

## Disorders of the salivary glands

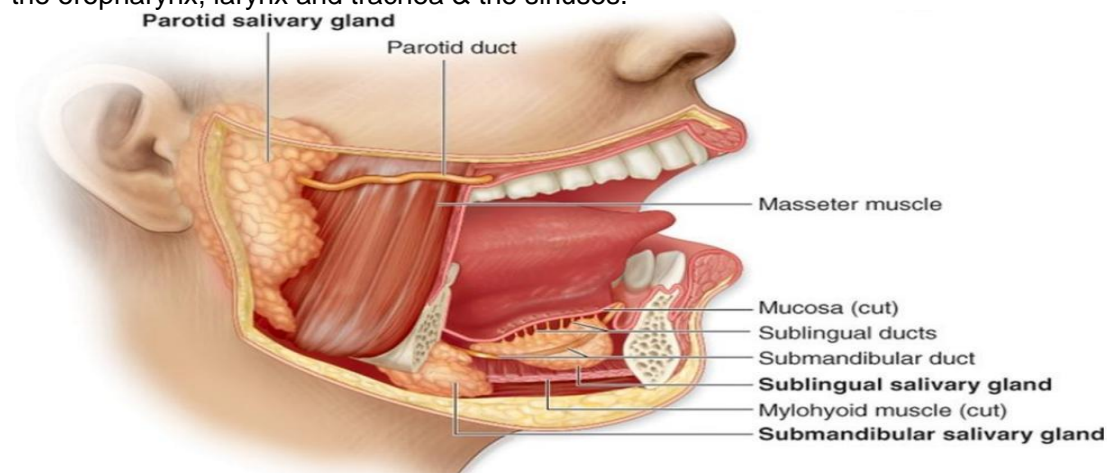
### Anatomy of salivary glands

#### a- Major :

- \_ Two submandibular glands
- \_ Two parotid glands
- \_ Two sublingual glands

#### b- Minor

Approximately **450** minor salivary glands: in the mucosa of the lips, cheeks, palate, floor of the mouth and retromolar area, also in other areas of the upper aerodigestive tract including the oropharynx, larynx and trachea & the sinuses.



*Anatomy of major salivary glands*

### Composition & functions of saliva

#### Composition of Saliva

- Mostly water 99.5%
- Ionic content: low in  $\text{Na}^+$  and  $\text{Cl}^-$ , high in  $\text{K}^+$  and  $\text{HCO}_3^-$
- Enzymes: lingual lipase and  $\alpha$ -amylase (ptyalin).
- Mucins
- Lysozymes: proteolytic enzyme
- Immunoglobulin A (IgA)

**Table 1. Saliva components and functions (4).**

Functions	Components
Lubrication	Mucin, proline-rich glycoproteins, water
Antimicrobial action	Lysozyme, lactoferrin, lactoperoxides, mucins, cystins, histatins, immunoglobulins, proline-rich glycoproteins, IgA
Maintaining mucosa integrity	Mucins, electrolytes, water
Cleansing	Water
Buffer capacity and remineralisation	Bicarbonate, phosphate, calcium, staterin, proline-rich anionic proteins, fluoride
Preparing food for swallowing	Water, mucins
Digestion	Amylase, lipase, ribonucleases, proteases, water, mucins
Taste	Water, gustin
Phonation	Water, mucin

**Rule of 80% :**

**Nearly** (80% of all salivary glands occurs in parotid gland, & 80% of them are benign, 80% of these are pleomorphic adenomas, 80% of these parotid pleomorphic adenomas occur in the superficial lobe, & 80% of all untreated pleomorphic adenomas remain benign )

**Salivary gland tumours – frequency and distribution.**

Type	Location	Frequency	Malignant %
Major	Parotid	Common	10-20
	Submandibular	Uncommon	50
	Sublingual	Very rare	85
Minor	Upper aerodigestive tract	Rare	90

**Common Disorders Of Minor Salivary Glands**

**Cysts**

Extravasation cysts are **common**, result from **trauma**. They usually affect glands within the **lower** lip. Usually as a painless, translucent swelling. Some resolve spontaneously, but most require formal surgical excision. Recurrence is rare. Figure below ( Mucous retention cyst).



*Mucous retention cyst.*

### *Tumours*

They are histologically similar to those of major glands; however, up to **90 %** of minor salivary gland tumours are **malignant**. Although they may occur anywhere in the upper aerodigestive tract, common sites for tumour formation include the upper lip, palate and retromolar regions. Less common sites are the nasal and pharyngeal cavities, the paranasal sinuses and the pharynx.

