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BDS Year 4 Regular batch
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Subject: Oral Medicine & Radiology
Topic: SALIVARY GLAND DISORDERS -Diagnosis

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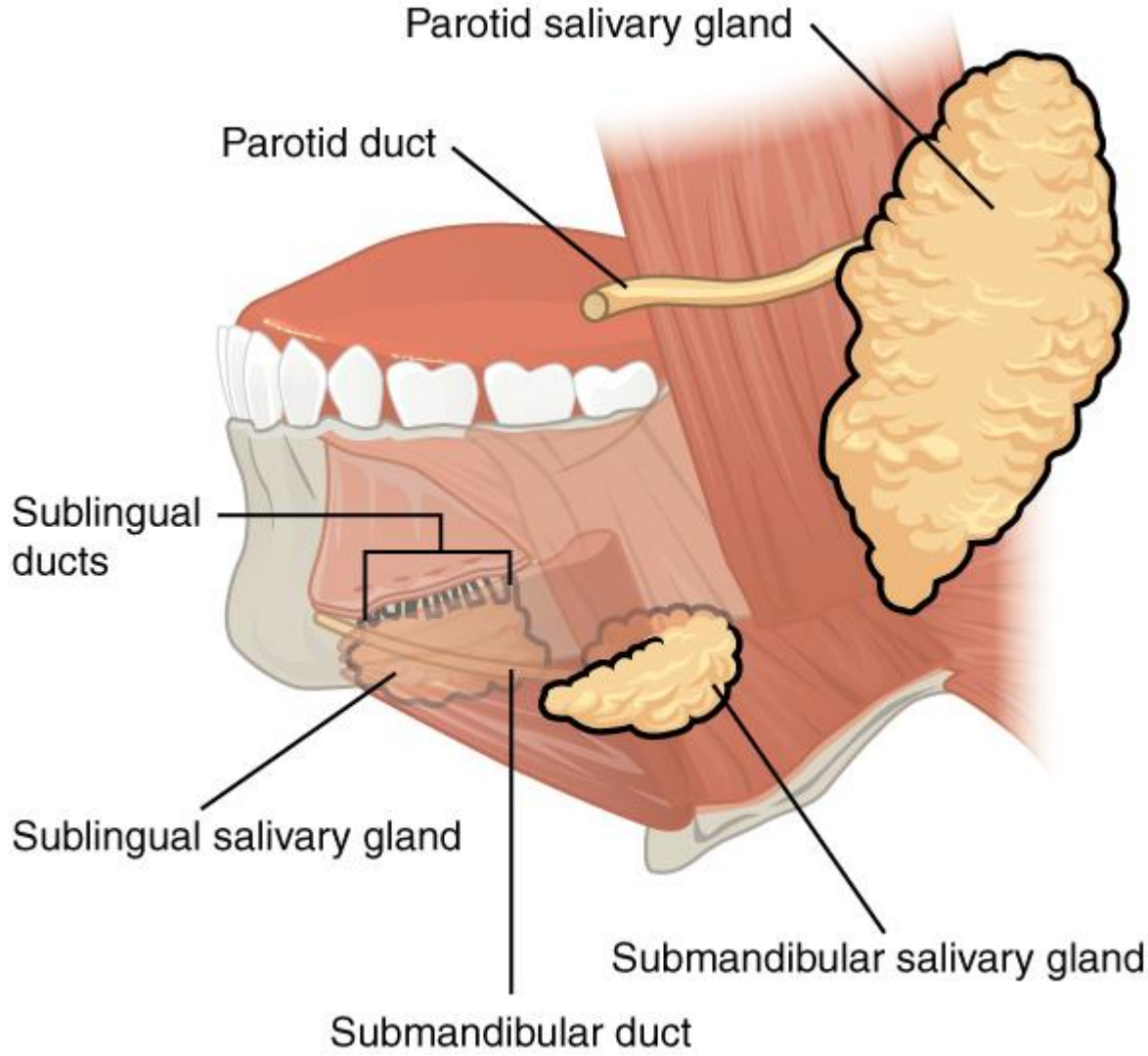
INTRODUCTION

- There are three major salivary glands: parotid, submandibular, and sublingual - paired glands that secrete a highly modified saliva - branching duct system.
- There are also thousands of minor salivary glands throughout the mouth, most of which are named for their anatomic location (labial, palatal, buccal, etc).
- These minor glands are located just below the mucosal surface and communicate with the oral cavity with short ducts.



- Saliva is the product of the major and minor salivary glands dispersed throughout the oral cavity. It is a highly complex mixture of water and organic and inorganic components.
- Most of the constituents are produced locally within the glands; others are transported from the circulation.

DIAGNOSTIC APPROACH

- Oral dryness, swelling, or a mass in a gland.

Evaluation of Dry Mouth

- The subjective feeling of oral dryness is termed xerostomia. Xerostomia is a symptom, not a diagnosis or disease.
- Actual salivary gland pathology may or may not be present
- Non-salivary causes, such as dehydration.

PAST AND PRESENT MEDICAL HISTORY

- Reveals medical conditions or medications that are known to be associated with salivary gland dysfunction.
- Radiotherapy for a head and neck malignancy
- History of all medications being taken
- Patients should also be questioned concerning dryness at other body sites. A patient's report of eye, throat, nasal, skin, or vaginal dryness, in addition to xerostomia

CLINICAL EXAMINATION

- Obvious signs of mucosal dryness
- Increase in erosion and caries
- Candidiasis, the erythematous form, is frequent.
- “lipstick” sign
- “tongue blade” sign-the examiner should hold a tongue blade against the buccal mucosa; in a dry mouth, the tissue will adhere to the tongue blade as the blade is lifted away.
- Both signs suggest that the mucosa is not sufficiently moistened by the saliva.

- The major salivary glands should be palpated to detect masses and also to determine if saliva can be expressed via the main excretory ducts.
- The expressed saliva should be clear, watery, and copious.
- Viscous or scant secretions suggest chronically reduced function.
- A cloudy exudate may be a sign of bacterial infection.
- Palpation should be painless.
- The consistency of the gland should be slightly rubbery but not hard, and distinct masses within the body of the gland should not be present

SALIVA COLLECTION- Unstimulated whole saliva

- Methods of whole saliva collection include the draining, spitting, suction, and absorbent (swab) methods.
- Individual parotid gland saliva collection is performed by using Carlson-Crittenden collectors
- Saliva from individual submandibular and sublingual glands is collected with an aspirating device or an alginate-held collector called a segregator.

