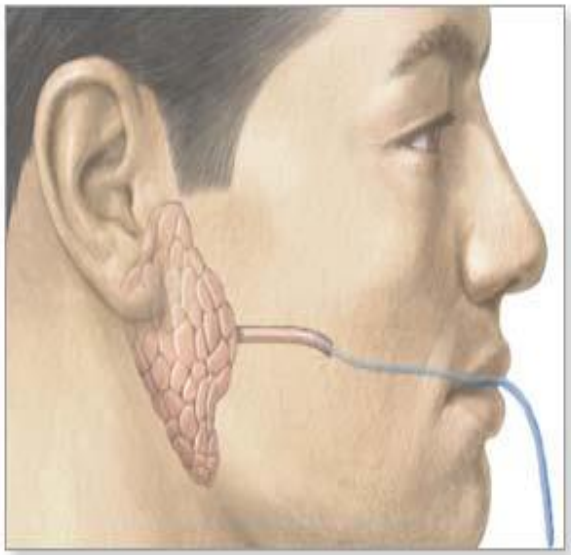
SIALOGRAPHY

III year BDS lecture,

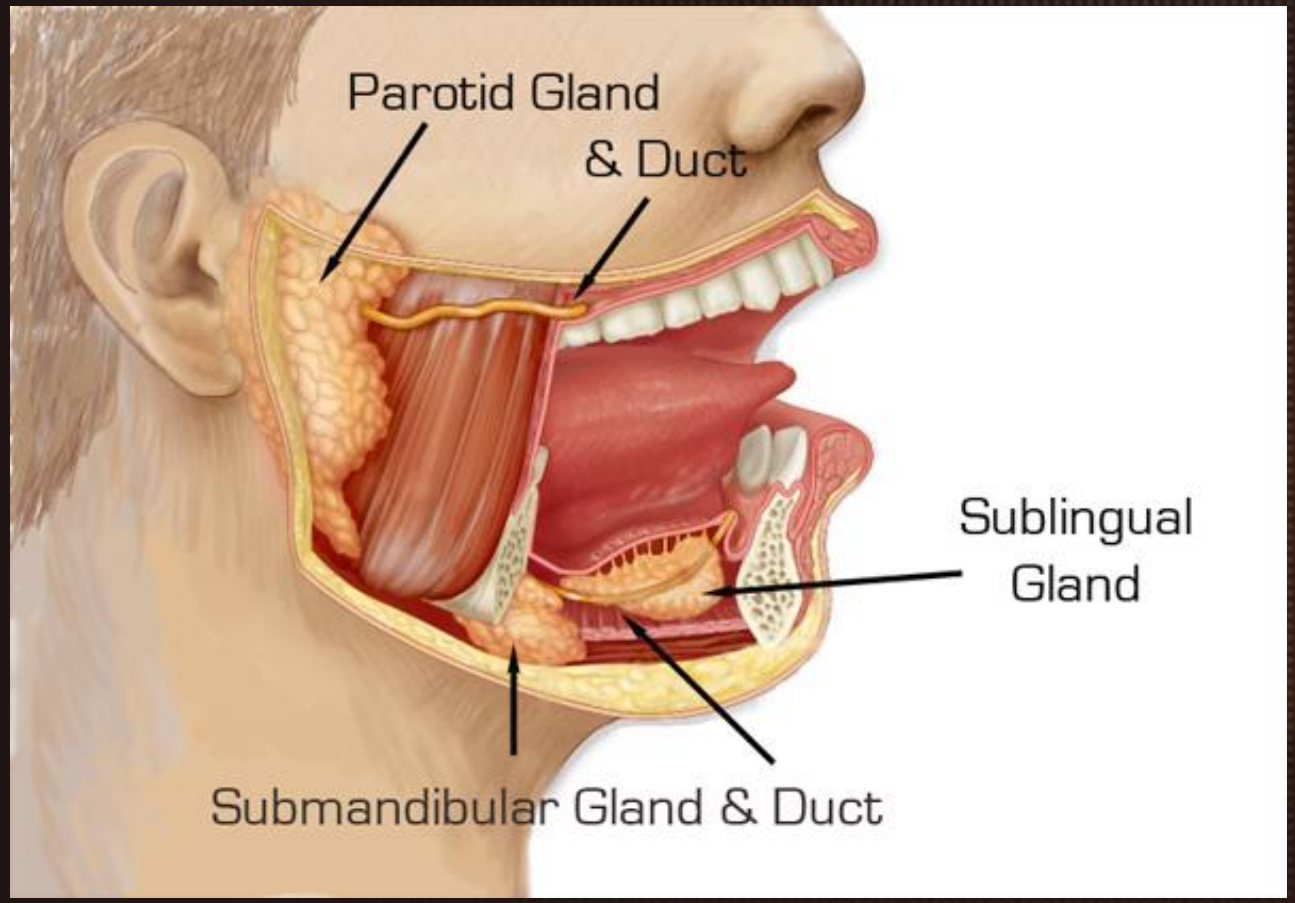
By
Dr Sowmya GV, OMDR, IDS

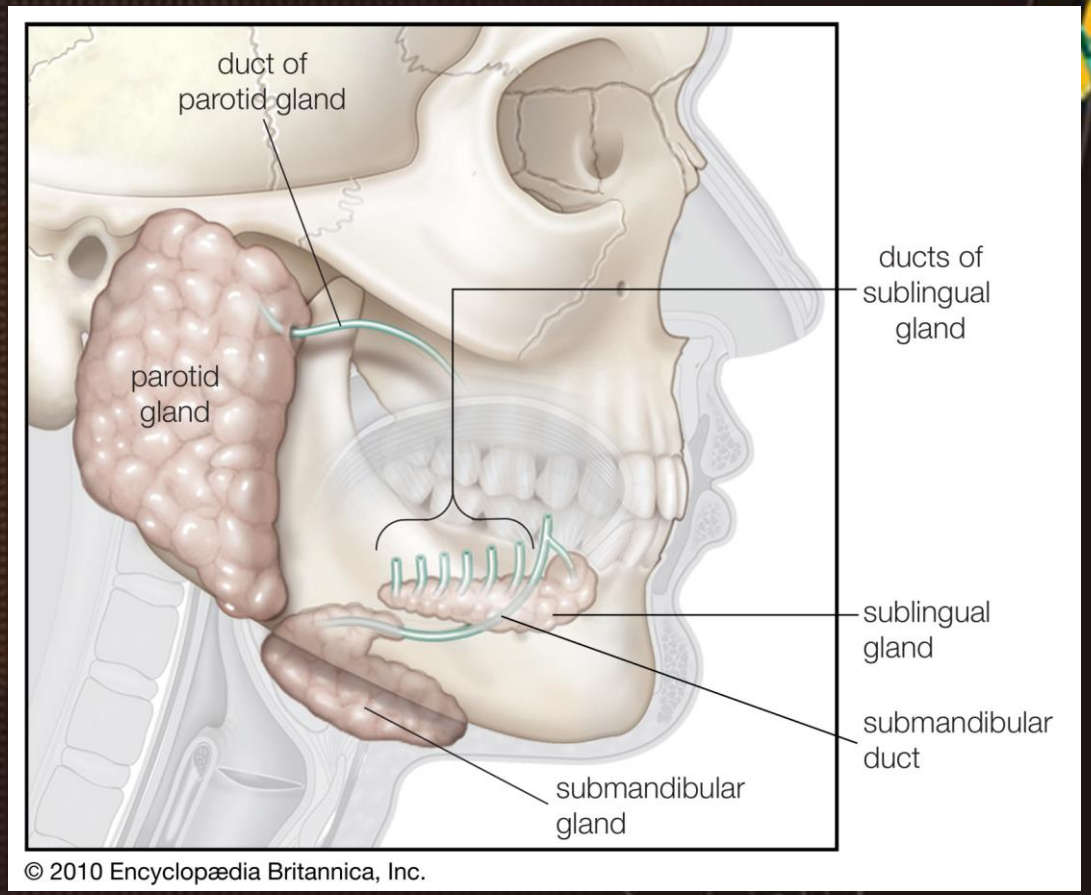


Contrast medium is injected into the salivary gland duct

A.D.A.M.

