



**American College
of Radiology**

Focused. Forward. Together.

Imaging of the salivary glands

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Clinics**



@bpoliceni



I have no relevant financial relationships
with commercial interests



**ABSOLUTELY
NOTHING!**



**NEXT 60
MINUTES**

Acknowledgment

- Dr Wendy Smoker
- Dr Henry Hoffman

Learning Objectives

- Review Anatomy of the parotid gland
- Discuss appropriate imaging evaluation of parotid gland pathology
- Review differential diagnosis for parotid pathology

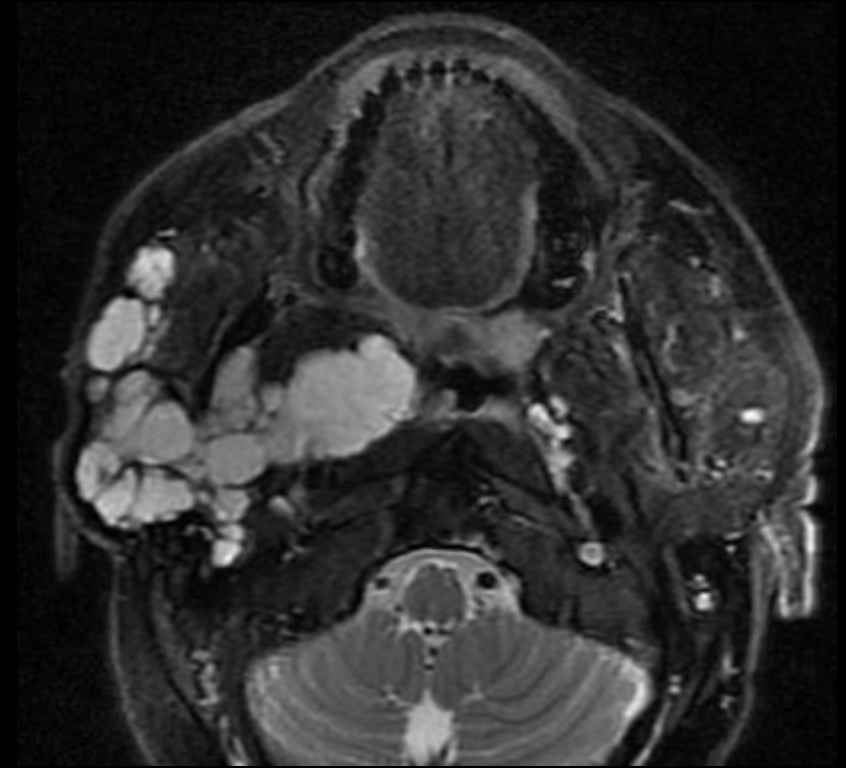
Overview

- Sublingual glands, submandibular and parotid are the major paired salivary glands.
- In addition, multiple small minor salivary glands are noted randomly distributed in the upper aerodigestive tract, including paranasal sinuses and parapharyngeal spaces.



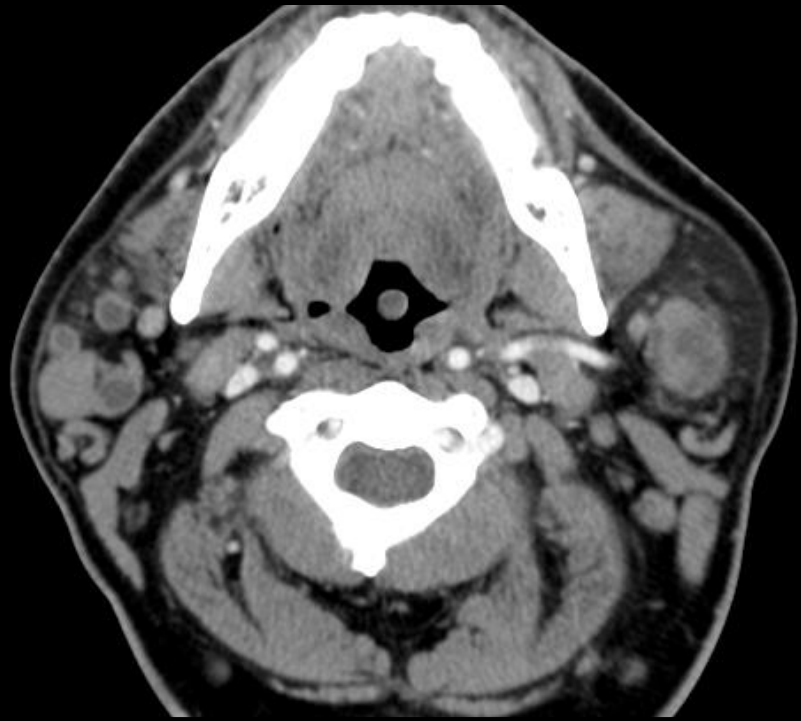
CASE 1:

80 year old male, smoker, incidental finding



CASE 2:

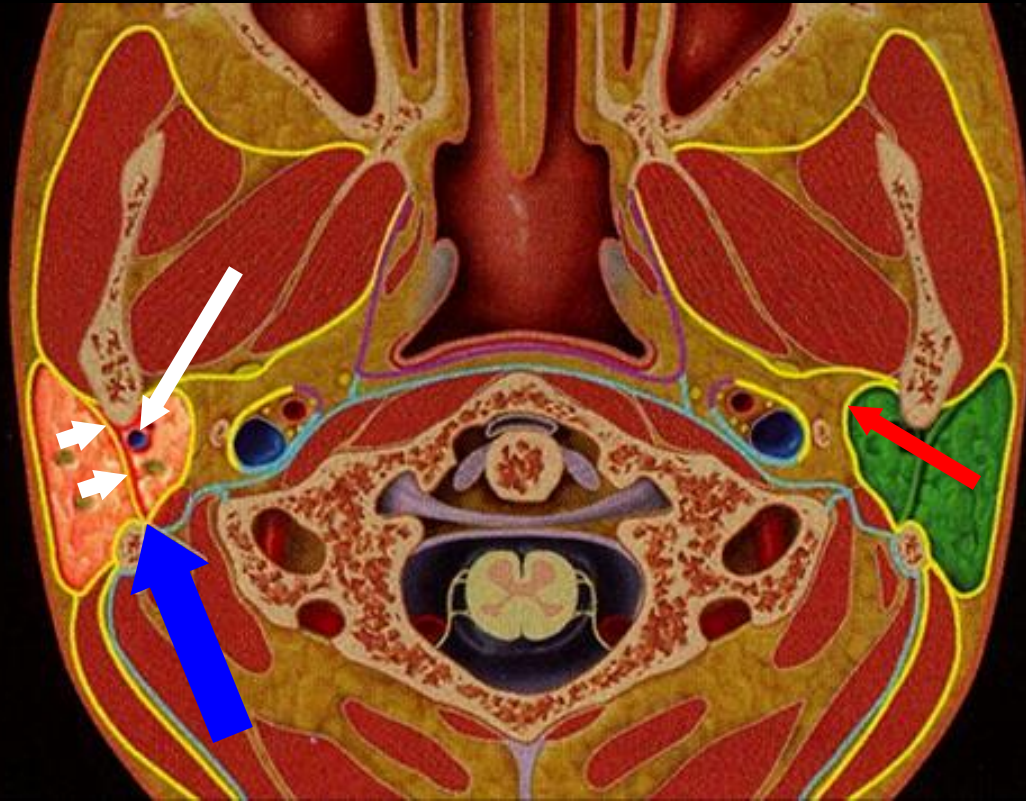
51 y/o male presents with a longstanding, slow-growing mass affecting the right side of the face.



CASE 3:

35 year old HIV positive male with bilateral parotid lesions

Parotid Space (PS)

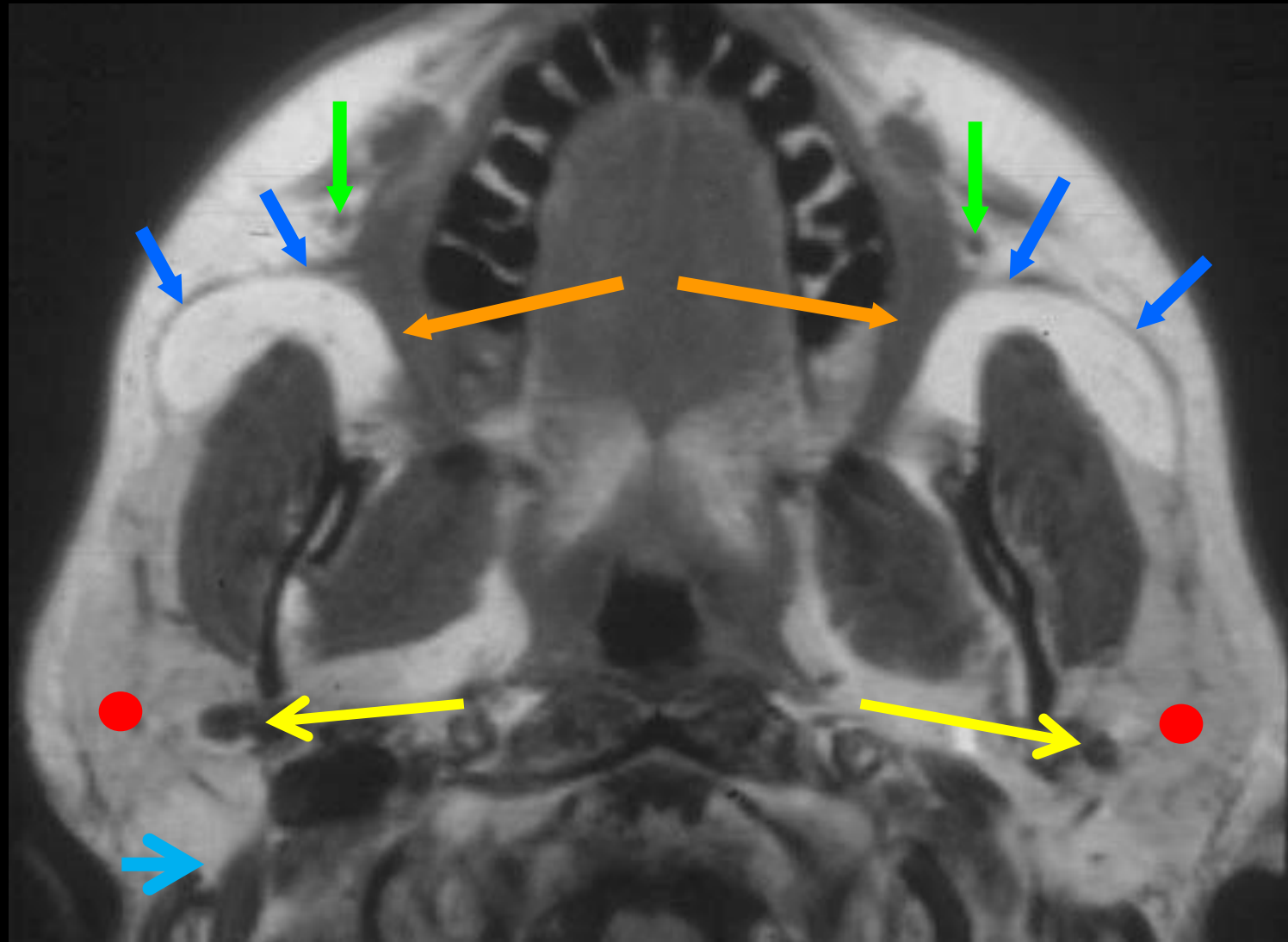


From: Harnsberger HR, et al. Diagnostic Imaging: Head and Neck

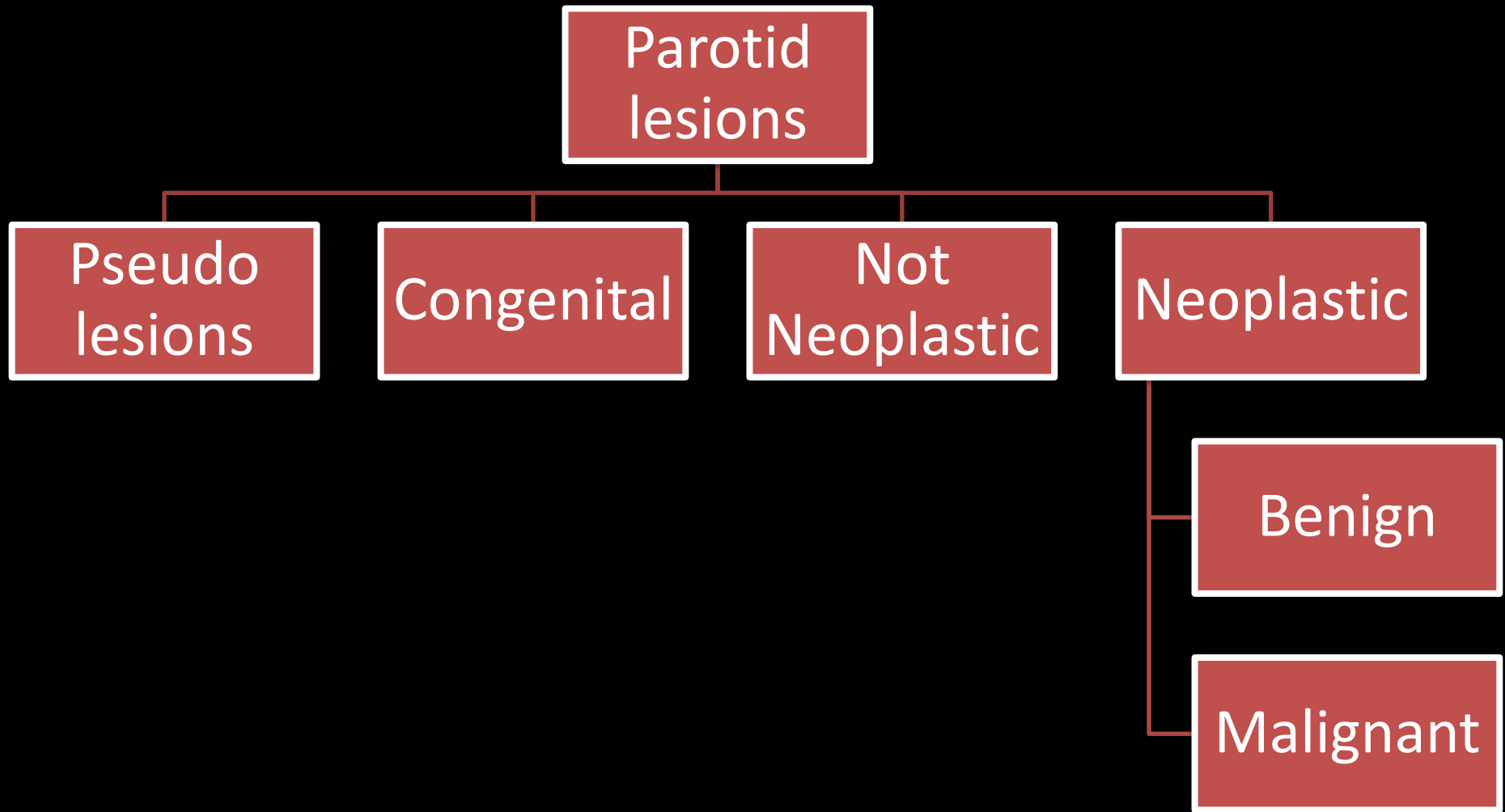
Parotid Space Contents

- **Parotid gland and duct** (Stenson's duct) coursing through buccal space
- **Facial nerve** (VII): Creates a surgical plane that divides parotid into superficial and deep lobes; Courses immediately lateral to retromandibular vein
- **Retromandibular vein** (lateral to ECA)
- **External carotid artery**
- **Intraparotid lymph nodes**: 20-30 nodes; first order drainage for adj scalp, EAC

