



**American College
of Radiology**

Focused. Forward. Together.

Neck spaces – Suprahyoid Neck

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Chair

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@bpoliceni

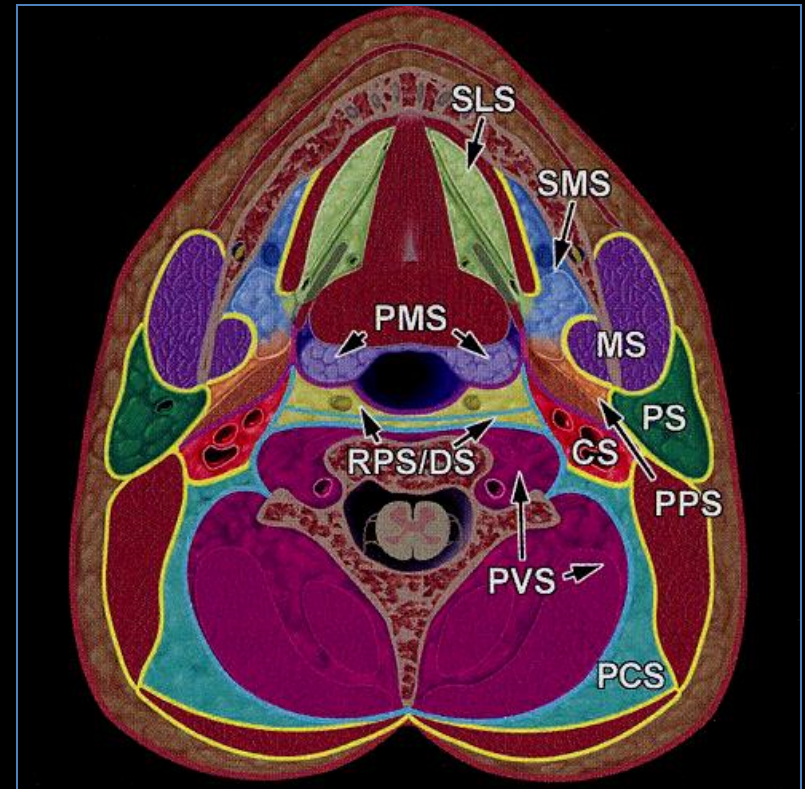


Financial Disclosure

No conflict of interest relevant to
this topic

Cervical Fascia

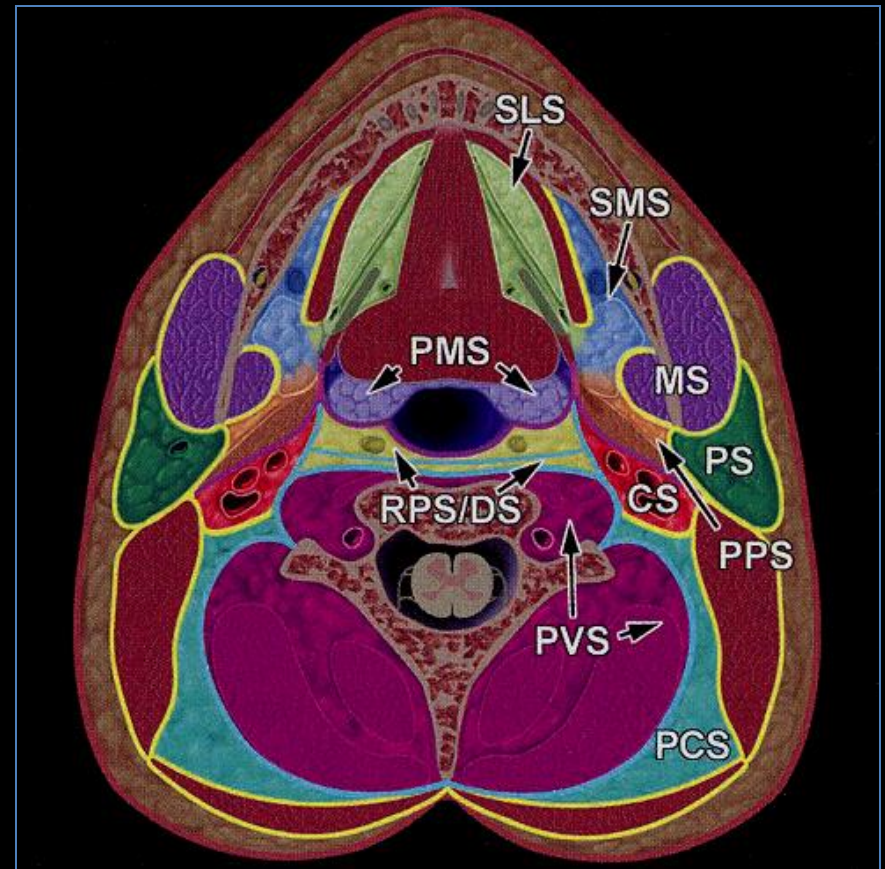
- Deep Cervical Fascia
 - Superficial Layer (Investing Fascia)
 - Middle Layer (Visceral or Pre-tracheal Fascia)
 - Deep Layer (Perivertebral Fascia)



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

Fascial Spaces of the Suprahyoid Neck

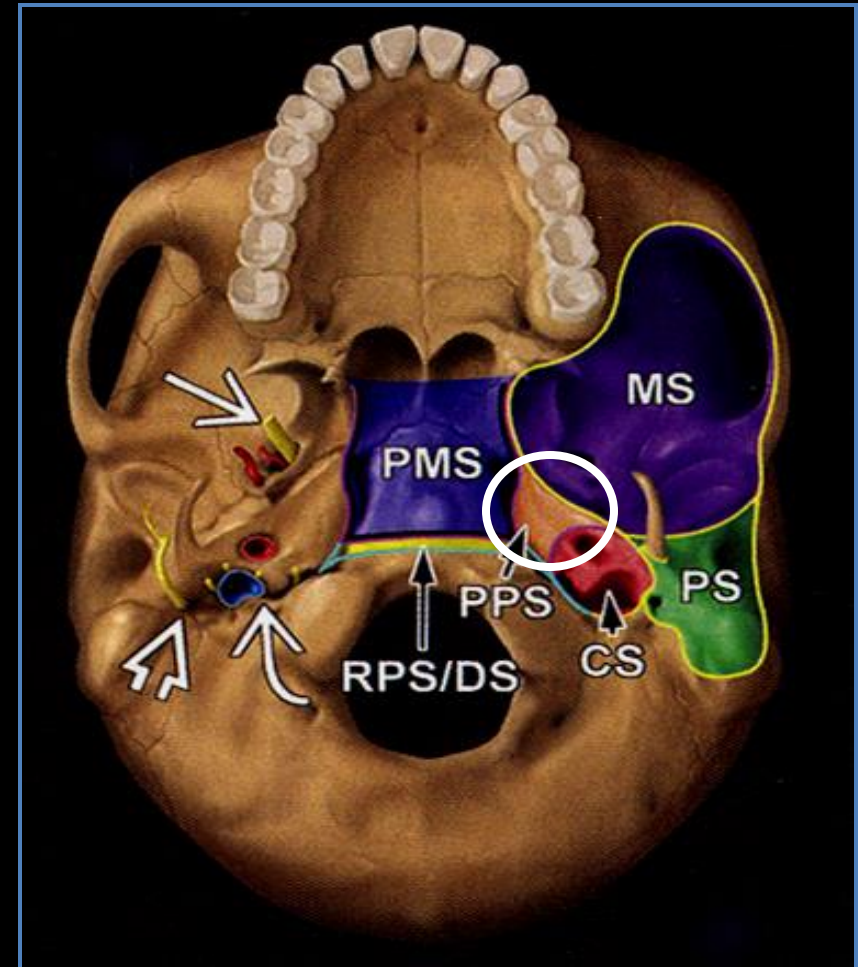
- Superficial Space
- Parapharyngeal Space
- Carotid Space
- Masticator Space
- Parotid Space
- Pharyngeal Mucosal Space
- Retropharyngeal/Danger Space
- Perivertebral Space
- Posterior Cervical Space



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

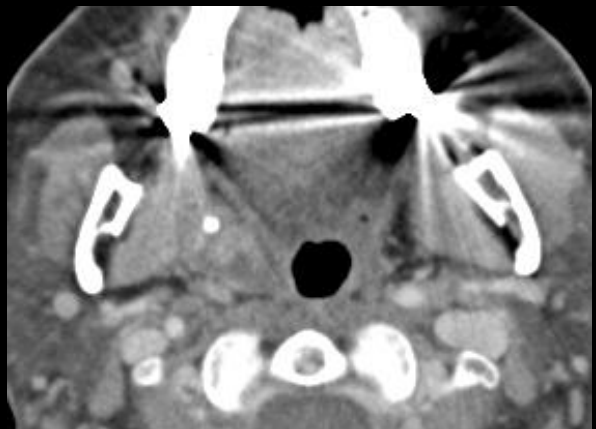
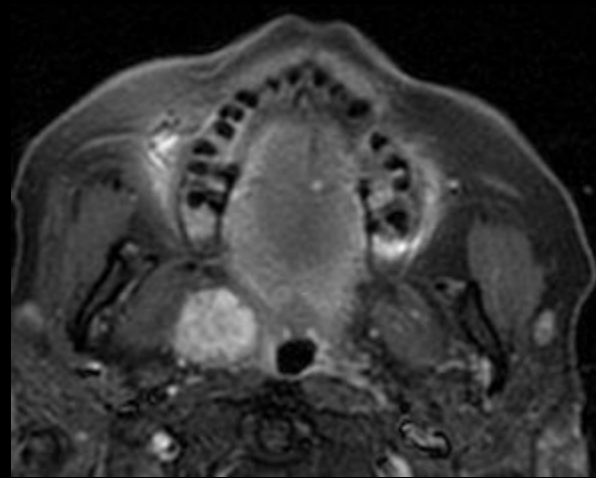
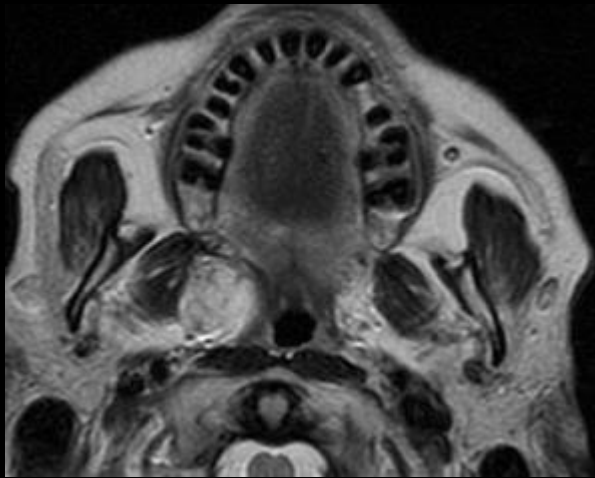
Parapharyngeal Space-Contents

- Fat
- Branches of the mandibular nerve (V3)
- Internal maxillary artery branches
- Ascending pharyngeal artery
- Pharyngeal venous plexus
- Ectopic salivary gland tissue
- Lymph nodes