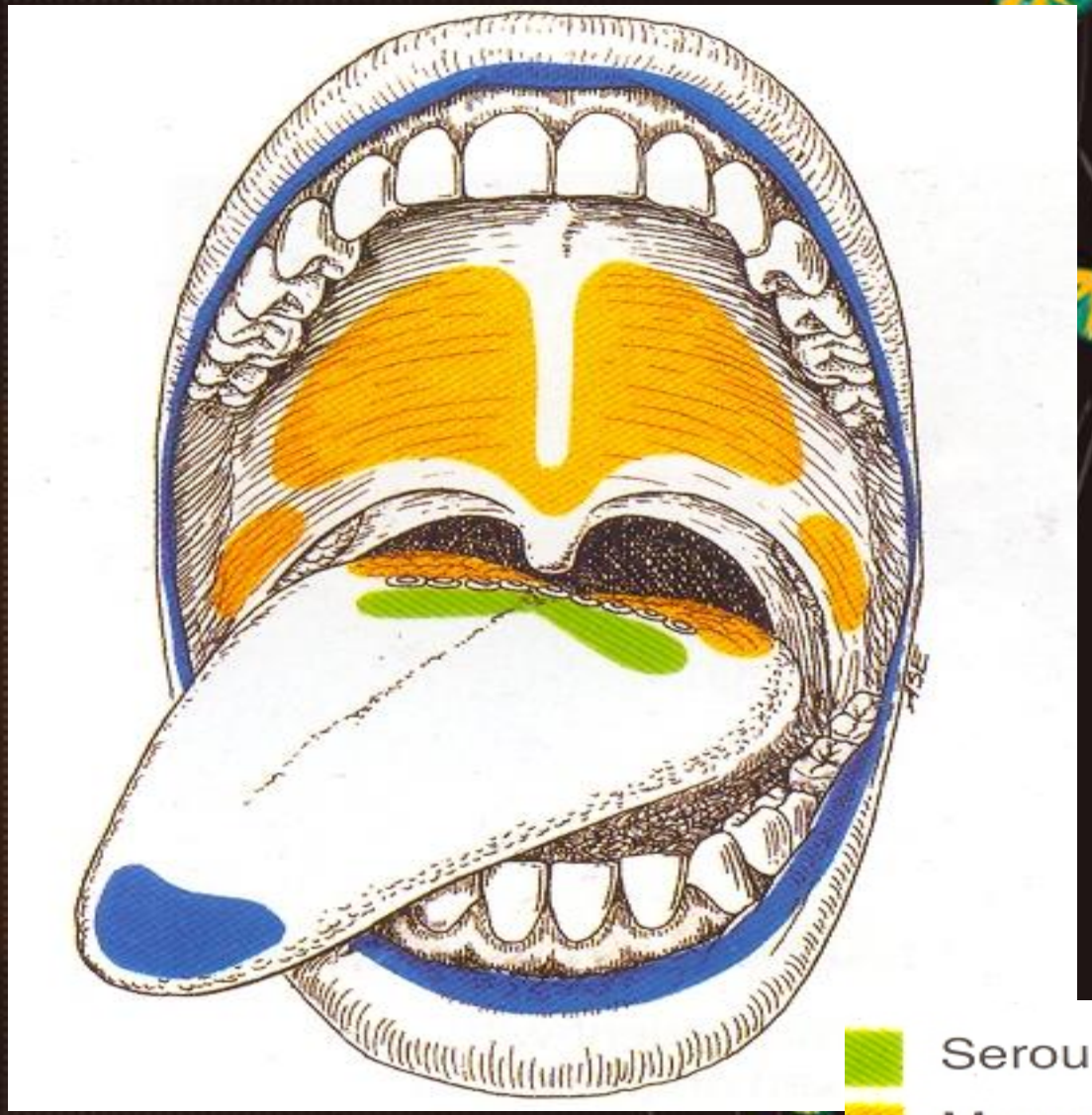
Salivary Glands



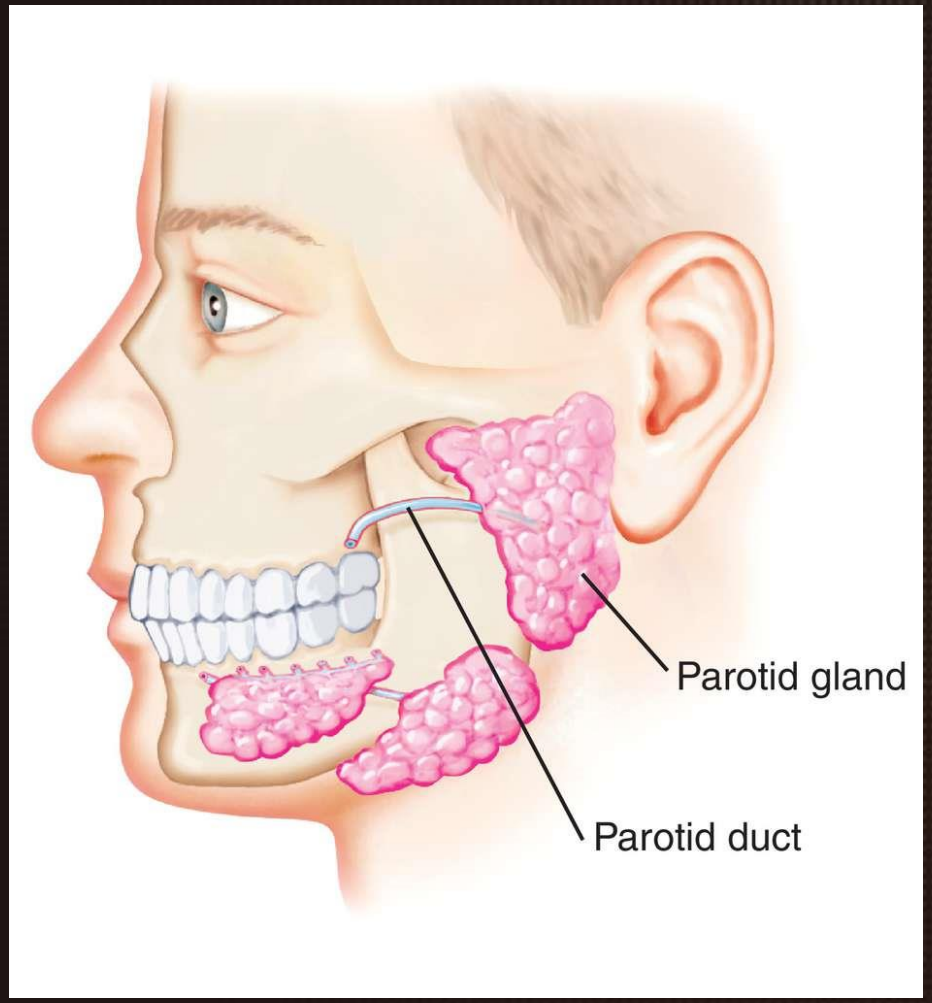


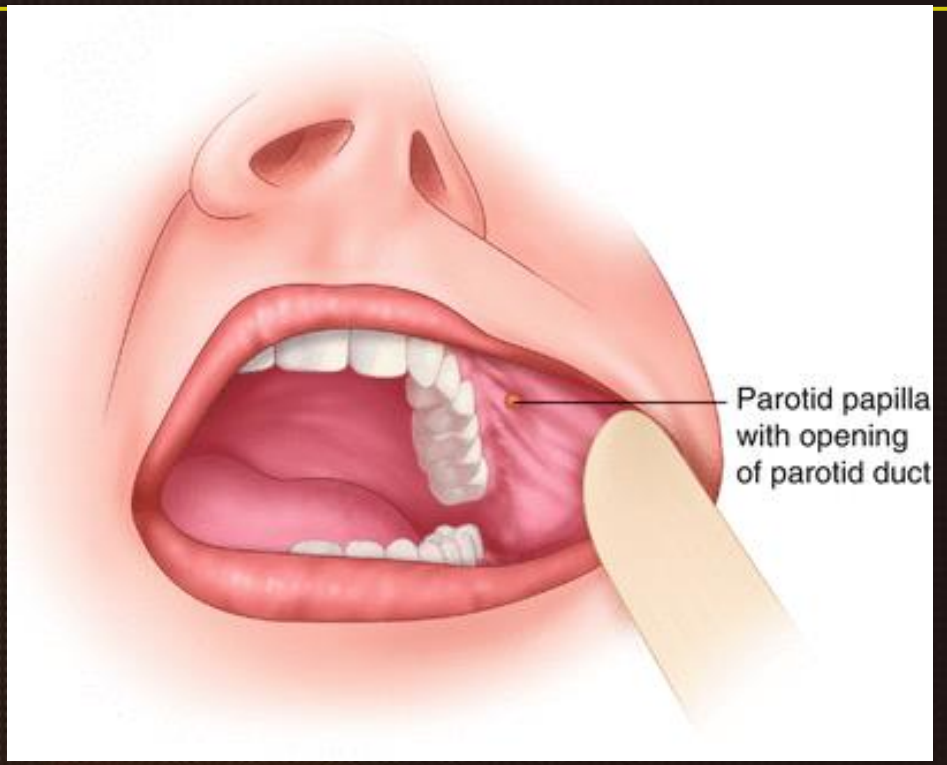
MINOR SALIVARY GLANDS

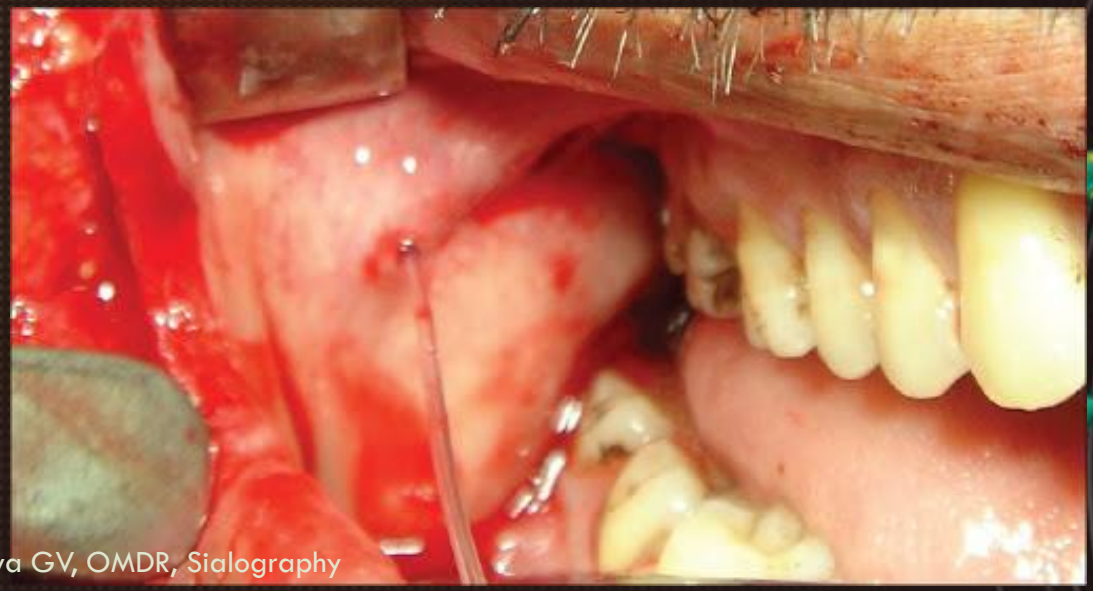
- LABIAL{Superior and Inferior}→Lips
- BUCCAL→Cheeks
- LINGUAL→Tongue
- PALATINE→Hard palate,Soft palate,Uvula
- GLOSSOPALATINE→Ant.Faucial pillar,