Parotid Space Anatomy



Parotid Space Pathology



Parotid Space Pathology

Pseudotumors

Long parotid tails

Accessory parotid glands

Parotid gland agenesis

Parotid Gland Agenesis with Accessory Parotid Gland



Parotid Space Pathology

Congenital Lesions

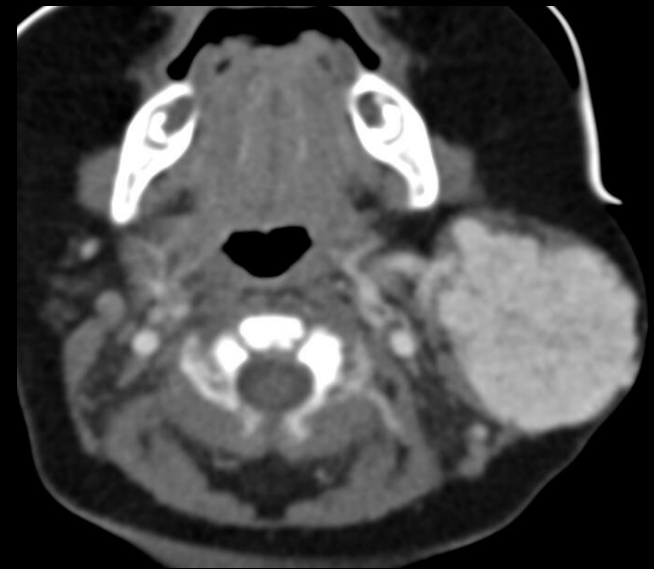
First Branchial Cleft Cyst

Hemangiomas

Lymphatic Malformations

Infantile Hemangioma

- Most common benign neoplasm arising in infancy, characterized by increased proliferation and turnover of endothelial cells with abnormal cell mitotic activity. 10 % of infants in US; less common in Asia
- 60% occur in the head and neck.
- Not commonly present at birth. GLUT1 positive.
- Proliferative phase starting at 3-9 months followed by an involuting phase usually completed by age 5-9 years.
- Occur predominantly in female. F:M = 2-5:1
- GLUT1 positive

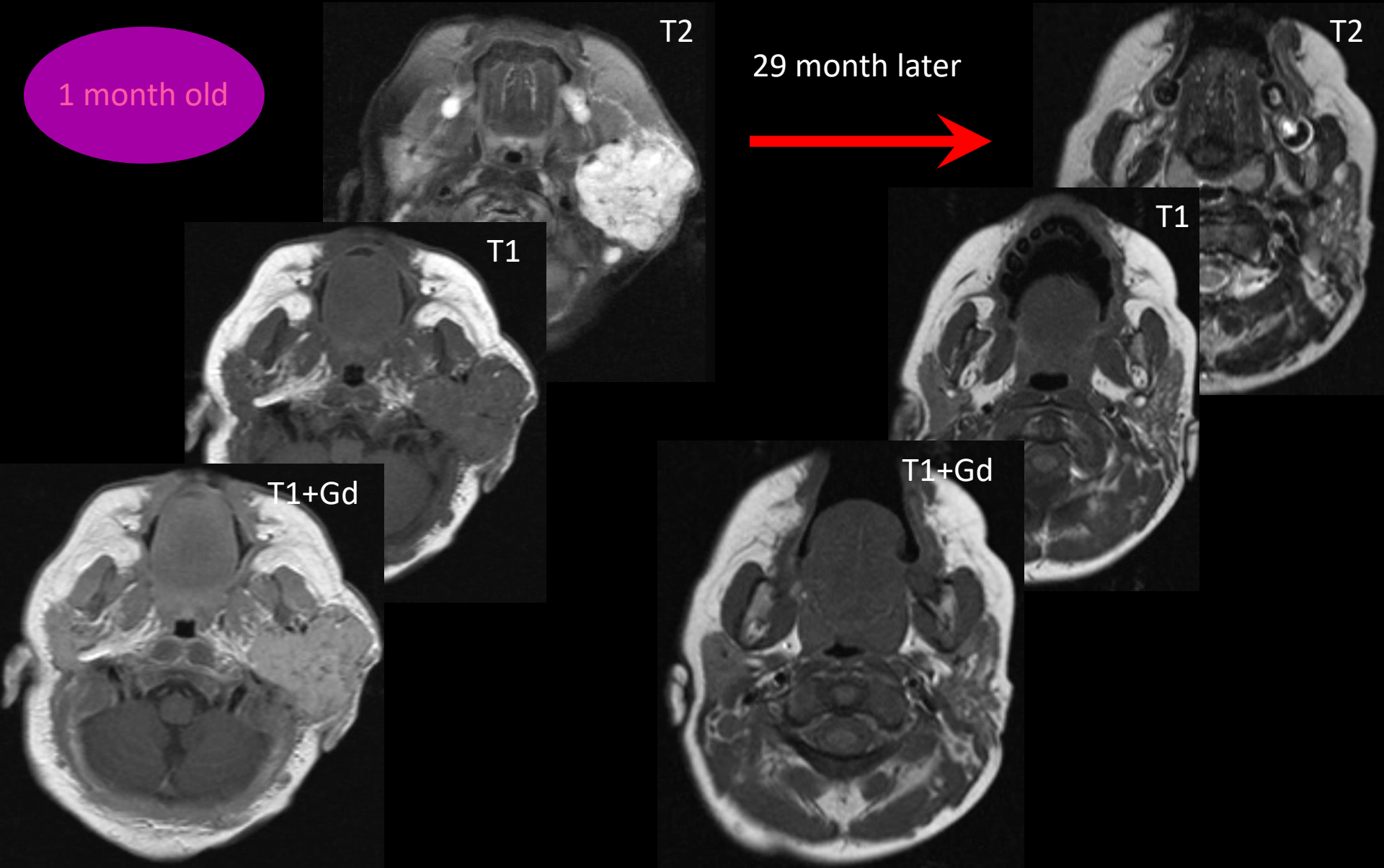


Proliferative and Regressive Phases of Infantile Hemangioma

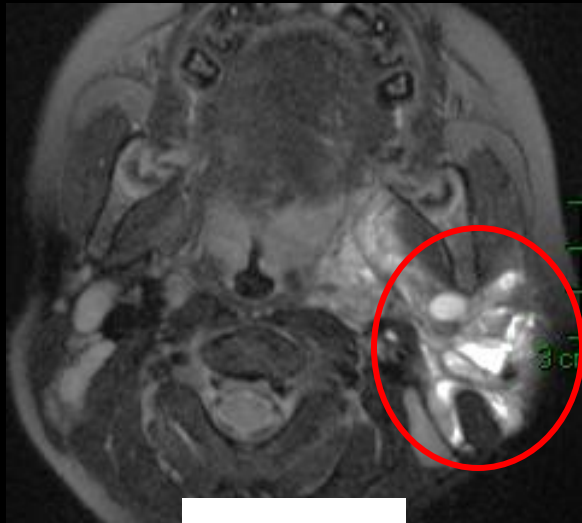
Enlarging left parotid mass

Spontaneous regression

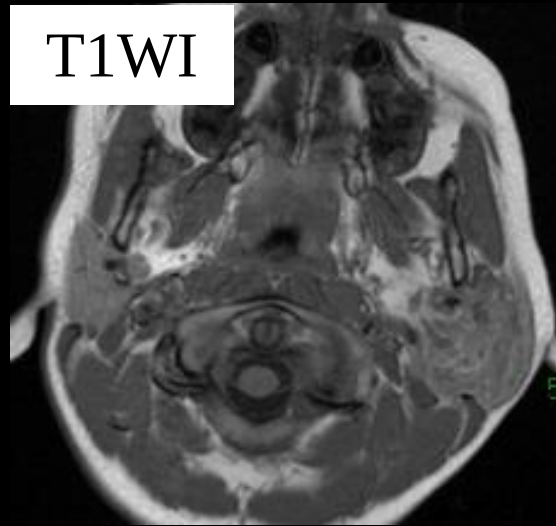
1 month old



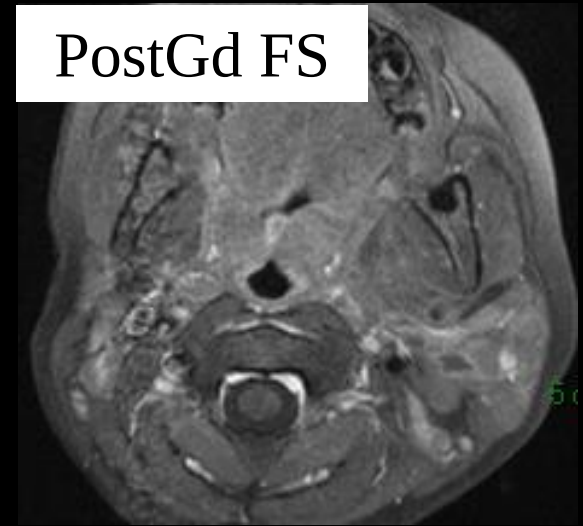
Parotid Lymphatic Malformation



T2WIs



T1WI



PostGd FS

Anomalous low flow lymphatic channel that results from primitive lymph sacs failing to connect to the venous system during the embryonic development.

Lymph systems arises in the head and neck from lymphatic sacs. As a result 80% of the lymphatic malformations are seen in this region.

Usually present at birth.

Parotid Space Pathology

Not neoplastic

Lymphoepithelial lesions

Autoimmune sialectasis

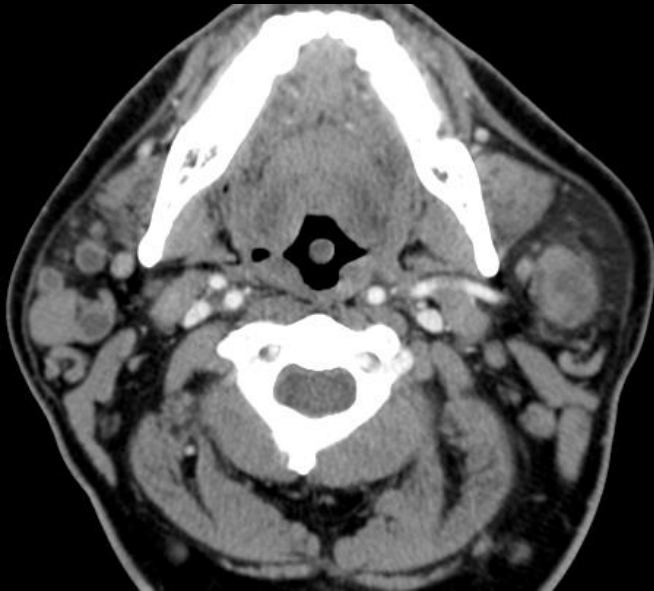
Sialosis

Sialoliths

Benign Lymphoepithelial Lesions (BLEL)

- Old term=benign lymphoepithelial cysts
- Typical history: Bilateral parotid swelling with cervical adenopathy, usually in a patient HIV positive
- May or may not have full blown AIDS
- Imaging features: Bilateral parotid enlargement with intra-glandular cystic and solid lesions.
- May see associated cervical adenopathy.

Lymphoepithelial Lesions

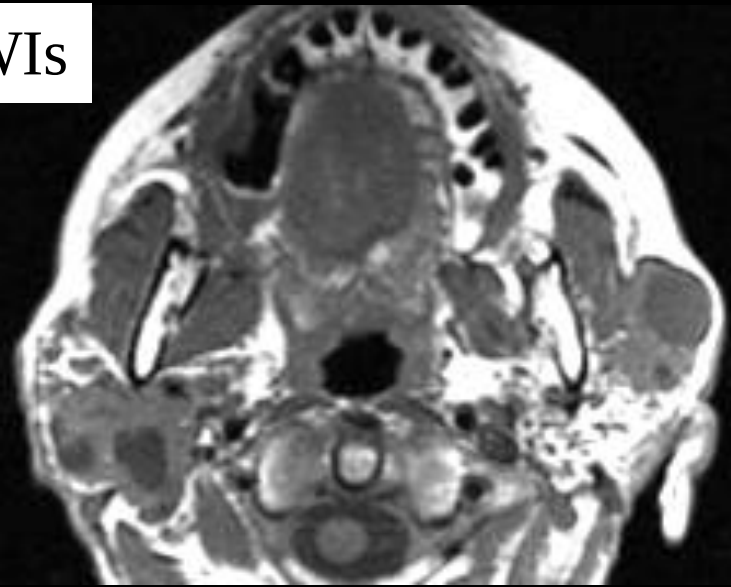


Sjogren Syndrome

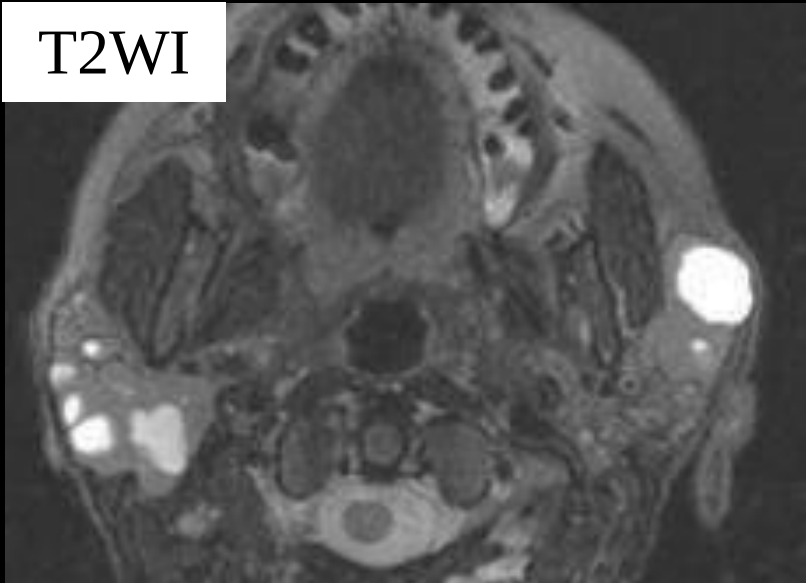
- Clinical triad:
 - Enlarged salivary glands with xerostomia
 - Enlarged lacrimal glands keratoconjunctivitis sicca
 - Connective tissue disease (RA most common)
- Increased risk of developing a lymphoma, often aggressive
- 90-95% female; 50-70 years of age
- CT/MR: Enlarged glands with honeycomb appearance; Some cysts may be quite large and indistinguishable from BLEL by imaging alone

