Sheet no. : 10

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**“Salivary Glands Disorders”**

It’s a common subject between head and neck surgeons, maxillofacial surgeons and sometimes plastic surgeons (because it’s confined with the facial area which demands esthetics). For example parotid surgery, which is a challenging surgery because of its site with relation to the facial nerve.

* **Anatomical Considerations:**

Three main pairs; submandibular (in the submandibular triangle), sublingual (in the floor of the mouth) and parotid gland. In addition to more than 400 minor salivary glands. Check out their positions (slide no.2).

* **Minor Salivary Glands**
* They’re significant because they contribute 10% of total salivary volume, and they have benign (rare; like “retention cyst” which is caused by trauma) and malignant tumors. **Tumors in the minor salivary glands are rare but usually malignant**.
* They lie just under mucosa
* They appear in upper aero digestive tract (pharynx), over lips, cheeks, palate, floor of mouth and retro-molar area.
* Contribute 10% of total salivary volume
* The clinical indication of these, autoimmune diseases or connective tissue diseases will affect the salivary glands like Sjogren’s syndrome. To diagnose salivary gland disorders biopsy of the inner part of the lip is taken.
* **Sublingual Gland**
* The smallest of the major salivary glands. Sizes in descending order: Parotid > Submandibular > Sublingual.
* The almond shaped gland lies just deep to the floor of mouth mucosa between the mandible & Genioglossus muscle.
* It is bounded inferiorly by the Mylohyoid muscle, which takes part of the site of the submandibular gland.
* Sublingual gland has no true fascial capsule; which leads to early spread in malignant tumors.
* It lacks a single dominant duct. Instead, it is drained by approximately 10 small ducts (the Ducts of Rivinus) small pits around the frenuli.
* Its secretion is serous and mucus which has significance in stone formation. The sublingual gland is the most common area for stones formation.
* **Submandibular Gland**
* This gland lies in the submandibular triangle formed by the anterior and posterior bellies of the Digastric muscle and the inferior margin of the mandible.
* The gland forms a ‘C’ around the anterior margin of the Mylohyoid muscle, which divides the gland into a superficial and deep lobe
* From anatomical point of view, now that it lies in the submandibular triangle the surgical incision is a transverse incision over the submandibular gland along with the Langer’s lines (skin lines for surgical incision) to avoid later on scar formation. Langer’s lines on the neck are transverse. To decide where to start the incision we place two-finger grip below the mandible, you might feel the submandibular gland tumor beneath your fingers, we do so to avoid injury to the marginal mandibular branch of the facial nerve which supplies depressor angularis, which leads to a mouth deviation. It overlies the angle of the mandible within 1cm below or above, around the mandible. Also to avoid injury to the submandibular gland, which is a disfiguring injury.
* After the surgery is done if the nerve was injured the patient would have an asymmetrical smile.
* The types of injures are either cut-injury or injury due to pressure or fracture like apraxia which improves later on.
* **Wharton’s duct** empties into the intraoral cavity lateral to the lingual frenulum on the anterior floor of mouth. Wharton’s duct can be seen with the naked eye.
* The presentation is either with the stone seen at the tip of the duct or the patient says that it gets swollen whenever the he eats something sour. They might have sialadenitis.
* The management is by the retrieval of the stone
1. We do duct cannulation and probing to widen it, after duct milking/palpation we give off the stone and give it to the patient.
2. If milking didn’t work we do masculinization; open the duct in a way not to get stenosed again. Most of the time stones aren’t seen like this (slide no.6), so we need GA because the patient can’t open his mouth.
* **Parotid Gland**
* The parotid gland represents the largest salivary gland
* The most common site of the salivary gland tumors. The most common tumor is Pleomorphic adenoma.
* The significance is derived from its anatomy. The boundaries:
* Superior border – Zygoma
* Posterior border – External Auditory Canal
* Inferior border – Styloid Process (it has its own implications), Styloid Process musculature, Internal Carotid Artery, Jugular Veins
* Anterior border – a diagonal line drawn from the Zygomatic root to the external auditory canal
* The whole area is called the parotid region, any swelling or mass in it is a bulge of tumor until proven otherwise, e.g: a patient comes with a 1cm tumor, this shouldn’t be considered simple because it might be a tumor in the parotid gland. Its section or excision includes going deep into the parotid gland which puts the facial nerve at risk, so it need an experienced surgeon.

The differential diagnosis includes:

Sebaceous cyst, lipoma, simple folliculitis or a large acne in that site.