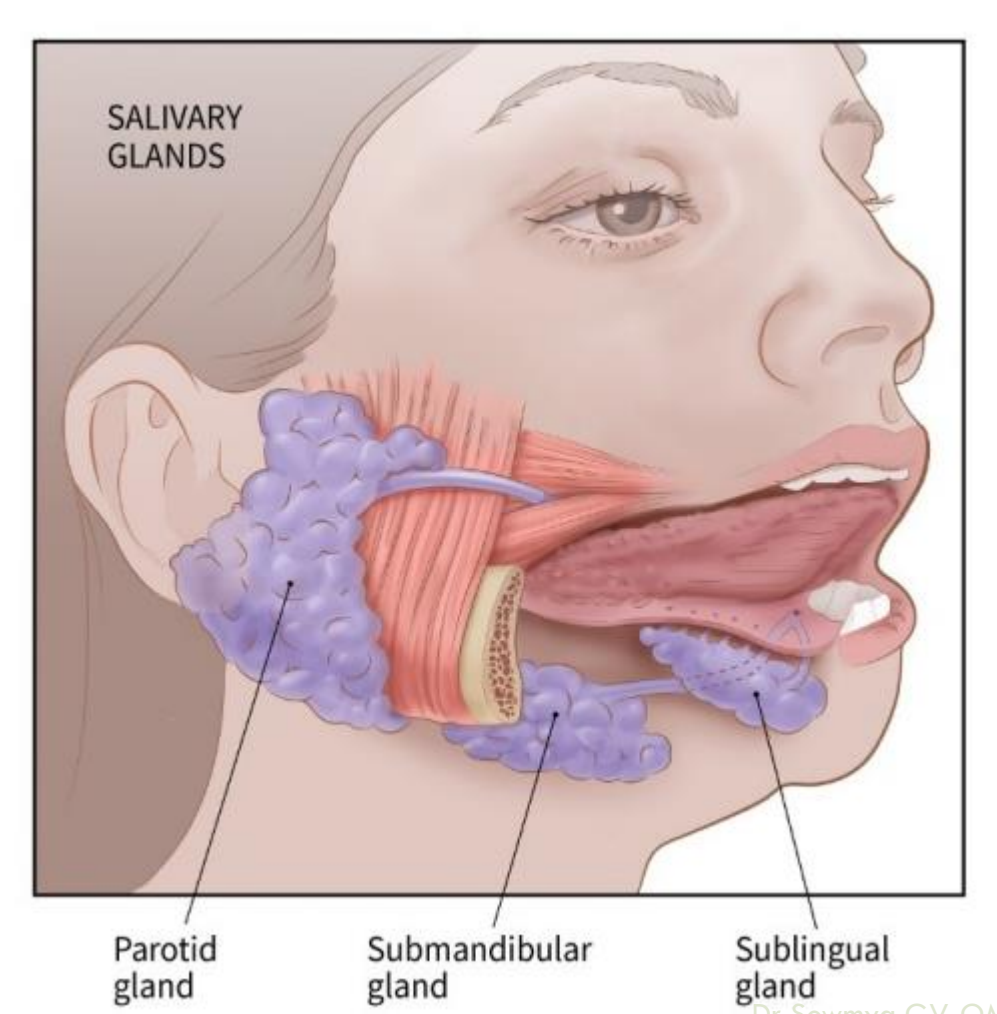
Parotid Gland



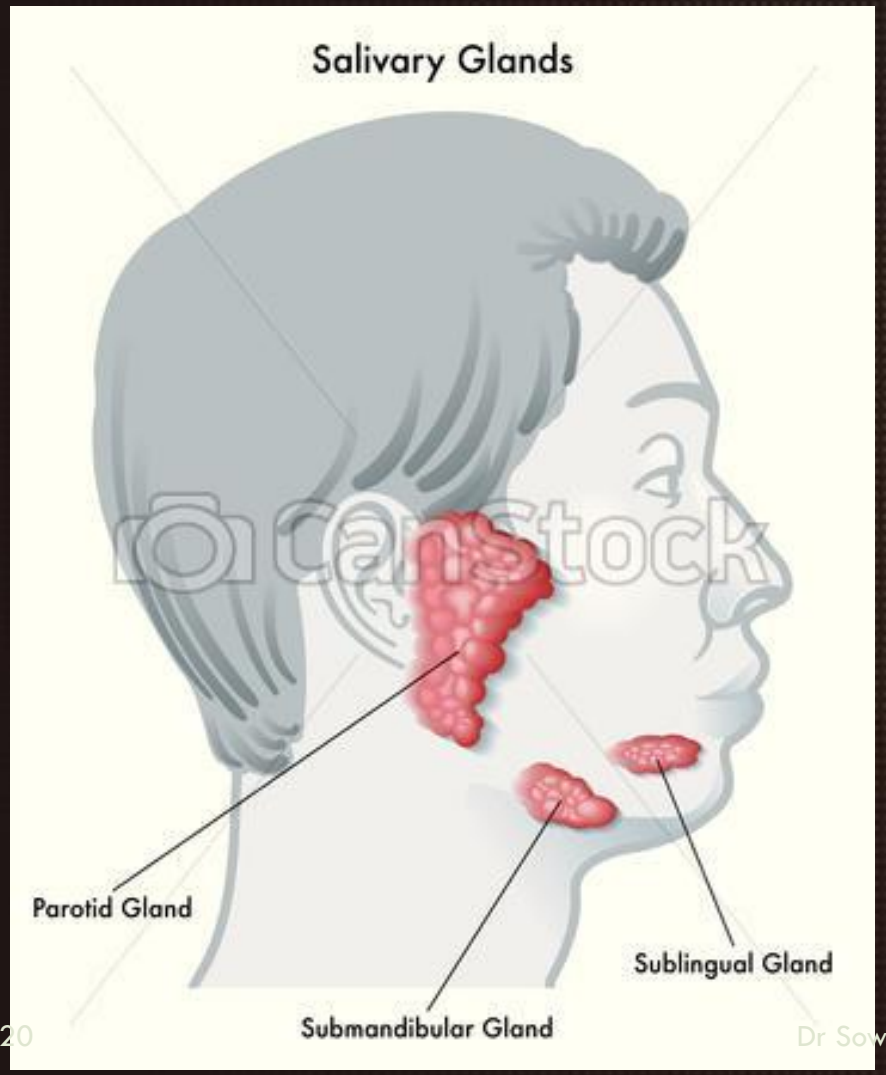


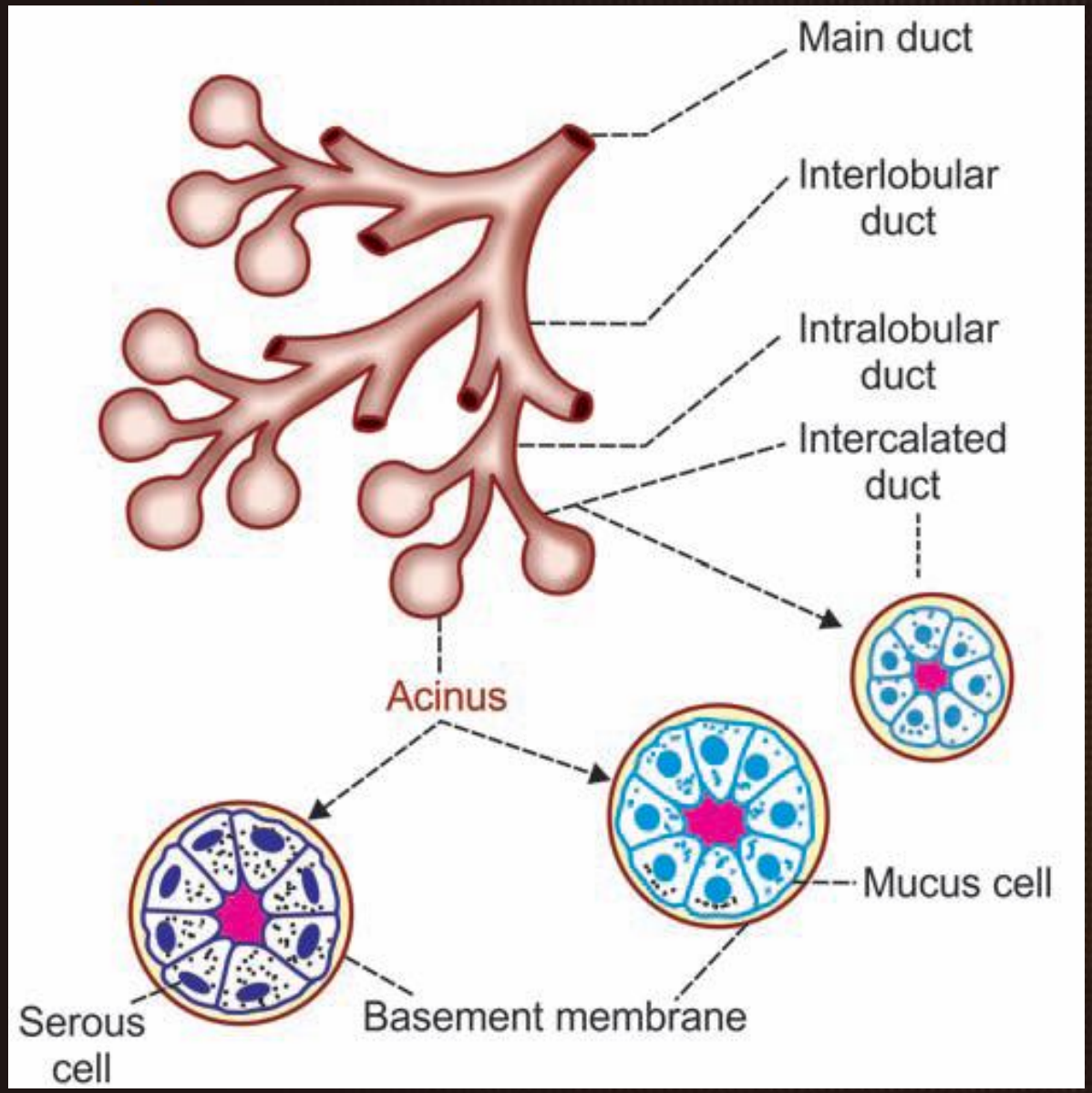


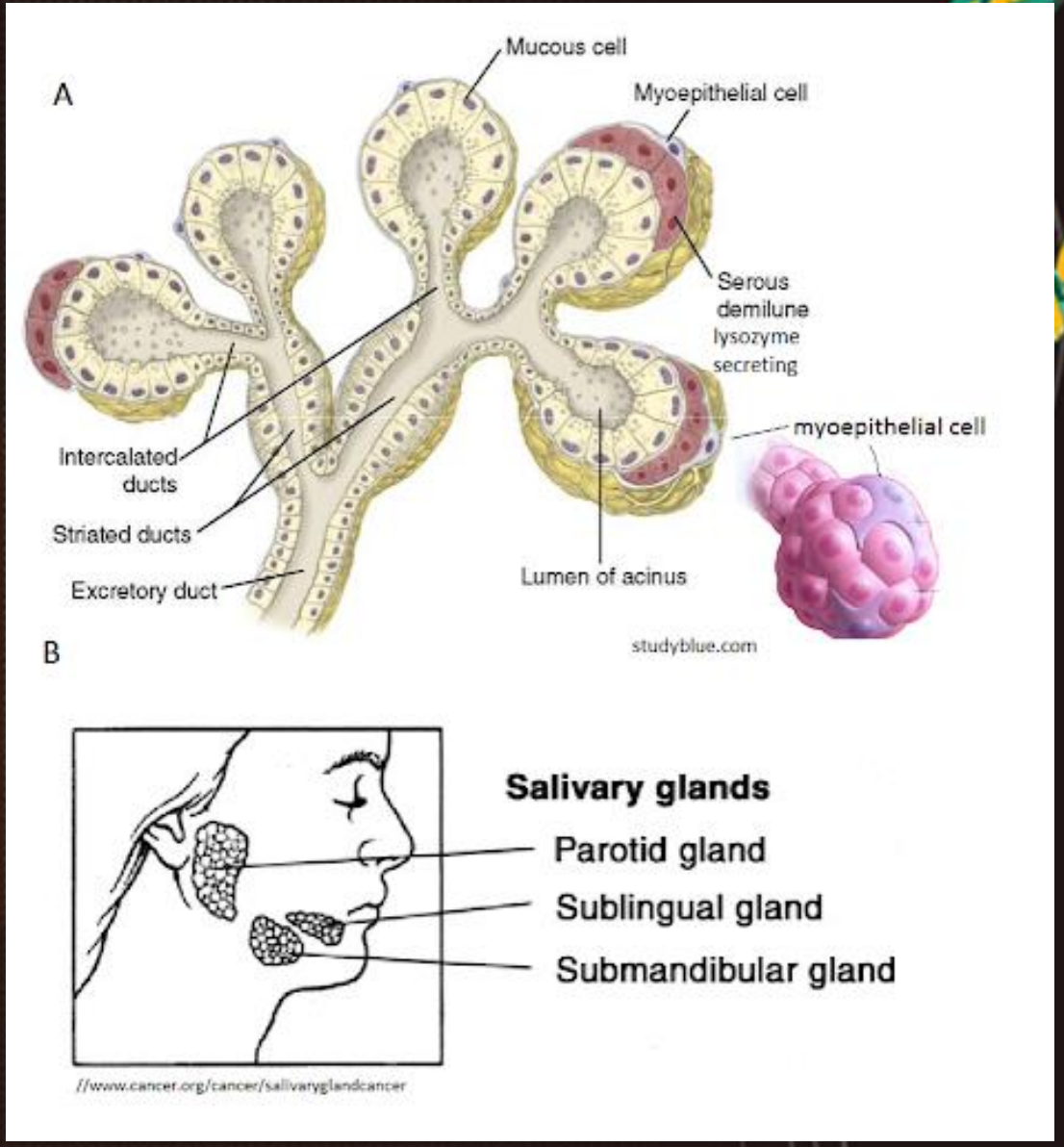
Sub mandibular Gland



Sub lingual gland



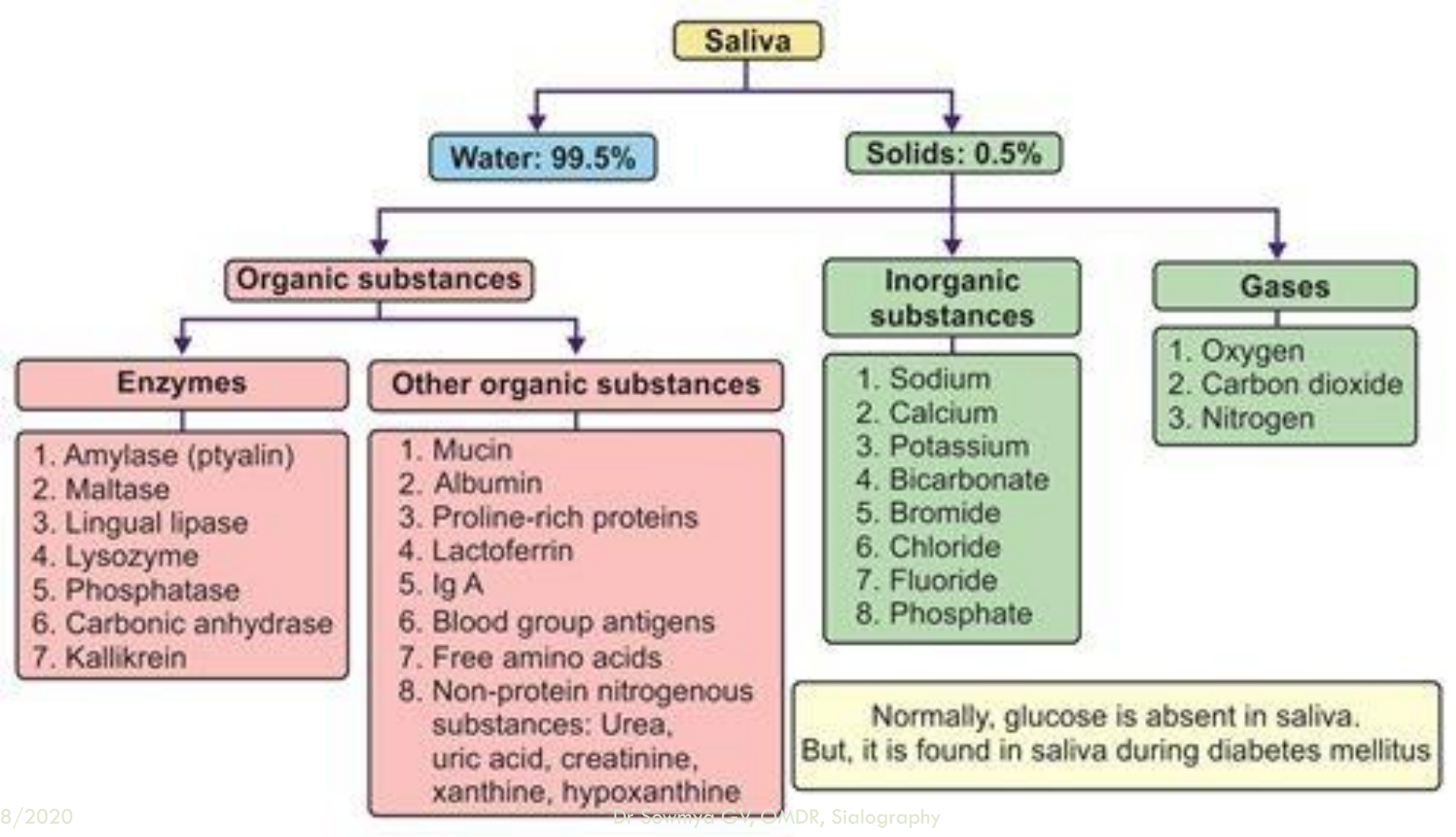

Main duct
Interlobular duct
Intralobular duct
Intercalated duct
Acinus
Mucus cell
Serous cell
Basement membrane


A
Mucous cell
Myoepithelial cell
Serous demilune lysozyme secreting
myoepithelial cell
Intercalated ducts
Striated ducts
Excretory duct
Lumen of acinus
studyblue.com
B
Salivary glands
Parotid gland
Sublingual gland
Submandibular gland
//www.cancer.org/cancer/salivaryglandcancer

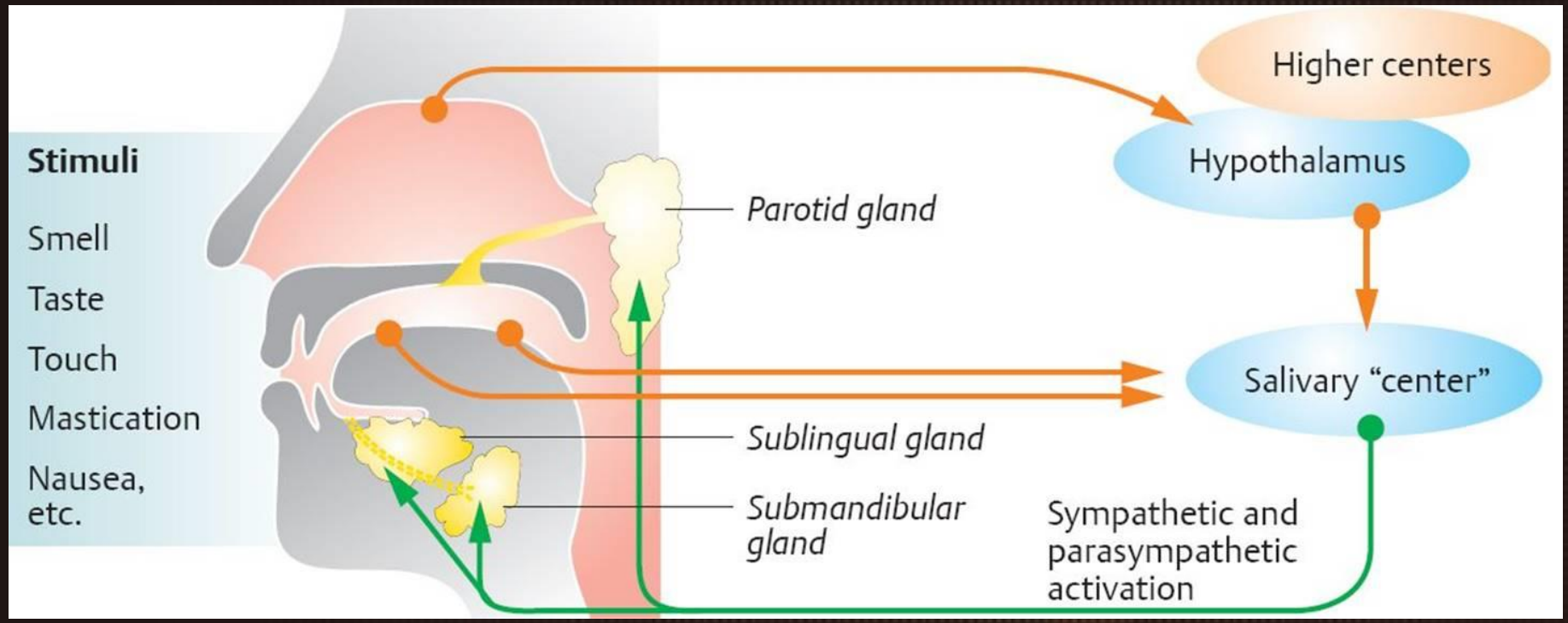
Difference between Serous & Mucous Acini