SALIVA COLLECTION-Stimulated saliva

- Obtained by applying a sialagogue such as citric acid to the dorsal surface of the tongue.
- By chewing inert materials like paraffin wax

Unstimulated whole saliva flow rates of < 0.1 mL/min

Stimulated whole saliva flow rate's of < 1.0mL/min

considered abnormally low, indicative of salivary hypofunction.

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SALIVARY GLAND IMAGING

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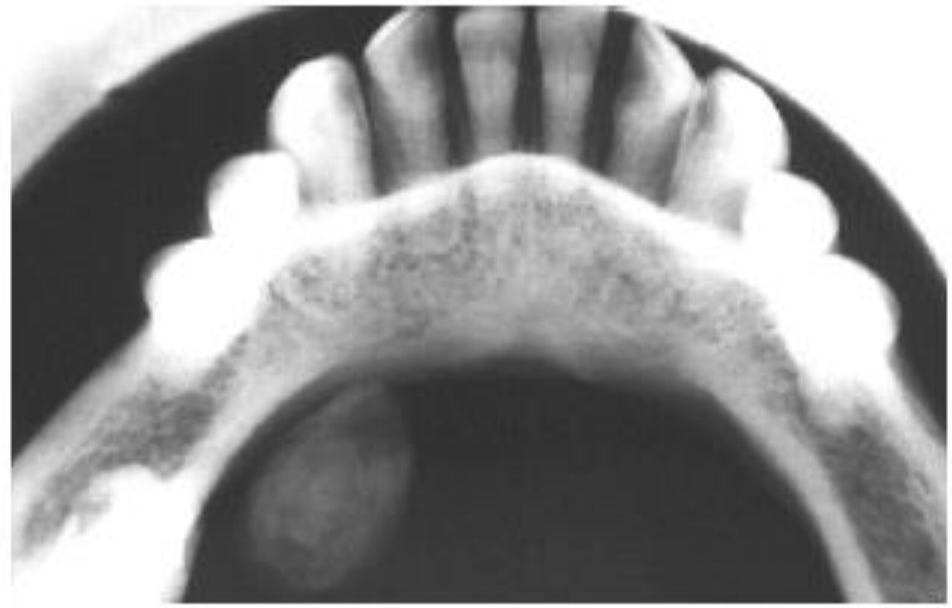
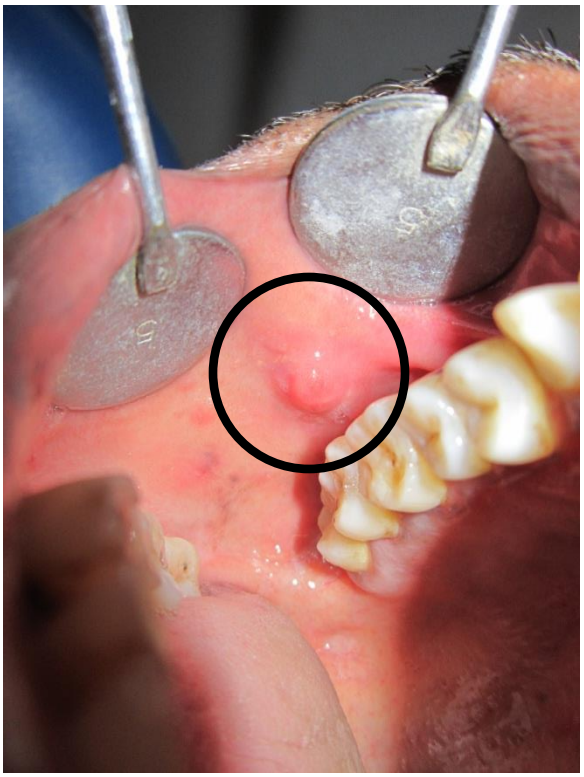
Plain-Film Radiography

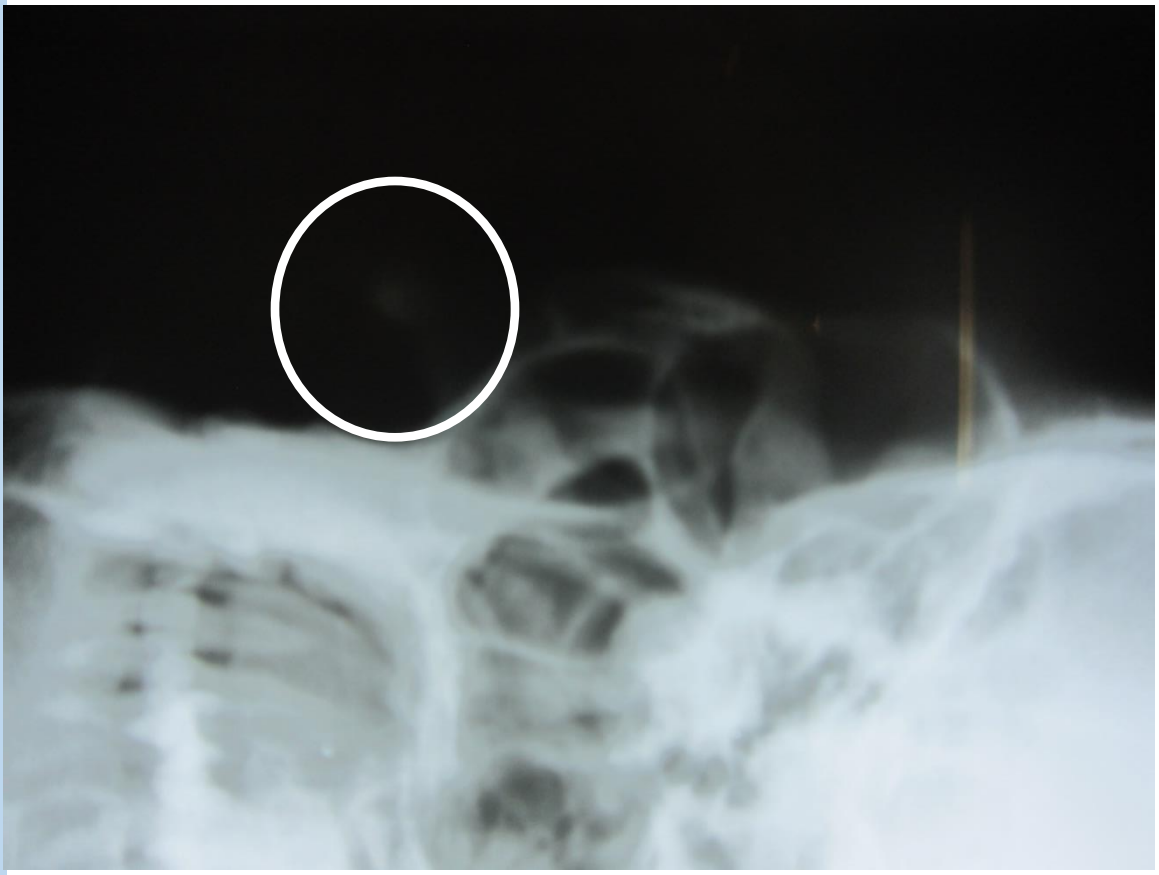
- **Main indications**
  - **Salivary Stones**
  - **Bone involvement**
- **Radiographs used**
  - **IOPAR**
  - **OPG**
  - **Occlusal**
  - **Lateral Oblique**
  - **Skull Views**