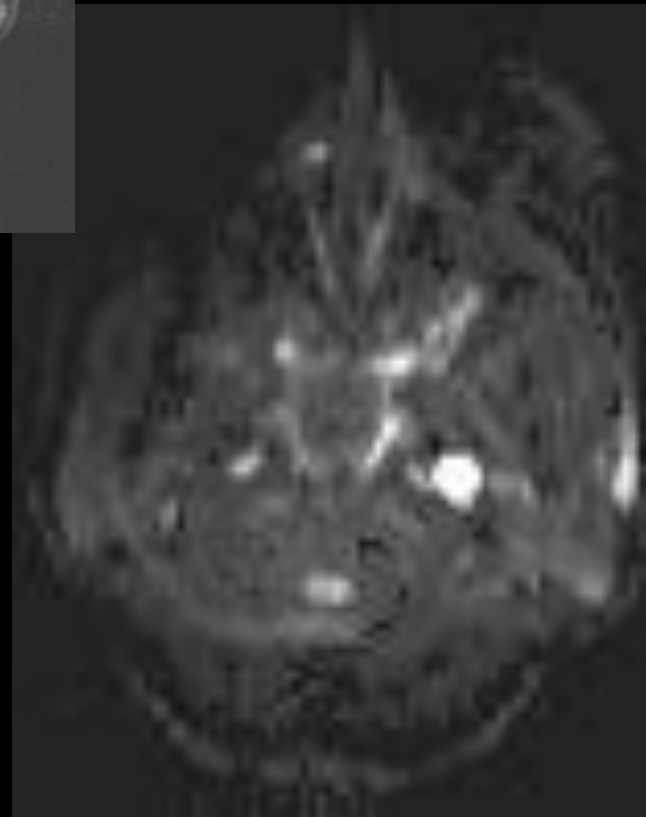
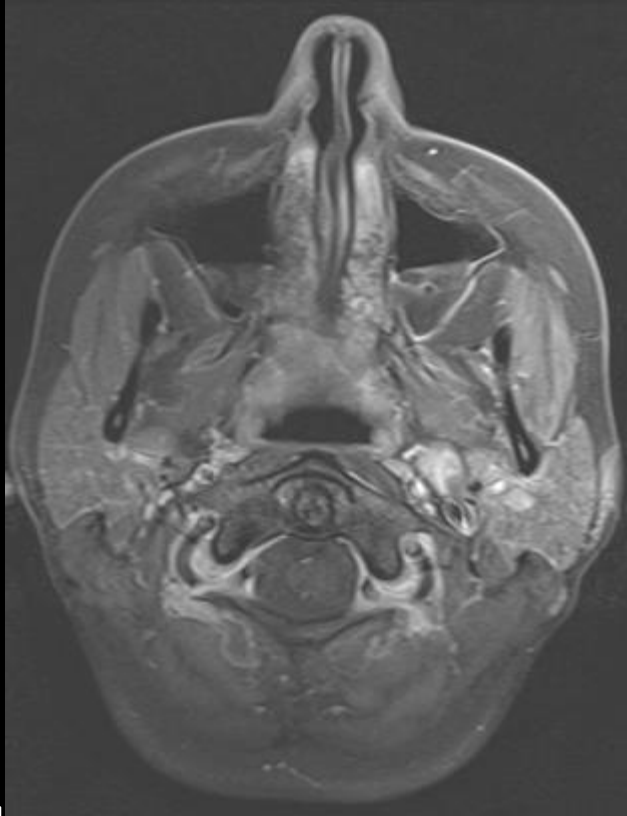


From: Harnsberger et al. Diagnostic Imaging, Head and Neck

Diplopia, incidental finding

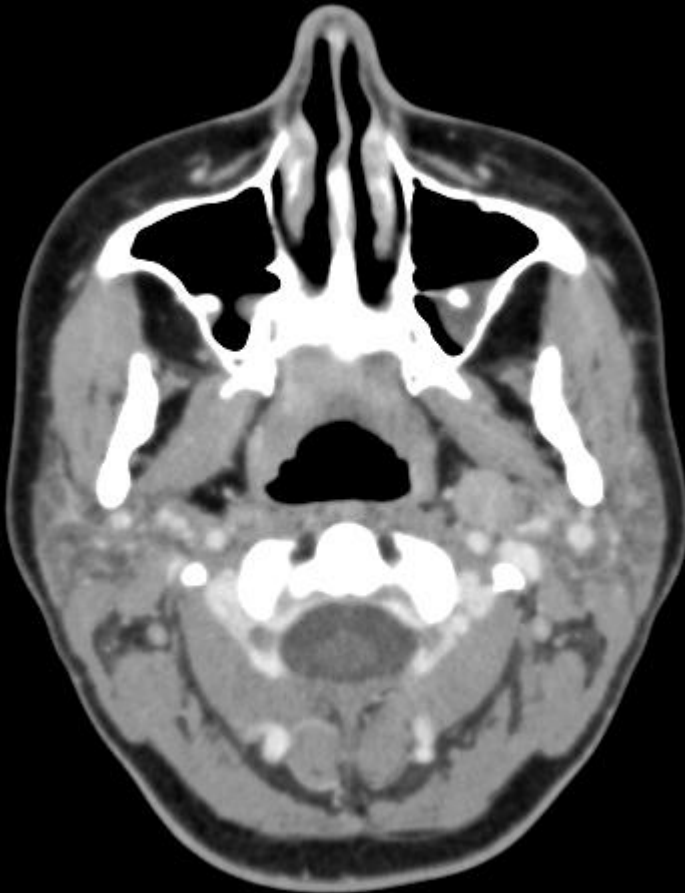


27 yo female
with
headache,
dysphagia and
voice changes

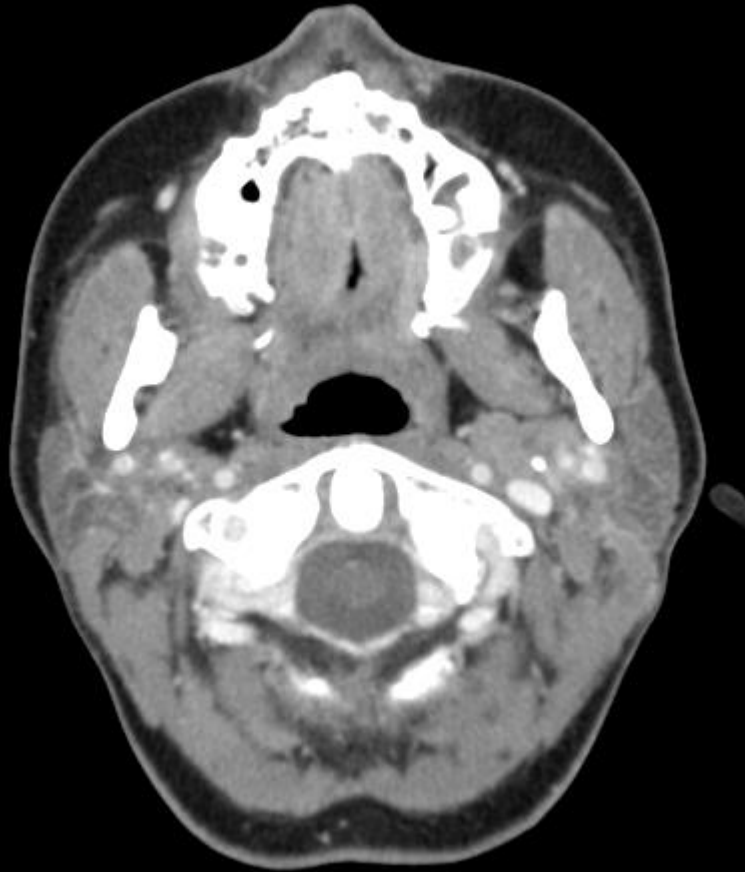


Anterior approach

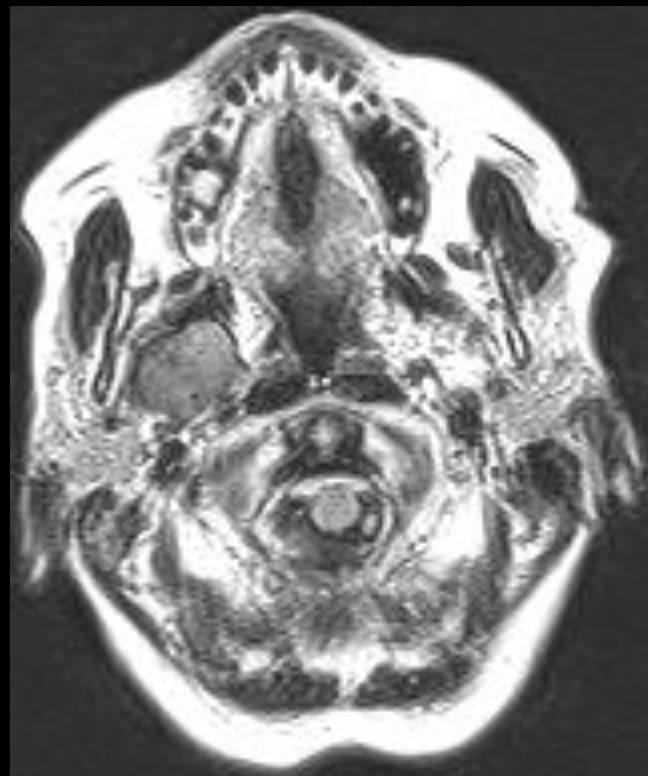
Reactive lymphoid tissue



Stable at one year follow-up



80 y.o. female who presents with a history of
aural fullness and asymmetric hearing loss



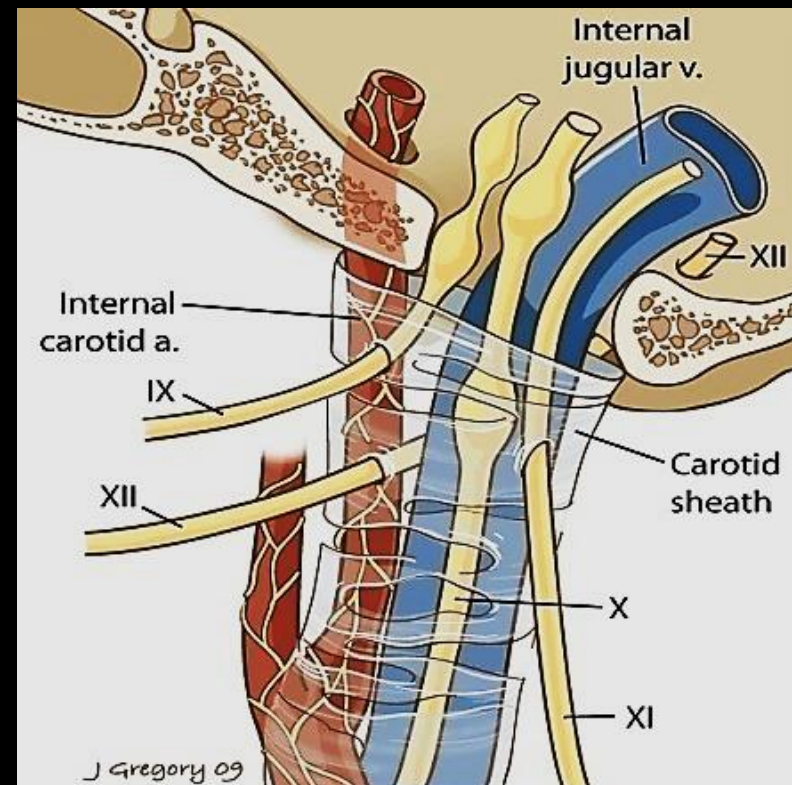
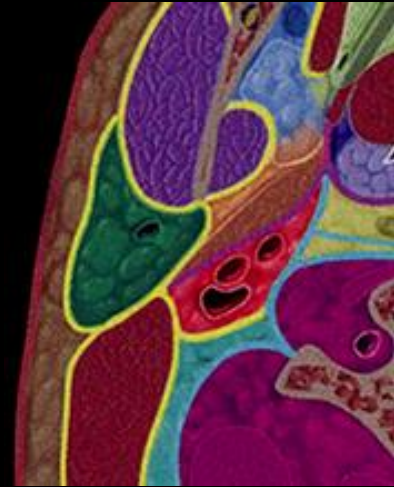


Pleomorphic Adenoma

- **Most common benign parotid tumor (80%);** if left untreated, est. **25% will undergo malignant degeneration**
- PFS arise from ectopic salivary gland rests
- Path: Mixture of epithelial and myoepithelial cells
- Typical patient: >50 years of age with slow-growing lump in the cheek
- **Sharply marginated;** round, oval, or lobulated
- CT: Variable enhancement, infrequent dystrophic calcification, and internal pockets of low density when large due to “muroid matrix”
- MR: **Very hyperintense on T2WI;** may have internal **pockets of greater hyperintensity if “muroid matrix”**

Carotid space

- Internal carotid artery
- CN IX, X, XI, XII
- Sympathetic ganglion
- Internal jugular vein
- Internal jugular lymph node chain