* Parotid surgery most commonly is superficial parotidectomy, because mostly tumors take place in the superficial part (80%), superficial to the Masseter muscle and 20% in the retromandibular part.
* Its incision is called “Lazy-S” anterior to the ear pinna🡪 postauricular space🡪 anterior border of the sternocleidomastoid muscle. This incision gives adequate exposure to the parotid gland, and runs along with skin lines so that gives the best results. Most of the surgeons start their incision from the styloid process, which is an important landmark, 2cm away from the main trunk of the facial nerve. The most important step during the surgery is to define the facial nerve which can be done by two ways; antegrade and retrograde.

Antegrade is better, where the surgeon goes along with the main trunk, to define it we need to start with the styloid process.

* This portion of the gland lies in the Prestyloid Compartment of the Parapharyngeal space
* Parotid duct/Stensen’s duct arises from the anterior border of the Parotid and parallels the Zygomatic arch, 1.5 cm inferior to the inferior margin of the arch.
* It runs superficial to the masseter muscle, then turns medially 90 degrees to pierce the Buccinator muscle at the level of the second maxillary molar where it opens onto the oral cavity. The clinical implication of this is:

1. A facial razor blade stab at which we suspect injury to the facial nerve (the most dangerous), parotid gland and parotid duct, so:

* We have to examine the facial nerve before suturing this injury because we might be blamed for causing this facial n. injury which was already present, so we become responsible medicolegally.
* We have to examine the parotid gland and do adequate exposure under anesthesia. The parenchyma of the parotid gland would look different from the Masseter muscle, appears as white texture after irrigating we find a parotid gland injury. If you only sutured the skin a fistula will result later on, so you need to close the parotid gland itself; the fascia and the capsule before suturing the skin, or at least to tell the patient that a salivary gland fistula formation is expected because the parotid gland was already injured.
* We have to examine the wound carefully and do irrigation to search for Stensen’s duct, its opening is easily seen and felt by a probe. We have to document the presence of injury and try to suture it by 6-0 or 7-0 to prevent parotid gland obstruction🡪 parotitis 🡪 atrophy🡪 facial asymmetry, but when you close the duct only a scar formation will result

2. A patient presents with swelling, fever and pain so you suspect parotitis, which is most commonly viral and can be a secondary bacterial infection or in deblitated critically ill patients (dehydrated with stasis in the salivary gland leading to secondary bacterial infection) you have to inspect the duct opening from the inside, sometimes you find erythema, swelling or pus. It’s a fatal mistake to diagnose bacterial parotitis without inspecting the duct from the inside.

* Cranial VII / facial nerve divides the parotid gland into 2 surgical zones (the superficial and deep lobes). The surgery takes no less than 4 hours because you have to dissect every single branch of the facial nerve. The nerve branching process takes place within the gland inside the parenchyma, so there’s no clear margin or plane between the lobes, it was divided in relation to the facial nerve into superficial and deep lobes.
* The facial nerve after exiting the foramen, it turns laterally to enter the gland at its posterior margin
* The nerve then branches at the Pes Anserinus (goose’s foot) approximately 1-3 cm from the stylomastoid foramen. The nerve then gives rise to 2 divisions:

1. Temperofacial (upper)

2. Cervicofacial (lower)

* Followed by 5 terminal branches:

1. Temporal (raise his eye brows)

2. Zygomatic (close his eyes-ipsilateral)

3. Buccal (blow his mouth-ipsilateral)

4. Marginal Mandibular (show his teeth)

5. Cervical (when he shaves)

You have to document before proceeding to surgery

* Bell’s palsy/ Idiopathic facial paralysis might be caused by frequent trauma or infection.

* **Functions of saliva include the following:**
1. It has a cleansing action on the teeth
2. It moistens and lubricates food during mastication and swallowing
3. It dissolves certain molecules so that food can be tasted
4. It begins the chemical digestion of starches through the action of amylase, which breaks down polysaccharides into disaccharides.
5. The saliva from the parotid gland is a rather thin, watery fluid, but the saliva from the sublingual (mixed) and the submandibular glands contains mucus and is much thicker
* **Disorders of minor salivary Glands:**
1. **Extravasation Cysts**:
* Follow trauma
* MSG with in lower lip (not well-aligned dentures)
* Visible painful swelling
* Some resolve spontaneously or require surgery
1. **Tumors:**

MSG tumors are rare but 90% are malignant

Common sites include:

* Upper lip
* Palate
* Retromolar regions
* Rare sites are nose, post nasal space(PNS) and pharynx
1. **Benign Tumors:**

Benign tumors present as painless slow growing swellings, overlying ulceration is rare

Surgically: Benign tumors of palate < 1cm in size are removed by excisional biopsy

When size larger than 1 cm prior incisional biopsy is done

1. **b. ors:nt:ns:ns gland band byby the apparent ear pinna w recurrence rate CT without contrast; because everything would look wMalignant Tumors**

Malignant tumors have firmer consistency/ stony/ hard and have ulceration at later stage

Surgically: Malignant tumors are managed by excision which may involve low-level or total maxillectomy and immediate reconstruction