Plain-Film Radiography



Plain-Film Radiography

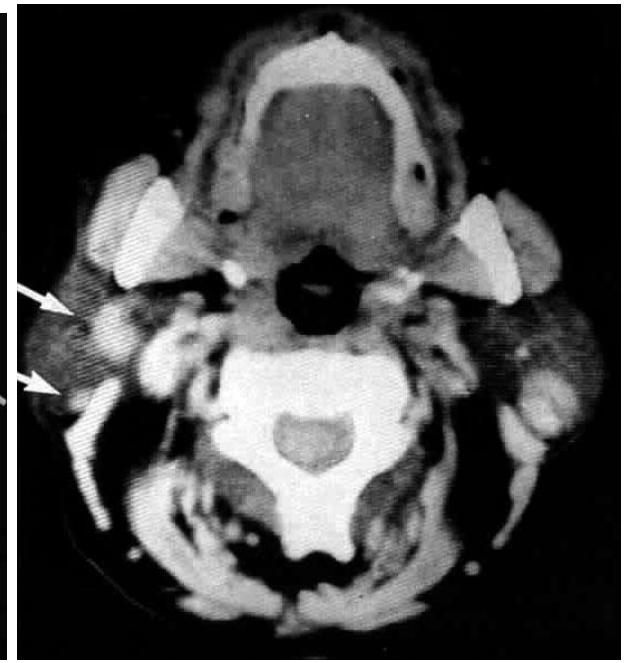




Computed Tomography

- Cross-sectional imaging
  - intra- and extraglandular tumours
  - adjacent structures
  - metastatic lymphadenopathy
- Contrast-enhanced CT scans
  - deep lobe of the parotid and parapharyngeal space
  - vascular and nodal structures adjacent to the gland
  - dense parotid gland
- CT sialography
  - stronge clinical suspicion of disease but negative or equivocal with conventional CT scanning
  - possible mass lesions in submandibular gland
- CT guided biopsy

Computed Tomography



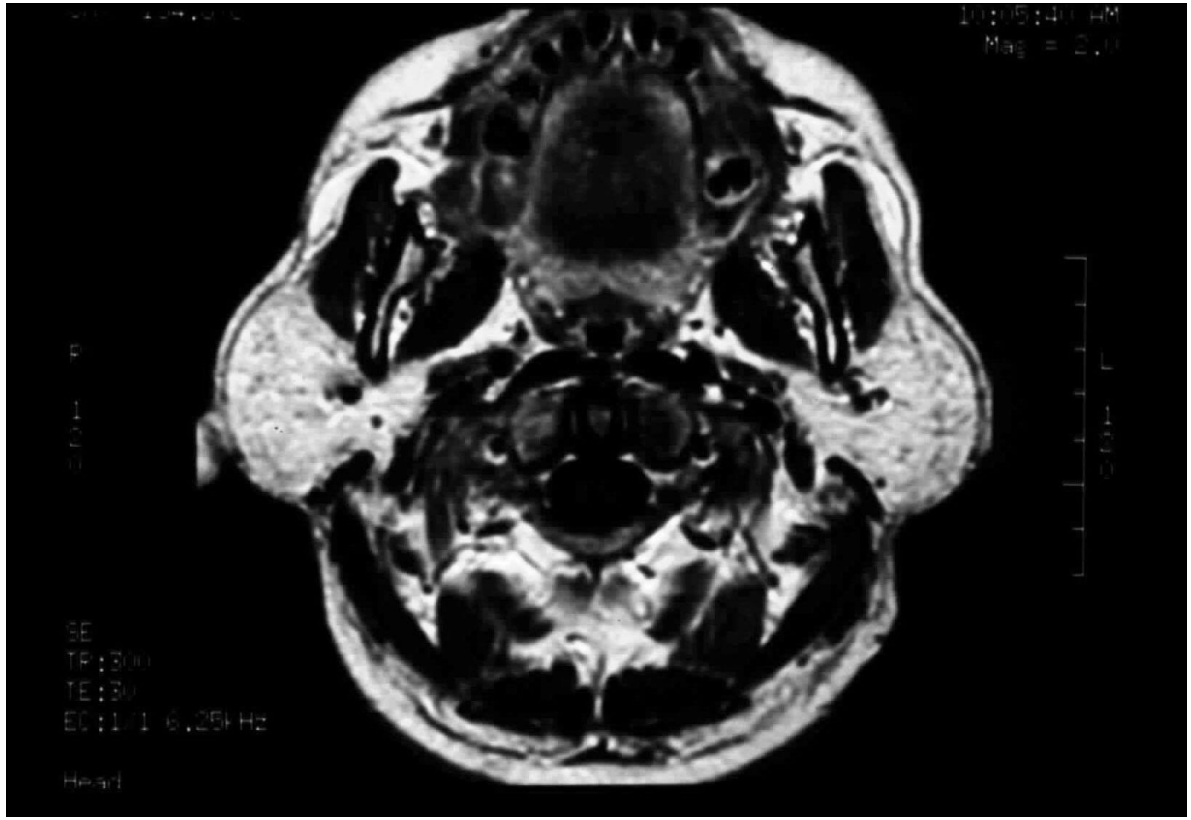
Magnetic Resonance Imaging

- Excellent contrast resolution
- provide cross-sectional images in different planes without repositioning the patient
- produces images superior to those of CT for mass lesions
- Major blood vessels depicted without the use of intravenous administration of contrast medium lesions in the deep lobe and the parapharyngeal space identification of the fat plane between a normal appearing gland and an extrinsic mass. Nerve involvement can be detected sometimes.
- MRI Sialography

Contraindication

- claustrophobic
- those not fully cooperative
- patients with cardiac pacemakers or insulin pumps, intracranial ferromagnetic clips or hemoclips on cerebral aneurysm