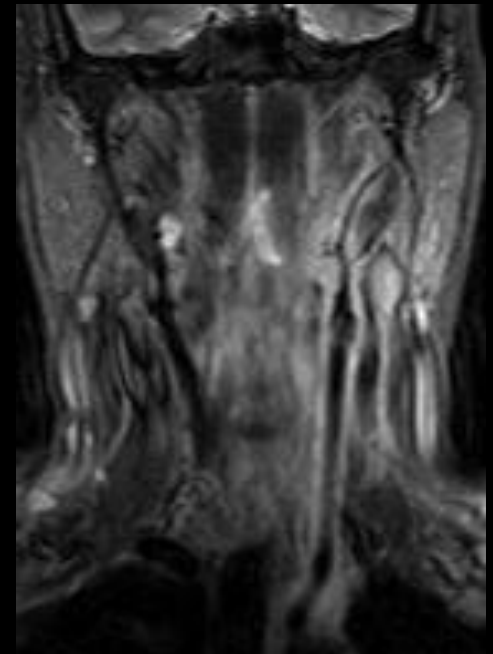
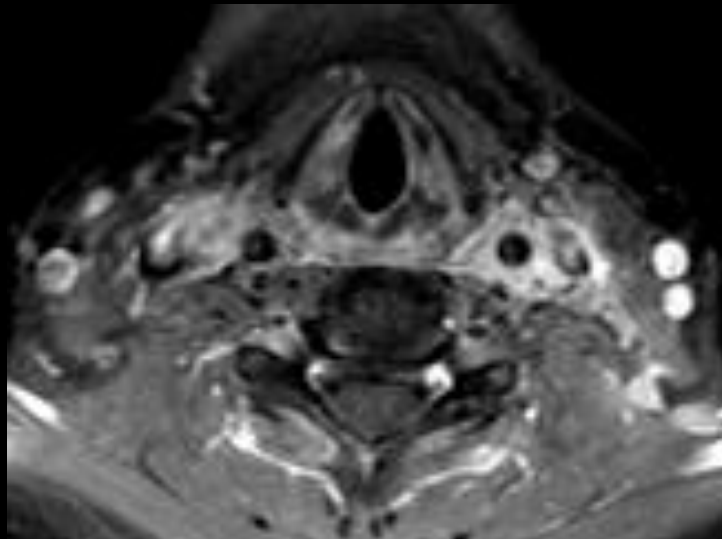
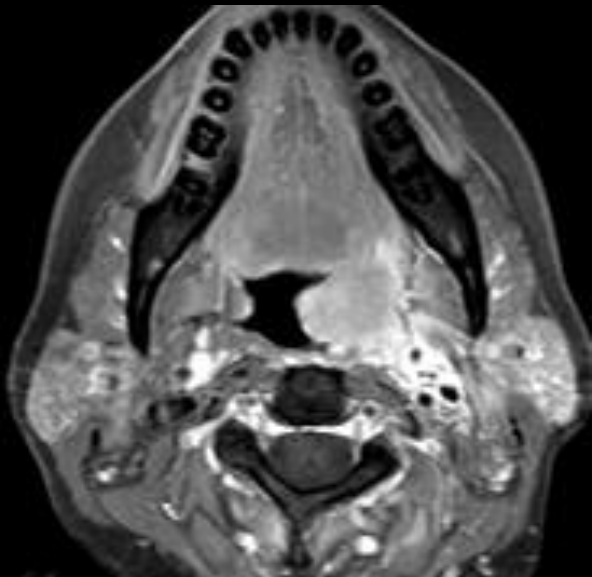
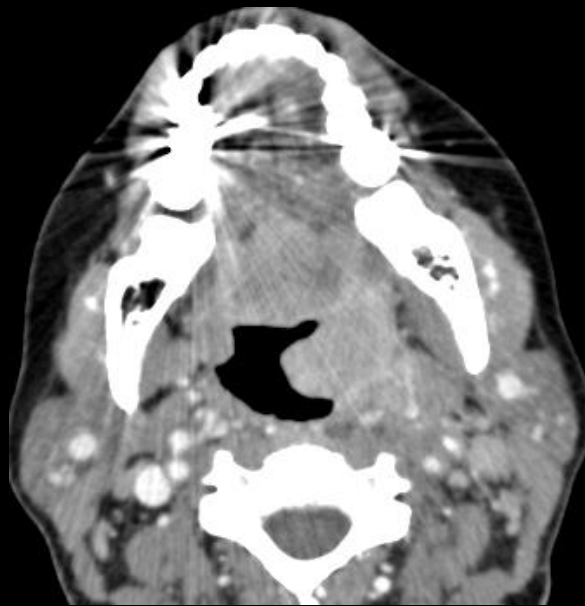


Differential diagnosis

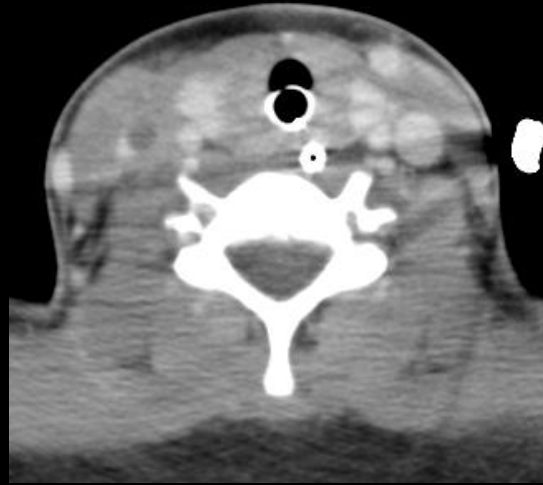
- Congenital (cystic lesions of the neck)
- Inflammatory
- Vascular Lesions
- Neoplastic

Inflammatory

Peritonsillar Abscesses



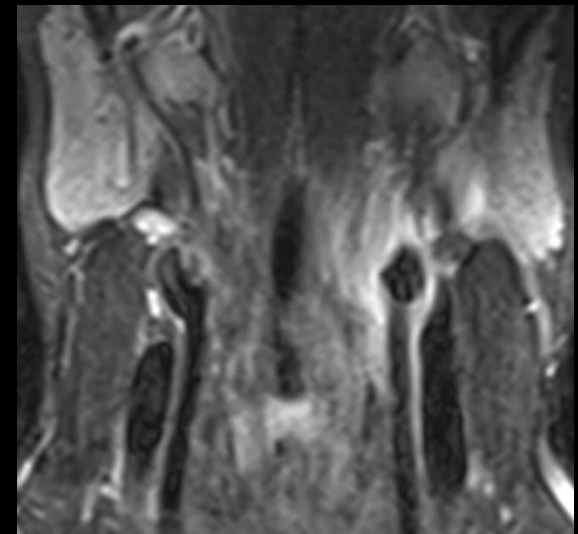
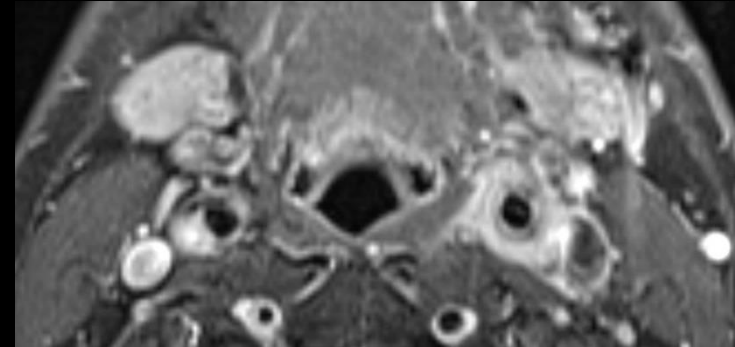
Lemierre Syndrome



Fusobacterium nucleatum

Carotidynia

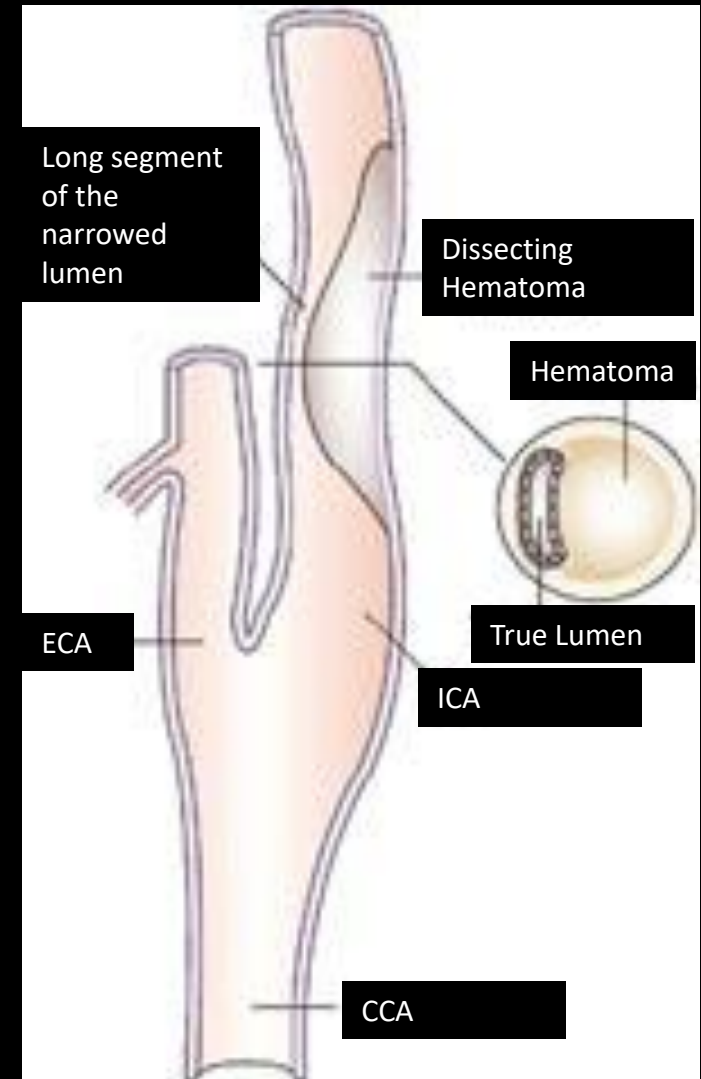
- AKA: Fay syndrome (atypical neuralgia in the neck and face)
- Focal eccentric thickening of the carotid wall by enhancing tissue, generally without hemodynamic changes
- Pathology: non-specific inflammatory changes including vascular proliferation, proliferation of fibroblasts and low-grade chronic active inflammation
- Idiopathic carotiditis