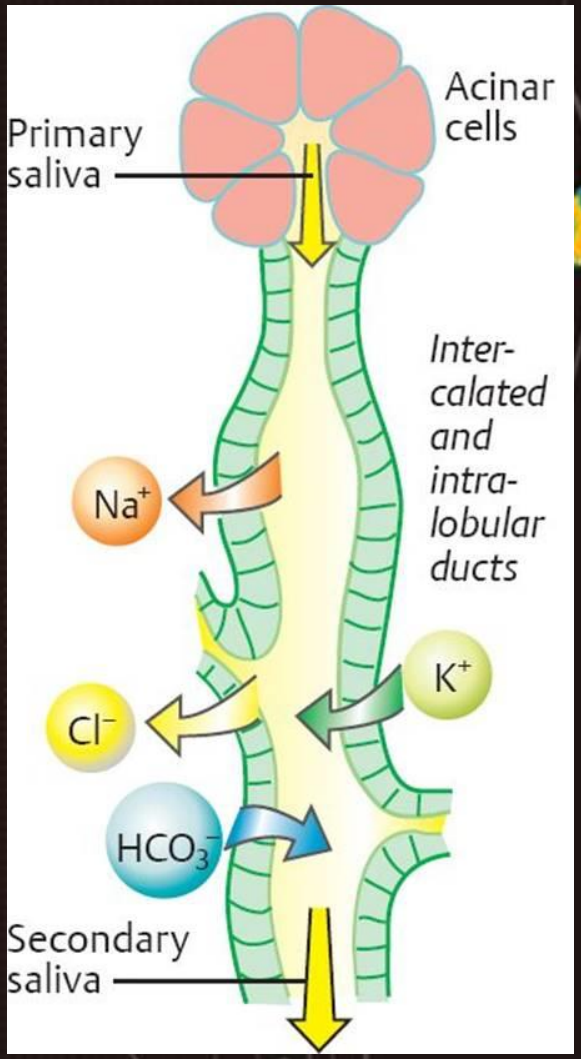
Serous	Mucous
• Thin, watery	• Thick, viscous
• Proteinaceous secretion	• Mucopolysaccharides
• Zymogen granules in cyto	• Mucigen droplets
• Central rounded Nucleus	• Nucleus-flat & peripheral
• Small Lumen	• Large Lumen
• Indistinct cell bondaries	• Distinct cell boundaries
• Darkly stained	• Lighly stained
• Enzymatic action	• Protection & lubrication
• Parotid Gland	• Sublingual gland

Composition of Saliva



Regulation of Salivary secretion





Sialography – Introduction

- It is an invasive retrograde procedure in which a Radio-opaque dye is injected into the gland via the intra-oral opening of Stenson's or Wharton's ducts.
- Is a radiographic procedure that is a useful diagnostic adjunct for the detection and monitoring of salivary gland diseases that change the internal architecture.
- This technique is used to examine the ductal and acinar systems of the major salivary glands.

- First performed in 1902
- **1925 Barsony** introduced the technique (20% KI) .

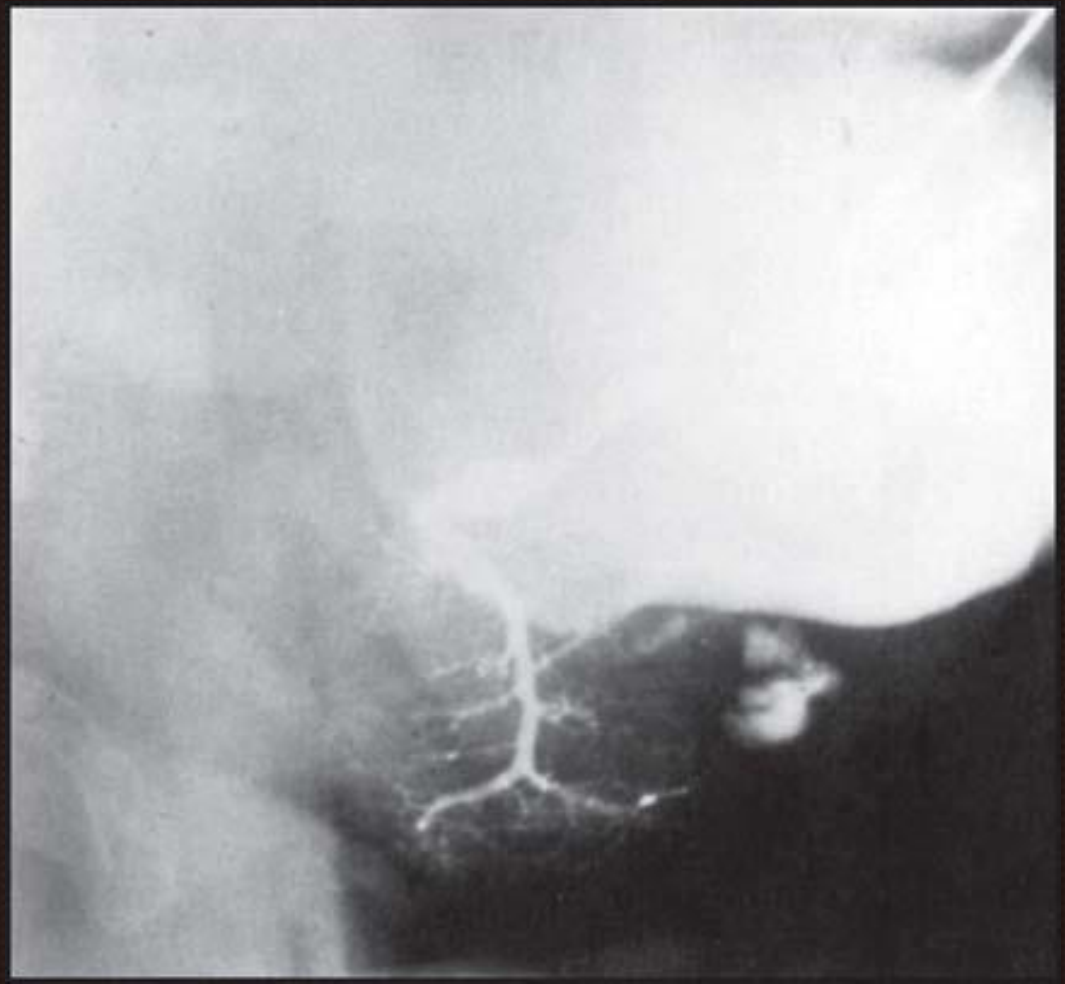
Injection of the opaque material through the opening of the parotid duct demonstrated the absence of an obstruction

INDICATIONS FOR SIALOGRAPHY

1. Detection of calculus or calculi or foreign bodies, whether these are radiopaque or radiolucent.
2. Determination of the extent of destruction of the gland secondary to obstructing calculi or foreign bodies.
3. This will aid in deciding whether a total excision of the gland or a simple lithotomy should be performed.
4. Detection and portrayal of fistulae, diverticula or strictures.
5. Determination and diagnosis of recurrent swellings and inflammatory processes.
6. Demonstration of a tumor and the determination of its location, size and origin, whether the radiograph suggests a benign or a malignant lesion.

- Selection of a site for biopsy.
- Outline of the plane of the facial nerve as a guide in planning a biopsy or dissection.
- Detection of residual stone or stones, residual tumor, fistula or stenosis; or retention cysts following simple lithotomy or other surgical procedures.
- Sialography has also been recognized as a therapeutic procedure because:
  - ✓The dilatation of the ductal system produced during the study may aid in the drainage of the ductal debris.
  - ✓The therapeutic effect produced by the iodinated contrast media when injected into the ductal system has also been seen.

Submandibular gland sialolith



CONTRAINDICATIONS

1. Patient with a known **sensitivity to iodine** compounds and patients who have experienced severe asthmatic attacks or anaphylaxis following use of iodine compounds in a prior radiologic examination.
2. The use of Sialography during a **period of acute inflammation** of the salivary system is contraindicated.
   - During this period the ductal epithelium may be disrupted, and escape of the contrast medium from the ductal system into the parenchyma can produce severe foreign body reaction, accompanied by severe pain.
   - This is specially true when the oily contrast medium is used.

3. The administration and retention of the iodinated contrast material may interfere with subsequent **thyroid function tests,** such function studies if required, should be done prior the sialography procedure.

Contrast agents

An ideal sialographic contrast media should have the following characteristics:

I. Physiological properties similar to that of saliva.

II. Miscibility with saliva

III. Absence of local or systemic toxicity.

IV. Pharmacological inertness.

V. Satisfactory opacification.

VI. Low surface tension and low viscosity to allow filling of fine components of the ductal system.

VII. Easy elimination, but should be durable for sufficient time so as to permit time for satisfactory radiographs.

VIII. Residual contrast media should be absorbed by the salivary gland and detoxified by the liver or excreted by the kidney.

i.	*Water soluble media*	ii.	*Fat soluble media (Oil Based)*
a.	These are principally iodinated benzene or pyridone derivatives.	a.	There are two types of fat soluble contrast media. 1. Iodized Oil. 2. Water Insoluble Organic Iodine Compounds.
b.	These compounds have a low viscosity, less surface tension and are more miscible with the salivary secretions.	b.	These compounds are more viscous have more surface tension and are less miscible with the salivary secretions.
c.	These physical characterstics permit filling of the finer ductal system under lower pressure and facilitate prompt drainage.	c.	It requires a higher injection pressure than that of the water soluble media, to visualize finer ducts. Oil based media is poorly elimi nated and causes ductal obstruction.
d.	Causes less pain or discomfort, with no granulomatous reac-tion, in the glands.	d.	Usually accompanied with pain and a lot of discomfort. Extravasation of the fat soluble media can produce severe foreign body reaction with focal necrosis of the parenchyma and stroma.
e.	Opacification of the water based media is not as good as that of oil media.	e.	The fat soluble contrast media on the whole pro-duces a satisfactory degree of opacification. This a an excellent media if the ductal systems under examination are intact.
f.	The excretion of the contrast media is very rapid.	f.	The excretion of the con-trast media is slow and gives adequate time to carry out the various radio-graphic procedures.
g.	Hydropaque and Renografin are the available water soluble contrast media.	g.	Ethidol is the available fat soluble contrast media.

- Fat or water soluble agents 37% iodine.
  - Fat soluble eg – Lipidol .

- Water soluble , more commonly used.
  - Sinografin (diatrizoate meglumine) 38% iodine content.

PROCEDURE

1. PREOPERATIVE PHASE

- Preliminary plain films evaluation **- "scout" film**
  - Parotid OPG, AP view, lateral oblique veiw.
  - Submandibular – OPG, mandibular occlusal veiw.

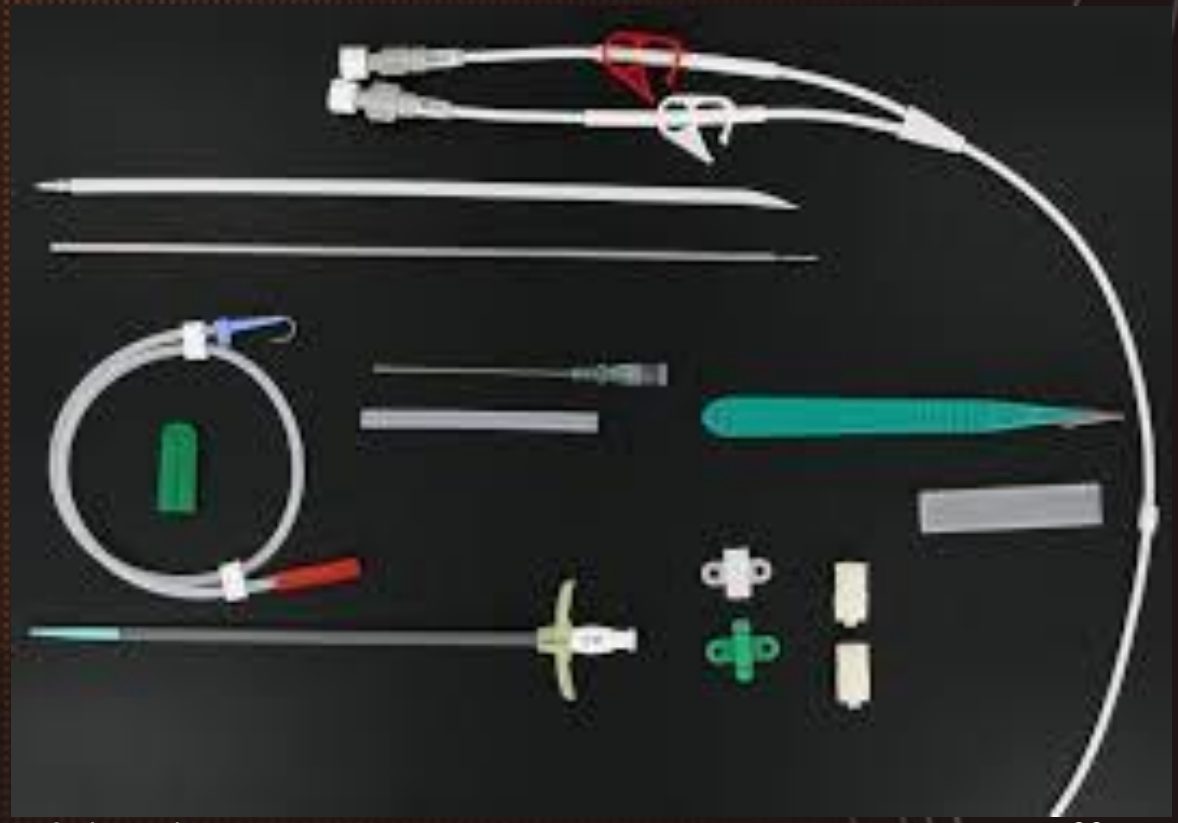
2. INJECTION OR FILLING PHASE - Cannulation – Ductal orifice identified, probed, cannulated, pushed posteriorly.