Magnetic Resonance Imaging



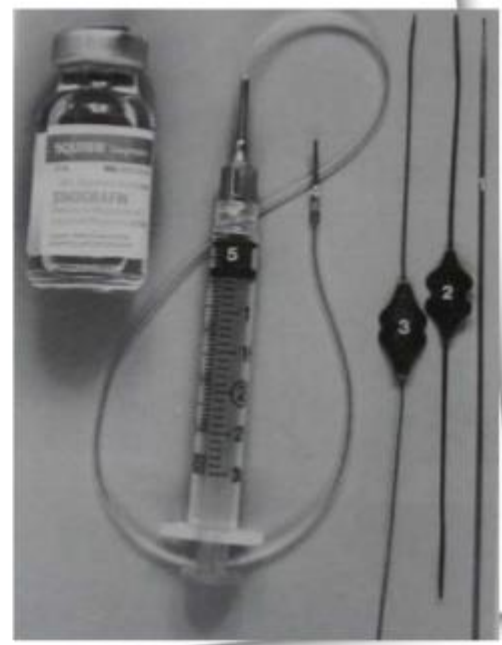
Sialography

- Type of contrast imaging.
- Indications:
  - DUCT SYSTEM
  - OBSTRUCTION
  - FISTULA
  - RECURRENT PAROTITIS
  - AUTOIMMUNE DISEASES
  - OTHER NON-NEOPLASTIC DISEASES
- Contra-Indications:
  - ACUTE INFLAMMATION
  - ALLERGY TO IODINE

Sialography: Equipments

EQUIPMENT

- Cannulas- Rabinov type
- (0.012- 0.033inch tip)
- Lacrimal dilators
- Syringe
- Contrast agent- Sinograffin
- Gauze sponge pads
- Secretogogue
- Focused light
- Magnifying glass



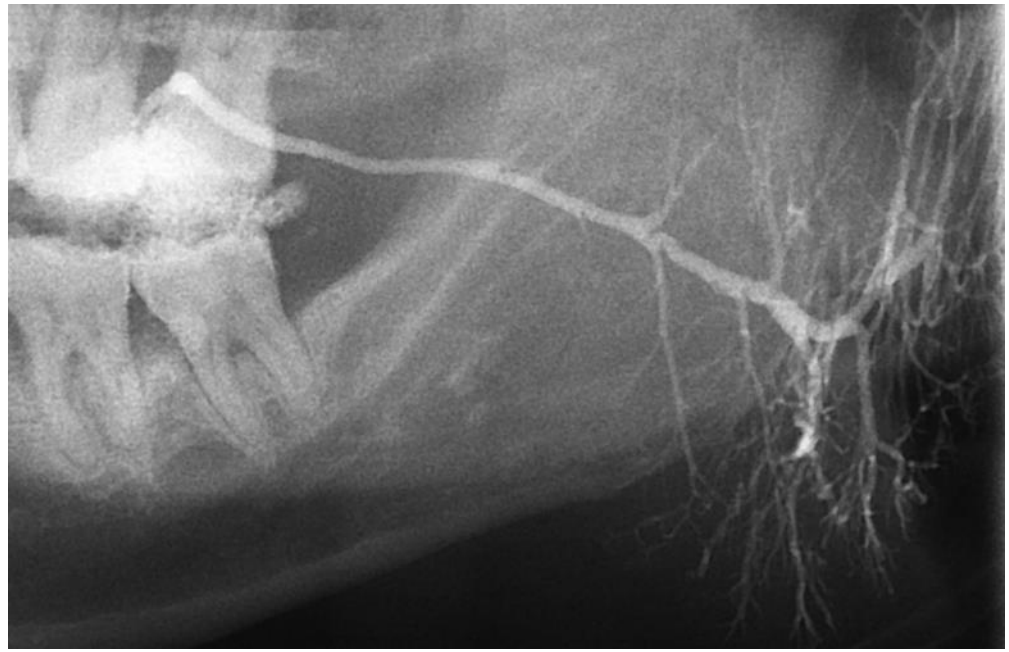
Sialography: Procedure

- Technique of conventional sialography
- Control images are taken with the patient supine to assess for radio-opaque calculi
- The patient may be asked to suck on a lemon or secretory stimulant for 2-3 minutes before sialography
  - to make the salivary duct opening conspicuous for cannulation
- Symptomatic parotid or submandibular duct cannulated
  - 21 gauge catheter for Stensen's duct
    - located adjacent to the crown of the second upper molar in the buccal mucosa
  - 24 or 27 gauge for Wharton's duct
    - at the base of the frenulum of the tongue
- Up to 2 mL of water-soluble contrast is instilled
- Care should be taken not to introduce air into the salivary ducts, as it can mimic a ductal calculus on sialography

Sialography

- **Advantages**
  - Higher spatial resolution for superior diagnostic elucidation (when the procedure is successfully achieved) with accurate delineation of second- and third-order branches
  - Enables therapeutic approach in sialoendoscopy for removal of sialoliths, retrograde displacement of sialoliths to relieve acute obstruction, and to dilate strictures
- **Disadvantages**
  - Invasive procedure
  - Substantial failure rate of procedure (especially submandibular sialography) due to cannulation problems, lack of skill, lack of patient compliance, pain, etc.
  - Radiation exposure
  - Contrast media exposure with risk of allergic reaction