These tumours arise in **submucosal seromucous** glands. Very rarely, a mucoepidermoid carcinoma can present as an intraosseous tumour of the mandible. Benign minor salivary gland tumours present as painless, firm, slow-growing swellings. Minor salivary gland tumours of the upper lip are managed by excision with primary closure.

Benign tumours of the palate less than 1 cm in diameter, can be managed by excisional biopsy, and the defect is allowed to heal by secondary intention while those greater than 1 cm in diameter, incisional biopsy is recommended prior to formal excision.

Malignant minor salivary gland tumours are rare. They have a firm consistency.

The tumour may become necrotic with ulceration as a late presentation.

Malignant minor salivary gland tumours of the palate are managed by wide excision which may involve partial or total maxillectomy with suitable reconstruction.

## **THE SUBLINGUAL GLANDS**

### *Anatomy*

The sublingual glands are a paired set of minor salivary glands lying in the anterior part of the floor of mouth between the mucous membrane, the mylohyoid muscle and the body of the mandible close to the mental symphysis. Each gland has numerous excretory ducts that open either directly into the oral cavity or indirectly via ducts that drain into the submandibular duct.

### **Common disorders of the sublingual glands**

#### *Cysts*

Minor mucous retention cysts develop in the floor of the mouth either from an obstructed minor salivary gland or from the sublingual salivary gland.

### *Plunging ranula*

The term '**ranula**' is a mucous extravasation cyst that arises from a sublingual gland. It produces a characteristic translucent swelling that takes on the appearance of a '**frog's belly**' (ranula).

Plunging ranula is a rare form of **mucous retention cyst** that can arise from both sublingual and submandibular salivary glands. Mucus collects within the cyst, which perforates through the mylohyoid muscle diaphragm to enter the neck. Patients present with a dumb-bell-shaped swelling that is soft, fluctuant and painless in the submandibular or submental region. Diagnosis is made on **ultrasound** or magnetic resonance imaging (**MRI**) examination. **Excision** is usually performed via a **cervical** approach removing the cyst and both the submandibular and sublingual glands. Smaller plunging ranulas can be treated successfully by **transoral** sublingual gland excision, with or without marsupialisation. Incision and drainage usually results in recurrence.



*Large ranula affecting the floor of the mouth.*

### *Tumours*

They are extremely rare and are usually (85 %) **malignant**. They present as a hard or firm painless swelling in the floor of the mouth. Treatment requires wide excision and neck dissection followed by immediate reconstruction.

## **THE SUBMANDIBULAR GLANDS**

### *Anatomy*

The submandibular glands are paired salivary glands that lie below the mandible on either side. They consist of a **larger superficial** and a smaller deep lobe that are continuous around the posterior border of the **mylohyoid** muscle. The gland is surrounded by a well-defined **capsule**. The gland is drained by a single submandibular duct (**Wharton's duct**) that drains into the anterior floor of the mouth at the sublingual papilla. There are several lymph nodes within the superficial part of the gland.

### **Important anatomical relationships of the submandibular glands**

- \_ Lingual nerve
- \_ Hypoglossal nerve
- \_ Anterior facial vein
- \_ Facial artery
- \_ Marginal mandibular branch of the facial nerve

### *Inflammatory disorders of the submandibular gland*

Submandibular sialadenitis may be acute, chronic or acute on chronic.

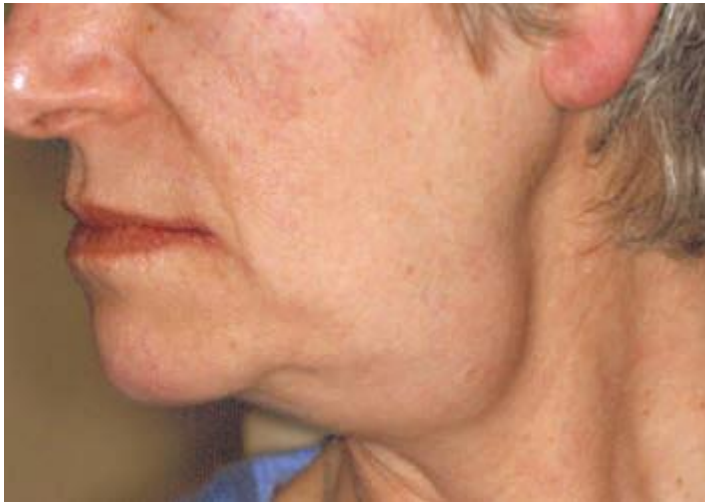
Common causes are:

I• Acute submandibular sialadenitis:

- **Viral.** The paramyxovirus (mumps) it usually produces parotitis. The submandibular glands are occasionally involved. Other viruses are extremely rare.
- **Bacterial.** Bacterial sialadenitis is more common than viral and occurs secondary to obstruction.

