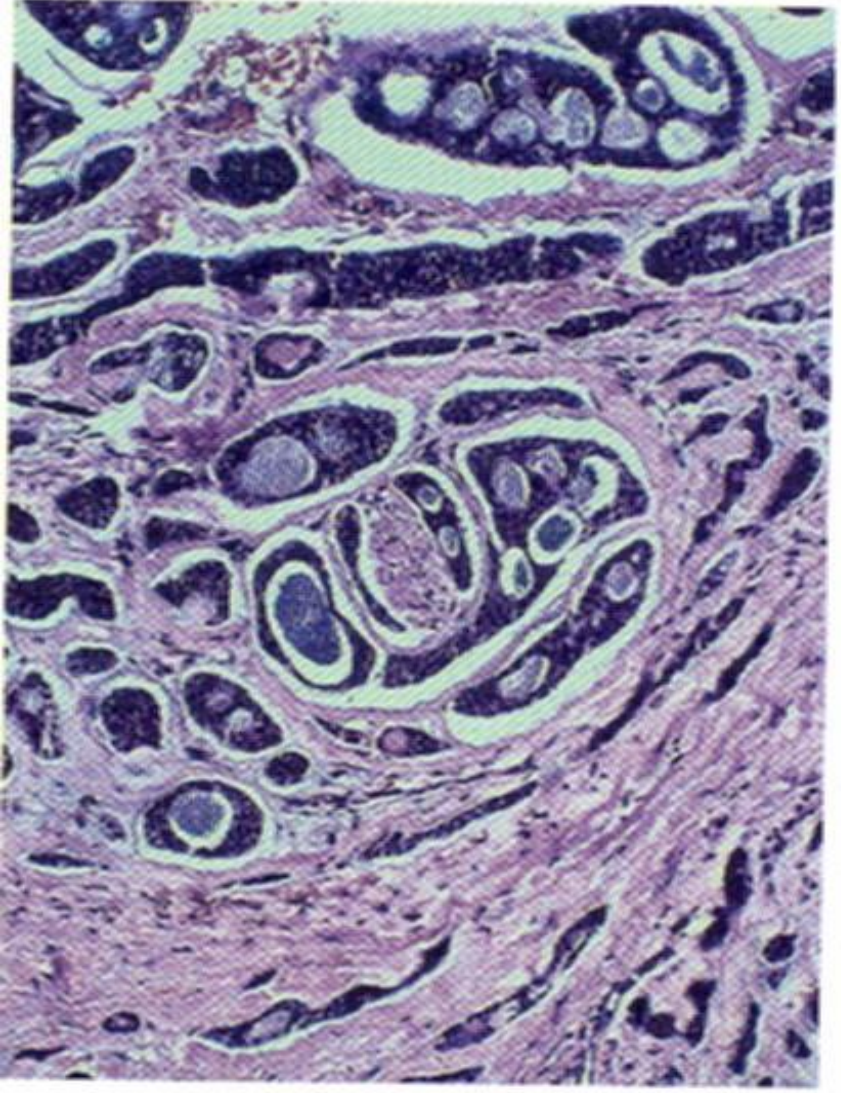


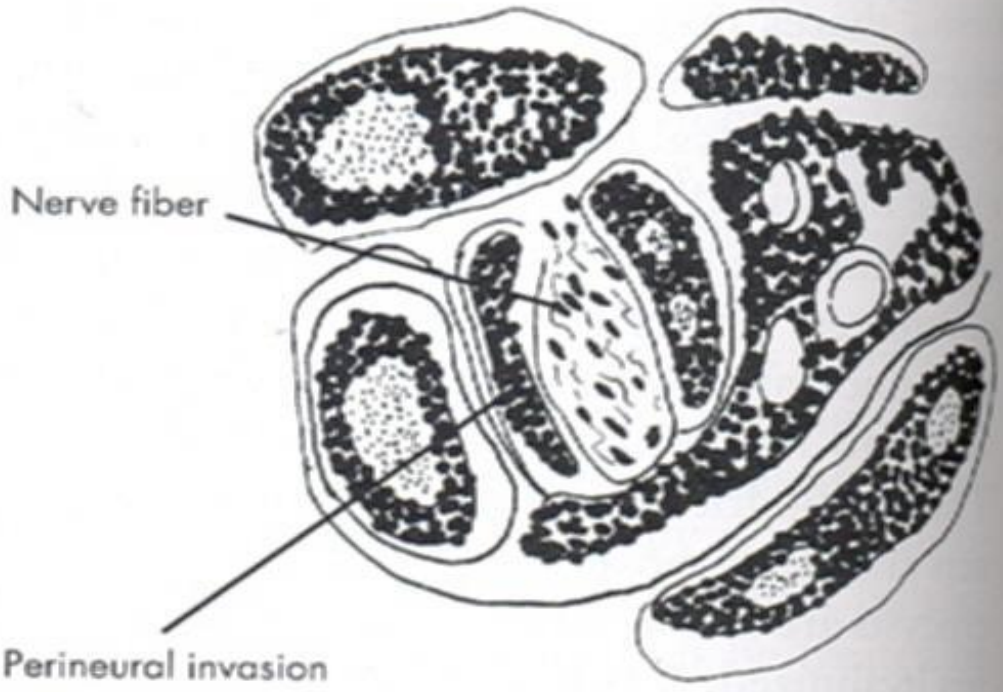


Adenoid cystic carcinoma. Cribriform pattern with a "Swiss cheese" appearance.