* **Disorders of sublingual salivary Glands:**

Problems and tumors are rare

Nearly all tumors are malignant 90%

1. **Minor mucous retention cysts**, Infections in the sublingual space which has no capsule will easily spread.
2. **Plunging ranula** which is a retention cyst that tunnels deep
* Rare form of retention cyst
* Looks like ledwig’s angina
* May arise from SM/SL salivary glands
* Mucous collects around gland
* Penetrates Mylohyoid muscle to enter neck
* Soft painless fluctuant dumb-bell shaped swelling
* Surgical excision via neck

Wide excision and simultaneous neck dissection is required

* **Disorders of submandibular salivary Glands**
1. **Acute sialadenitis:**
	1. Viral (Mumps)
	2. Secondary bacterial infection
		* More Common
		* Secondary to obstruction
		* Once infected it has poor capacity to recover. Despite control with Abx chronicity follows (fibrosis of the gland follows) and requires surgical excision.
2. **Chronic Sialadenitis:**
* Commonly due to obstruction following stone formation
* 80% salivary stones occur in submandibular salivary gland
* High mucous content
* Acute painful swelling rapidly precipitated by eating & resolves within 1-2 hours, specifically with acidic food and drink
* Enlarged bimanually palpable SMG
* Masculinization (stone inside the duct) or excision to the whole gland (stone in the parenchyma)
* We diagnose it usually by the history, physical examination, imaging study (CT without contrast; because everything would look white including the stones)
1. **Tumors of Submandibular Salivary Glands**
* Uncommon, slow growing, painless
* Only 50% are benign
* Even malignant tumors can be slow growing
* Pain is not a reliable feature
* Investigations:

-CT/MRI

-FNAC (fine needle aspiration cytology) vs. true-cut biopsy:

FNAC provides cells whereas true-cut biopsy provides core biopsy/tissue which aids in knowing whether the tumor is benign or malignant by noticing capsule invasion. Because most of the salivary glands/head and neck tumors are diagnosed by cells and because they contain critical structures we use FNAC

-No open biopsy, open biopsy causes invasion to the site

* Management:
* Small & encased within capsule intracapsular excision
* Large benign tumors– suprahyoid excision
* Malignant tumors require concomitant neck dissection
* **Disorders of parotid Glands**
1. **Mumps** (viral infection)
2. **Acute bacterial sialadenitis** in dehydrated deblitated patients
3. **Acute bacterial parotitis**
4. **Obstructive parotitis**: causes swelling at meal time
5. **Parotid tumors**
* Most common is **pleomorphic adenoma** (80-90%)
* Low grade tumors like **acinic cell carcinoma** are not distinguishable from benign and need multiple staining
* High grade tumors grow rapidly, are often painful and have nodal metastasis
* CT/MRI are useful
* FNAC better than open biopsy (we don’t use open biopsy)
* Tx: should be excised & not enucleated

Excision🡪with a safety margin, with high-recurrence rate tumors

Enucleation🡪we take out the capsule itself, with benign tumors with low-recurrence rate

* **Classification of Parotid Tumors:**
1. **Adenoma**

**Pleomorphic**

**Monomorphic (Warthin’s Tumour)** in hypertensive males above 50 and sometimes it’s bilateral

1. **Carcinoma**

**Low grade (Acinic cell/Adenoid cystic)**

**High grade (Adenocarcinoma/SCC)**

* Management:
* Superficial parotidectomy most common procedure
* Radical parotidectomy is performed for patients clear histological evidence of high grade malignancy
* In CT we find the parotid gland next to the obvious ear pinna.
1. **Tumor-like lesions**

**Sialadenitis**

* Diabetes
* Alcoholism
* Endocrine disorders
* Pregnancy
* Bulimia
	+ **Sjogren’s syndrome**
* Autoimmune condition causing progressive degeneration of salivary and lacrimal glands
* The oral aspects of primary Sjogren's syndrome consist of mucosal atrophy, salivary gland enlargement approximately
* The oral manifestations may include xerostomia with or without salivary gland enlargement, candidiasis, dental caries and taste dysfunction
* Investigations:
* Sialometry
* Sialography; to do cannulation to the duct
* Scintigraphy a radioactive tracer is given by vein that is subsequently taken up by the salivary glands and gradually eliminated within the salivary fluid
* Sialochemistry
* Ultrasonogram
* Labial or minor salivary gland biopsy
* Management:
* Symptomatic
* From the systemic drug treatment standpoint, immunosuppressive therapy in the form of corticosteroids or cytotoxic drugs have proven effective, in particular when symptoms are severe. A drug known as Plaquenil has also proven to be helpful in some cases with open questions remaining as to the role of alpha interferon and nonsteroidal anti-inflammatory drugs.