Sialography

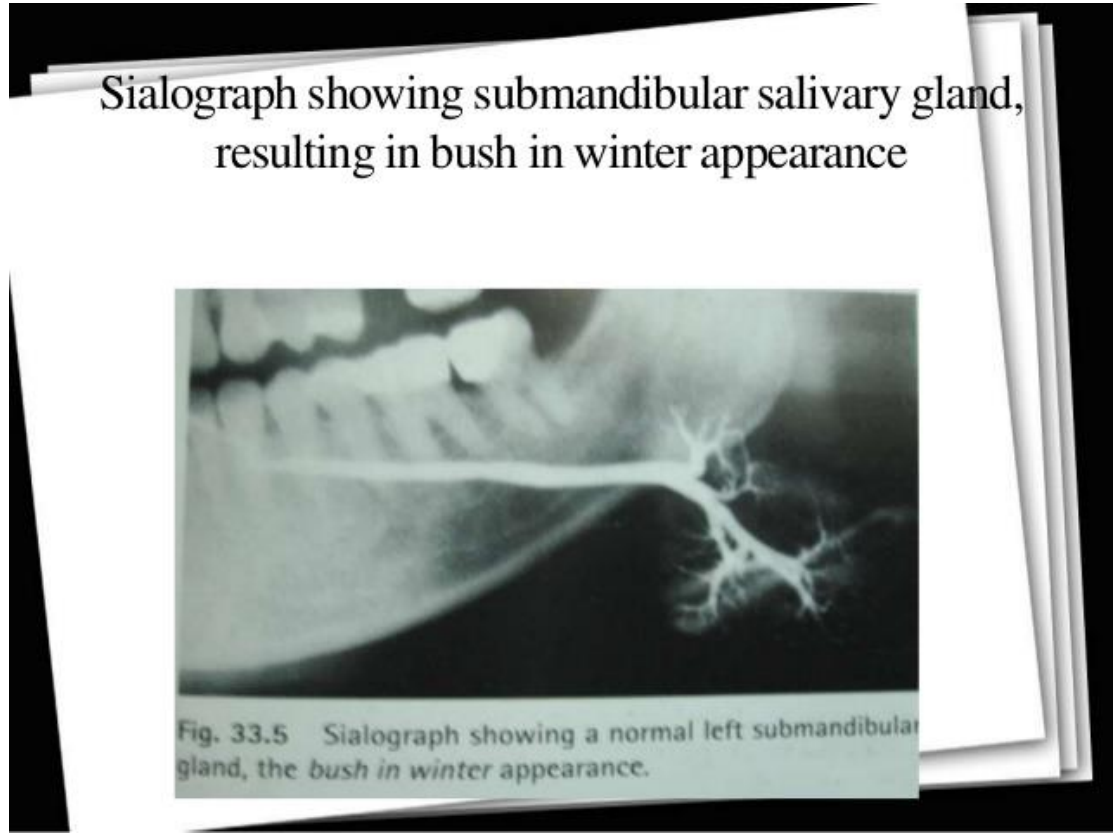


Sialography

Sialography

- **Advanced Sialography techniques**
  - **CT Sialography**
  - **MRI Sialography**

Sialographic appearences



NORMAL: TREE IN WINTER APPEARANCE

Sjogren's syndrome

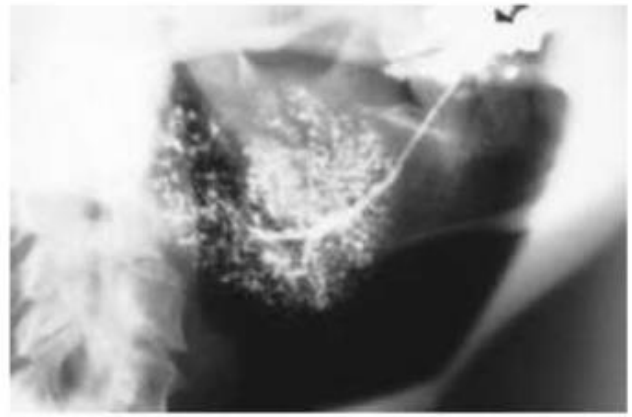


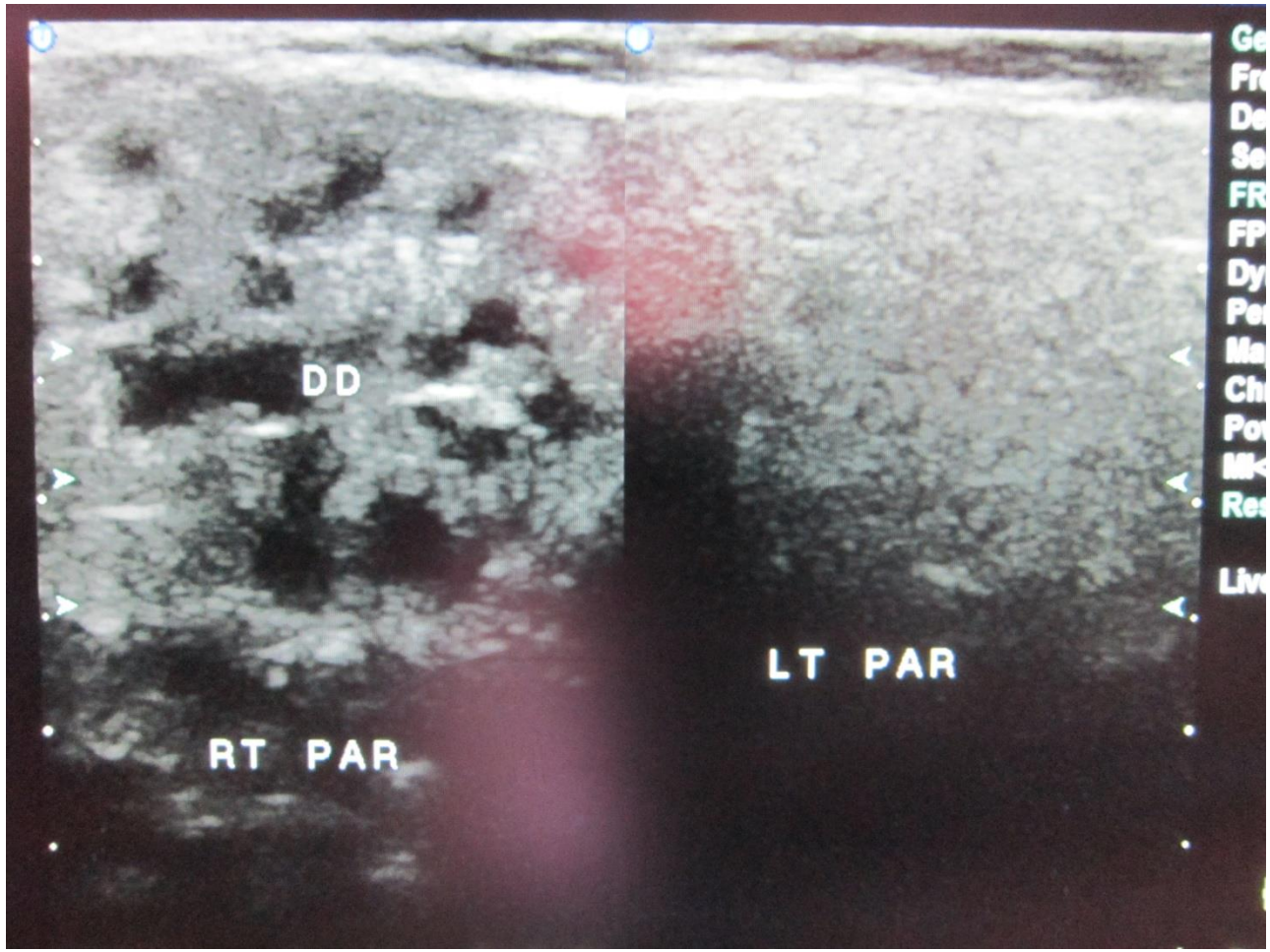
Fig 1. Sialography of a 46 year female with SS demonstrating the typical "cherry blossom" appearance. *History and photograph contributed by Dr. Lars Hollender, University of Washington*