Following infection and despite control of acute symptoms with antibiotics, the gland frequently becomes chronically inflamed and requires formal **excision**.

II• Chronic submandibular sialadenitis.



*Acute left submandibular sialadenitis.*

### *Obstruction and trauma*

An **80%** of all salivary stones<sup>1</sup> (sialolithiasis) occur in the **submandibular** glands because their secretions are highly **viscous**, & they are the **most common** cause of obstruction within the submandibular gland and its duct system. **80%** of submandibular stones are **radio-opaque**.

Other causes of obstruction include external pressure<sup>2</sup>, particularly trauma by an overextended flange<sup>3</sup> on a lower denture.

### *Clinical symptoms*

Acute painful swelling in the region of the submandibular gland, precipitated **by eating**. The swelling occurs rapidly and often resolves spontaneously over 1–2 hours after the meal is completed (if **complete** obstruction) . More frequently, the stone causes only partial obstruction, in such cases, symptoms are more infrequent, producing minimal discomfort and swelling, not confined to mealtimes.

**O/E** : Enlarged firm, tender gland on bimanual examination. **Pus** may be visible, draining from the sublingual papilla.

### *Management*

**Intraoral**: if the stone is lying within the submandibular duct in **the floor** of the mouth (accessible), the stone can be removed by incising longitudinally over the duct.



**Gland excision:** if the stone is proximal to the lingual nerve, i.e. at the **hilum** of the gland, stone retrieval via an intraoral approach should be **avoided** as there is a high risk of damage to the **lingual** nerve.

Treatment is by simultaneous submandibular gland **excision and removal** of the stone and ligation of the submandibular duct. In general submandibular gland excision is **indicated** for:

- sialadenitis +/- stones
- salivary tumours.

**Recent :** The retrieval of stone via an endoscopic approach (**sialadenoscope**) , and/or **lithotripsy**.

### *Complications of submandibular gland excision*

- haematoma
- wound infection
- injury to the **marginal** mandibular branch of the facial nerve
- **lingual** nerve injury
- **hypoglossal** nerve injury
- transection of the **nerve to the mylohyoid** muscle producing submental skin anaesthesia.

### *Tumours of the submandibular gland*

They are **uncommon** and usually present as a slow-growing, painless swelling within the submandibular triangle. Only **50 %** of them are benign, in contrast to 80–90 % of parotid gland tumours.

Most salivary neoplasms, even malignant tumours, are often **slow** growing, **painless** swellings.

### *Clinical features of malignant salivary tumours*

- facial nerve weakness
- rapid enlargement of the swelling
- induration and/or ulceration of the overlying skin
- cervical node enlargement.

### *Investigation*

1-Computed tomography (CT) and **MRI** scanning are the **most helpful** techniques for imaging tumours arising in the major salivary glands.

2-Fine-needle aspiration biopsy (**FNAB**) is a safe alternative to **open** biopsy (**contraindicated**) as the later may **seed** the tumour into surrounding tissues.

### *Management of submandibular gland tumours*

As with all salivary gland tumours, surgical **excision with a cuff** of normal tissue is the goal.

## **THE PAROTID GLAND**

### *Anatomy*

The parotid gland lies in a recess bounded by the ramus of the mandible, the base of the skull and the mastoid process. It lies on the carotid sheath and the XIth and XIIth

cranial nerves and extends forward over **the masseter** muscle. Several important **structures** run through the parotid gland. These include:

- branches of the facial nerve (divides the gland into deep and superficial lobes).
- the terminal branch of the external carotid artery that divides into the maxillary artery and the superficial temporal artery.
- the retromandibular vein.
- intraparotid lymph nodes.

## Inflammatory disorders

### *Viral infections*

**Mumps** is the most common cause of acute painful parotid swelling often exacerbated **by meals** and predominantly affects children. Symptoms resolve within **5–10 days**. A single episode of infection confers **lifelong** immunity. Treatment of mumps is **symptomatic** with regular paracetamol and adequate oral fluid intake.