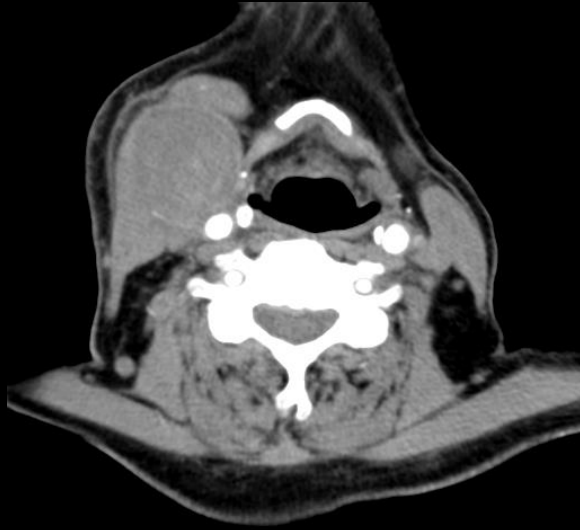
Vascular lesions

Cervicocephalic arterial dissection

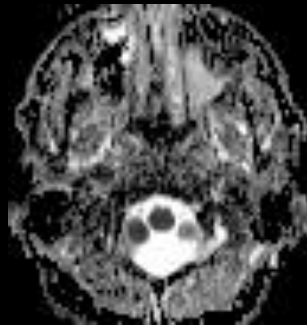
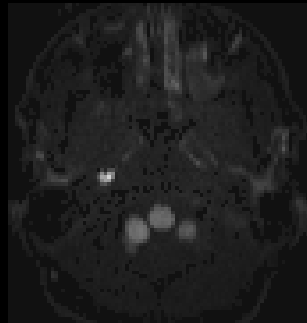
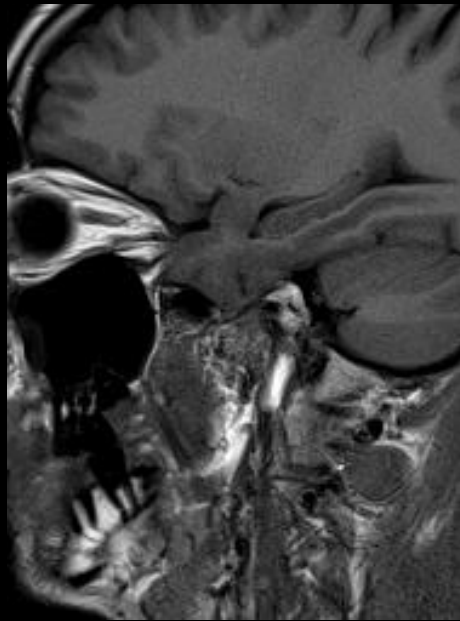
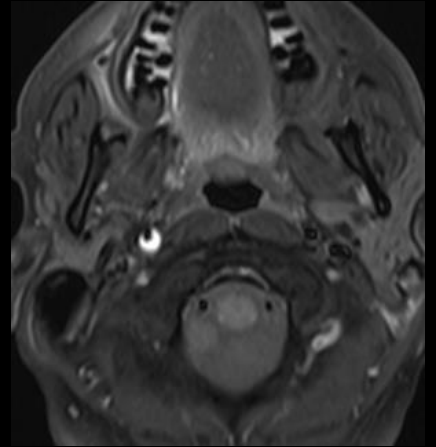
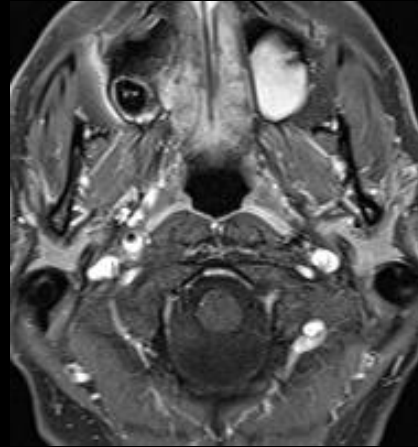
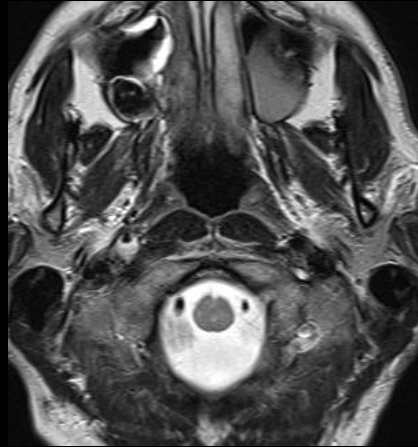
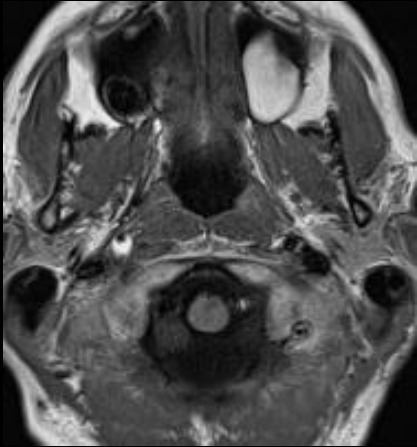
- Term dissection refers to hemorrhage within the wall of the artery, regardless of the etiology;
- Predisposing factors for spontaneous dissection: Hypertension, underlying arteriopathy (Fibromuscular dysplasia), cystic medial necrosis, Marfan syndrome, Type IV Ehrlens-Danlos.



Dysplastic ICA Aneurysm

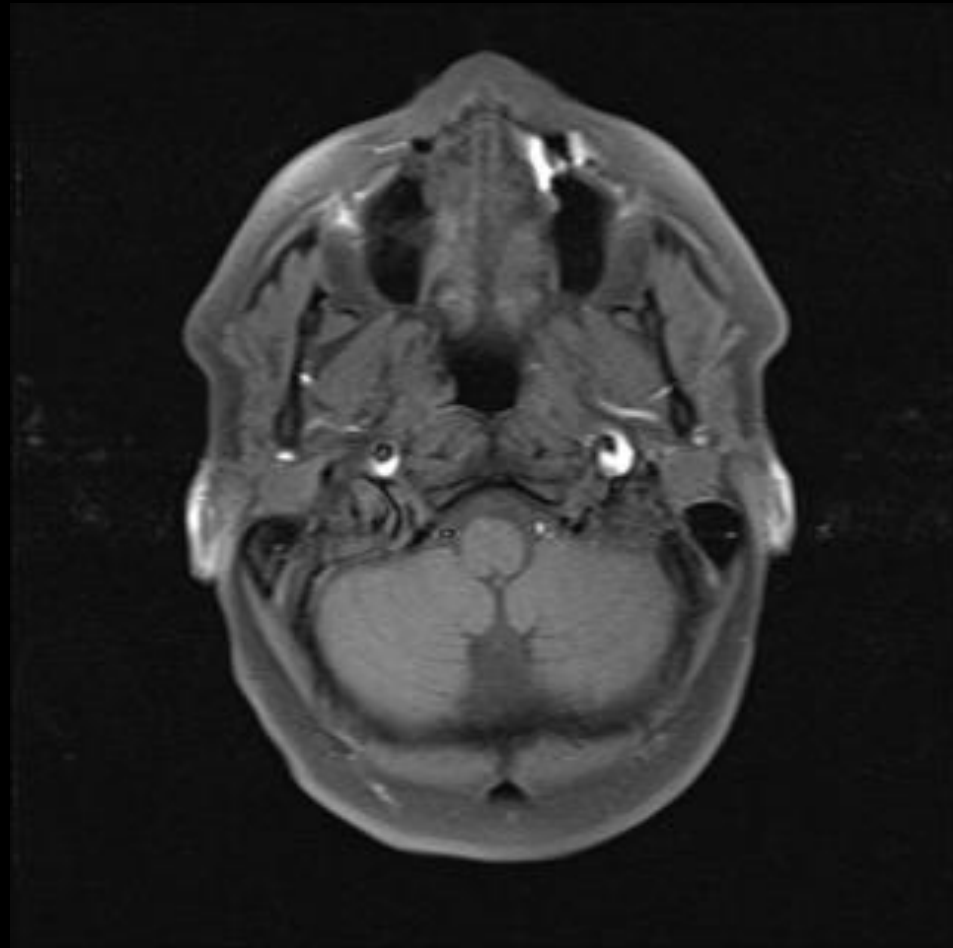
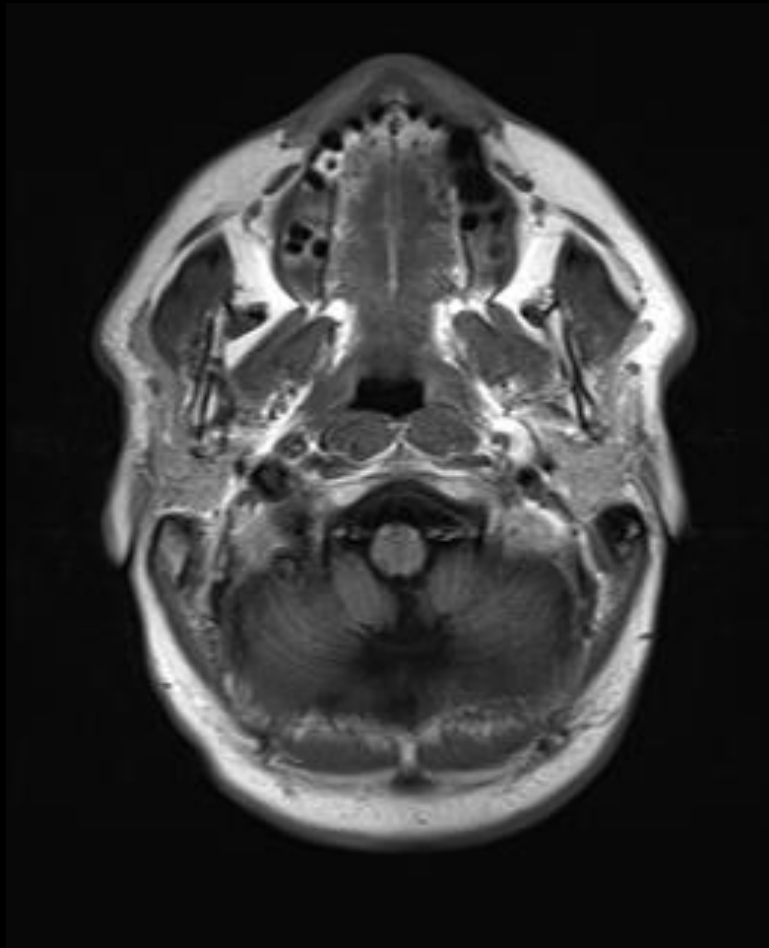


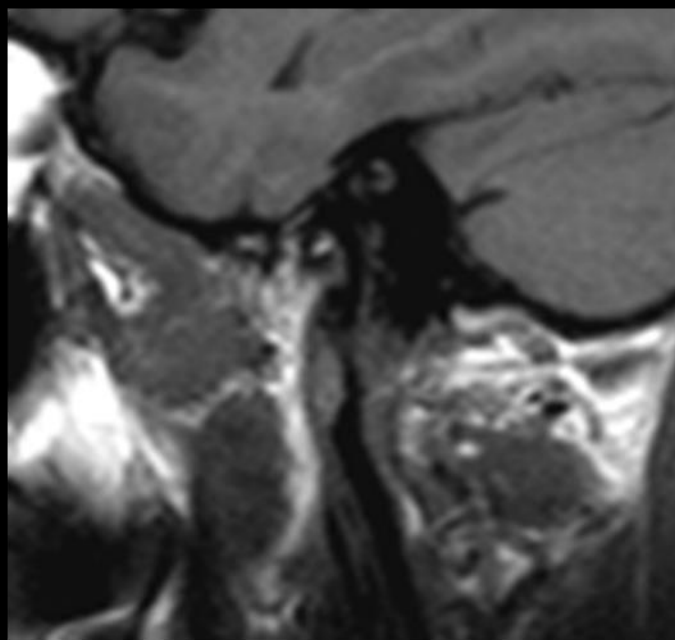
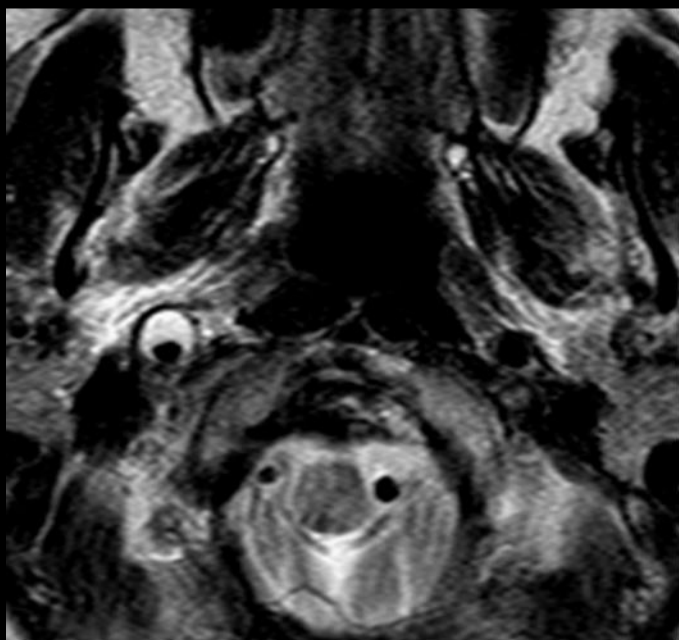
ICA Dissection