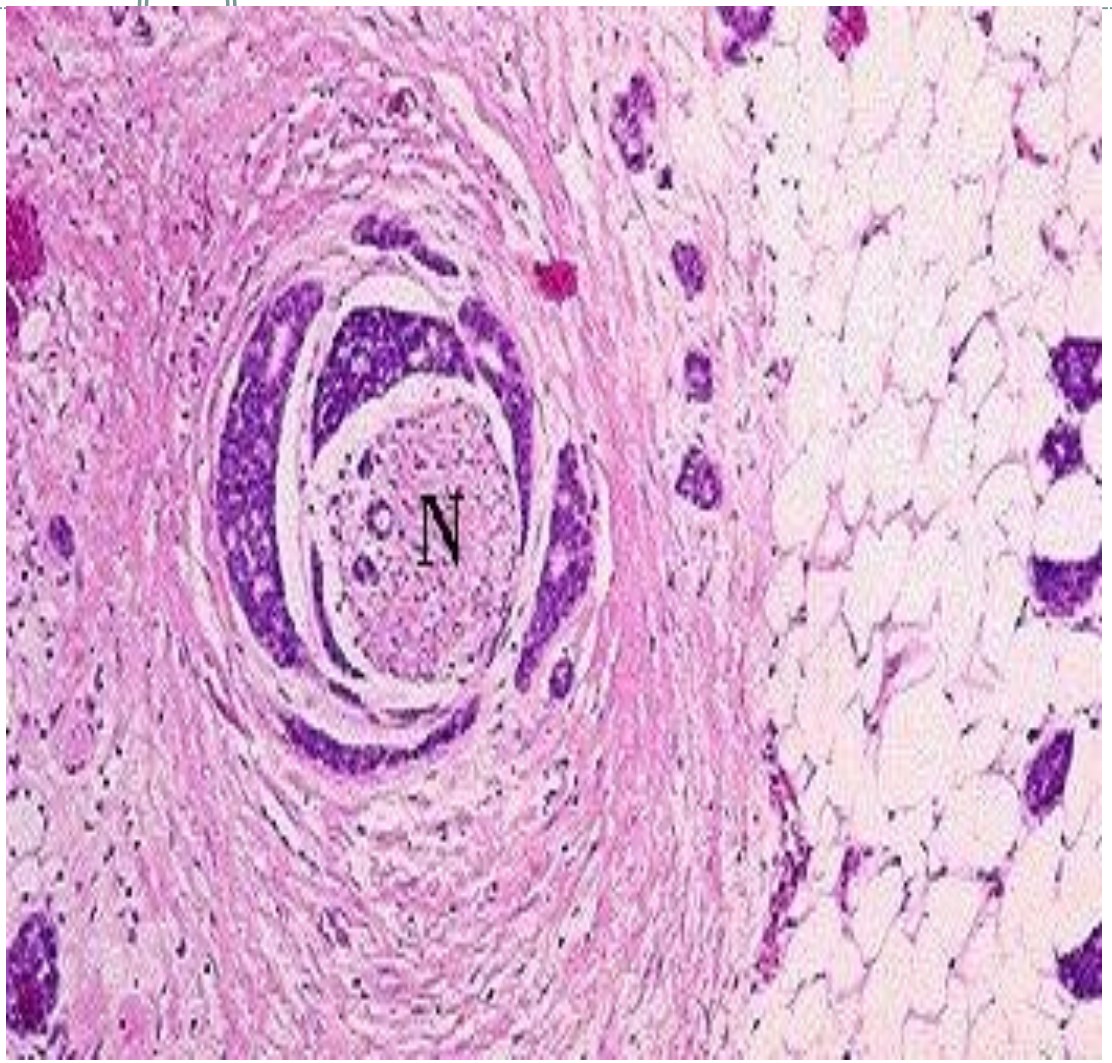




Adenoid cystic carcinoma. Affinity for perineural invasion by tumor cells (neurotropism) is evident.

Adenoid Cystic Carcinoma

- Nerve (N) invaded by adenoid cystic carcinoma (the blue area surrounding the nerve).
- Spread may occur by emboli along the nerve lymphatics



3- Acinic cell carcinoma
4- Adenocarcinoma
5- Squamous cell carcinoma
6- Malignant lymohoma
7- Carcinoma ex pleomorphic adenoma