**Complications** (**rare** but are more likely to occur in **adults**.): <sup>1</sup>orchitis, <sup>2</sup>oophoritis, <sup>3</sup>pancreatitis, <sup>4</sup>sensorineural deafness and <sup>5</sup>meningoencephalitis.

**Other** viral agents that produce parotitis include Coxsackie A and B, parainfluenza 1 and 3, Echo and lymphocytic choriomeningitis.

### *Bacterial infections*

**Acute** ascending bacterial sialadenitis is **historically** described in **dehydrated elderly** patients following **major** surgery. Reduced salivary flow secondary to dehydration results in **ascending** infection via the parotid duct into the parotid parenchyma.

Acute bacterial parotitis is **now** more common with **no obvious** precipitating factors. The patient presents with a tender, painful parotid swelling that arises over several hours.

There is generalised malaise, pyrexia and occasional cervical lymphadenopathy. The pain is exacerbated **by eating** or drinking. The parotid swelling may be diffuse, but often localises to the lower pole of the gland. **Intraoral** examination may reveal **pus** exuding from the parotid gland papilla. The infecting organism is usually *Staphylococcus aureus* or *Streptococcus viridans*, and treatment is with appropriate **intravenous antibiotics**. If the gland becomes fluctuant, ultrasound may identify **abscess** formation within the gland that may require **aspiration** with a large bore needle or formal **drainage** under general anaesthesia. Sialography is contraindicated during acute infection.

**Chronic** bacterial sialadenitis is **rare** in the parotid gland.



**Acute left bacterial parotitis.**

### *Recurrent parotitis of childhood*

**Unknown** aetiology and variable prognosis. It is characterised by rapid swelling of one or both parotid glands, in which the symptoms are made worse by chewing and eating. Systemic upset with fever and malaise. The symptoms usually last from (3 – 7) **days**, and are then followed by a quiescent period of weeks to several months.

Children usually present between the ages of (3-6) **years**.

The diagnosis is based on the characteristic **history** and can be confirmed by **sialography**. This shows a characteristic punctate sialectasis '**snowstorm**'. The condition usually responds to short courses of **antibiotics** although, if recurrence is frequent, prophylactic low-dose antibiotics may be required for several months or even years. Few children require formal **parotidectomy**.

### *Human immunodeficiency virus-associated sialadenitis*

The presentation of HIV-associated sialadenitis is very **similar to classical Sjögren's** syndrome in adulthood.

### **Obstructive parotitis**

There are several causes of obstructive parotitis, which produces intermittent painful swelling of the parotid gland, particularly at mealtimes.

### *Papillary obstruction*

Obstructive parotitis is **less common** than obstructive submandibular sialadenitis, but can be caused by **trauma** to the parotid papilla through either an overextended upper denture flange or a fractured upper molar tooth. Symptoms are unlikely to resolve unless a **papillotomy** is performed.

### *Stone formation*

Sialolithiasis is less common in the parotid gland (**20 %**) than in the submandibular gland (80 %). Parotid duct stones are usually **radiolucent**. Parotid gland **sialography** is usually required to identify the stone. A stone located in the collecting duct or within the gland may be managed by either <sup>1</sup>endoscopic retrieval, <sup>2</sup>lithotripsy or, least likely, <sup>3</sup>surgical removal via a parotidectomy approach.

### **Tumours of the parotid gland**

The parotid gland is the **most common** site for salivary tumours. Most tumours arise in the **superficial** lobe and present as slow growing, painless swellings below the ear, in front of the ear or in the upper aspect of the neck. Less commonly, tumours may arise as a persistent swellings within the **cheek** (from the accessory lobe) or as a **parapharyngeal** masses (from the deep lobe).

Some **80–90 %** of tumours of the parotid gland are **benign**, the most common being **pleomorphic adenoma**.

**Malignant** salivary gland tumours are divided into two distinct subgroups:

**1 Low-grade malignant tumours**, e.g. acinic cell carcinoma, are indistinguishable on clinical examination from benign neoplasms.



**2 High-grade malignant tumours** usually present as rapidly growing, often painless swellings in and around the parotid gland. Presentation with advanced disease is common, and cervical lymph node metastases may be present.

### *Investigations*

1-**CT** and **MRI** scanning are the **most useful** imaging technique.

2- **Fine-needle aspiration biopsy** may aid in obtaining a preoperative diagnosis, but **open** surgical biopsy is **contraindicated** unless malignancy is suspected, and preoperative histological diagnosis is required as a prelude to radical parotidectomy.