Horner Syndrome

Bilateral Carotid Dissection



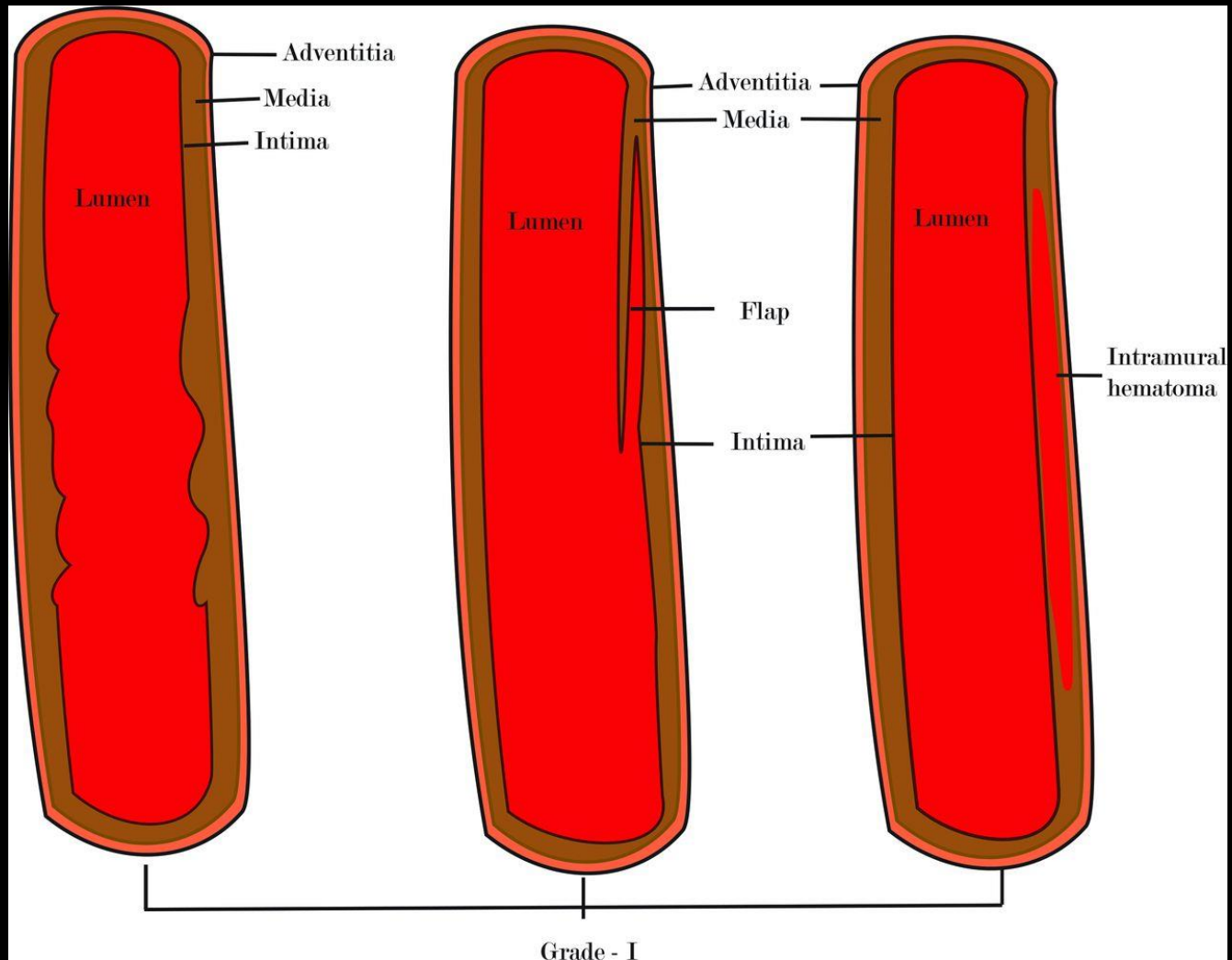


BCVI

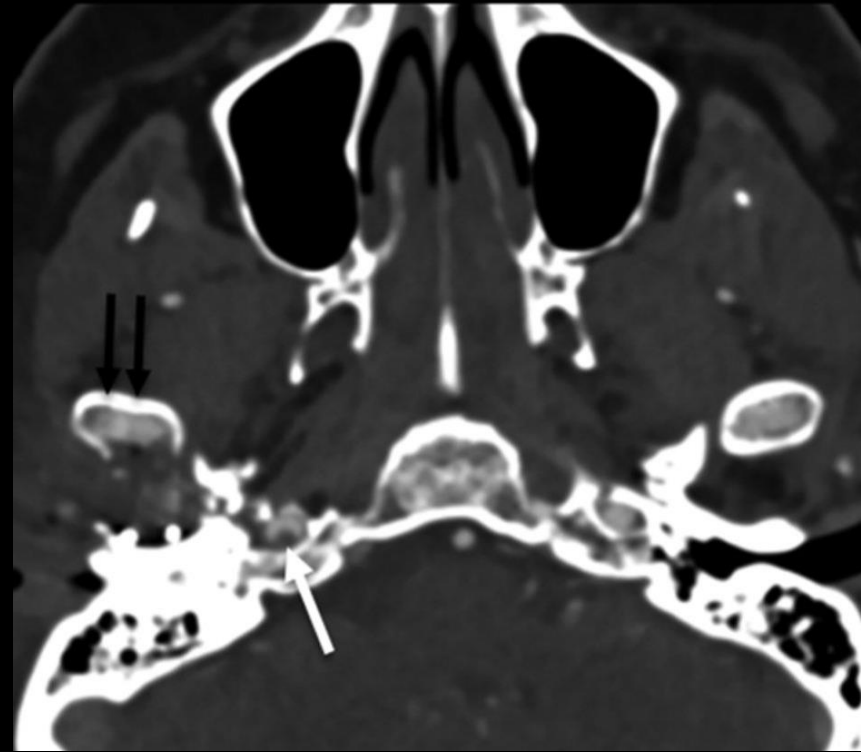
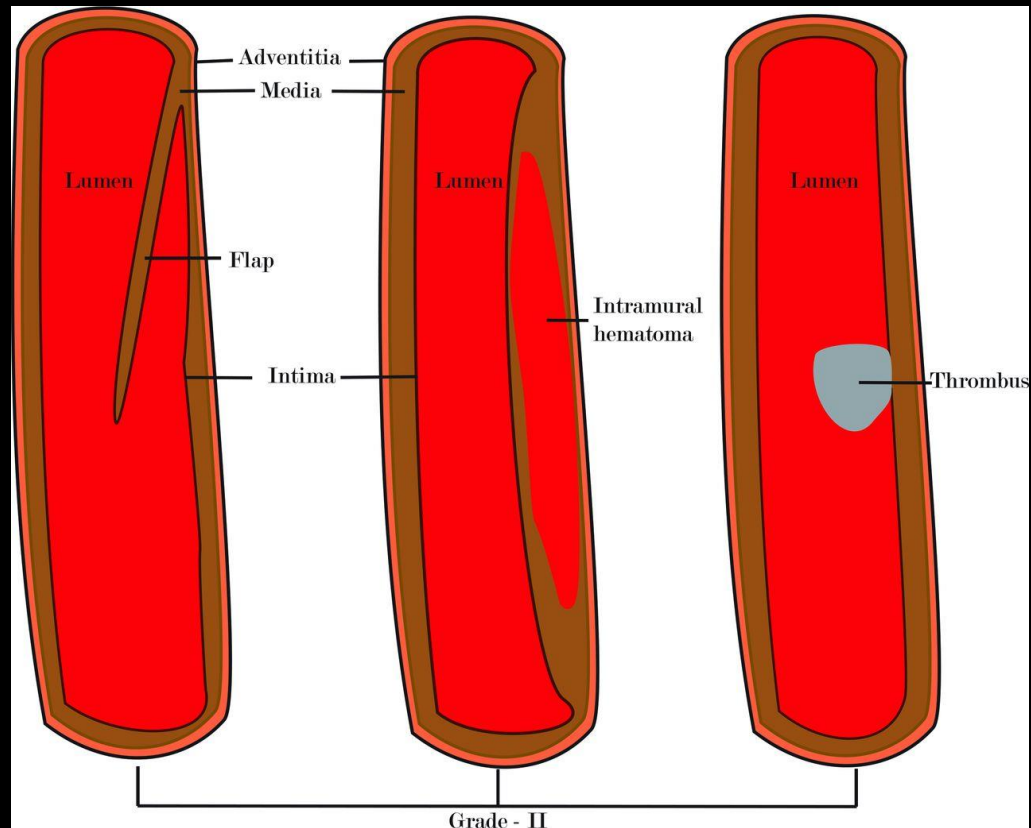
- Blunt injury of the carotid and vertebral arteries (collectively termed blunt cerebrovascular injury [BCVI]) is an injury in patients caused by blunt trauma.
- Stroke is one of the most feared outcomes of BCVI, with a reported overall incidence of 10%–13% in recent literature.
- Modified Denver Criteria being the most accepted

Nonstenotic luminal irregularity

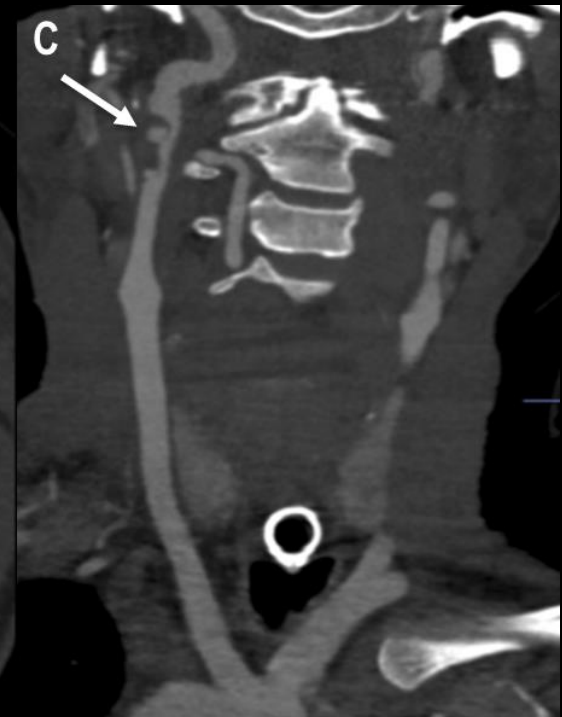
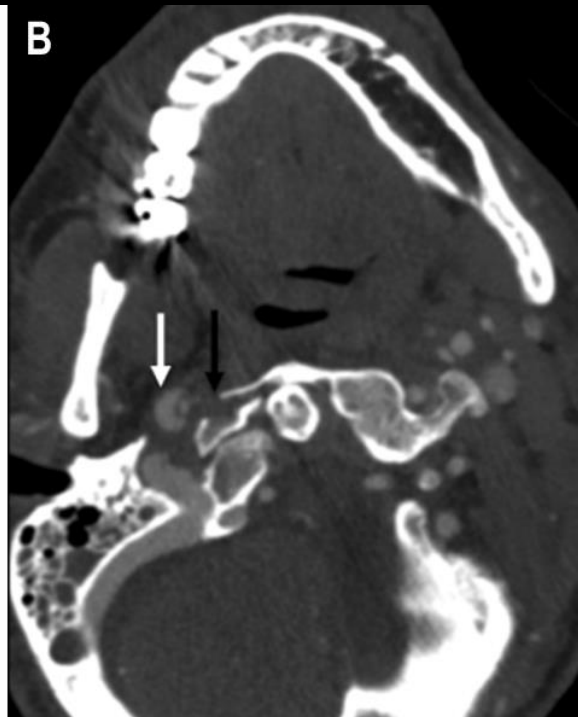
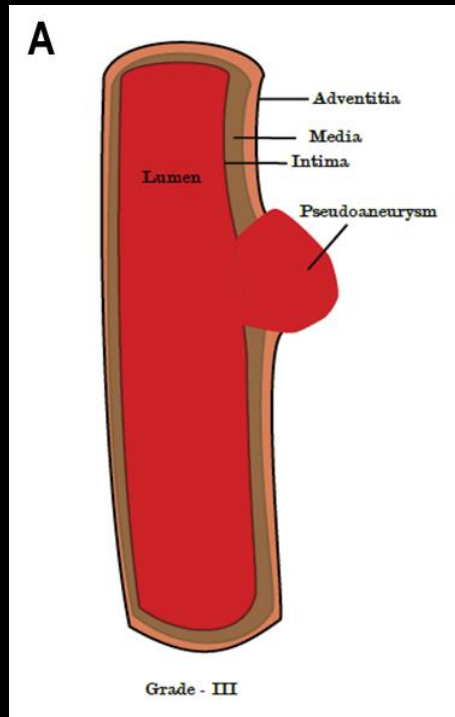
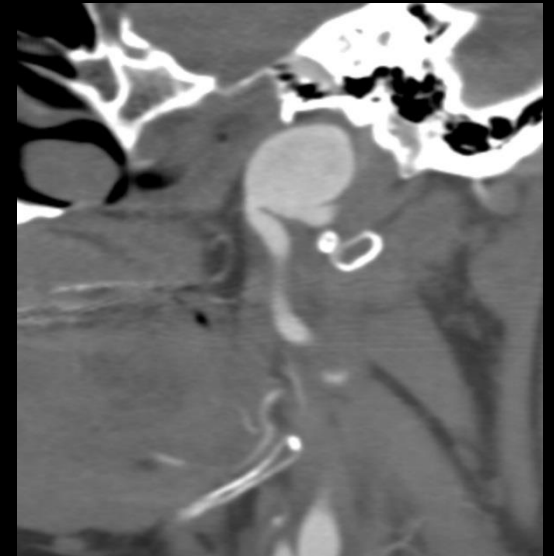
Intimal flap or wall thickening with 25% stenosis