Sjogren Syndrome

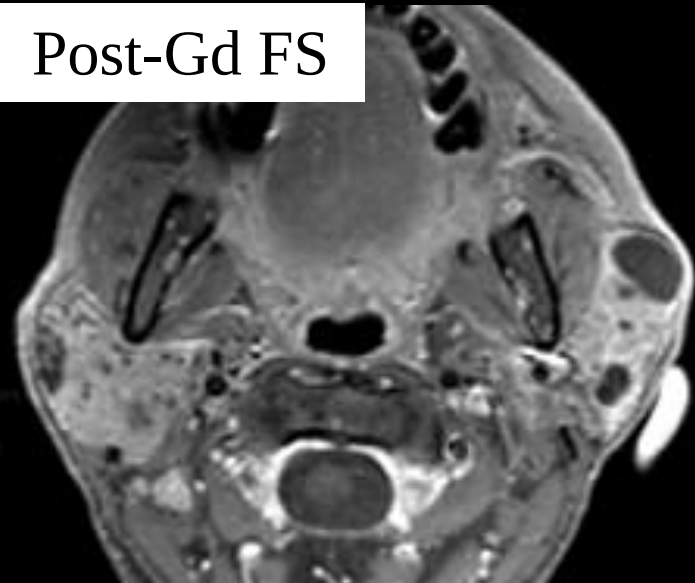
T1WIs



T2WI

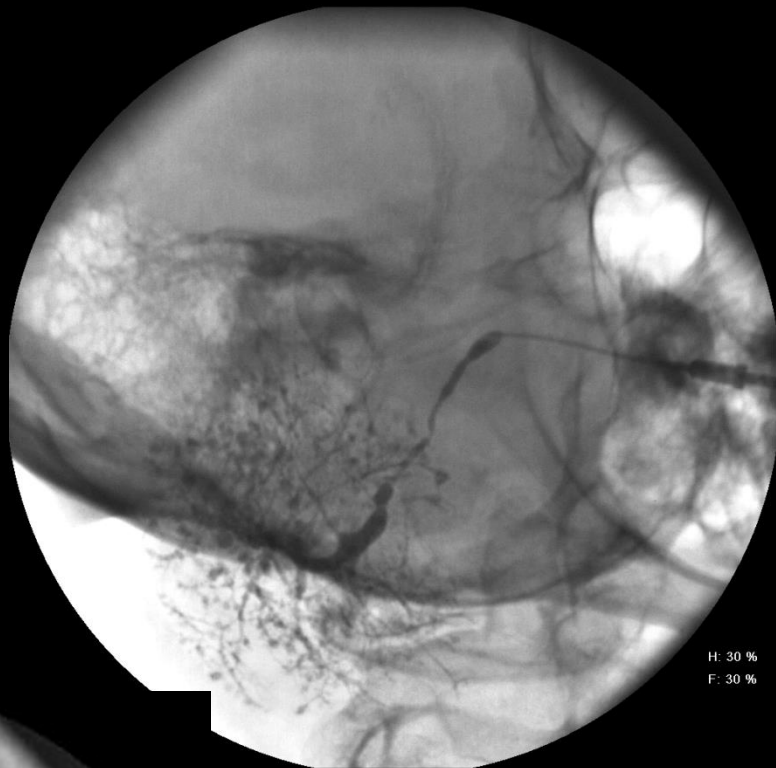


Post-Gd FS





H: 30 %
F: 30 %



H: 30 %
F: 30 %



H: 20 %
F: 10 %

Sialosis

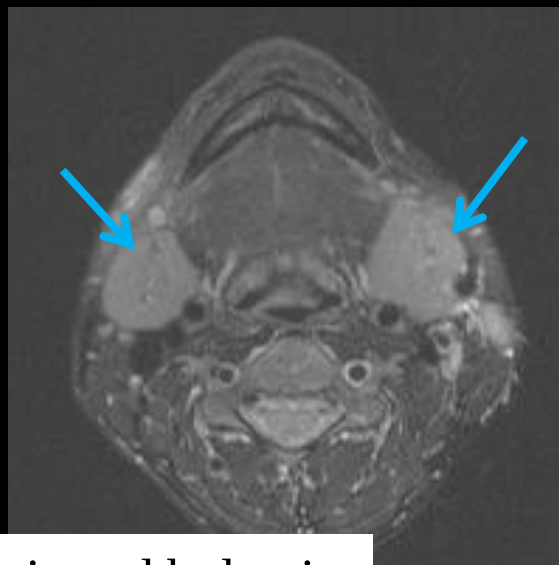
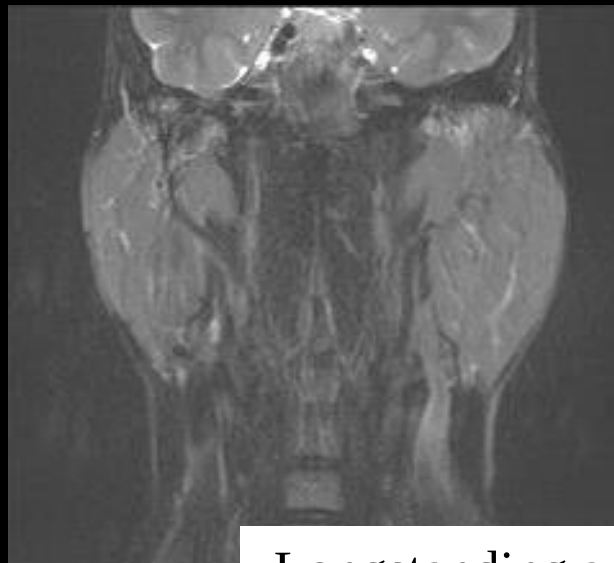
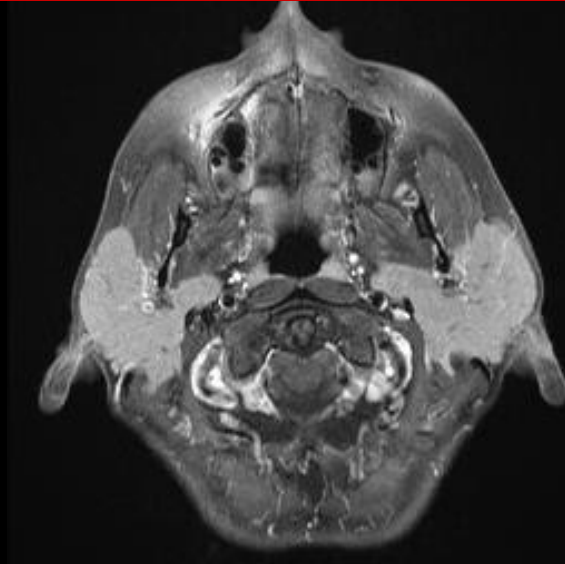
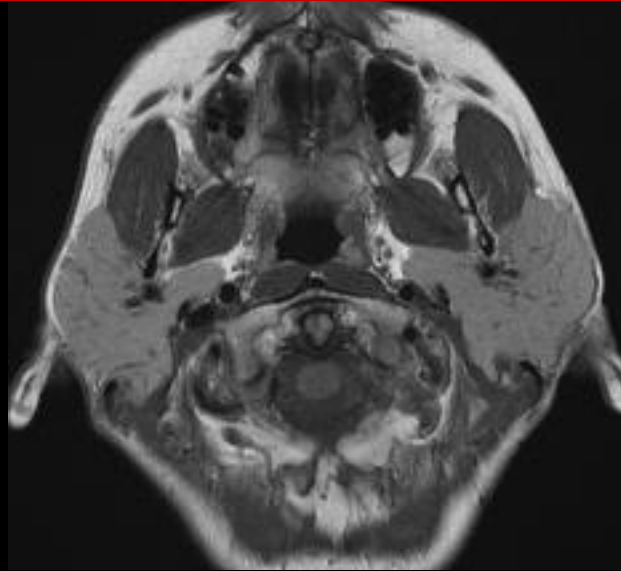
Diffuse bilateral parotid swelling; non-neoplastic, non-inflammatory, +/- non-tender parotid enlargement.

Usually insidious onset, assoc with variety of endocrine diseases, nutritional states, or certain medications.

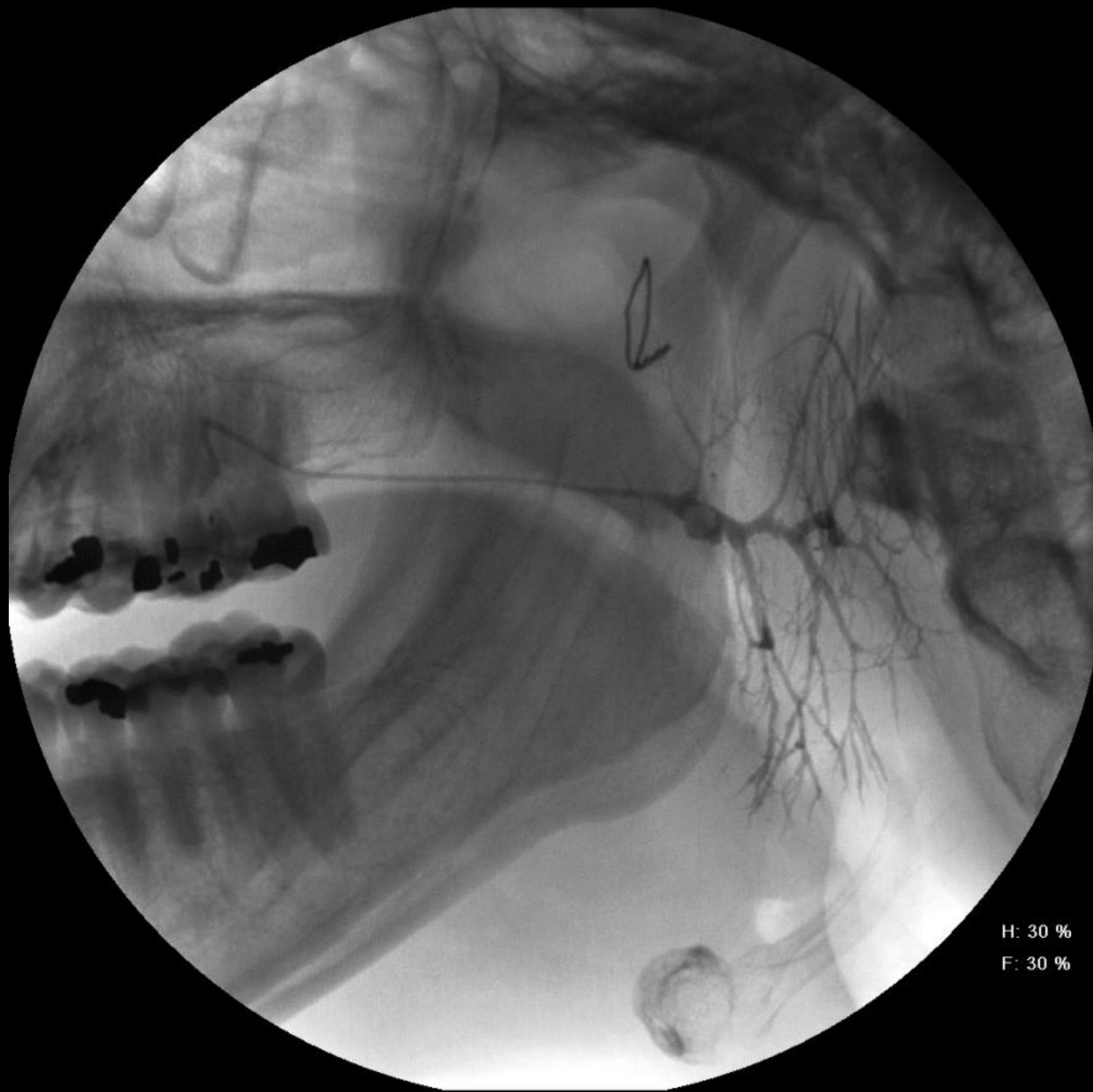


Diabetic female

Sialosis



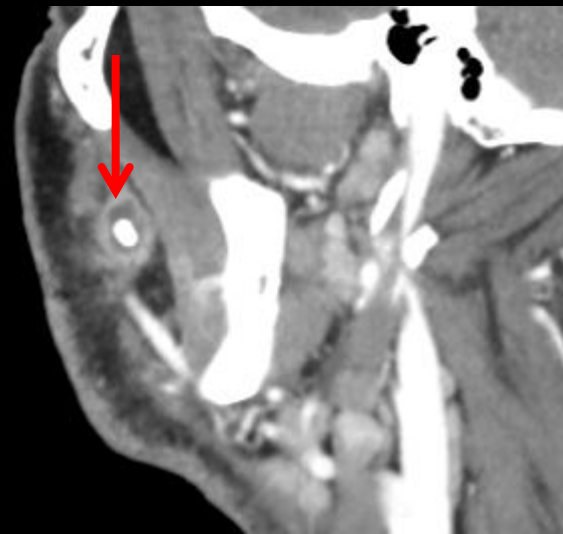
Longstanding anorexia and bulimia



H: 30 %

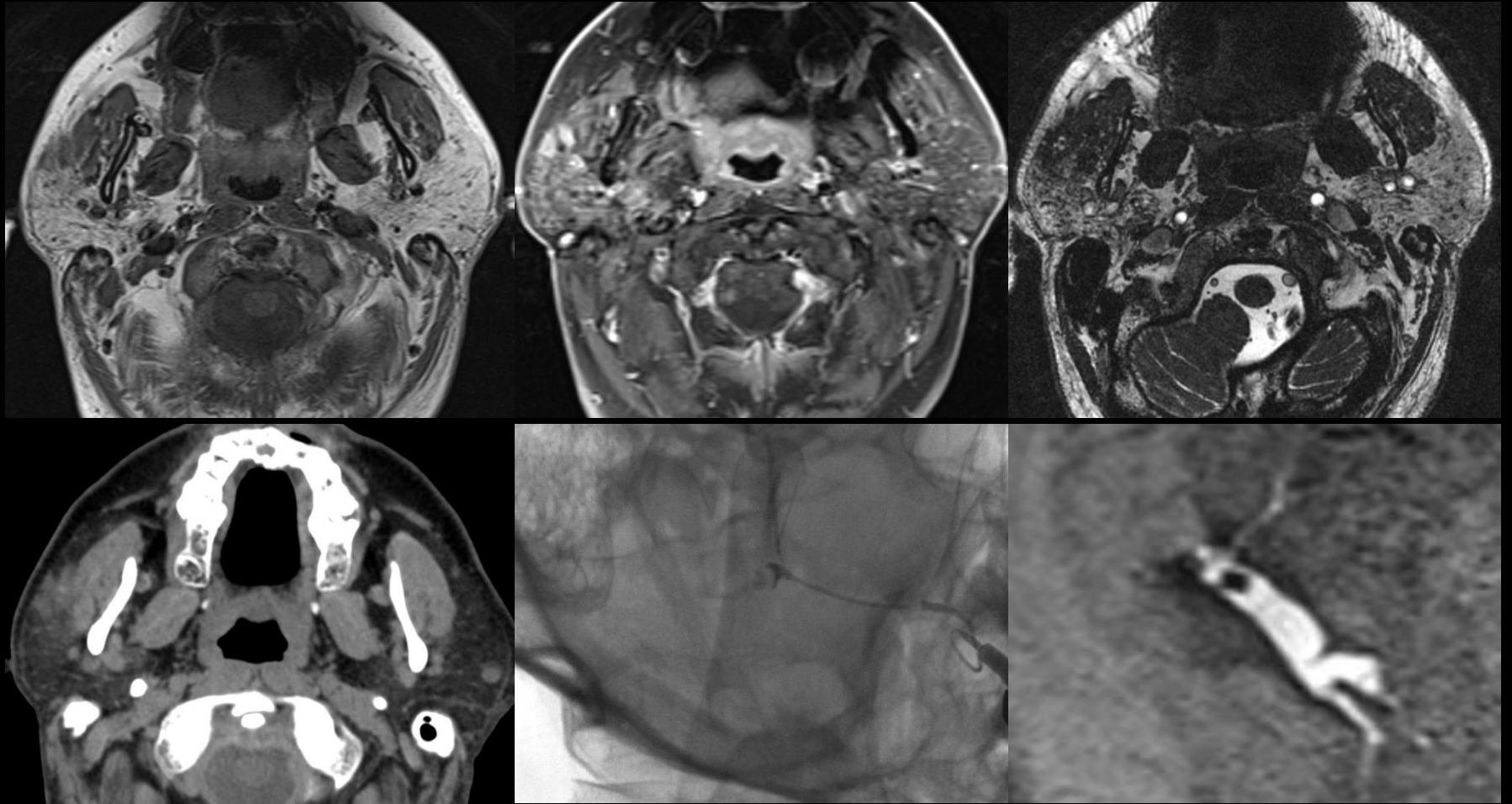
F: 30 %

Sialolith



57M with Rt
facial swelling

Sialolith



Parotid Space Pathology

Benign Neoplasms

Benign mixed tumor (Pleomorphic adenoma)