**All** tumours of the **superficial** lobe of the parotid gland should be managed by **superficial parotidectomy** (avoid injury to branches of **facial nerve**).

Those within deep lobe, or advanced, may need radical parotidectomy.

### *Complications of parotid gland surgery*

1• haematoma formation;

2• infection;

3• temporary facial nerve weakness;

4• transection of the facial nerve and permanent facial weakness;

5• sialocoele;

6• facial numbness;

7• permanent numbness of the ear lobe associated with great auricular nerve transection;

8• **Frey's syndrome (gustatory sweating)**: It results from **damage to the autonomic** innervation of the salivary gland with inappropriate **regeneration of parasympathetic** nerve fibres that stimulate the sweat glands of the overlying skin. There will be **sweating** over the region of surgical excision instead of salivation by the smell or taste of food. Management involves the prevention as well as the management of established symptoms.

### *Classification of salivary gland tumours*

I Adenoma :

Pleomorphic adenoma

Adenolymphoma (Warthin's tumour)

II Carcinoma:

Low grade: Acinic cell carcinoma, Adenoid cystic carcinoma, Low-grade mucoepidermoid carcinoma

High grade: Adenocarcinoma, Squamous cell carcinoma, High-grade mucoepidermoid carcinoma

III Non-epithelial tumours: Haemangioma, lymphangioma

IV Lymphomas Primary lymphomas: (NHL) & Secondary lymphomas (Lymphomas in Sjögren's syndrome)

V Secondary tumours: Local & Distant (Skin and bronchus)

VI Unclassified tumours

VII Tumour-like lesions: Solid ( Benign lymphoepithelial lesion & Adenomatoid hyperplasia) or Cystic (Salivary gland cysts)

### *Granulomatous sialadenitis*

Rare group.

Painless swellings of the parotid and/or submandibular glands.

These include:

#### **Mycobacterial infection**

Tuberculosis and non-tuberculous sialadenitis typically present as a tumour-like swelling of the salivary gland may be associated with xerostomia. There is little pain and no fever. The diagnosis is only confirmed by excision.

#### **Sarcoidosis**

swelling that may be associated with xerostomia.

#### **Other**

These include cat scratch disease, toxoplasmosis, syphilis, deep mycoses and Wegener's granulomatosis, allergic sialadenitis and sialadenitis associated with radiotherapy of the head and neck.

### *Sialadenosis (sialosis)*

**Non-inflammatory** swelling particularly affecting the parotid gland. It is usually occurs in association with a **variety** of conditions including diabetes mellitus, alcoholism, other endocrine diseases, pregnancy, drugs, bulimia and other eating disorders, drug-induced (sympathomimetics) and idiopathic diseases.

Most patients (**40-70**) years of age, and the swellings are **soft** and **symmetrical**.

The treatment is unsatisfactory, & aimed at the correction of the underlying disorder.

### **Degenerative conditions**

#### *Sjögren's syndrome*

It is an **autoimmune** condition causing progressive destruction of salivary and lacrimal glands. **Primary** Sjögren's syndrome differs from secondary Sjögren's syndrome in that xerostomia and keratoconjunctivitis sicca occur **without** the associated connective tissue disorder. However, the symptoms are often more **severe**, and the incidence of **lymphomatous** transformation in the primary group is higher. The characteristic pathological feature of Sjögren's syndrome is the progressive lymphocytic infiltration, acinar cell destruction and proliferation of duct epithelium in all salivary and lacrimal gland tissue. The diagnosis is based on the **history**.

#### *Management*

**Symptomatic.** An ophthalmological assessment is important, and **artificial tears** are essential to preserve corneal function. For dry mouth, various **artificial salivary substitutes** are available, but patients often consume large volumes of **water**. In the dentate patient, the use of salivary substitutes **with fluoride** is important.

Other oral complications include oral candidosis and accelerated periodontal disease.

While the most serious systemic complication is **lymphoma** (most commonly monocytoid B-cell lymphoma) in patients with Sjögren's syndrome. More in the primary type.

## Degenerative disorders.

### *Primary Sjögren's syndrome*

More severe xerostomia

Widespread exocrine gland dysfunction

No connective tissue disorder

### *Secondary Sjögren's syndrome*

M:F: 1:10

Middle age

Underlying connective tissue disorder

### *Benign lymphoepithelial lesion*

20% develop lymphoma

Diffuse parotid swelling 20% bilateral