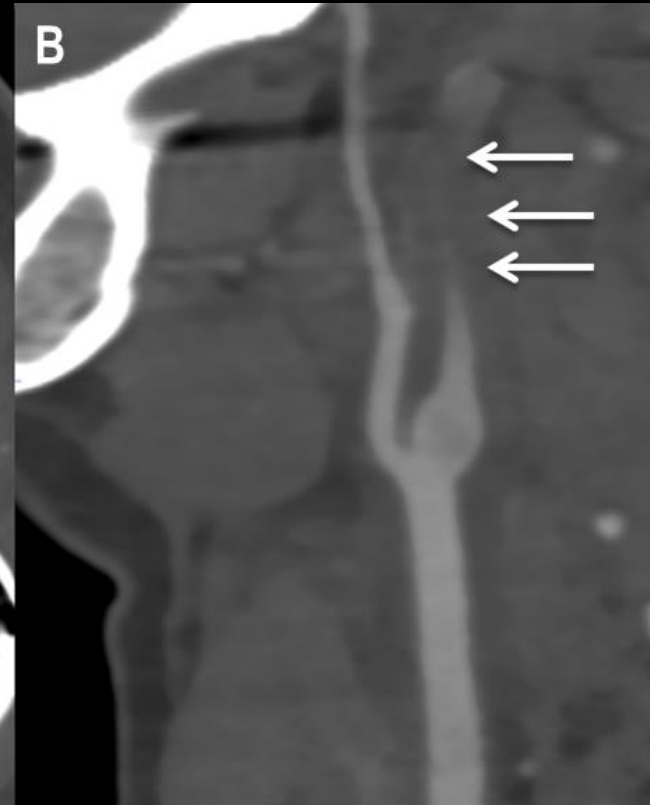
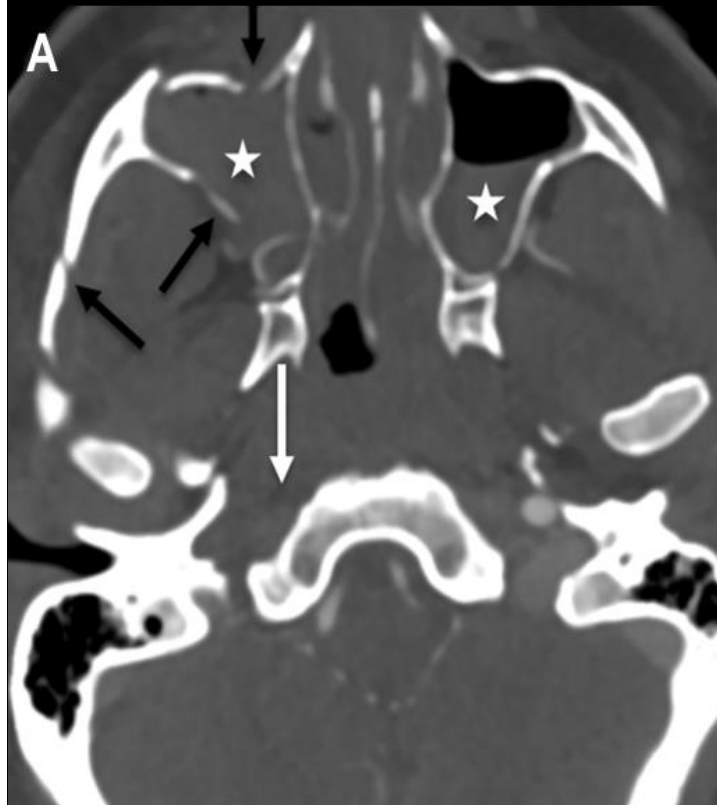
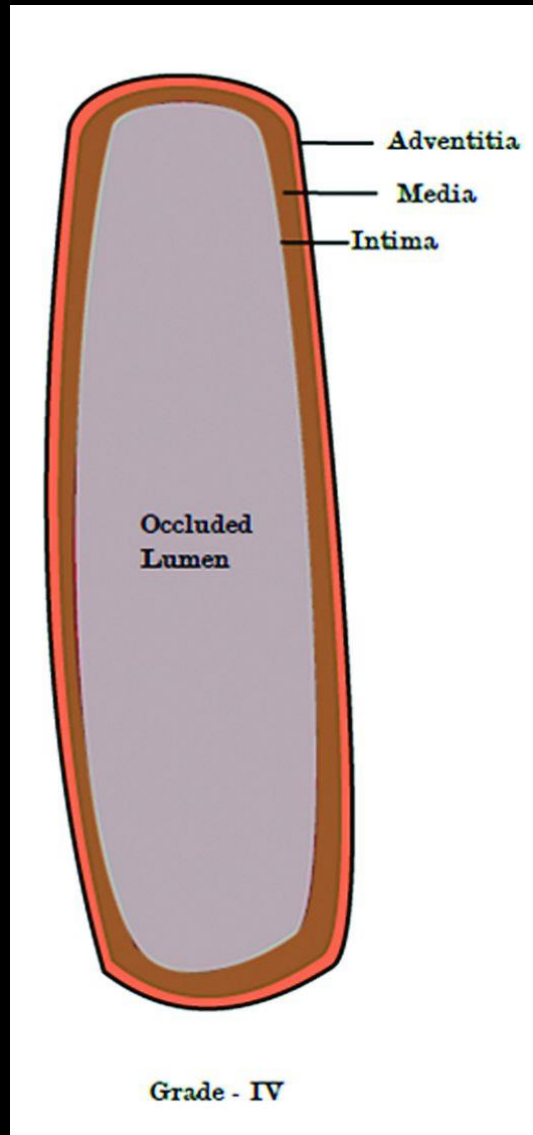
Luminal hypodensity (thrombus)
Intimal flap or wall thickening with 25% stenosis



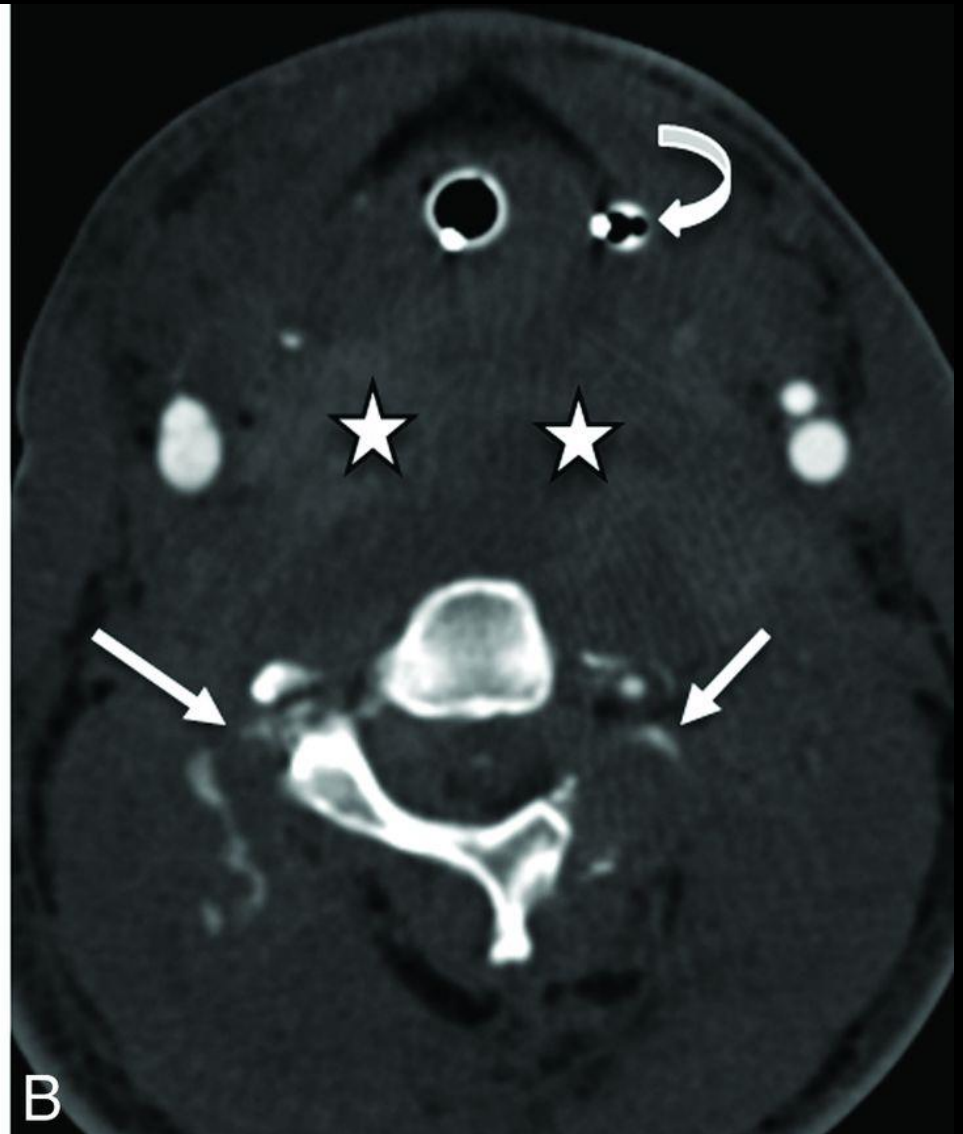
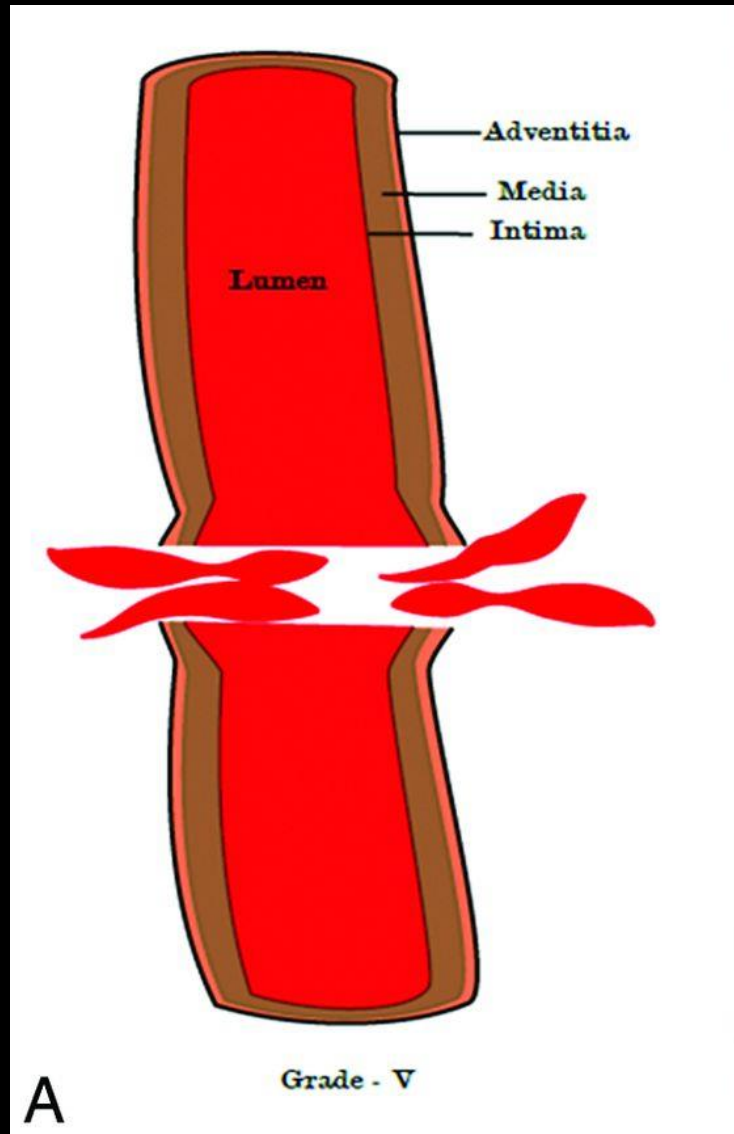
Eccentric contrast-filled outpouching limited by periarterial tissue



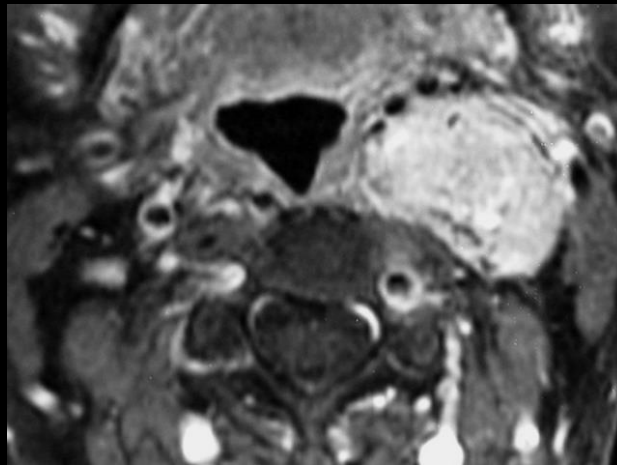
Lack of any intraluminal enhancement
Carotid occlusions: abrupt or tapered