Warthin tumor

Oncocytoma

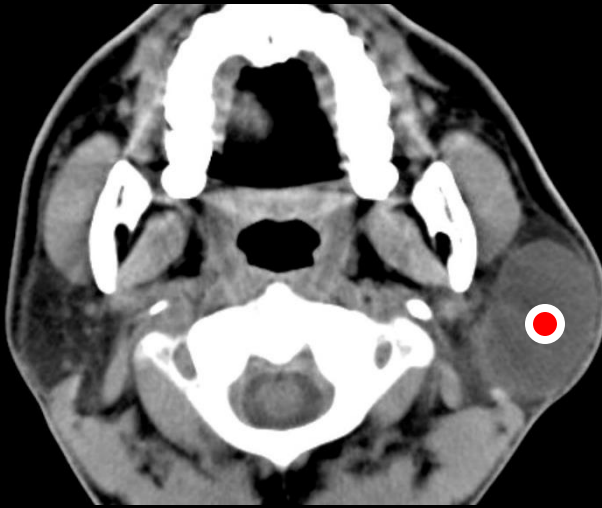
Lipoma

VII neurogenic tumor

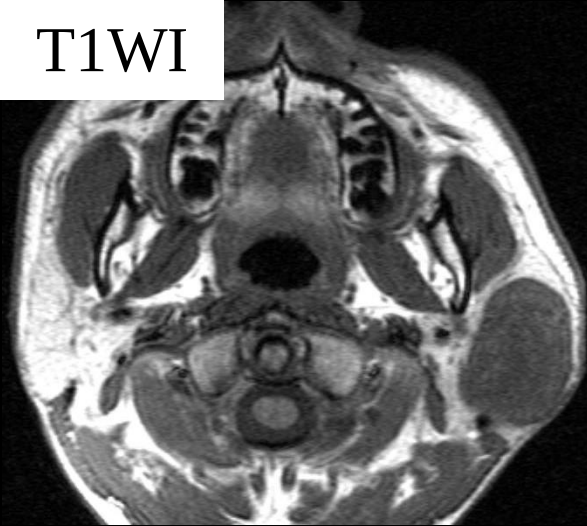
Benign Mixed Tumor (AKA Pleomorphic Adenoma)

- Most common benign parotid tumor (80%); if left untreated, est. 25% will undergo malignant degeneration
- Typical patient >50 years of age
- Sharply marginated; round, oval, or lobulated
- CT: Variable enhancement, infrequent dystrophic calcification,
- MR: T1-isointense; T2 hyperintense; enhancement

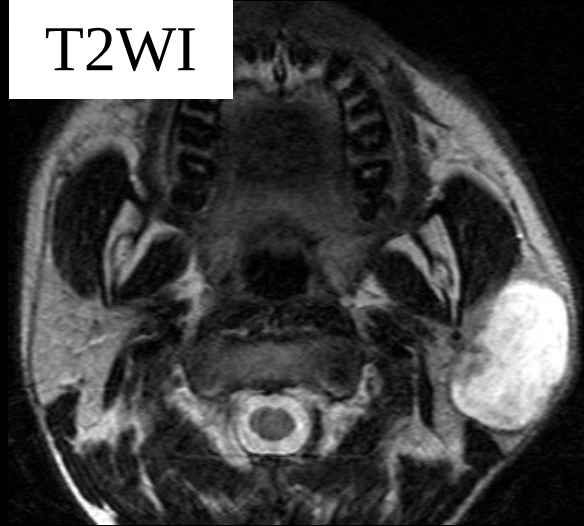
Benign Mixed Tumor



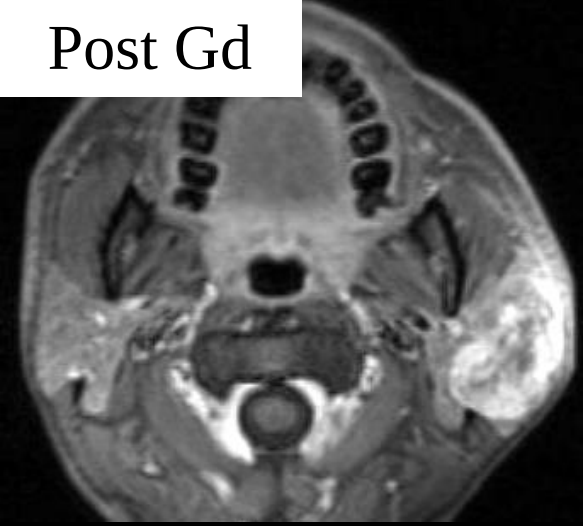
T1WI



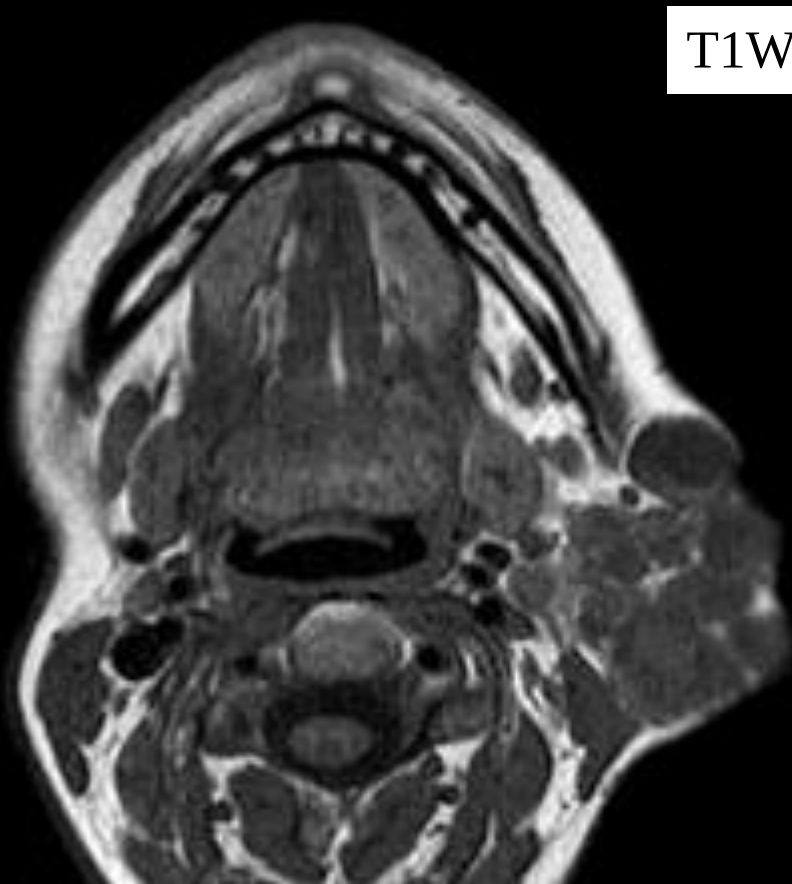
T2WI



Post Gd



Benign Mixed Tumor “Spill”



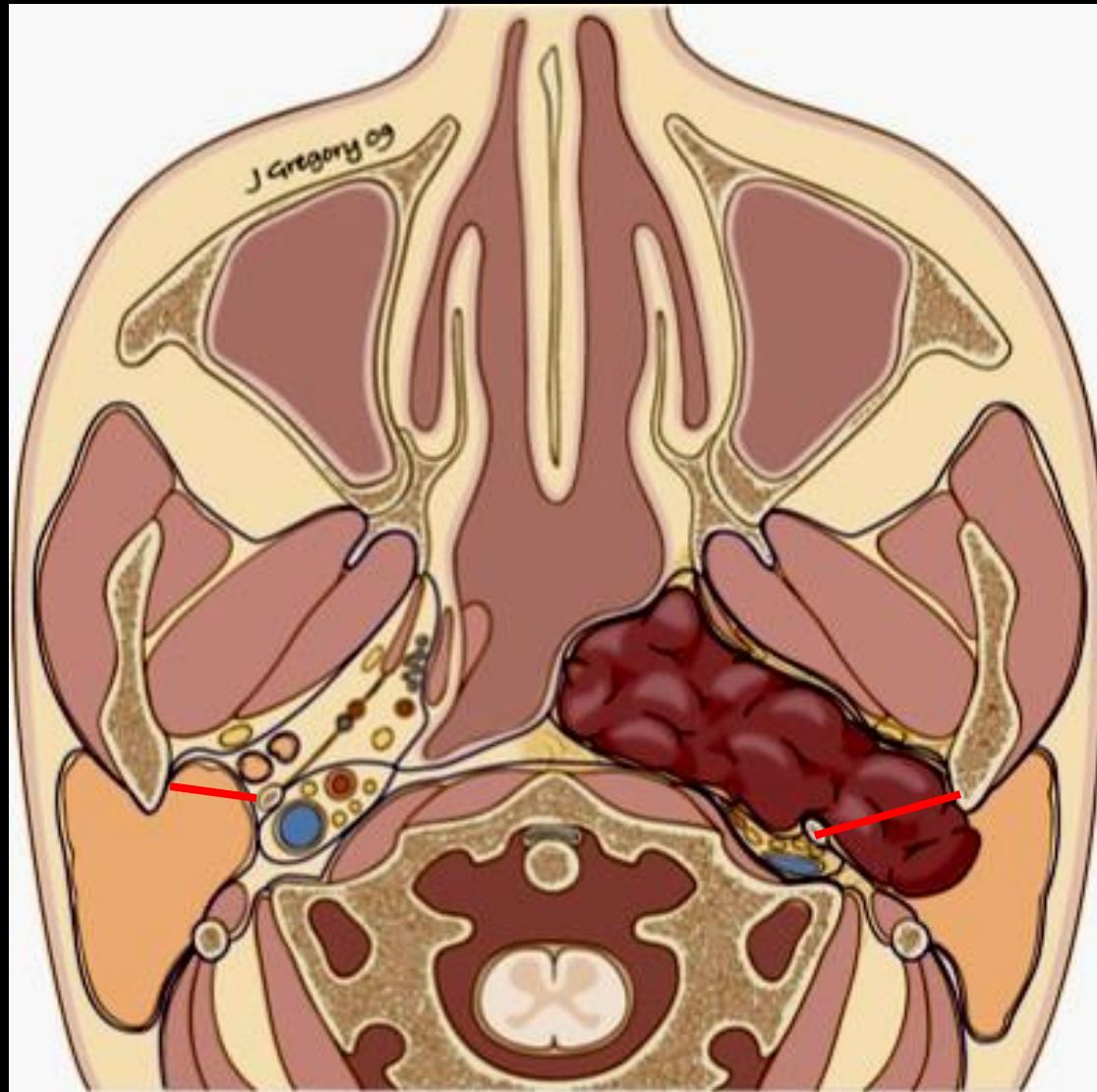
T1WI



T2WI

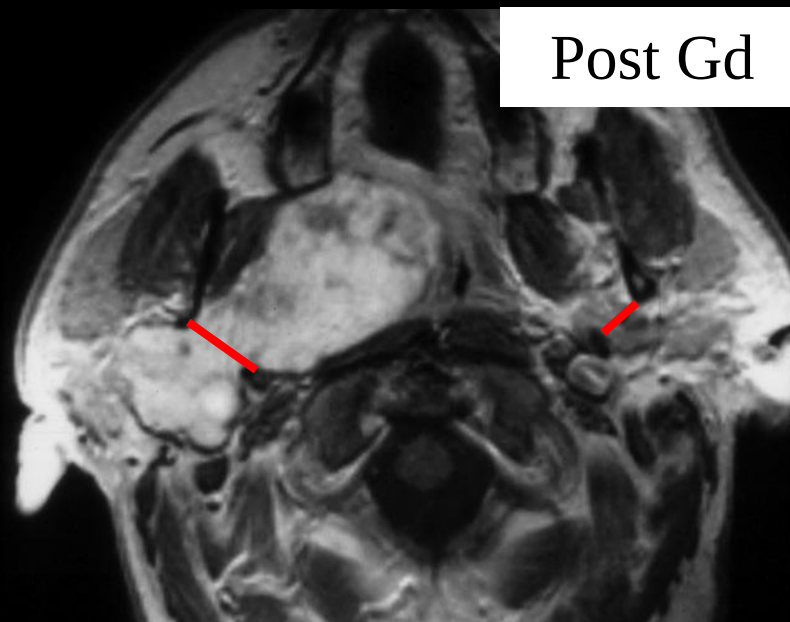
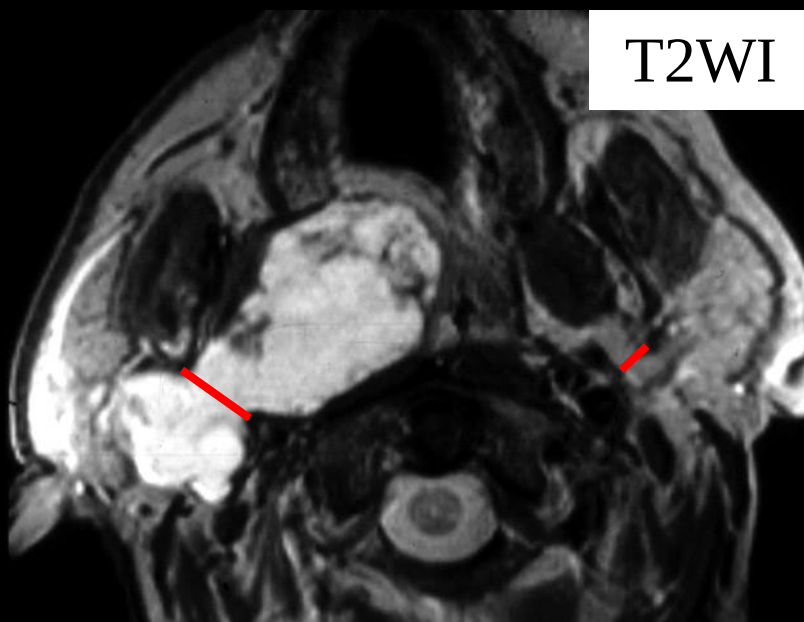
Mother confirmed Hx of surgery as
child for treatment of lump at left side of face