- Rotated PA veiw showing extensive ductal displacement, in pleomorphic adenoma of parotid gland resulting in BALL IN HAND appearance

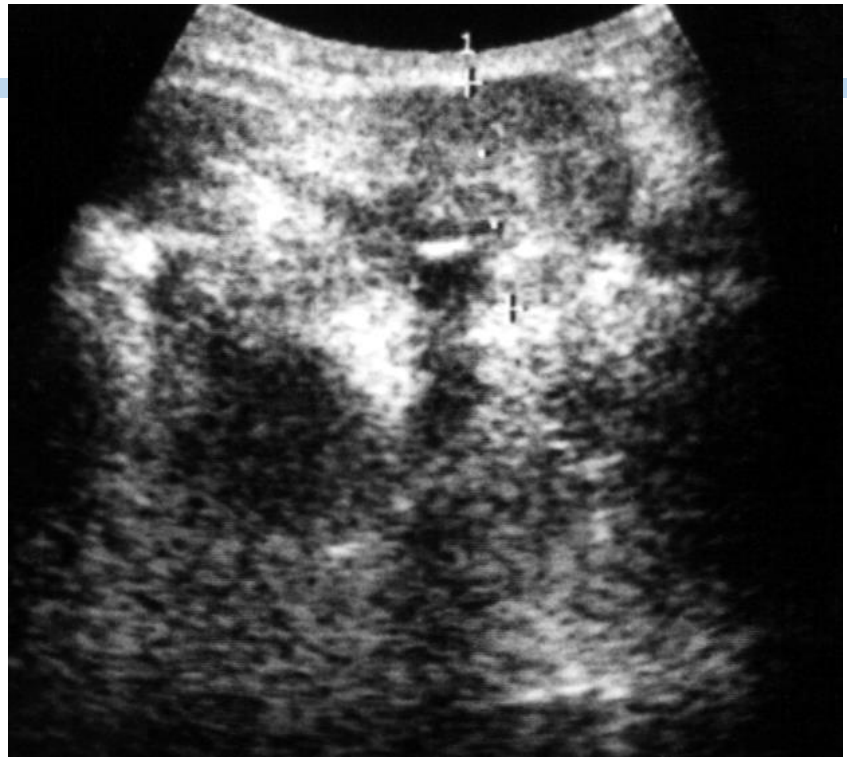
Ultrasonography

- Fast, economical, simple & non-invasive
- Detects space occupying lesions
- Differentiates cystic lesions from solid lesions

CAL - Calcification



DD – Dilated ducts, RT PAR – Right parotid, LT PAR – Left Parotid



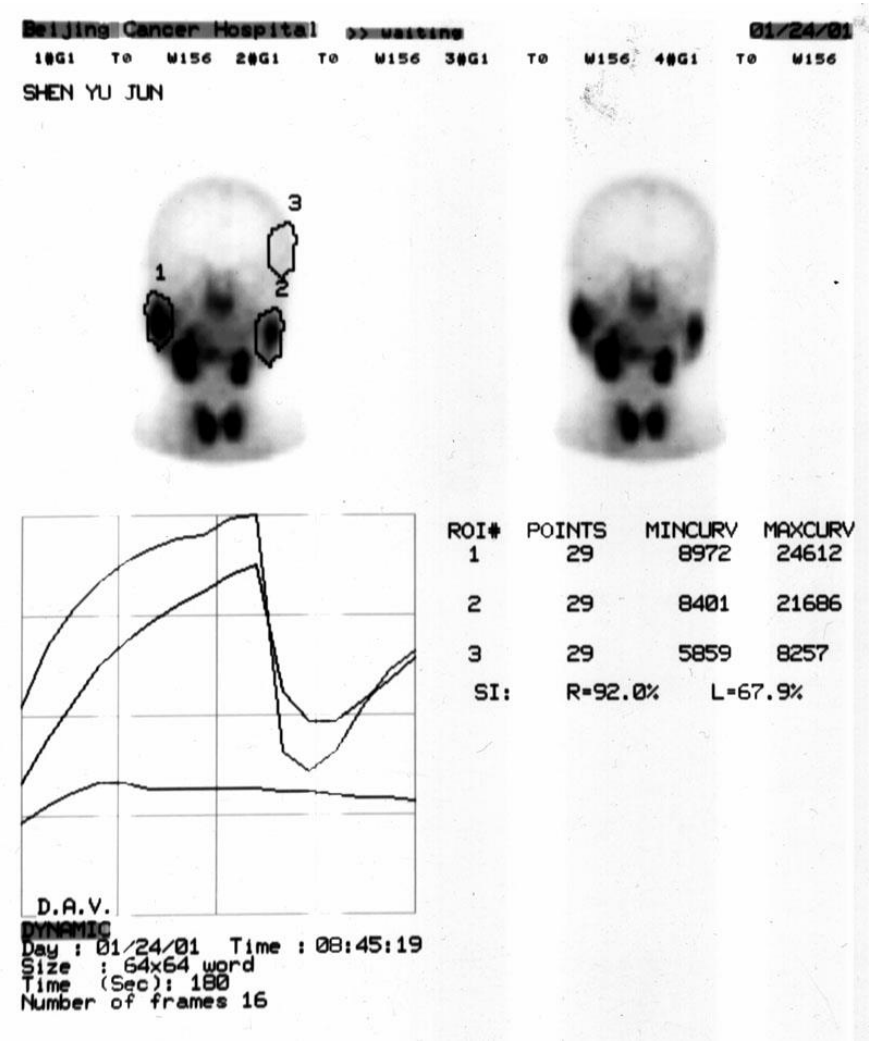
Sialolithiasis: echo-dense spots, posterior acoustic shadowing stones of 2 mm and larger