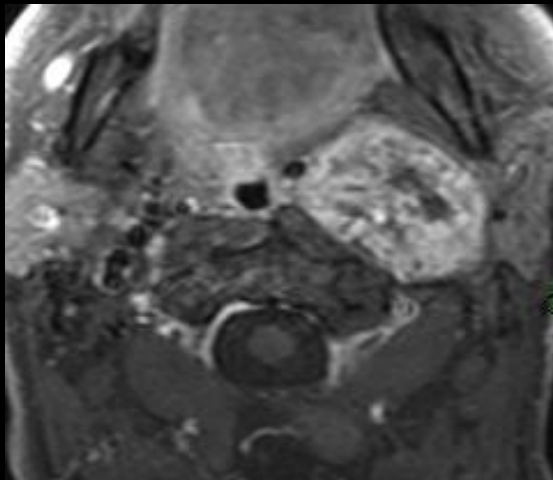
Irregular extravascular collection of contrast, not limited by periarterial tissue
Increases in density on delayed images, if obtained



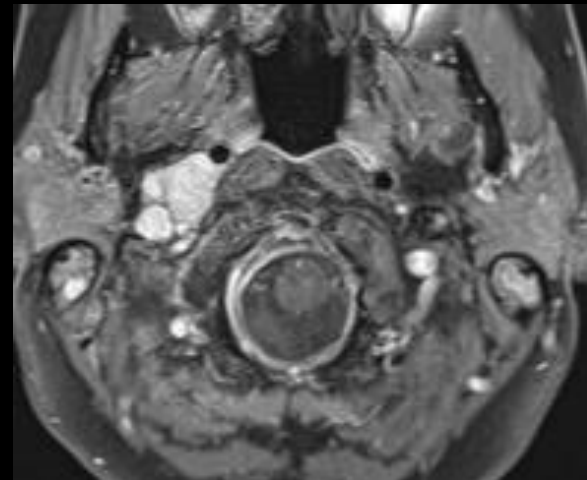
Neoplasms



Paraganglioma



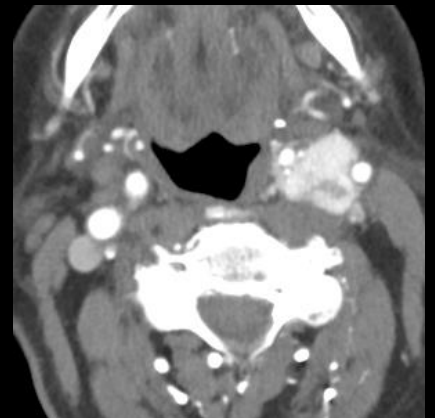
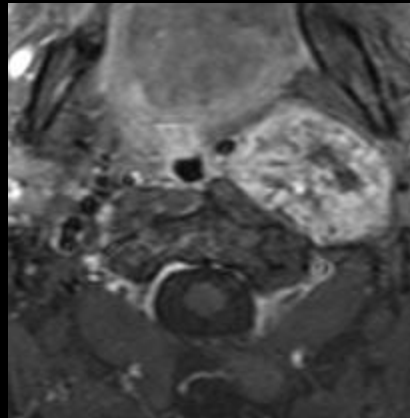
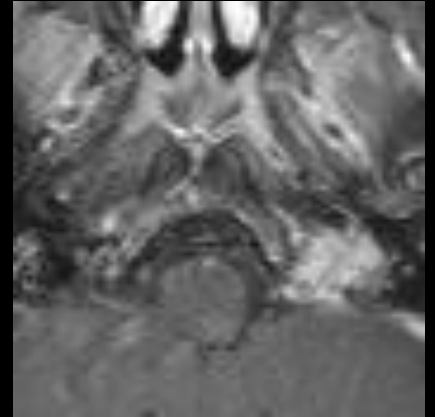
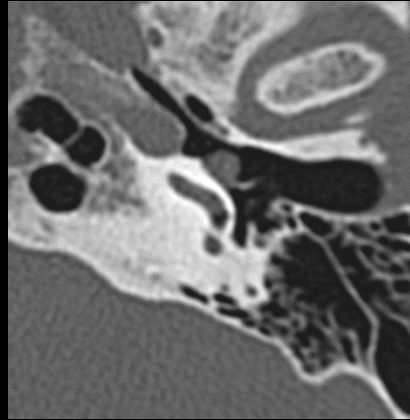
Schwannoma



Meningioma

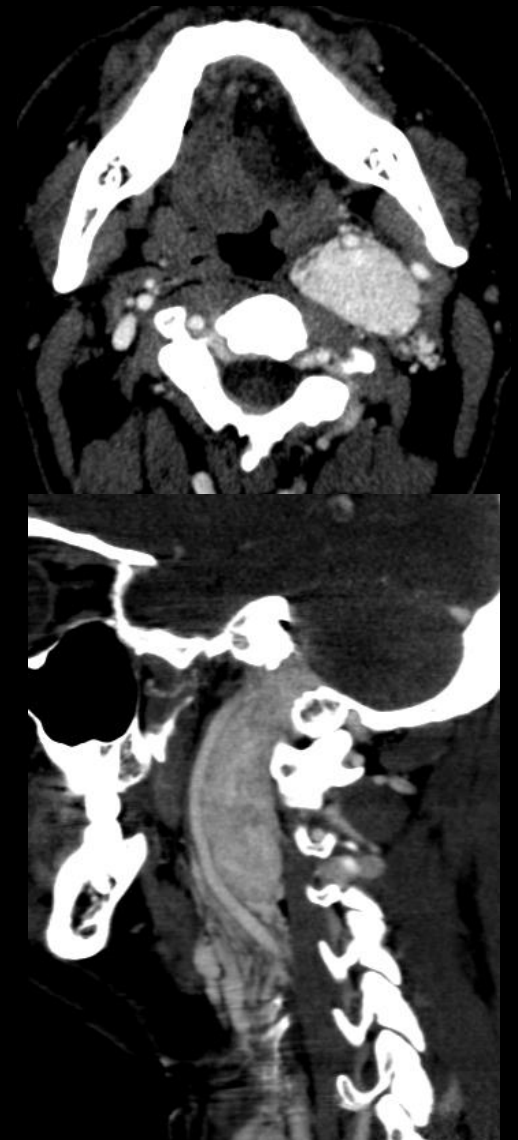
Paragangliomas

- Tympanic (Middle ear)
- Jugular
- Vagal
- Carotid Body

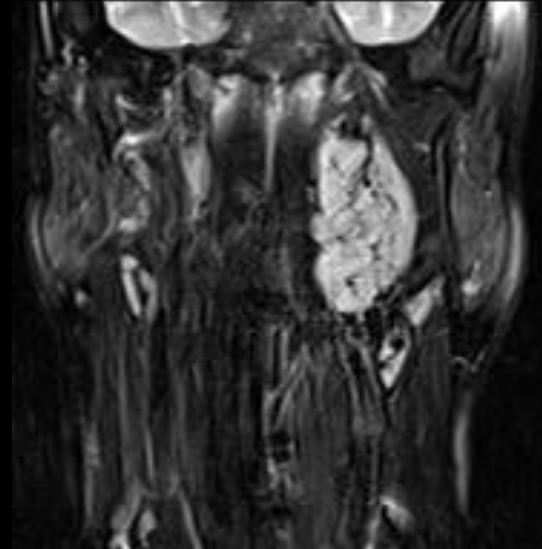
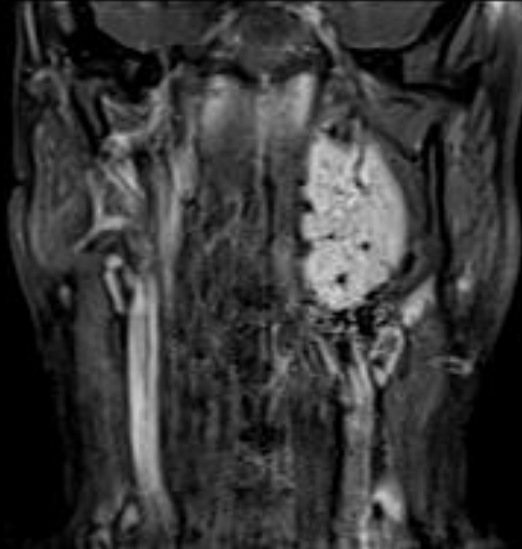
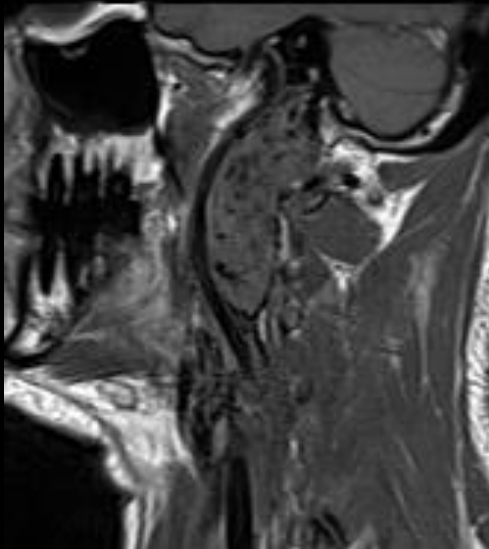
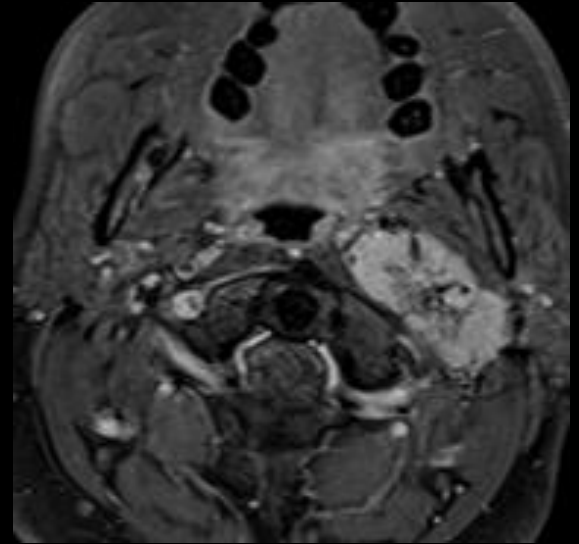
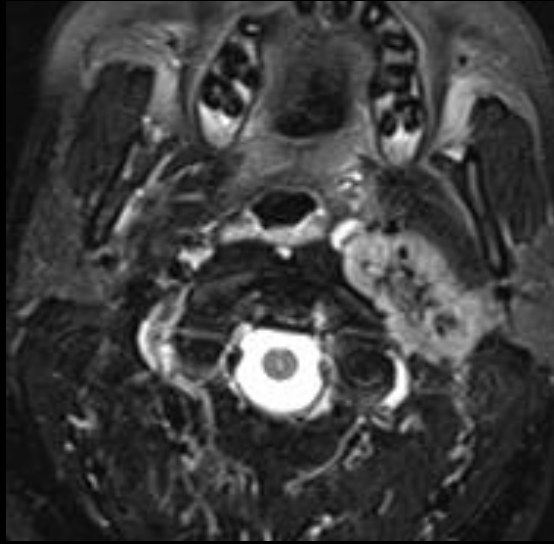
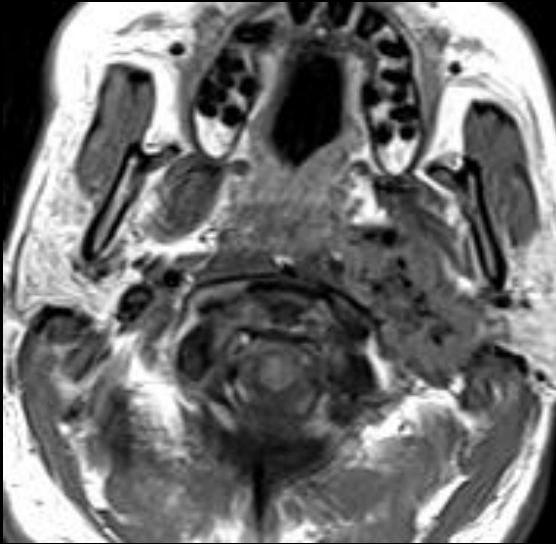