The Stylomandibular Tunnel





Deep Lobe Benign Mixed Tumor

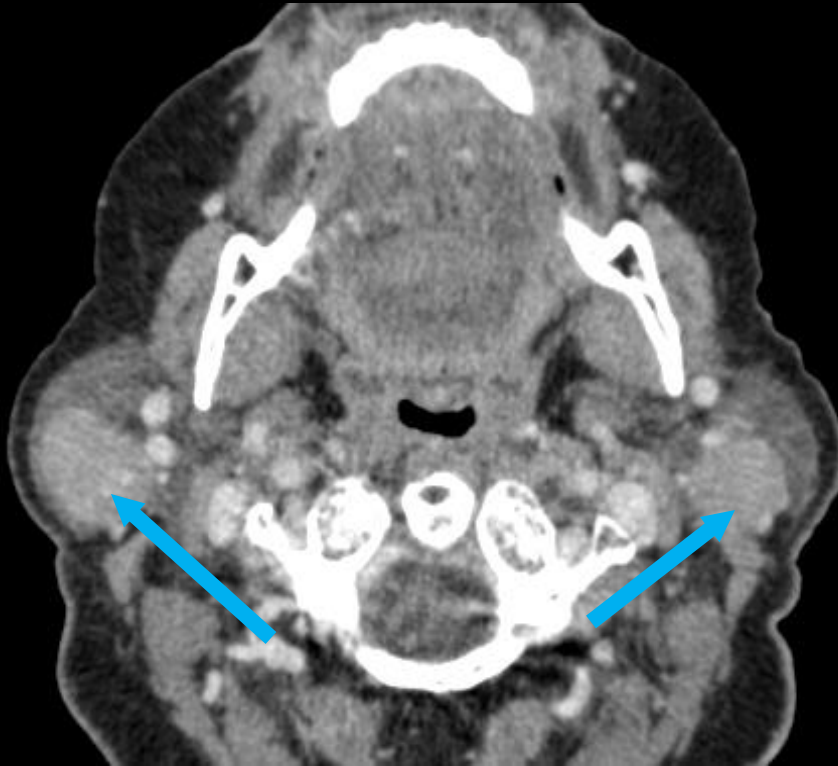


Warthin Tumor

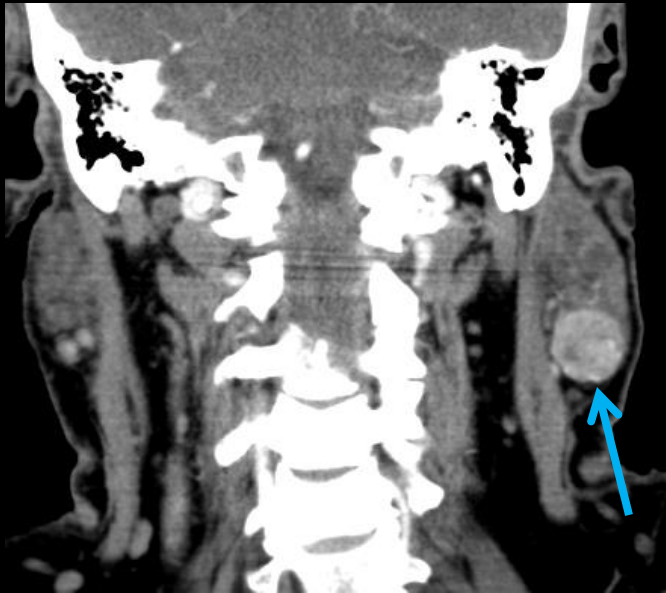
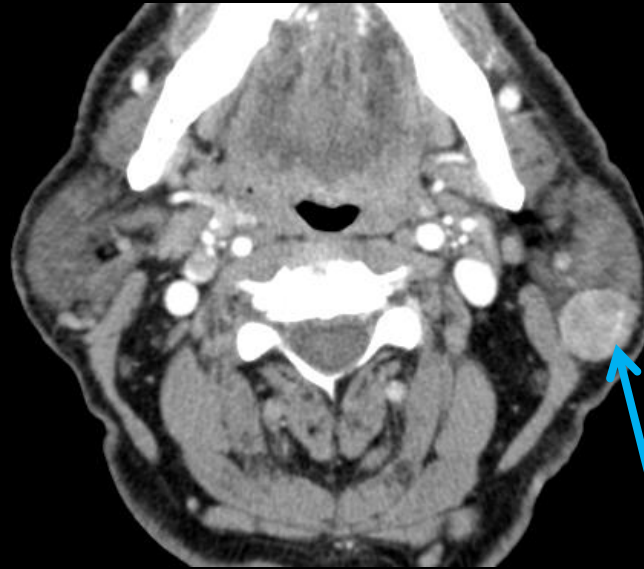
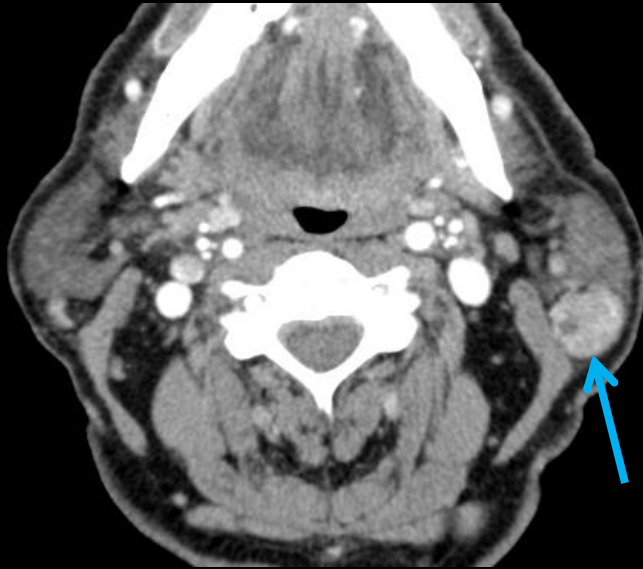
(Papillary Cystadenoma Lymphomatosum)

- Second most common benign tumor of parotid space
- 80% male; >50 years; parotid tail; bilateral 10-15%
- Arise from ectopic salivary gland rests within intra-parotid lymph nodes-**PAROTID GLAND ONLY**
- Imaging: Well-circumscribed, usually 3-4 cm
 - Complex mixture of solid and cystic components
 - Appears more complex than typical BMT

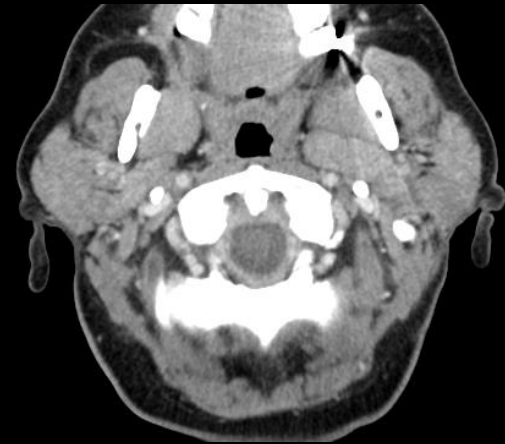
Bilateral Warthin Tumors



Warthin Tumor



55 y.o. female with a history of diffuse B cell lymphoma with completion of RCHOP therapy



Parotid Space Pathology

Malignant Neoplasms

Mucoepidermoid Ca

Squamous Cell Ca

Adenocarcinomas (Acinic Cell Ca...)

Adenoid Cystic Ca

Carcinoma Ex Pleomorphic Adenoma

NHL

Malignant Nerve Sheath Tumors

Liposarcoma

Metastases

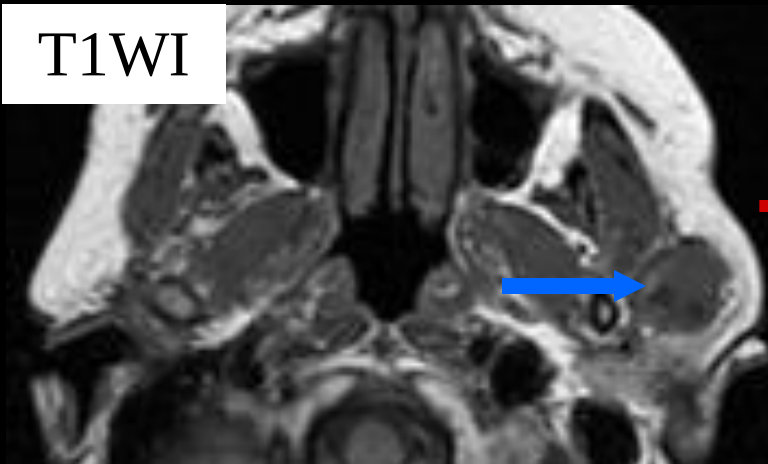
Perineural Tumor Spread

Mucoepidermoid Carcinoma

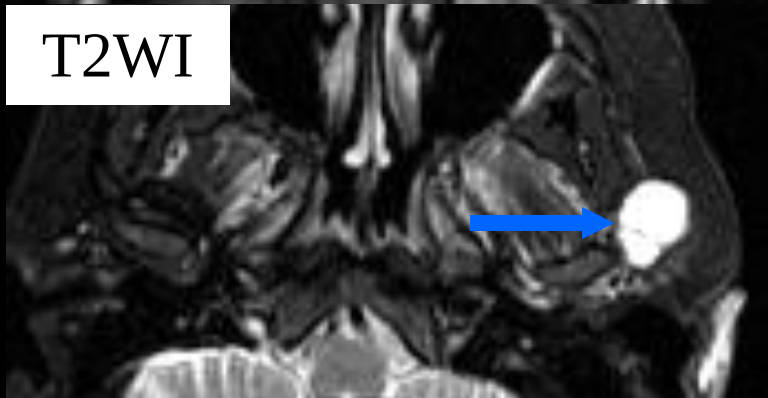
- Most common malignant lesion in in most series
- 35 and 60 years of age; F>M; 80% in parotid
- Clinical: Rock hard mass with associated pain and itching over the course of VII.
- Imaging features depend on grade:
 - Low grade: Benign appearance; cannot distinguish from BMT, Warthin, etc
 - Higher grade: Infiltrating, indistinct margins;
 - Low to intermediate signal on T1 and T2WI
 - Heterogeneous enhancement

Mucoepidermoid Carcinoma

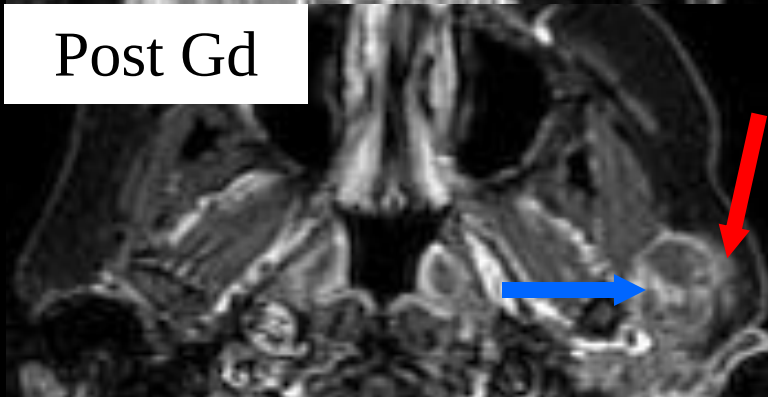
T1WI



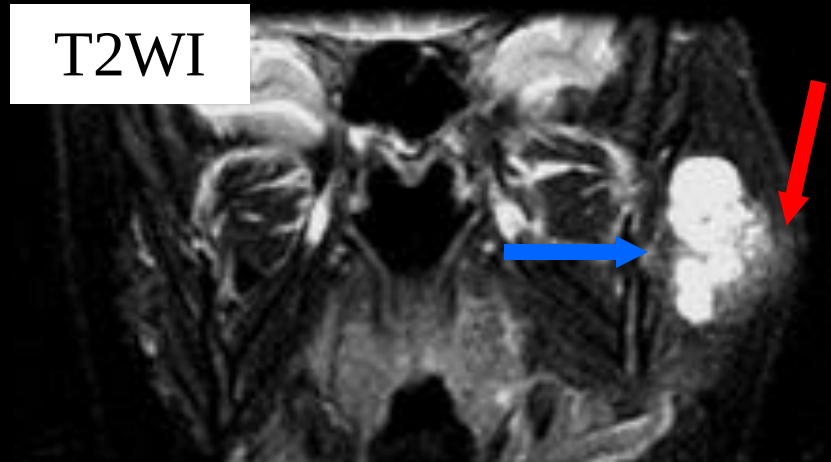
T2WI



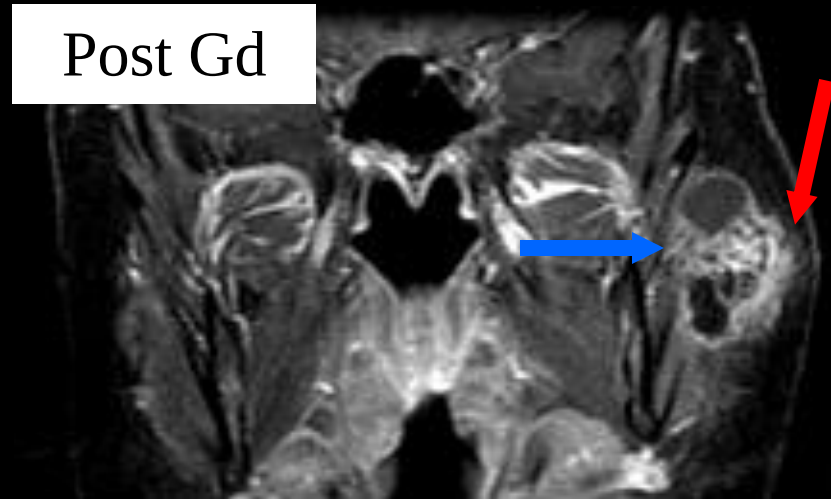
Post Gd



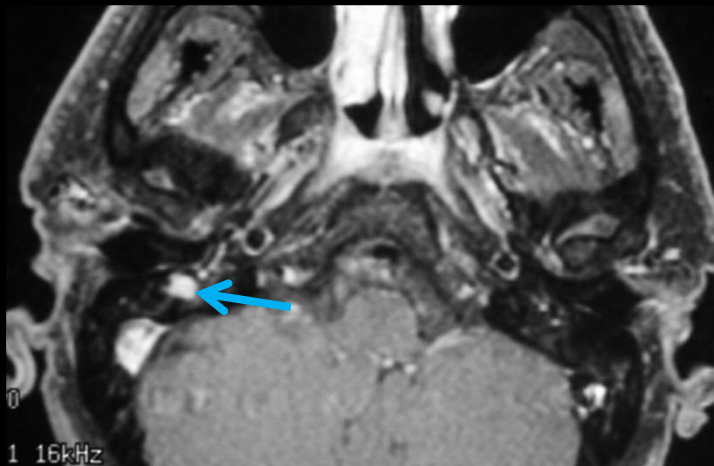
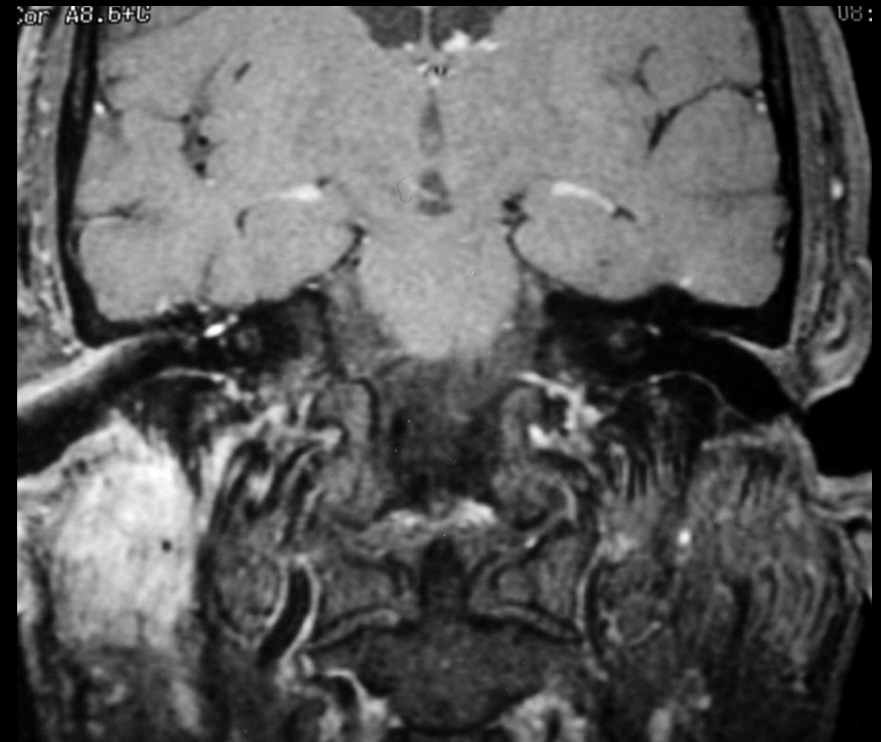
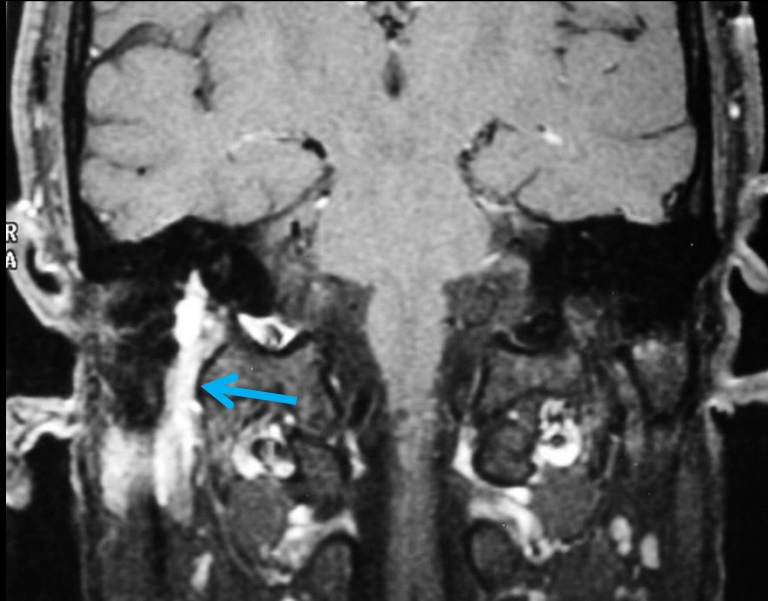
T2WI