- Contrast medium introduced.

Equipment's required-

- Polyethylene tubing with a special blunt end metallic tip with – side hole for parotid gland. – end terminal hole for submandibular gland.
- 5 or 10 cc syringe.
- Lacrimal dilators.
- Contrast media.
- Sialagogue, like 5 lemon slices or lemon extract

or chewing gum.



Injection Techniques

- **SIMPLE INJ.** - Hand injection , using a steady, constant pressure, under fluoroscopy , until pt experiences tightness , **0.75-0.76 ml parotid , 0.5 ml sub mandibular.**

- Hydrostatic tech
- Continuous infusion pressure monitored tech

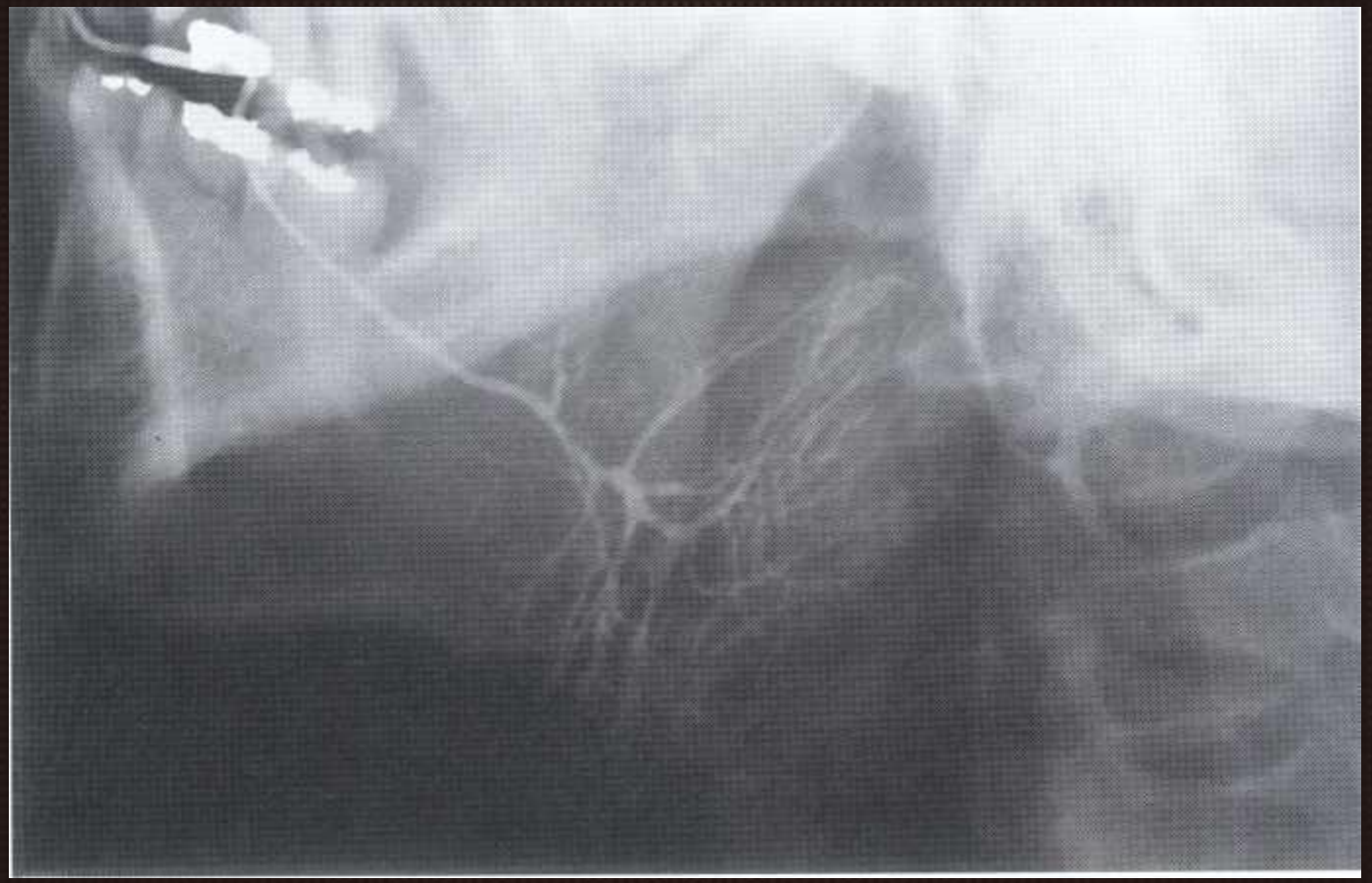
Different radiographs taken……

- **Lateral oblique projection and/or mandibular occlusal view** is used to delineate the submandibular gland. In the lateral oblique the duct pattern is not distorted and a sialolith is seen well on the occlusal view.
- **AP view** of both glands demonstrates the medial and lateral gland structures. In case of the parotid gland the patient should be asked to keep the mouth open.
- **Panoramic projection** may also be taken. This is helpful in studying erosion of bone or destruction of the mandible, in case of salivary tumors.

PHASES OF SIALOGRAPHY -

- The closed system technique is frequently recommended for making sialograms.
- **Ductal phase** – Injection of contrast & terminates once parenchyma starts to become hazy .
- Normal parotid sialogram - main duct to be of uniform caliber & extends from the ductal orifice – hilus.
- Intra ductal portion of the ductal system progressive arborization of secondary & tertiary ducts –leafless tree.

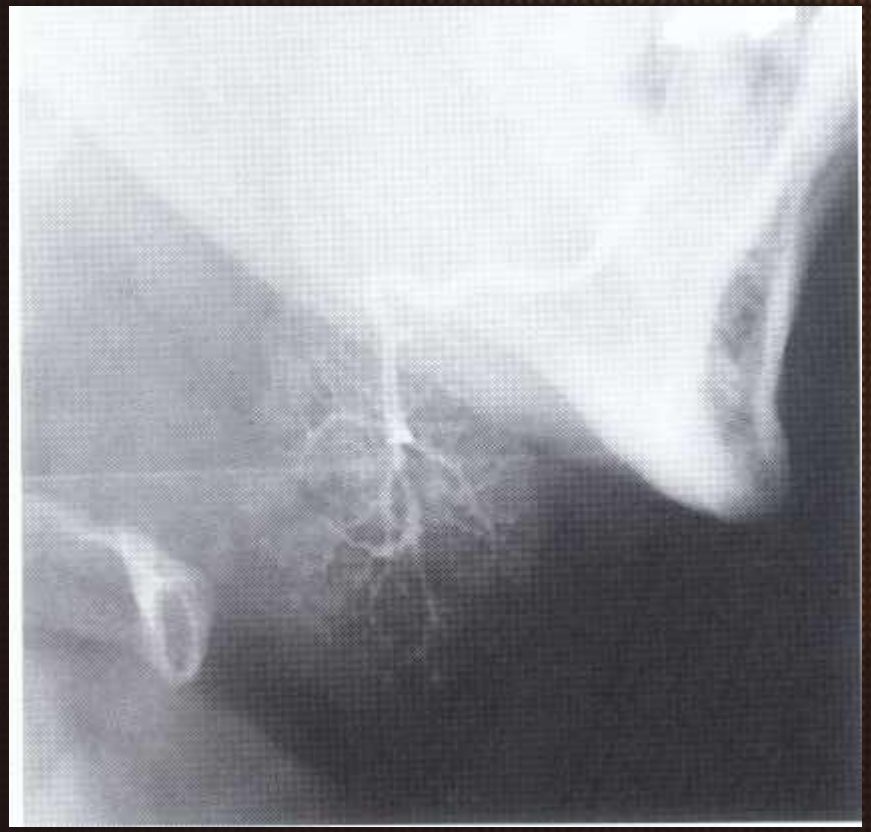
Sialogram of normal submandibular gland. This lateral view demonstrates the ductal filling stage before parenchymal opacification.



The image of the ductal system appears as "tree limbs," with no area of the gland devoid of ducts.

ACINAR PHASE

- With the completion of ductal opacification & ends generalized density of the gland.



With acinar filling, the "tree" comes into "bloom," which is the typical appearance of the parenchymal opacification phase

EVACUATION PHASE

- Secondary functions of the gland as well as demonstrating the ductal pathology that might not have been evident on other views.
  - **First phase** – evaluating the non stimulated evacuation of gland & ductal system, fluoroscopic exam over 1 min.

- **Second phase** – Evaluating the glandular response to stimulation using a sialogogue & intermittently monitoring the clearing of the gland.
- Non clearing or incomplete clearing of the gland may be due to a stricture, a sialolith or an underlying physiologic abnormality.

- Lateral jaw, lateral oblique or AP radiographs should be made 5 minutes after removal of the cannula. They provide the information about the excretory function of the gland.

- Normal salivary gland will excrete 100 percent of the contrast dye within 5 minutes after removal of the cannula.

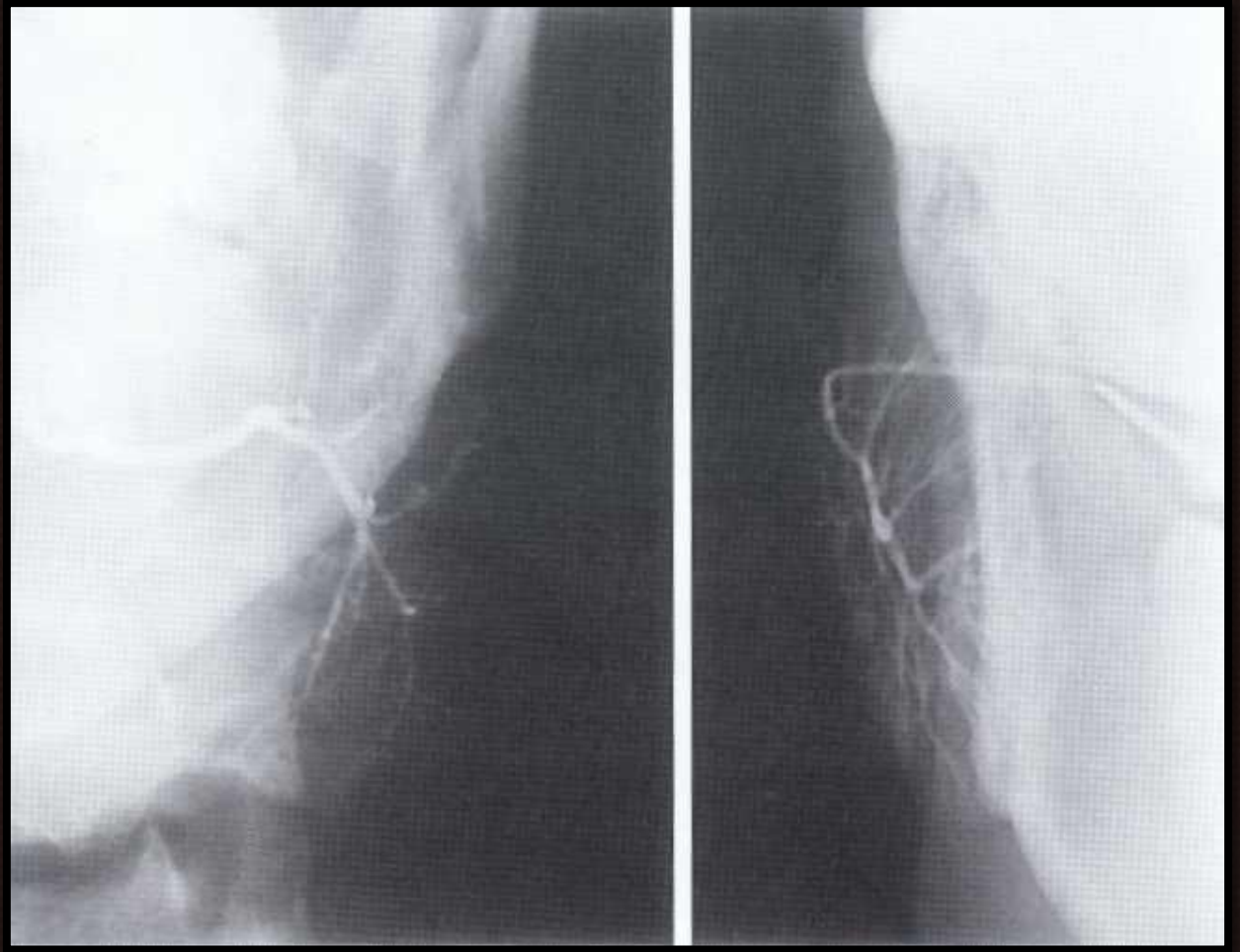
Additional views which may be taken to study special features are:

1. Reverse basilar view to demonstrate the deep portion of the parotid.
2. A film made with the cheek in the blow-out position in the anteroposterior view to demonstrate the superficial portion of the course of the Stenson's duct of the parotid gland.
3. Occlusal view for demonstration of the distal submandibular gland's Wharton's duct.
4. Filming of the filling phase with the mouth open will reduce superimposition of the mandible on the parotid gland.