SG TUMORS: USG

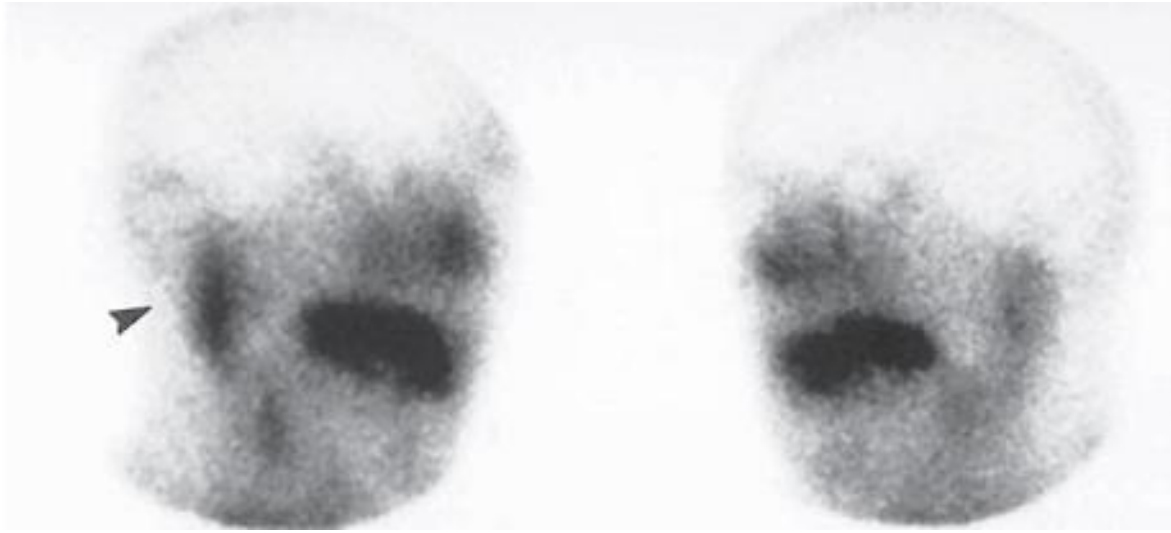
	Benign	Malignant
Shape	Regular	Irregular
Border	Well defined	Ill defined
Internal echo	Homogenous	Hetrogenous
Posterior enhancement	Enhanced	Attenuation, acoustic shadow

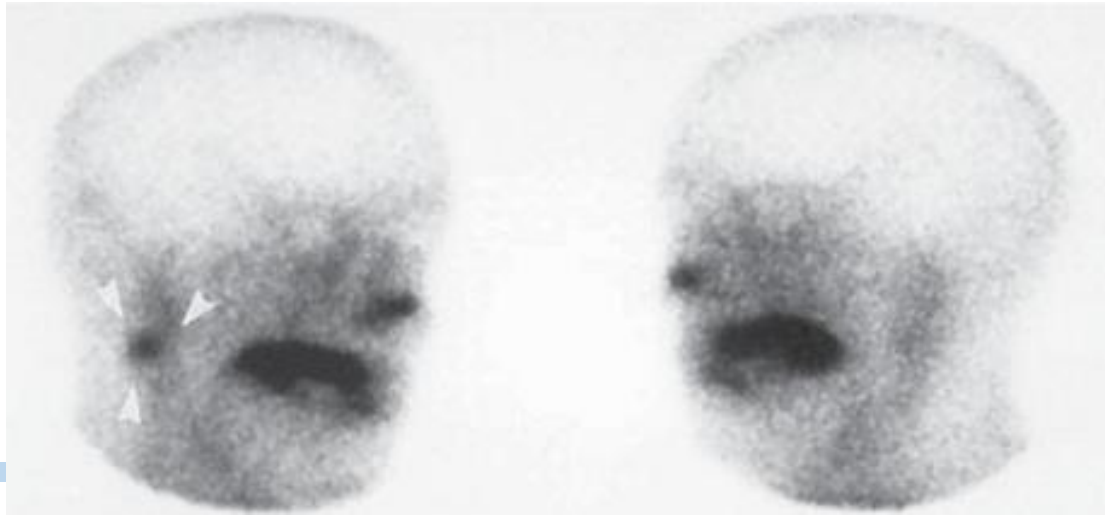
Radionuclide Salivary Imaging

- technetium-99m



Salivary Scintigraphy





Salivary Gland Imaging Modalities: Indications, Advantages, and Disadvantages

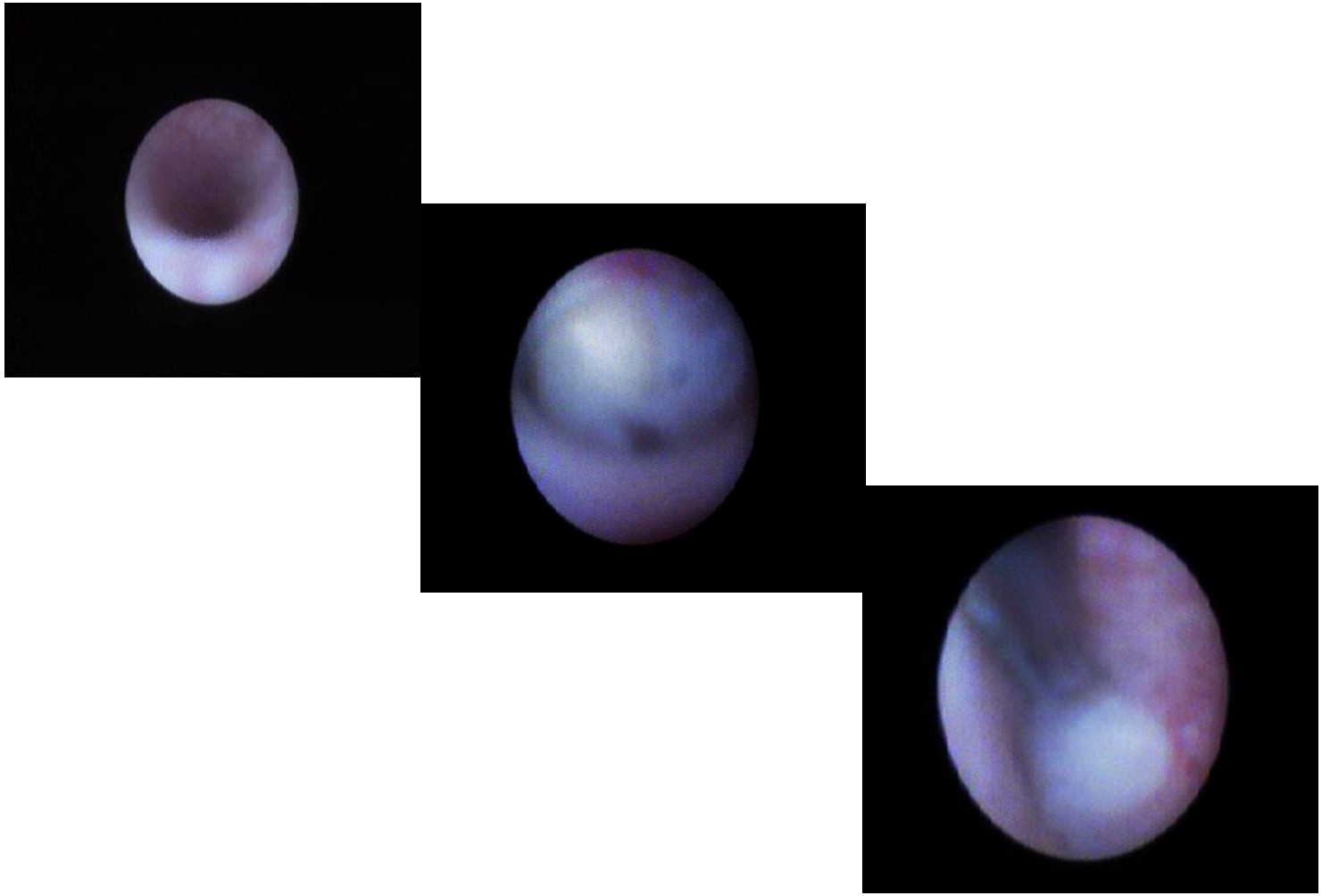
Imaging Modality	Indications	Advantages	Disadvantages
Ultrasonography	Biopsy guidance; mass detection	Noninvasive; cost-effective	No quantification of function; observer variability; limited visibility of deeper portions of gland; no morphologic information
Sialography	Stone, stricture; R/O autoimmune or radiation-induced sialadenitis	Visualizes ductal anatomy/blockage	Invasive; requires iodine-containing dye; no quantification
Radionuclide imaging	R/O autoimmune sialadenitis; sialosis, tumor	Quantification of function	Radiation exposure; no morphologic information
Computed tomography	R/O calcified structure; tumor	Differentiates osseous structures from soft tissue	No quantification; contrast dye injection; radiation exposure
Magnetic resonance imaging	R/O soft tissue lesion	Soft tissue resolution excellent, with ability to differentiate osseous structures from soft tissue; no radiation burden	Dental scatter; contraindicated with pacemaker or metal implant; no quantification
Positron emission tomography	Identify regional salivary gland functional alterations and inflammation	Highly sensitive to metabolic activity	Radiation exposure; no morphologic information