Post Gd



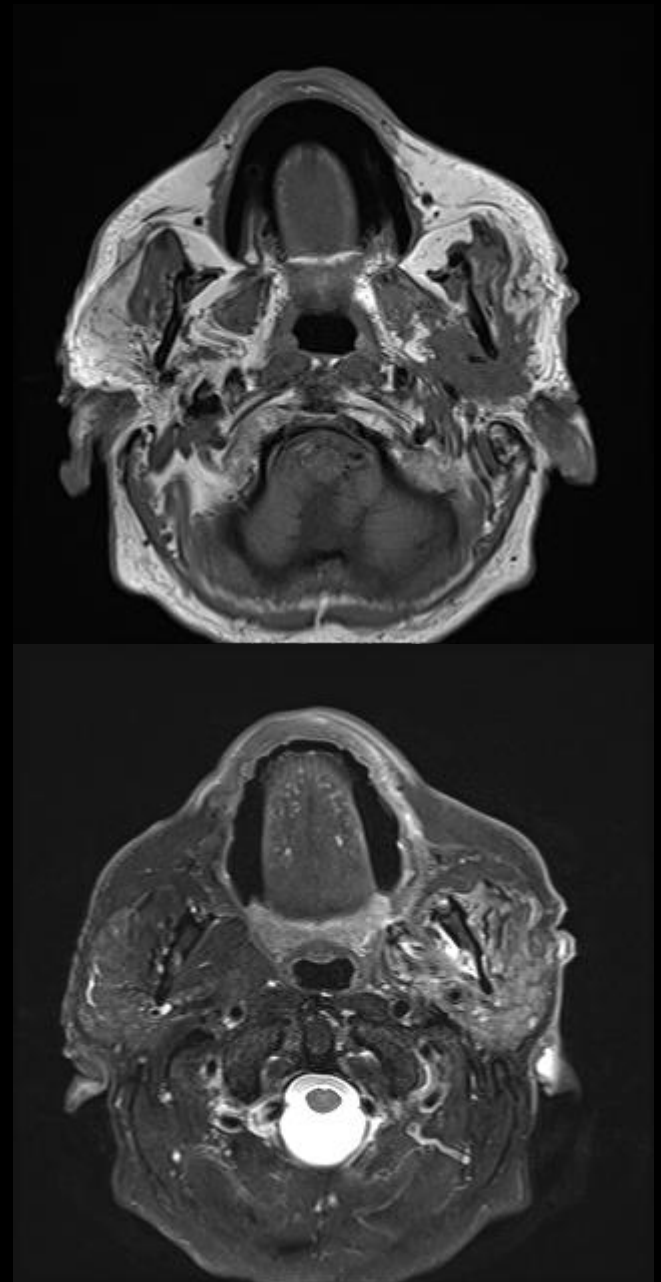
Adenoid Cystic Carcinoma

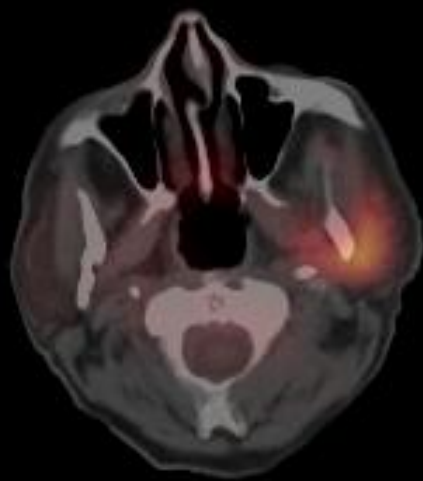
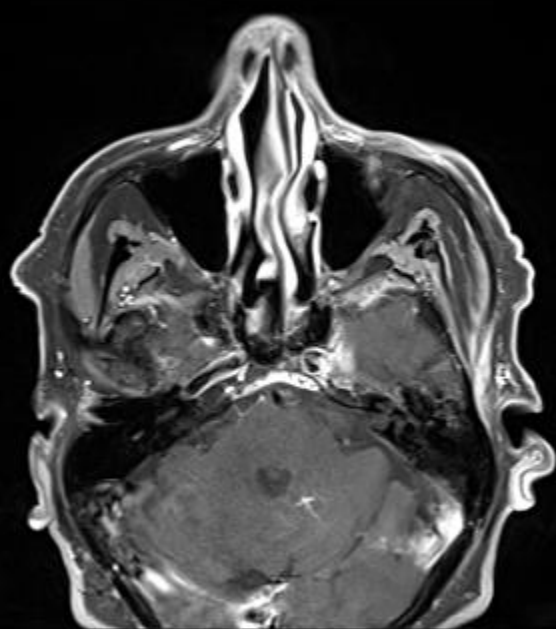
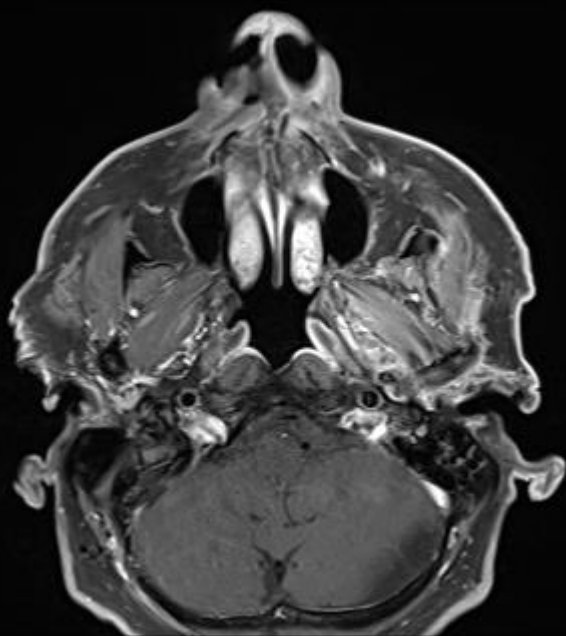
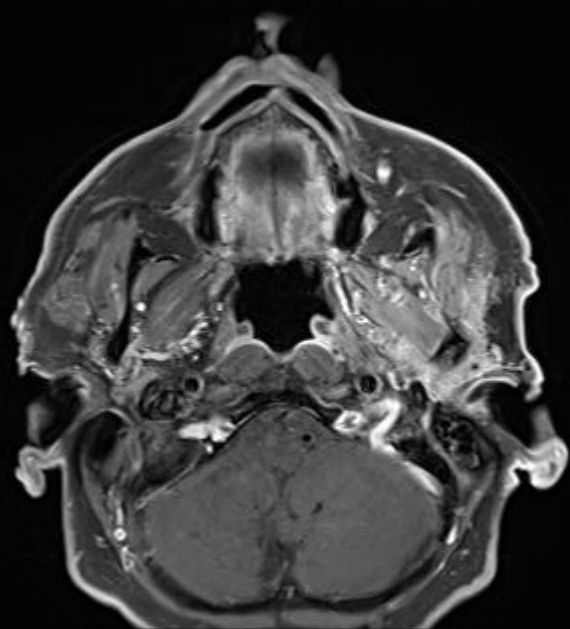


Carcinoma Ex Pleomorphic Adenoma

- Most common type of malignant change that occur in pleomorphic adenoma.
- This is a carcinoma that arises in the epithelial and/or myoepithelial component of a pleomorphic adenoma.
- It develops in 6% of all pleomorphic adenomas.
- Seen in patients in the sixth to seventh decades of life.
- Rarely encountered in patients younger than 30 years and is rarely seen in children.
- Malignant transformation may occur up to 50 years after a pleomorphic adenoma is first diagnosed; the average period before malignant transformation is 20 years.

**80 yo man
left-sided
facial
weakness
and pain and
trismus,
which
involved his
left face.**

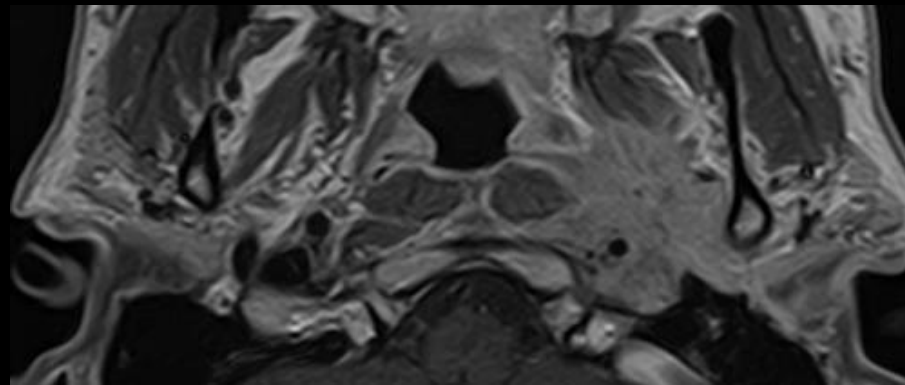
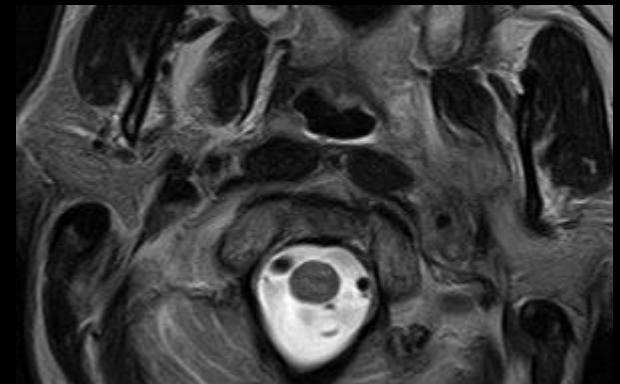
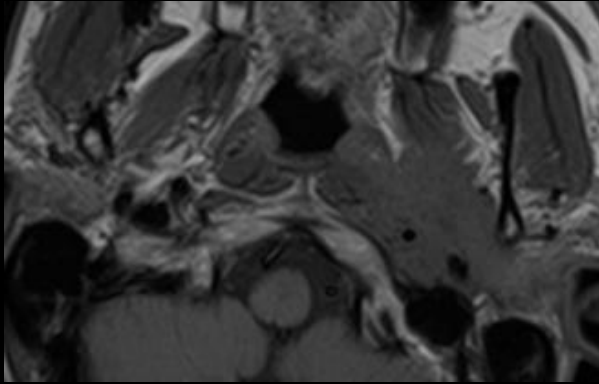




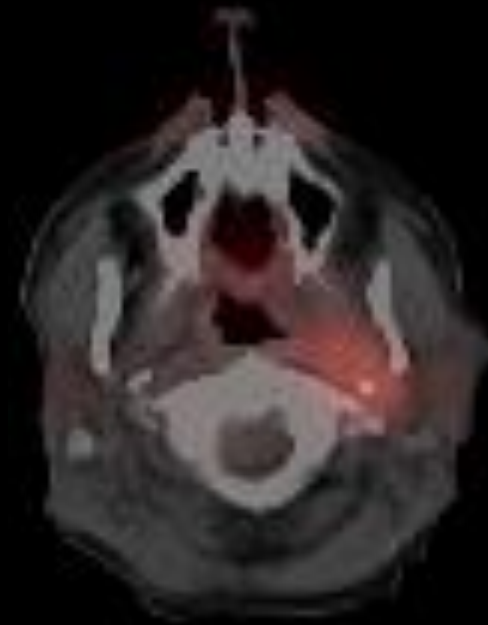
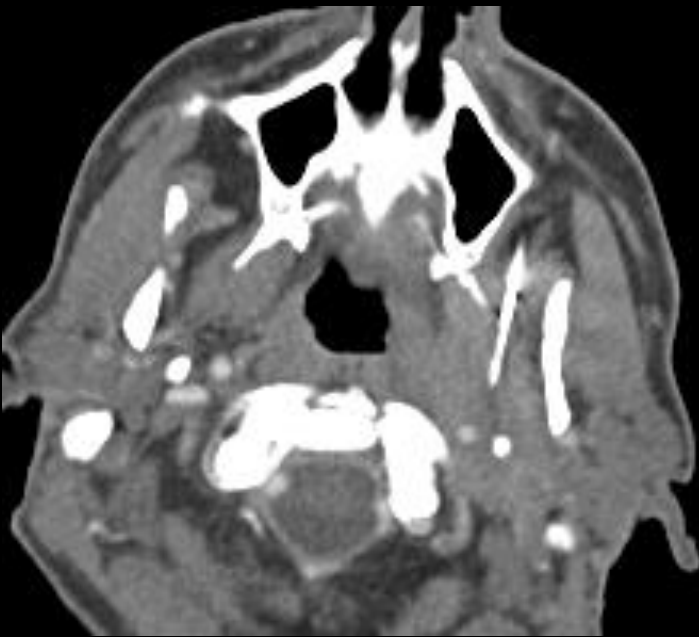
Poorly differentiated squamous cell carcinoma

- Primary squamous cell carcinoma of the parotid gland is a rare aggressive malignancy.
- Poor prognosis.
- Prior radiation therapy has been implicated as a predisposing factor
- Patients typically present in an advanced stage with rapidly enlarging mass around the angle of mandible, often accompanied by cervical lymphadenopathy and facial nerve involvement.

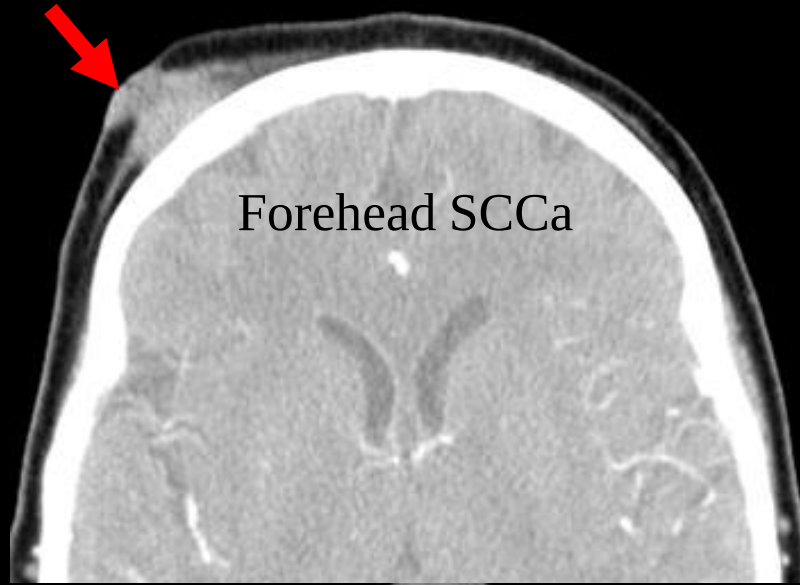
65 yo male sudden left sided hearing loss



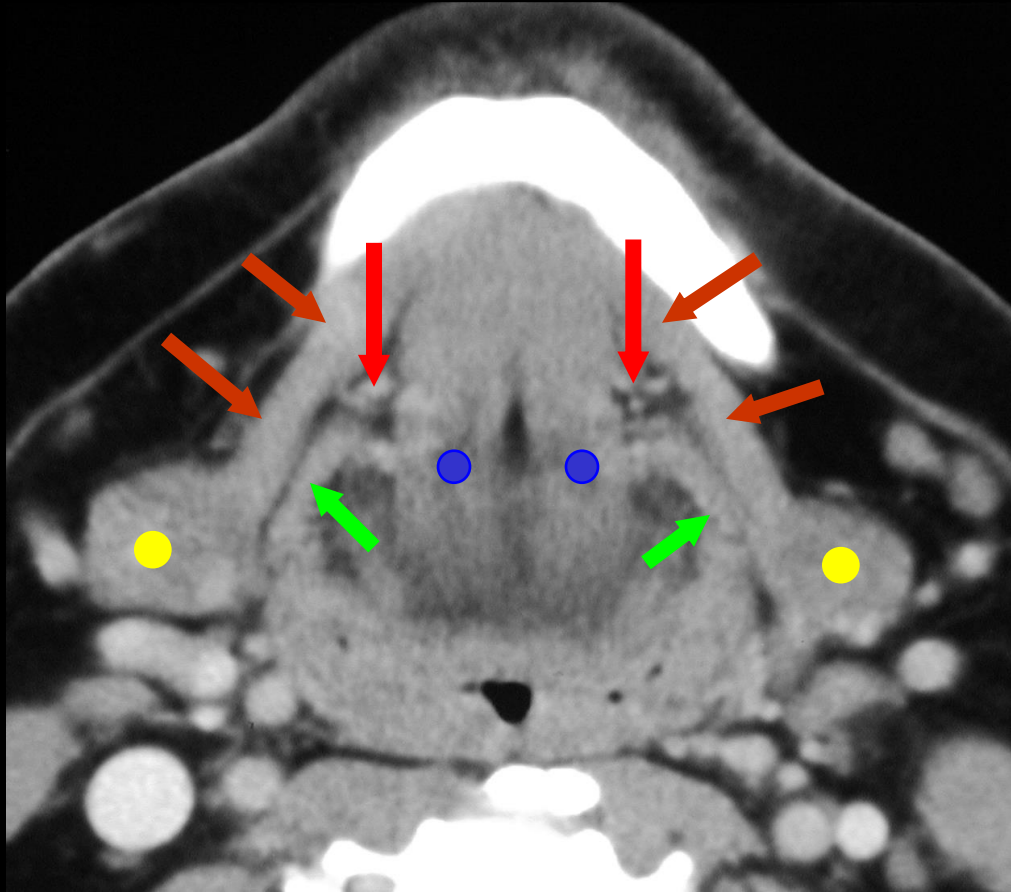
Poorly differentiated squamous cell carcinoma