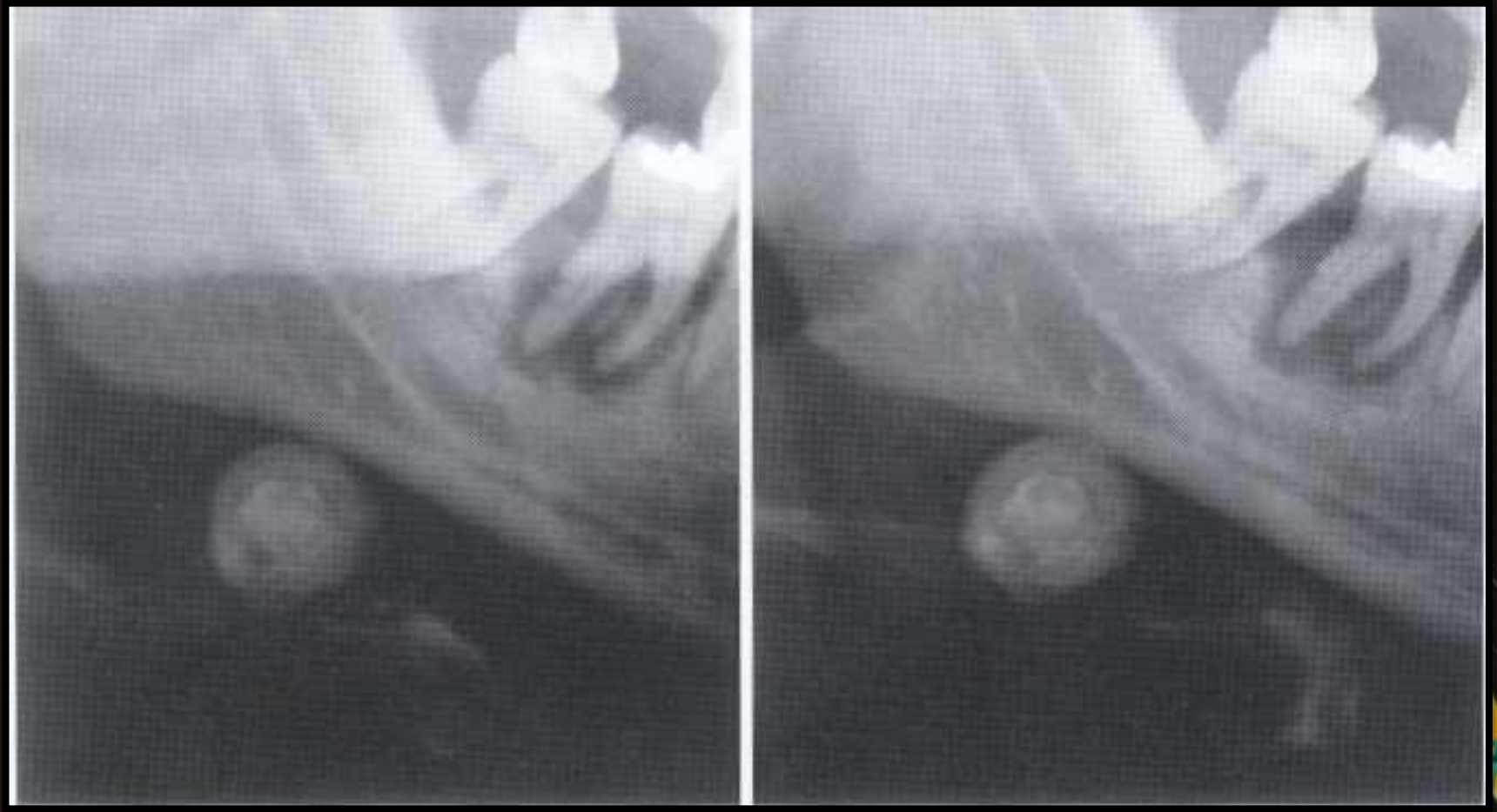
5. Stereoscopic studies are invaluable for the study of the spatial relationships of the gland and the duct.
6. Subtraction views are of great value in the delineation of the finer ducts and of the sublingual ductal system.
7. Plesioradiography is a technique in which a small X-ray tube is placed in contact with the facial soft tissues contralateral to the gland being examined in an attempt to eliminate the obscuring overlying bony structures.

Occlusal view with sialolith

A, PA projection of the submandibular gland
B, PA projection of the parotid gland



Stereoscopic panoramic plain film projections



CT SIALOGRAPHY

- Sialography can be performed in conjunction with CT (CT Sialogram).
- It was initially introduced as a means of enhancing the visualization of salivary masses on early CT .
- Detect masses in dense parotid & sub mandibular glands , suspected clinically not be demonstrated on routine non contrast or contrast enhanced CT studies.

CAUSES OF SIALOGRAM FAILURE

- Failure to locate & cannulate duct.
- Perforation of the duct into the cheek or floor of the mouth.
- Sub optimal filling of the ductal system.
- Complete acinarization of the gland so that all ductal detail is obscured.

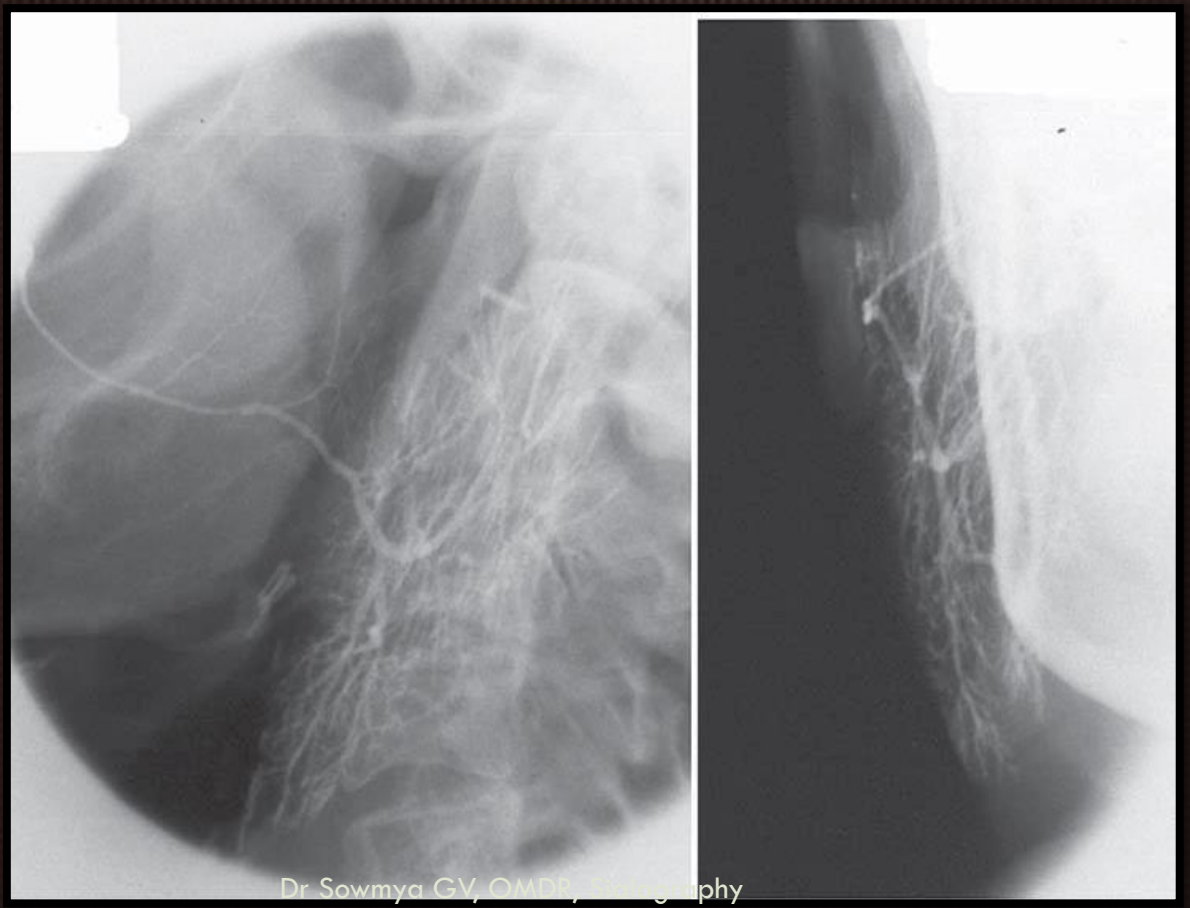
COMPLICATIONS

- Post procedure infection or inflammation may be caused by the incomplete draining of the gland , diminished salivary secretions, or retrograde dissemination of bacteria in an infected duct.

- Ductal rupture & contrast extravasation are infrequent complications.

SIALOGRAPHIC INTERPRETATION

- NORMAL PAROTID – **TREE IN WINTER (tree limb pattern)**



SUB MANDIBULAR – BUSH IN WINTER .

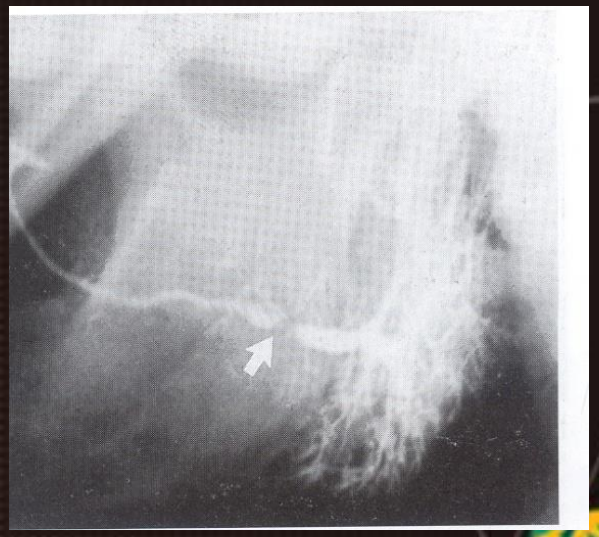
PATHOLOGICAL APPEARANCES

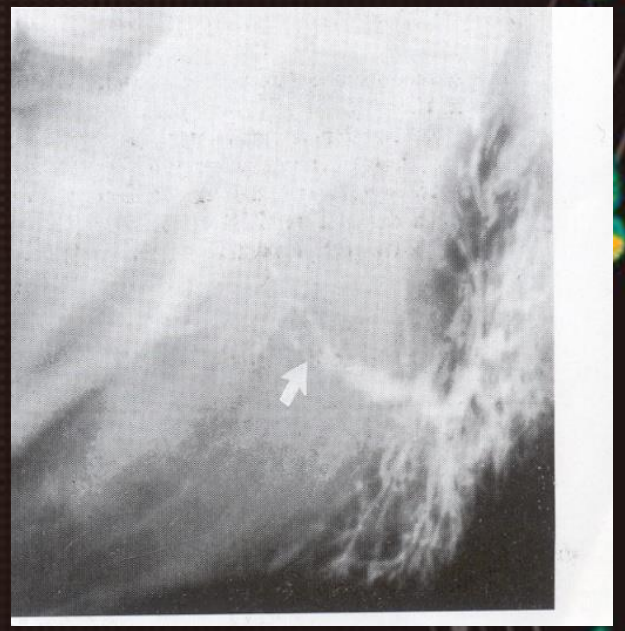
Ductal changes

Calculi –Filling defects main ducts.

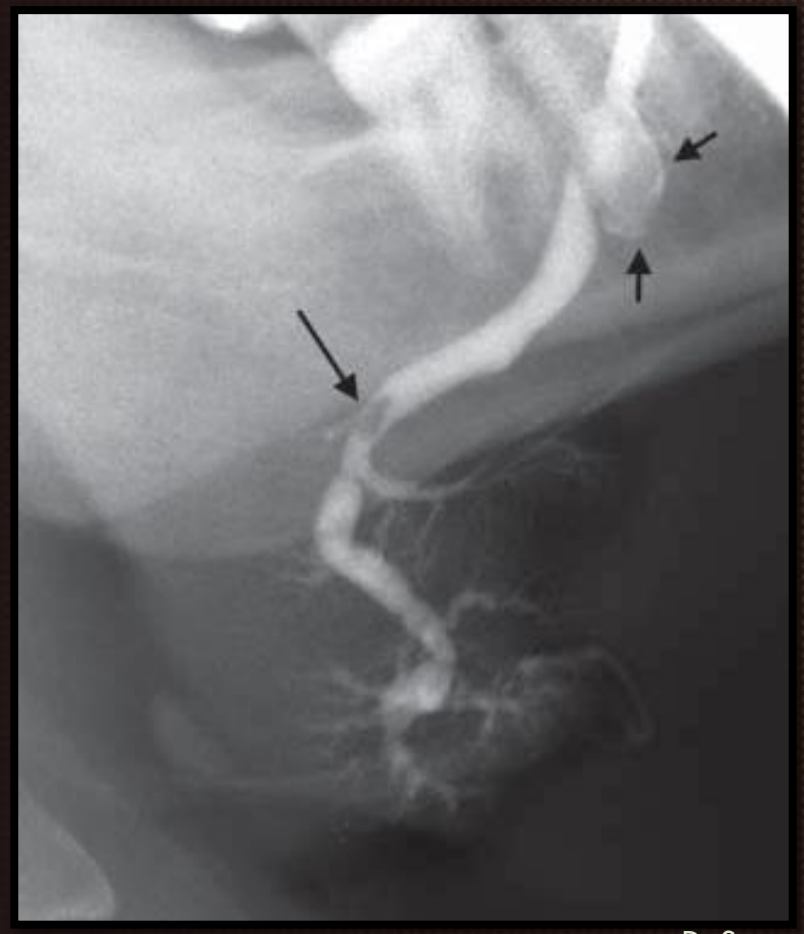
Ductal dilatation proximal to the calculi.