R/O = rule out.

Salio - Endoscopy

- Sialoendoscopy is a minimally invasive technique that allows for salivary gland surgery for the safe and effective treatment of obstructive salivary gland disorders and other conditions of the salivary glands.
- It is both diagnostic and therapeutic modality.
- During sialoendoscopy a small endoscope is placed into the salivary glands through the salivary ducts that empty into the mouth.
- Sialoendoscopy is an efficient yet simple mode of treatment for major salivary gland obstructions, strictures and sialoliths (salivary stones).
- Depending on the obstruction, sialoendoscopy can be conducted under local anesthesia in an outpatient office or in the operating room under general anesthesia.

Salio - Endoscopy



Title Article details	**Diagnostic accuracies of sialography and salivary ultrasonography in Sjogren's syndrome patients: a meta-analysis** Song GG, Lee YH. Clinical and Experimental Rheumatology 2014; 32(4): 516-522.
CEBM level of evidence	1a
Objectives	The purpose of this study was to compare the diagnostic performance of sialography and salivary ultrasonography(US) for Sjögren's syndrome (SS) patients.
Methods	subgroup meta-analysis of RCTs
Impression	Meta-analysis of published studies demonstrates that the diagnostic accuracy of salivary US is comparable with sialography in SS patients.

SALIVARY GLAND BIOPSY

- Lower lip biopsy
- E/O incisional biopsy
- Pre-surgical biopsy
- Fine needle aspiration cytology

SEROLOGIC EVALUATION

- The presence of nonspecific markers of autoimmunity, such as antinuclear antibodies, rheumatoid factors, elevated immunoglobulins (particularly immunoglobulin G [IgG]), and erythrocyte sedimentation rate, or the presence of antibodies directed against the more specific extractable nuclear antigens SS-A/Ro or SS-B/La are important contributors to the definitive diagnosis of Sjogren's syndrome.
- Another serologic marker that may prove useful for the diagnosis of salivary gland disorders is serum amylase.

Evaluation of a Salivary Mass or Enlarged Salivary Gland

- PHYSICAL EXAMINATION OF THE SALIVARY GLANDS
- IMAGING
- FINE-NEEDLE ASPIRATION CYTOLOGY
- OPEN SURGICAL BIOPSY
- STAGING OF SALIVARY GLAND TUMORS

Staging for Major Salivary Gland Cancer- 2002 Adapted from the American Joint Committee for Cancer (AJCC 6TH)

- Tx - Primary tumor can not be assessed
- To - No evidence of primary tumor
- T1 - Tumor < 2 cm in greatest dimension
- T2 - Tumor 2–4 cm in greatest dimension
- T3 - Tumor >4 cm in greatest dimension and/or extraparenchymal extension
- T4a - Tumor invades skin, mandible, ear canal and/or facial nerve.
- T4b - Tumor invades skull base and/or pterygoid plates and/or encases carotid artery

- Nx - Regional nodes cannot be assessed
- N0 - No regional lymph node metastases
- N1 - Single ipsilateral node < 3 cm in diameter
- N2a - Single ipsilateral node 3–6 cm in diameter
- N2b - Multiple ipsilateral node, none > 6 cm
- N2c - Bilateral or contralateral nodes, none > 6 cm
- N3 - Metastasis in a lymph node > 6 cm

Mx - Presence of distant metastases cannot be assessed

M0 - No distant metastases

M1 - Distant metastases

Stage I: T1a N0 M0, T2a N0 M0

Stage II: T1b N0 M0, T2b N0 M0, T3a N0 M0

Stage III: T3b N0 M0, T4a N0 M0, Any T (except T4b) Nl M0

Stage IV: T4b Any N M0, Any T N2N3 M0, Any T Any N M1

CCES

1. Ball in hand appearance is a sialographic picture of
    1. Sjogrens Syndrome
    2. Sialadenitis
    3. Benign tumor of SG
    4. Fistula in SG
2. In USG internal echo of Benign tumor is
    1. Homogenous
    2. Hetrogenous
    3. Mixed echo
    4. None of the above

CCES

3. Serological evaluation is done for SS-A & SS-B in
    1. Sjogrens Syndrome
    2. Sialadenitis
    3. Benign tumor of SG
    4. Fistula in SG
4. Sialography is contraindicated in
    1. Allergic to Iodine
    2. Acute infections
    3. Both of the above
    4. None of the above

CCES

5. **Positive lipstick and tongue blade sign signifies**
   1. **Reduced salivation**
   2. **Increased salivation**
   3. **Viral infection of salivary gland**
   4. **Fistula in SG**

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