Parotid node metastases



Sublingual and Submandibular Anatomy



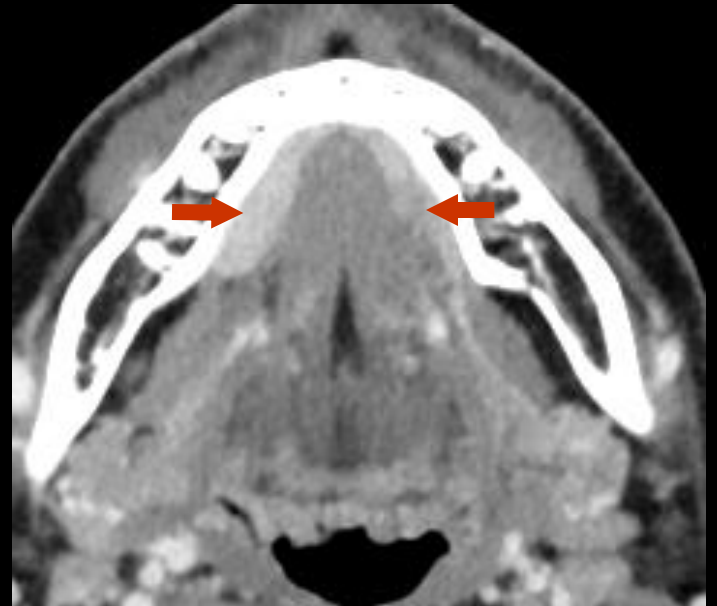
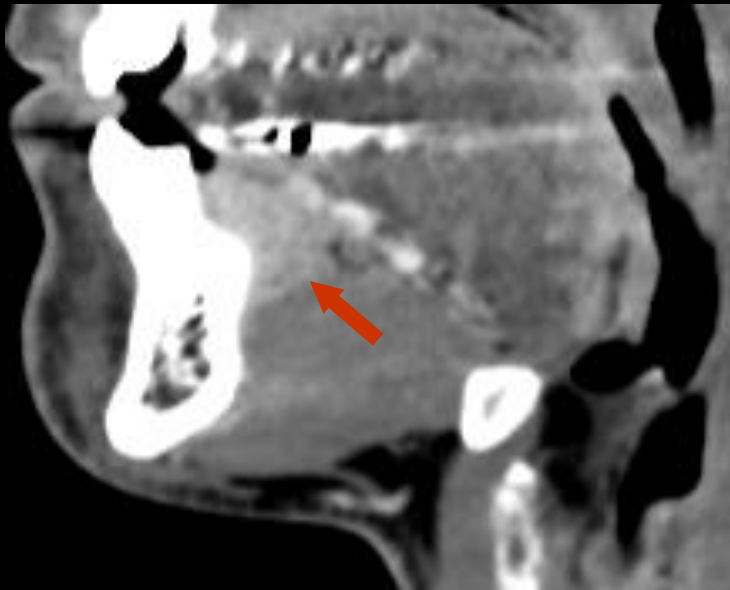
Mylohyoid muscles

Hyoglossus muscles

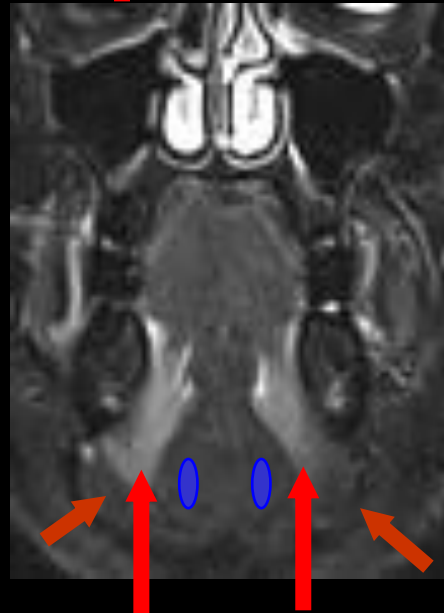
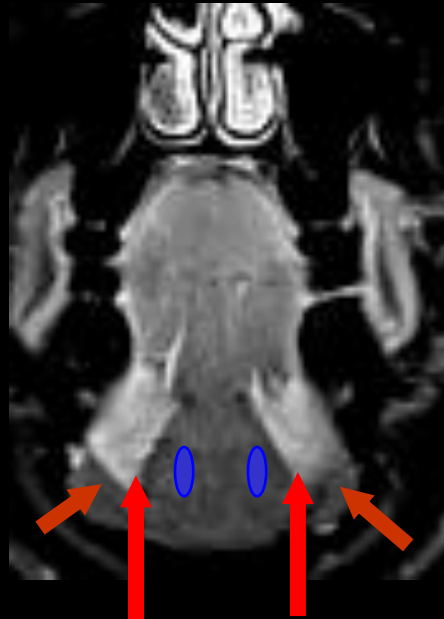
Sublingual space and
neurovascular bundle

Genioglossus muscles

Submandibular gland



Sublingual gland



Mylohyoid muscles

Hyoglossus muscles

Sublingual space and
neurovascular bundle

Genioglossus muscles

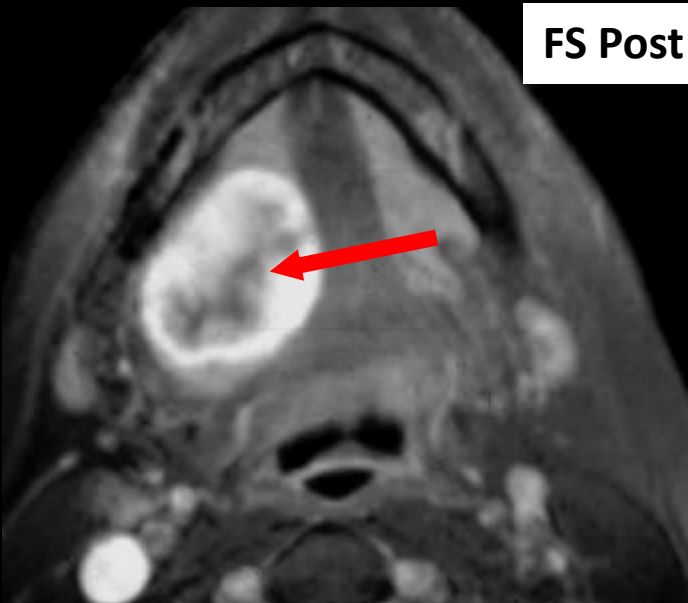
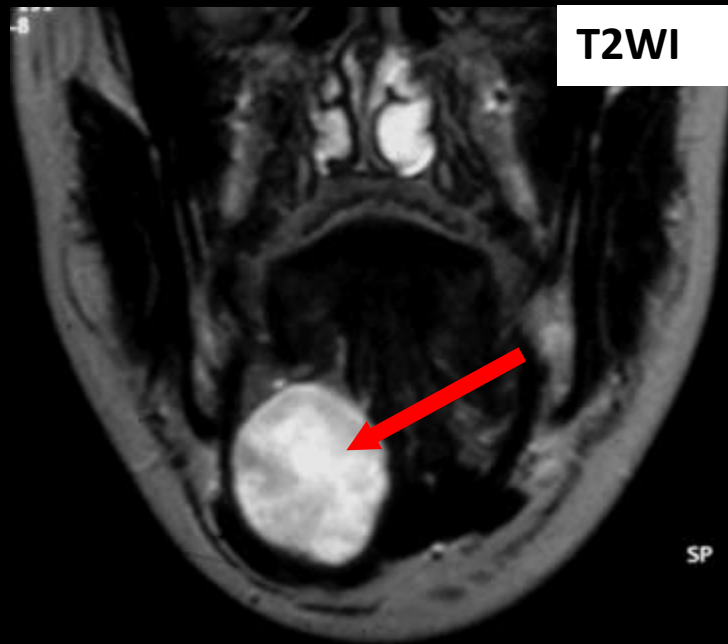
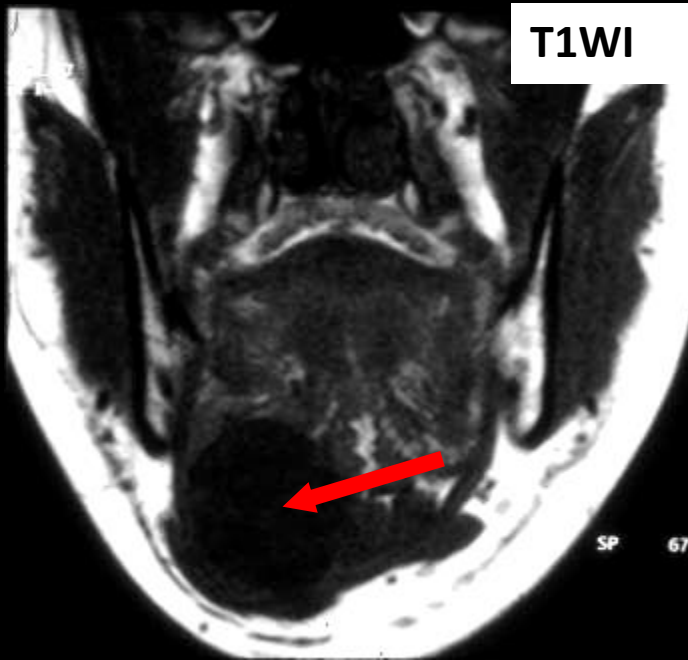
Submandibular gland

Sublingual Gland

Sublingual Gland

- Smallest
- Sublingual space
- Mandible – Genioglossos
- Cranial to the Mylohyoid
- Multiple draining ducts
(Rivinus)

Sublingual Gland Pleomorphic Adenoma

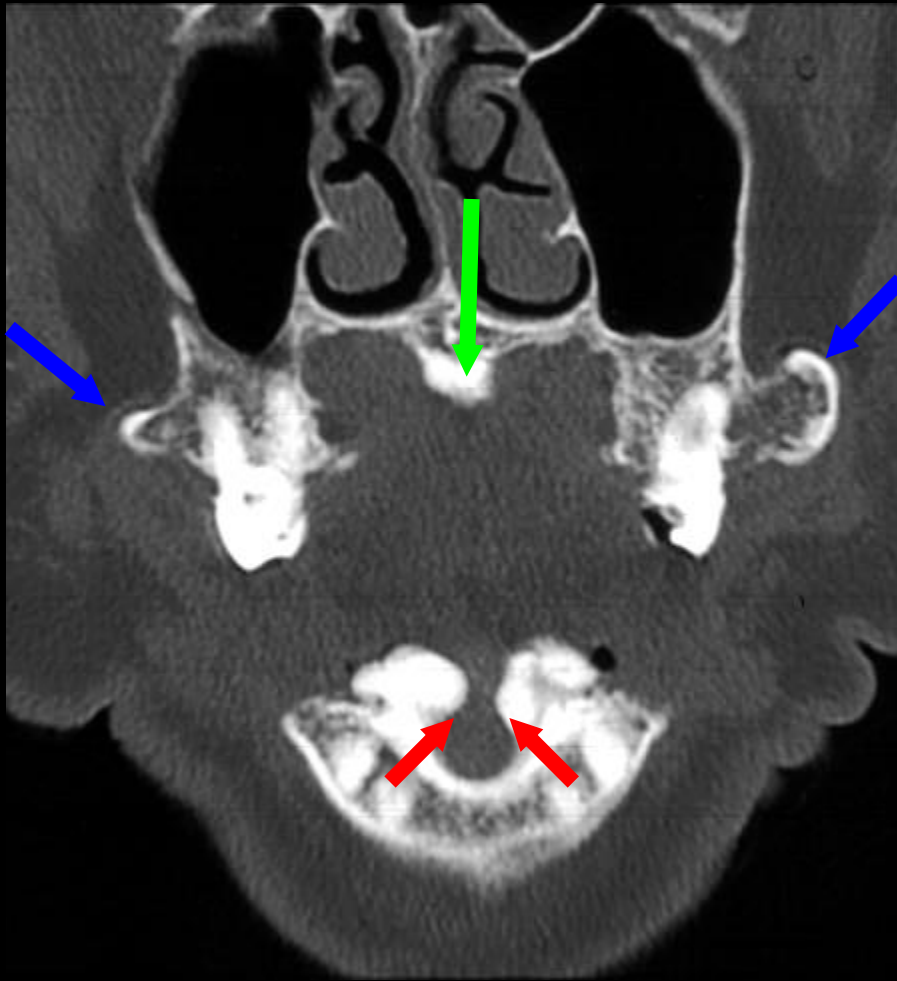


Exostoses

- Dense cortical bone w/ or w/o cancellous bone
- Incidental unless they preclude proper denture fitting
- Occasionally very large and interfere with swallowing
- Torus palatinus
- Torus mandibularis
 - interna/externa
- Torus maxillaris
 - interna/externa



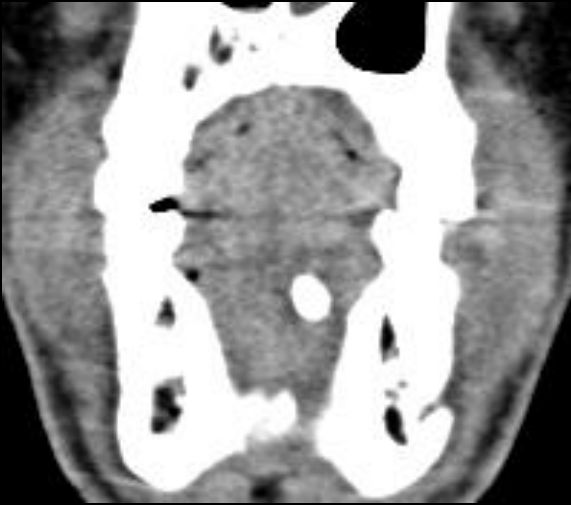
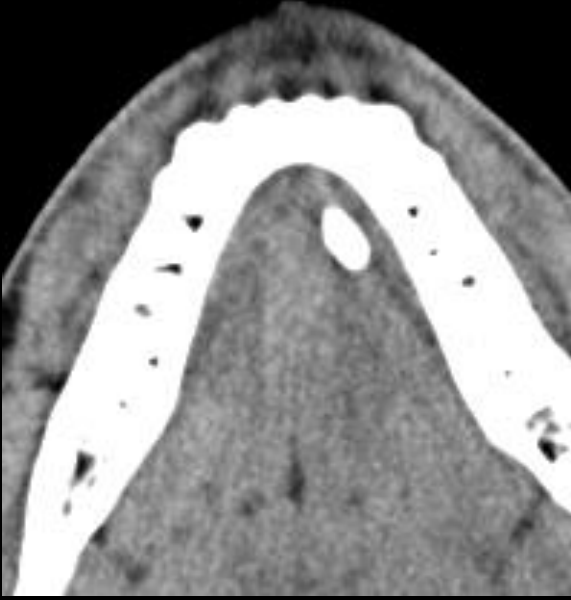
Exostoses