Contrast retained behind stone.



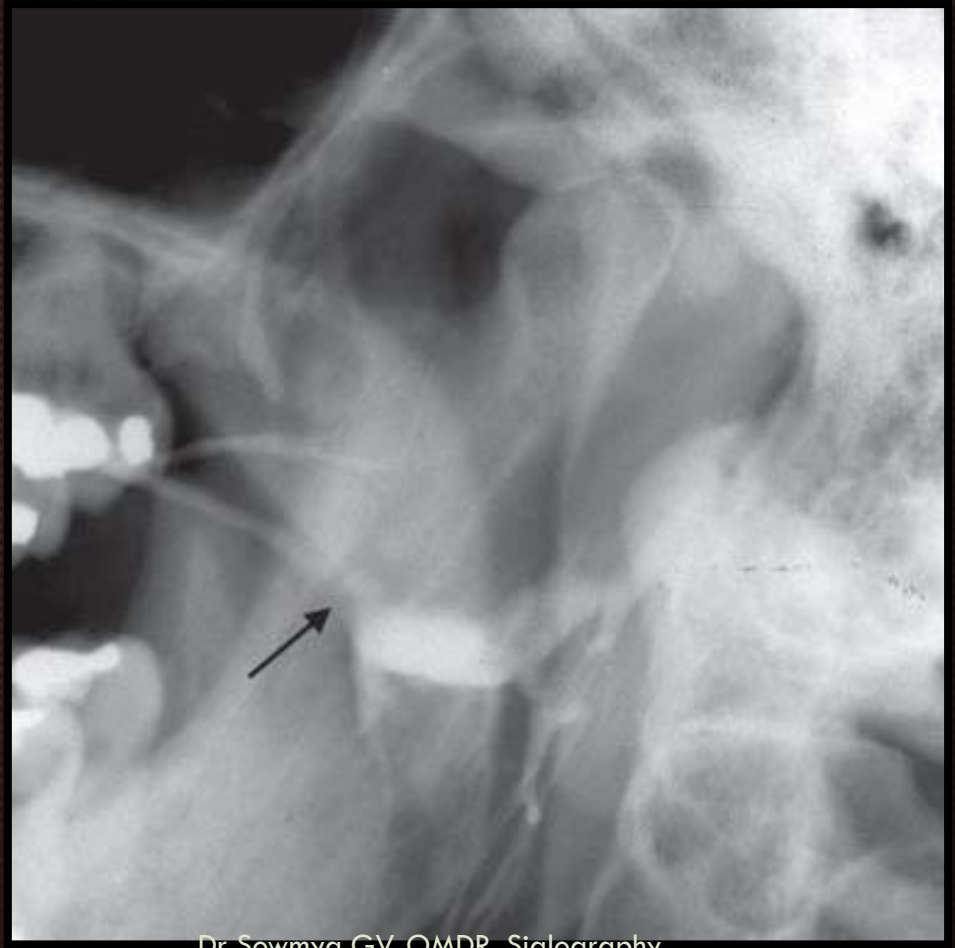


Sialograph of the same patient demonstrating flow of contrast past the stone *(short arrows)* and a negative filling defect *(long arrow)* from a smaller radiolucent sialolith. The proximal secondary ducts within the gland show abnormal irregular widening indicating sialodochitis.

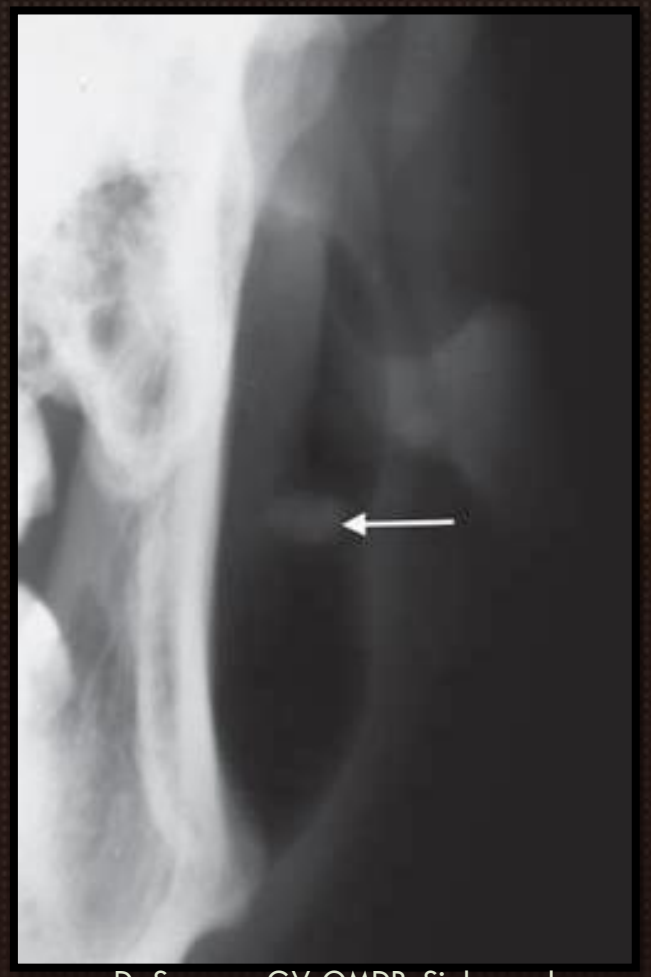


Sialography should not be performed if a radiopaque stone has been shown by plain radiography to be in the distal portion of the duct because the procedure may displace it proximally into the ductal system, complicating subsequent removal

The filling defect *(arrow)* and abnormal dilation of the proximal ducts.



Cropped view of a posteroanterior skull view as part of a parotid investigation; the cheek has been puffed out, providing air contrast and revealing a poorly calcified sialolith *(arrow)*.

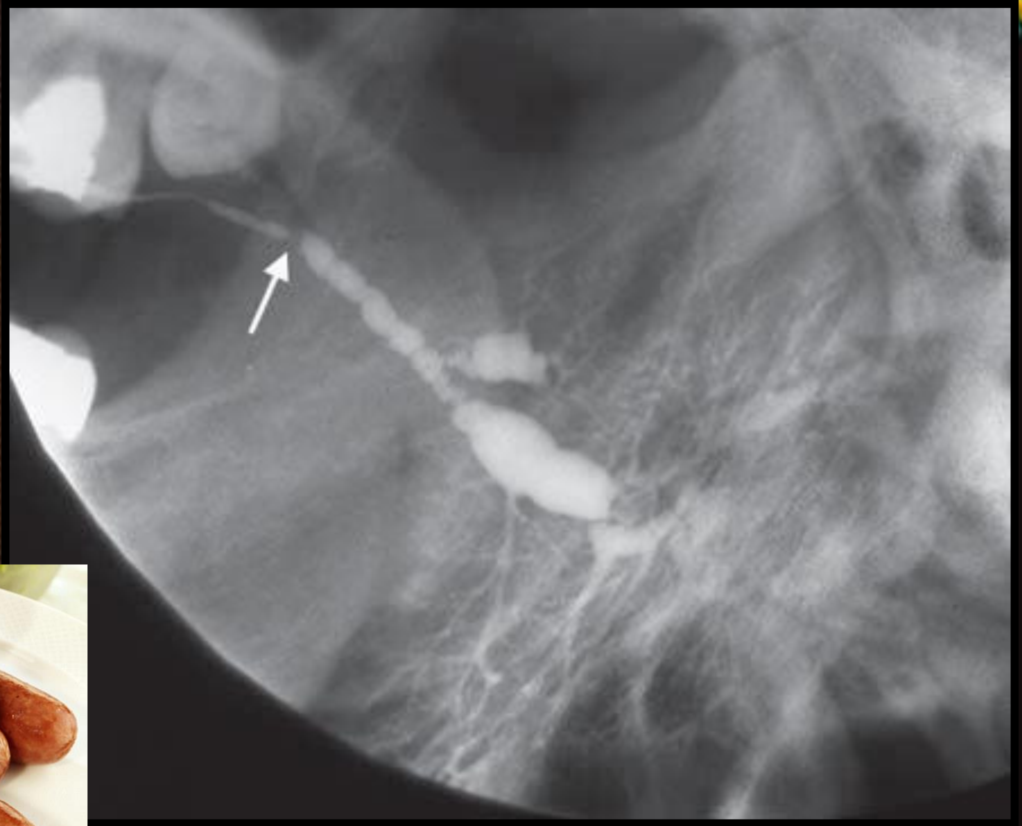


Cropped view of a posteroanterior skull view of the sialograph of the same patient with the negative filling defect representing the sialolith *(arrow)*

Sialodochitis – Ductal infl / infection

Segmented sacculation or dilation & stricture of the main duct – **sausage like appearance**.

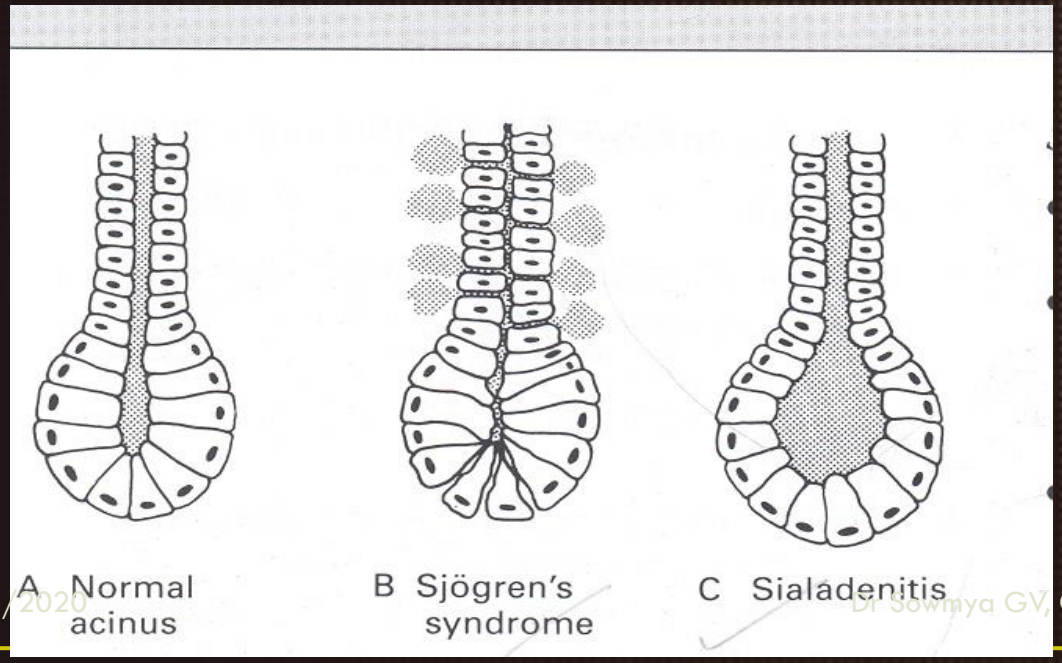
Lateral view of a sialogram of a parotid gland demonstrating a negative fill defect *(arrow)* representing a noncalcifi ed sialolith and prominent intermittent stricture and dilation of the main and secondary ducts, which is typical of advanced sialodochitis.

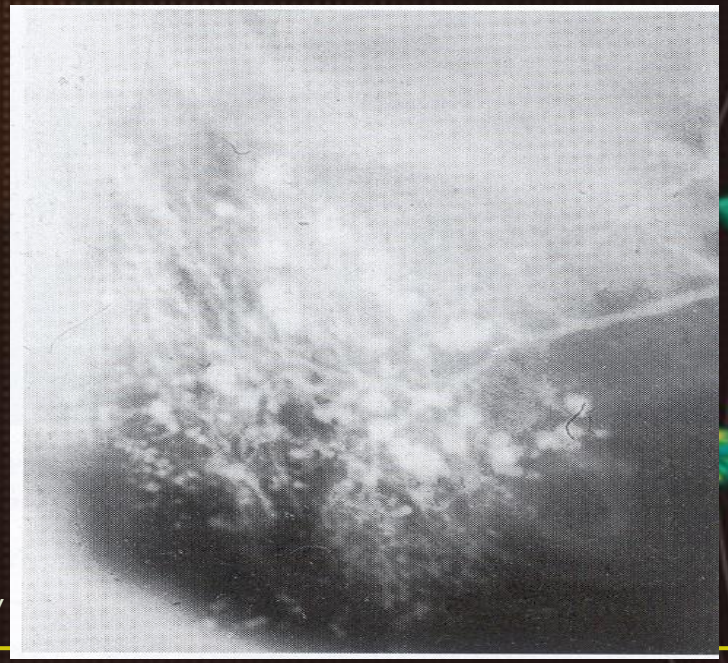


GLANDULAR CHANGES

Sialadenitis – glandular infl / infection

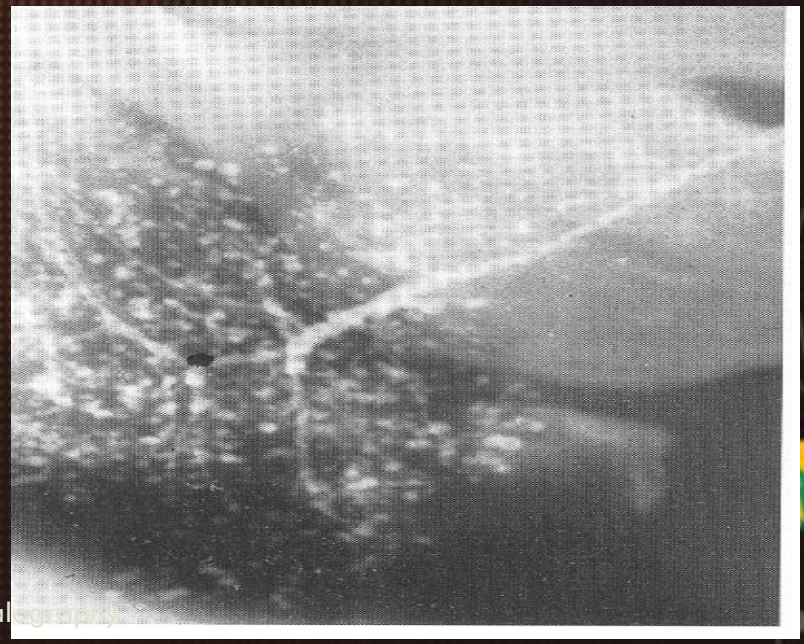
- **Dots or blobs of contrast with in the gland** –Sialectasis , infl of gland producing saccular dilatation of acini.