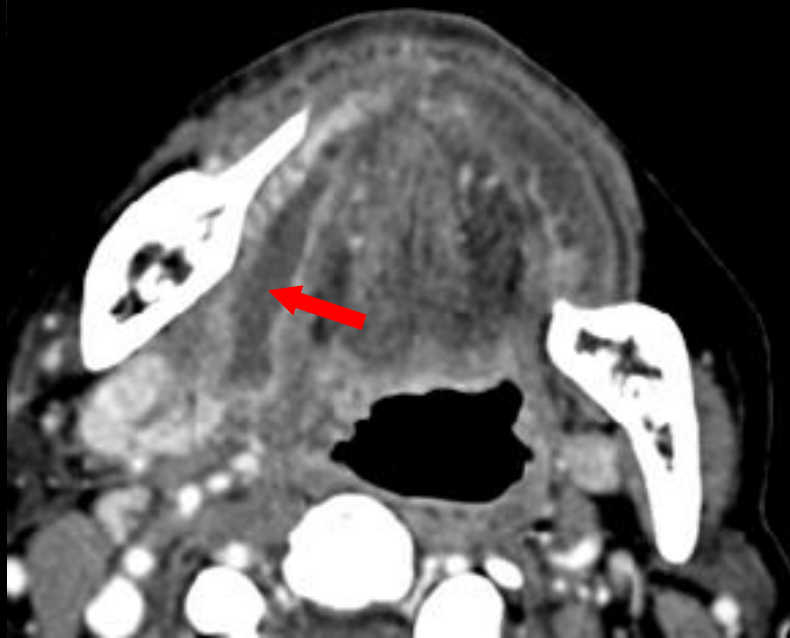
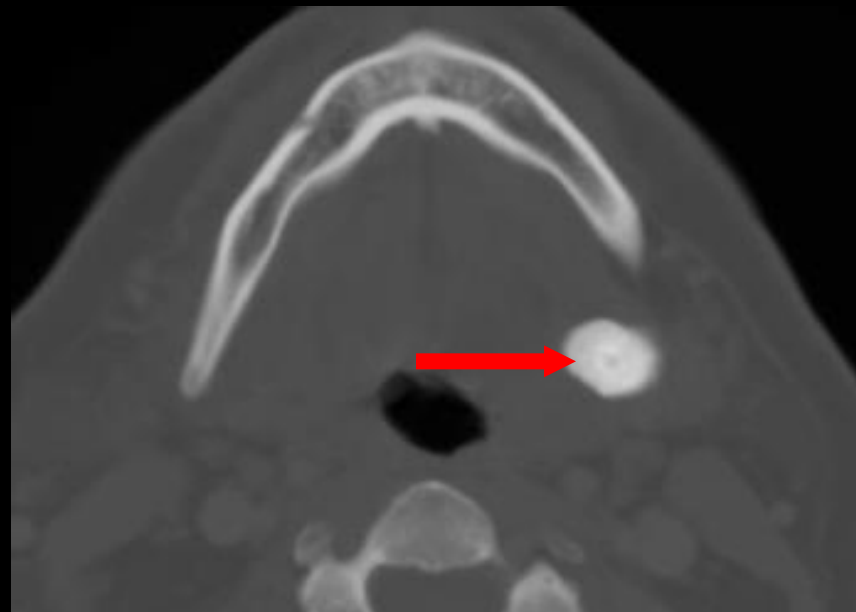
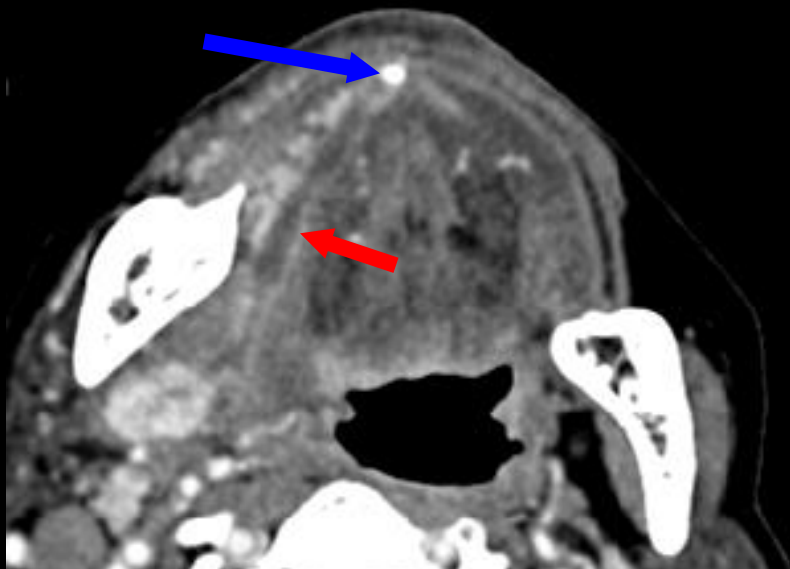


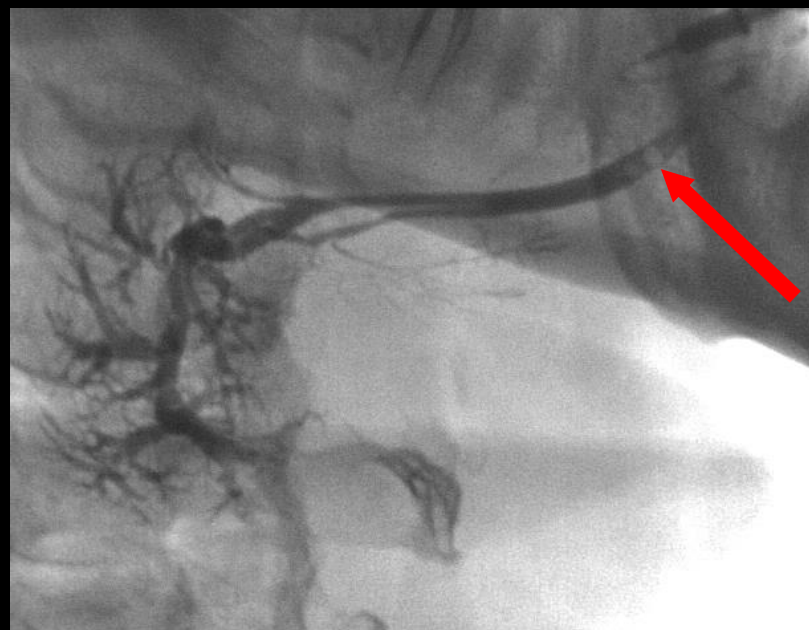
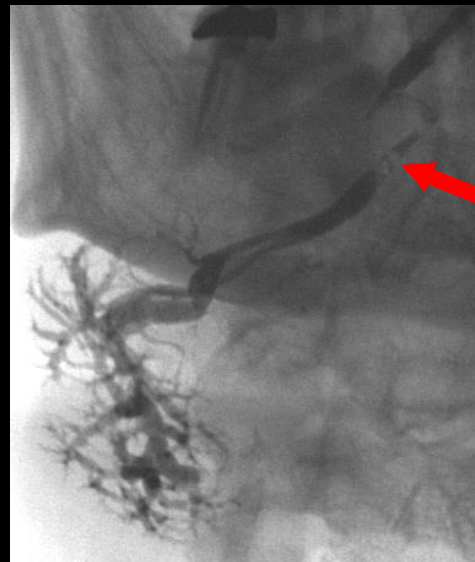
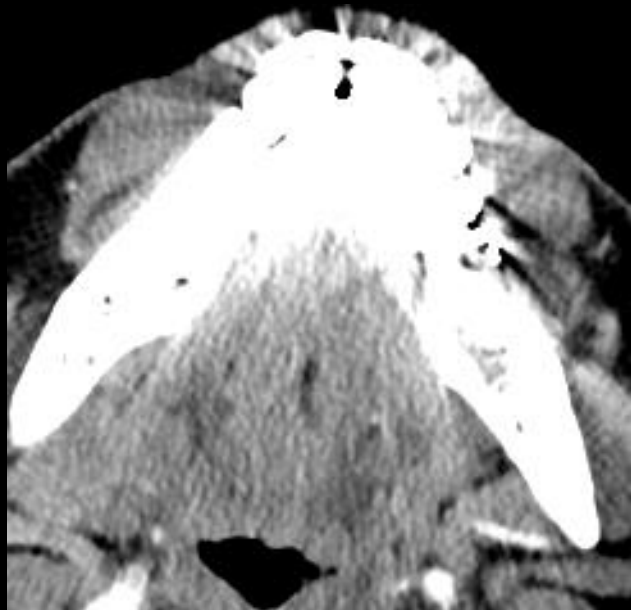
Submandibular Gland

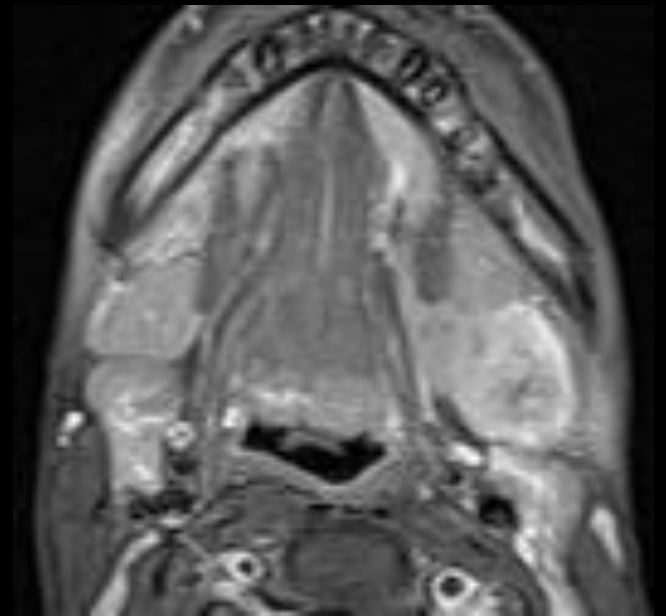
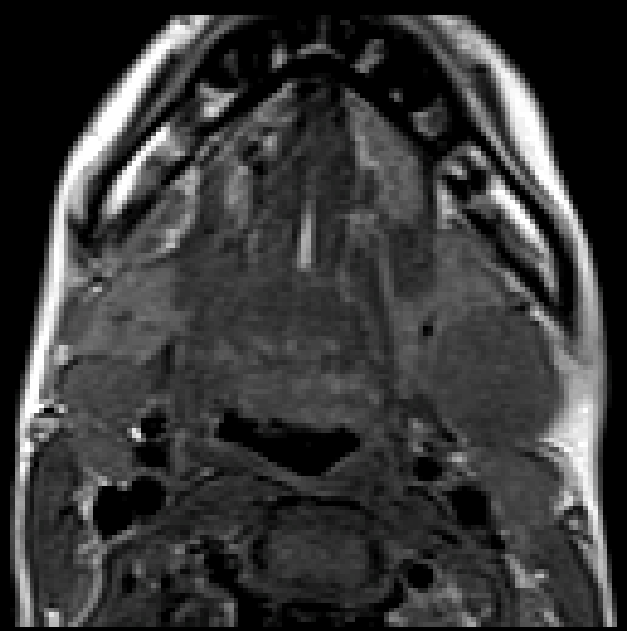
Submandibular Gland

- Second largest gland
- Submandibular space
- Folded around the dorsal free edge of the myelohyoid









SMS Lipoma



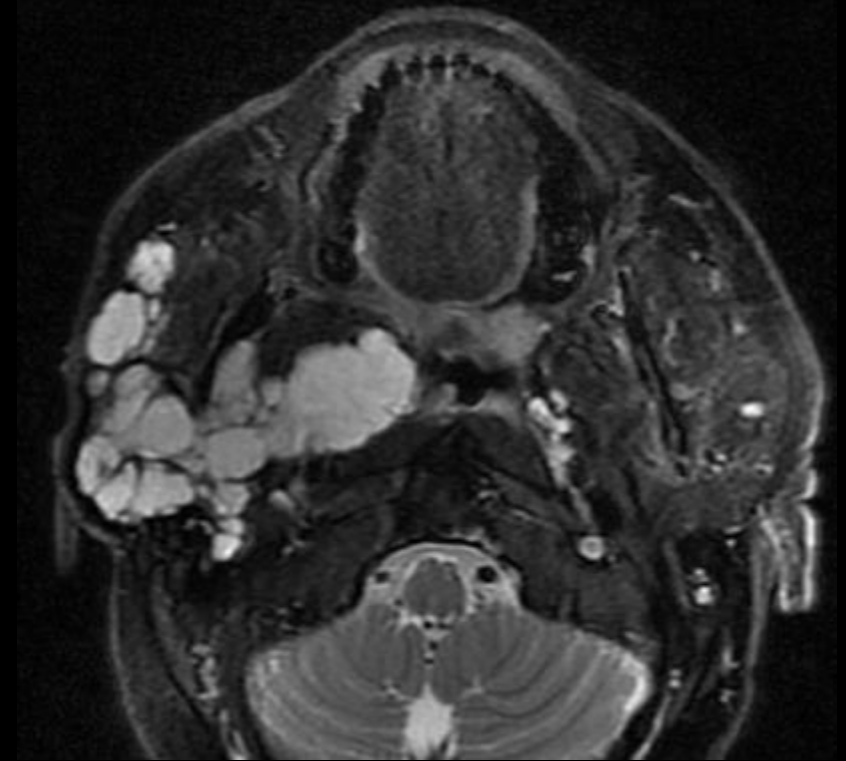


CASE 1:

80 year old male, smoker, incidental finding

- Second most common benign parotid tumor
- Bilateral 10-15%

WARTHIN TUMORS
DIAGNOSIS?

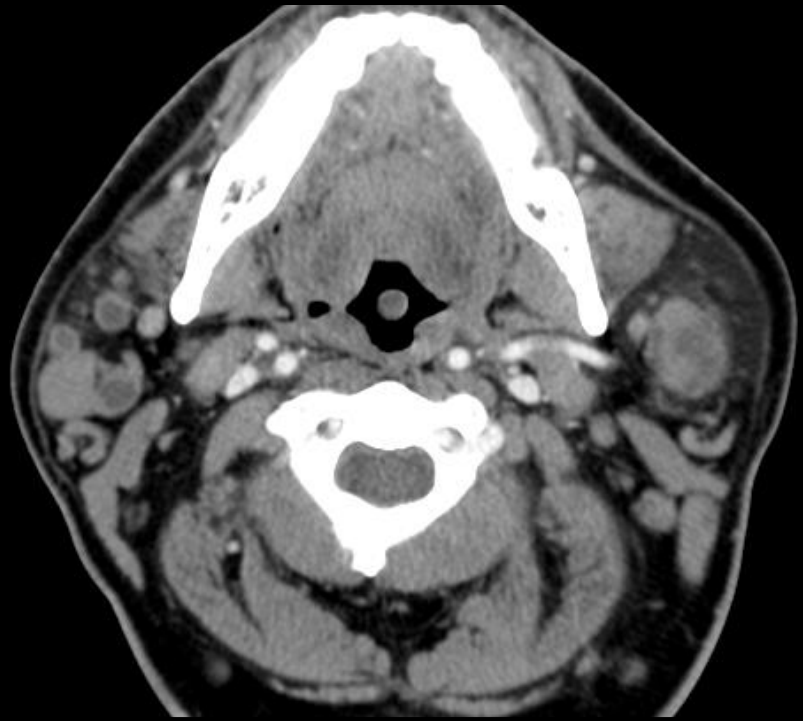


CASE 2:

51 y/o male presents with a longstanding, slow-growing mass affecting the right side of the face.

- Multiseptated mass within the parotid space.

Recurrent Pleomorphic Adenoma
DIAGNOSIS?



CASE 3:

35 year old HIV positive male with bilateral parotid lesions

Lymphoepithelial lesions
DIAGNOSIS?



That's all Folks!