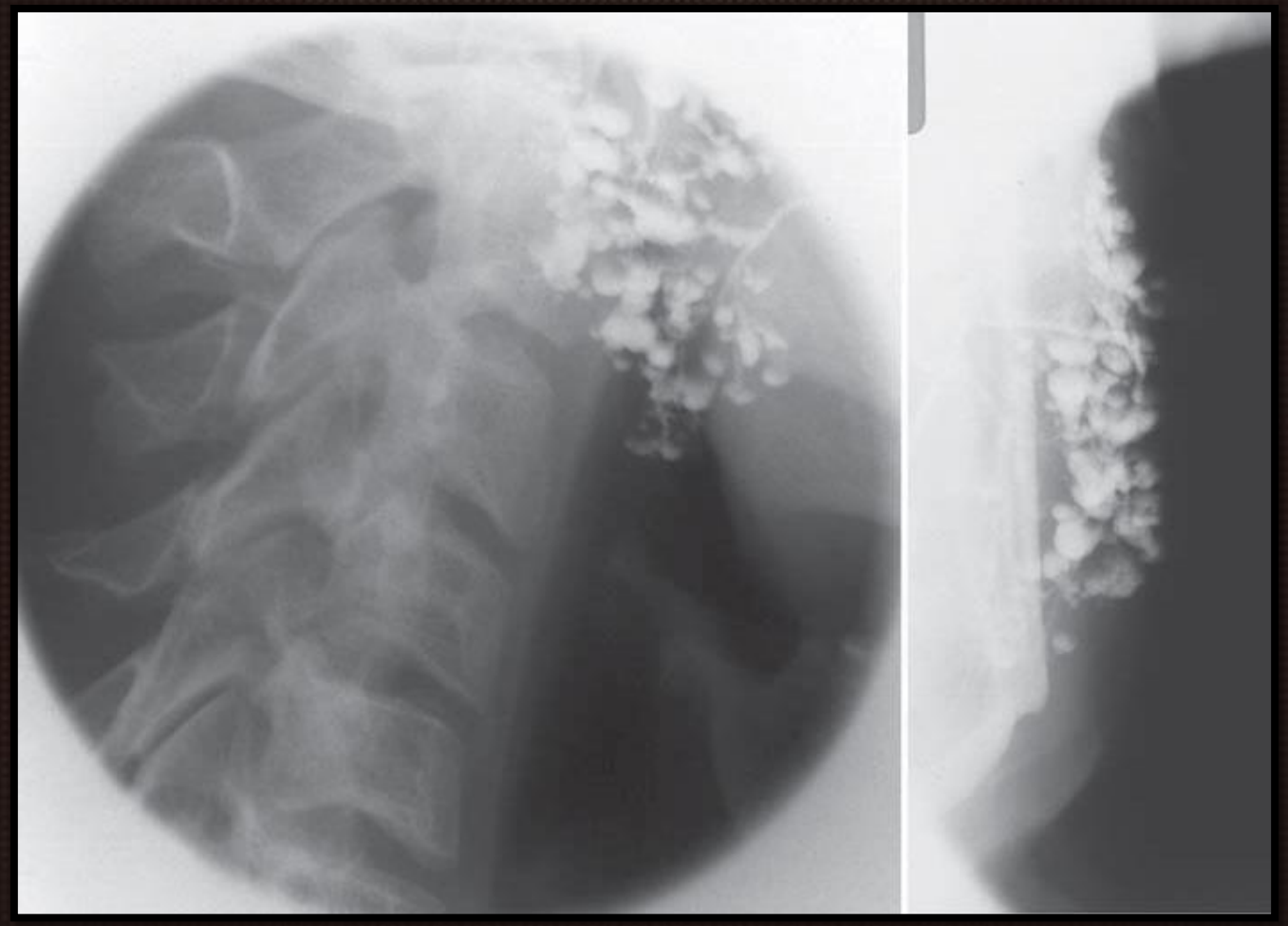


Sjogren's syndrome

- Wide spread dots & blobs with in the gland – **punctate sialectasis , snow storm , fruit laden branchless tree or cherry blossom appearance.**
- Caused by weakening of epithelium lining the intercalated ducts allowing escape of medium out of the duct.



Lateral projection demonstrates punctate sialectases distributed throughout the gland, which is suggestive of autoimmune sialadenitis

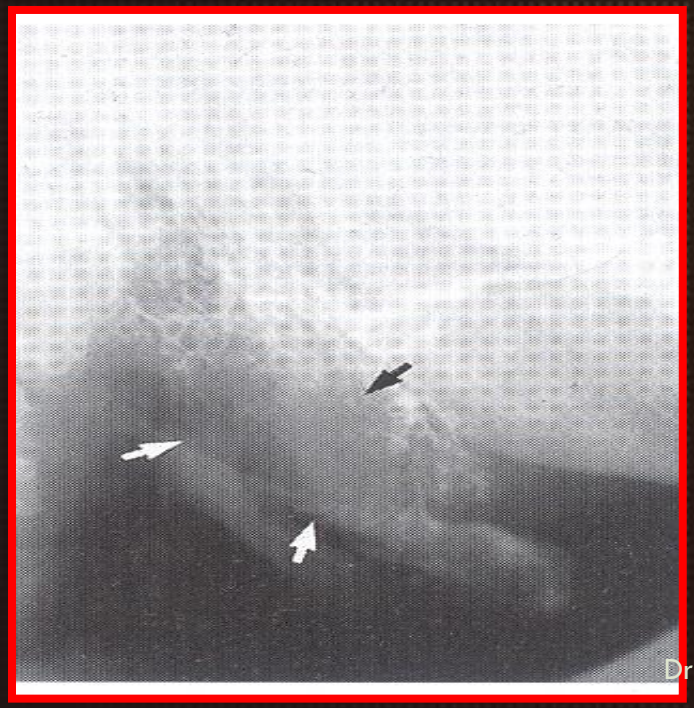


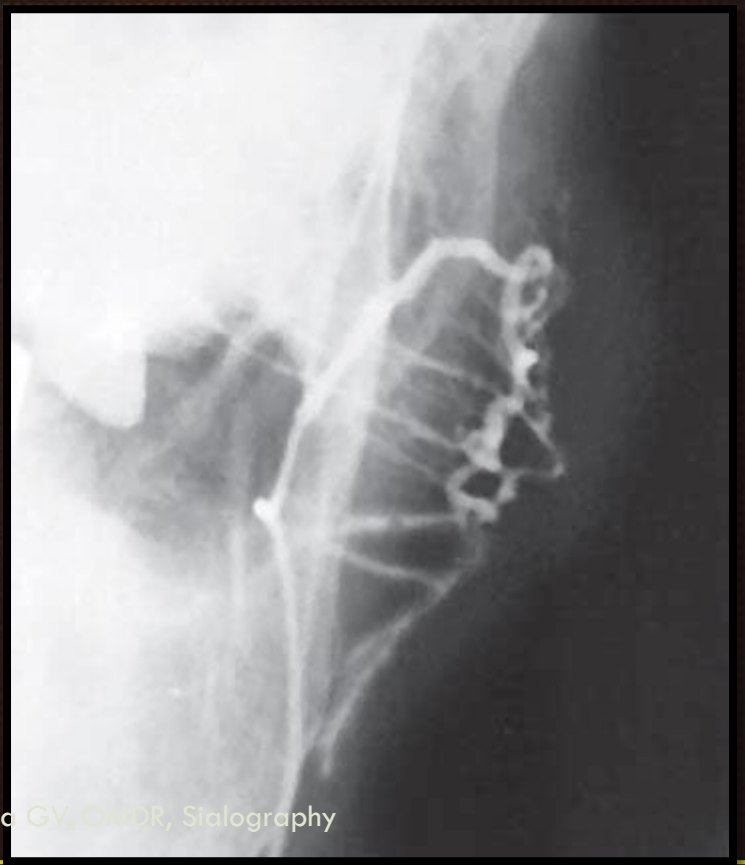
INTRINSIC TUMOURS

Area of under filling with in the gland ,due to ductal compression by the tumor.

Ductal displacement – ducts adjacent to the tumor are usually stretched around it –

ball in hand appearance.





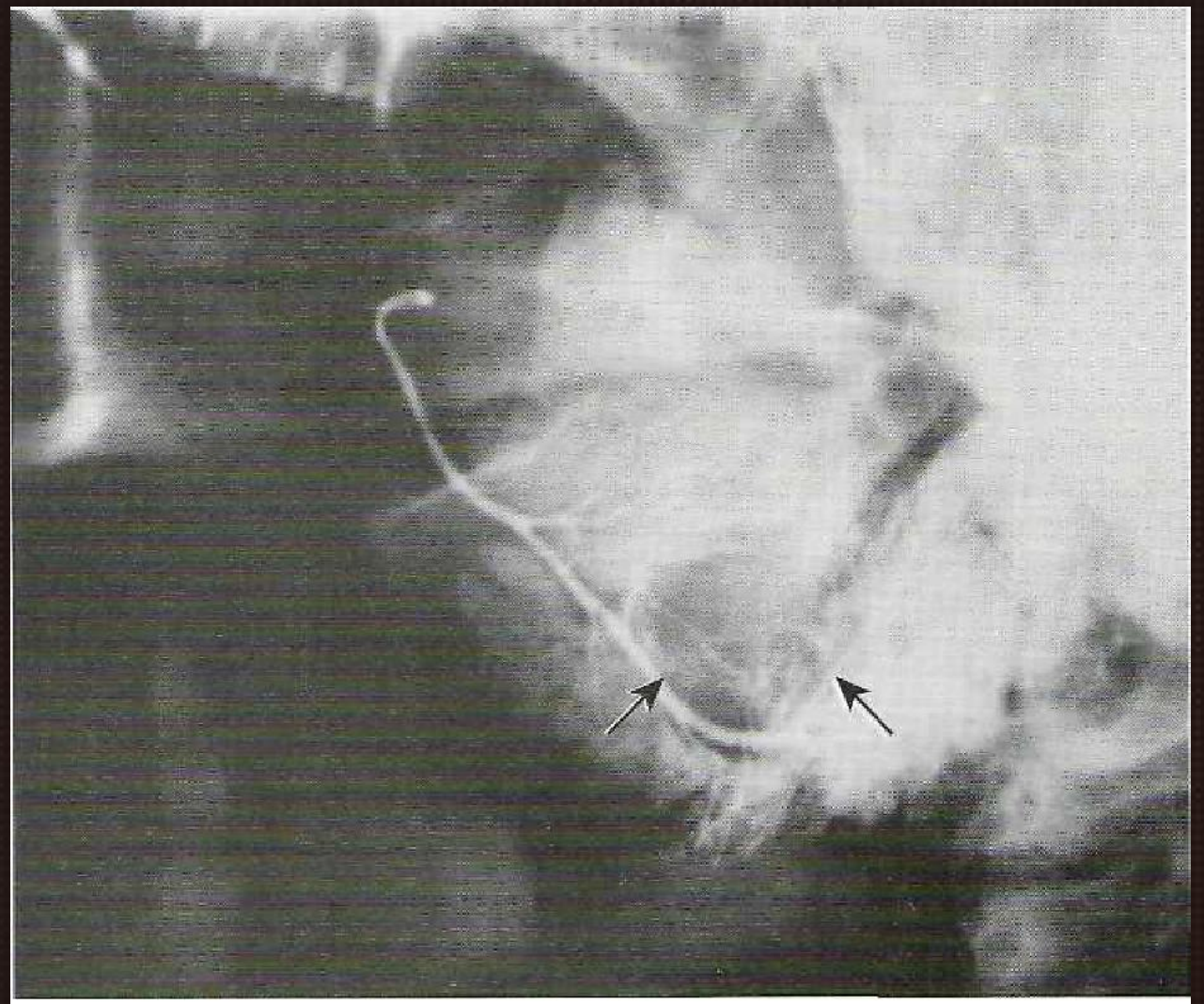


FIG. 20-11 Sialogram of right parotid gland illustrates "ball-in-hand" phenomenon (arrows)

Case of Warthin's tumor