Vagal Paragangliomas

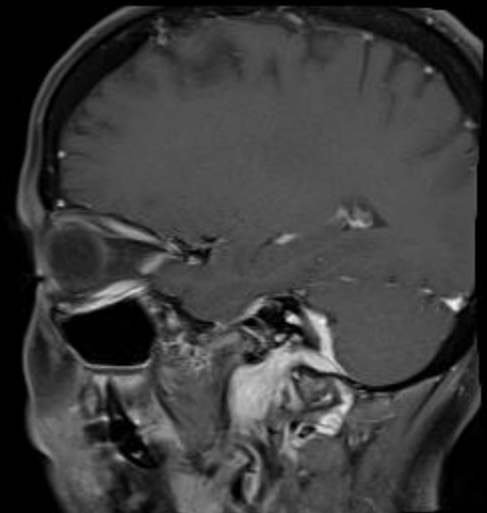
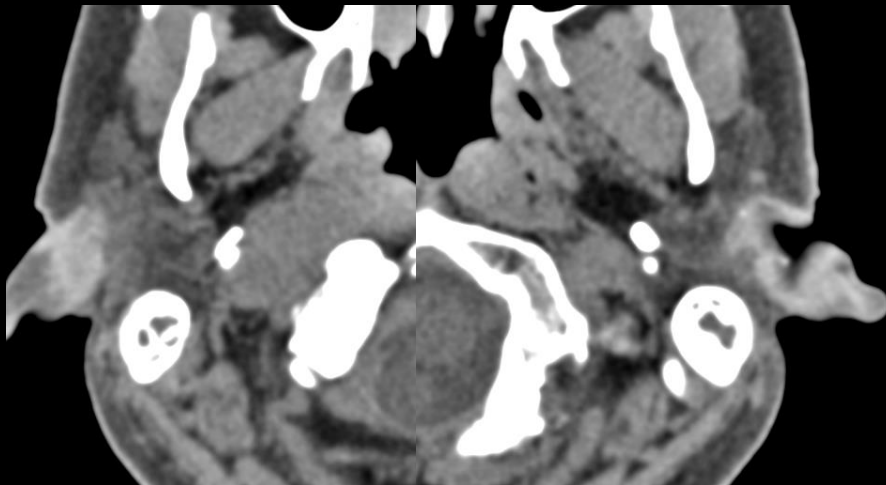
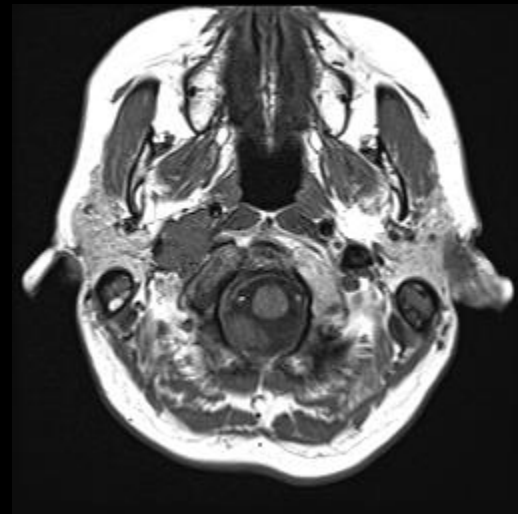
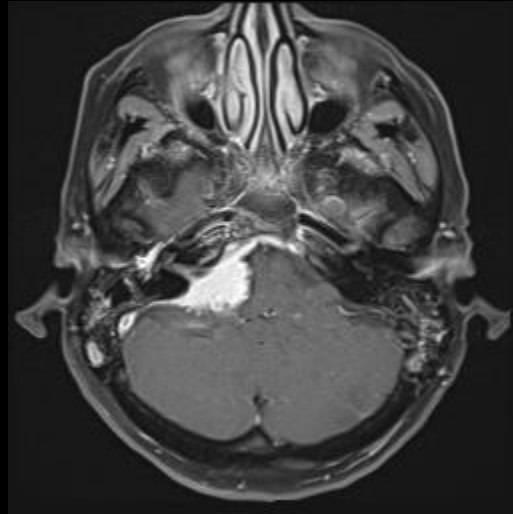
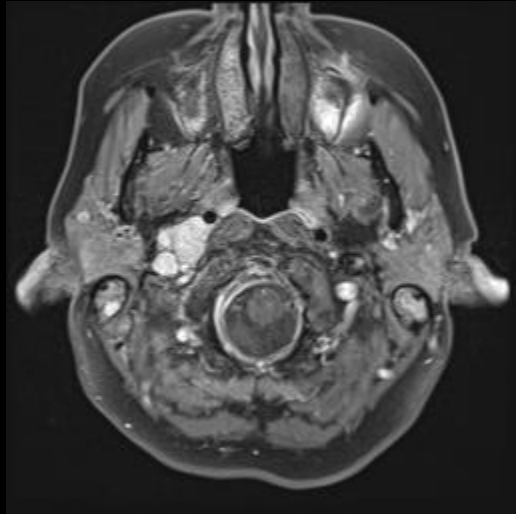
- Located below skull base,
- Usually lie entirely within carotid space
- As vagus nerve lies dorsal to ICA, these tumors usually displace ICA anteriorly
- Permeative erosive changes with amputation of the jugular spine demonstrated on CT



Vagal Paraganglioma

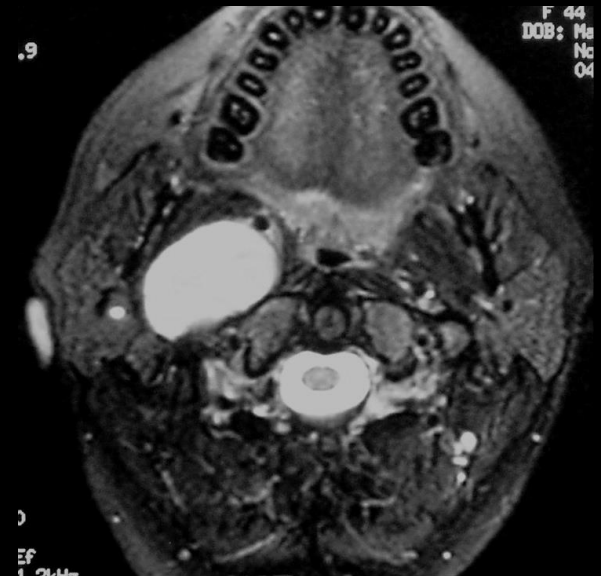
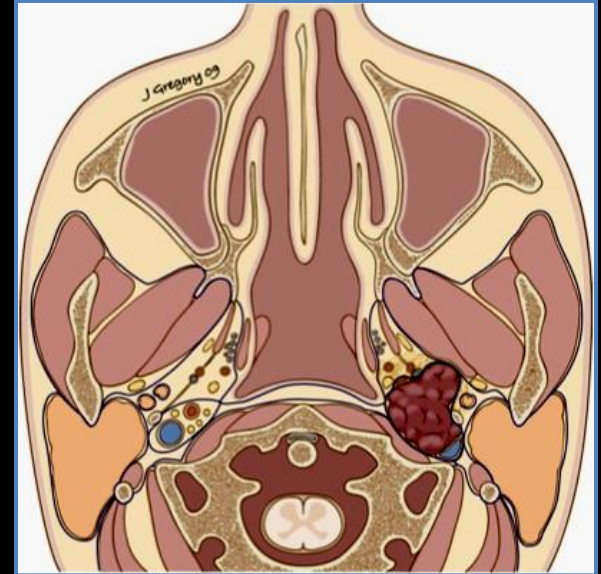


Meningioma

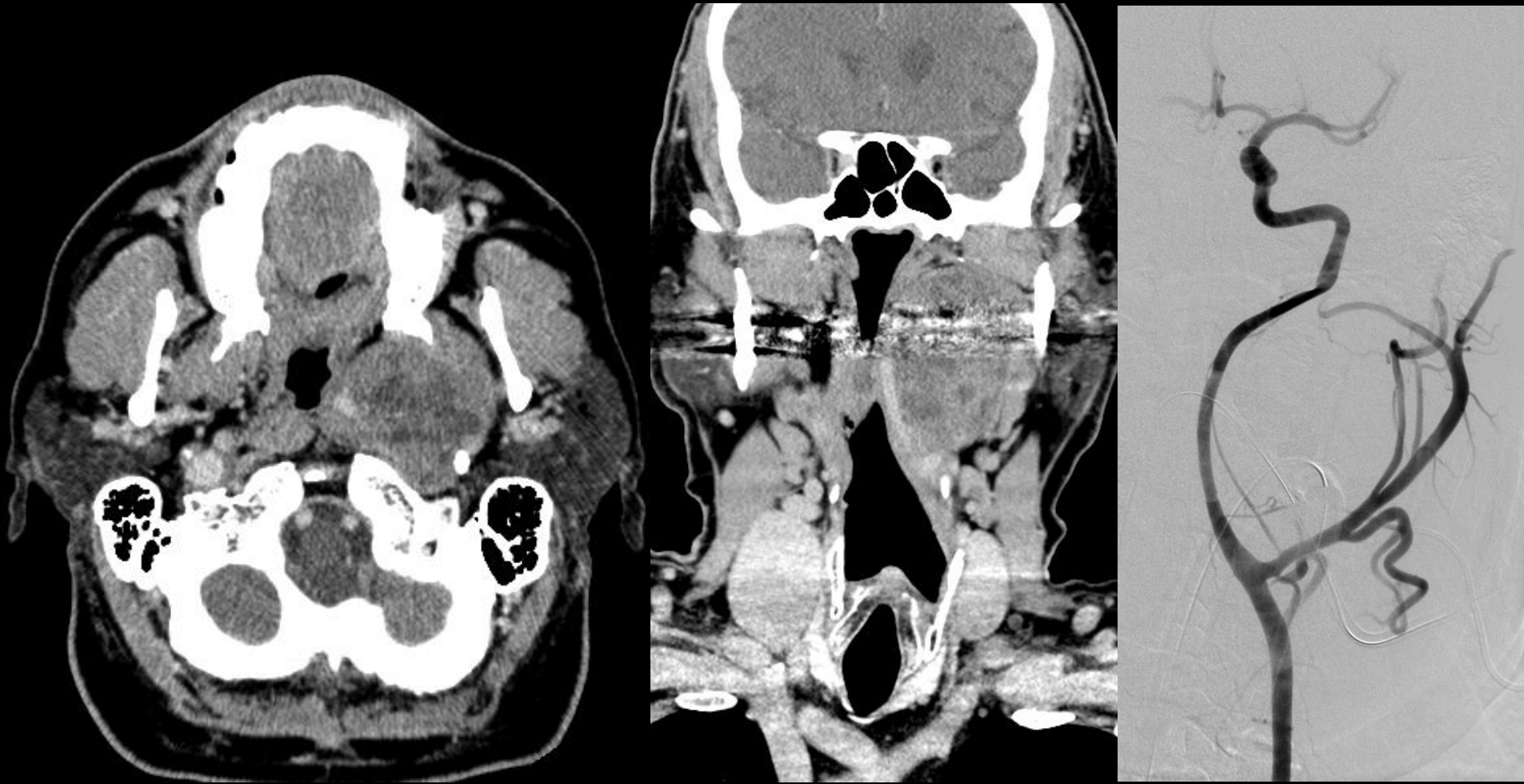


Schwannomas

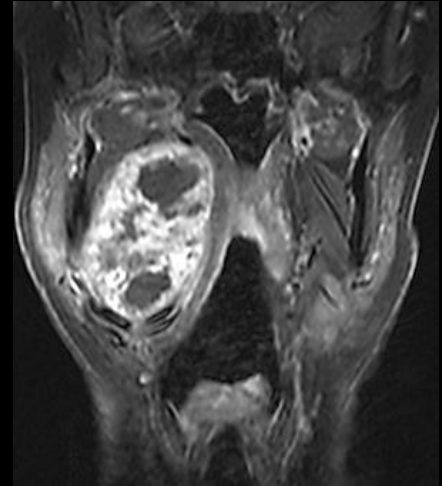
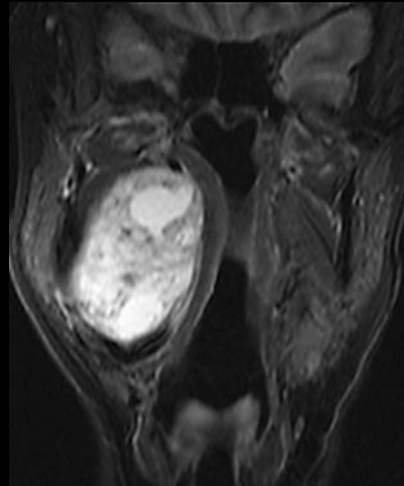
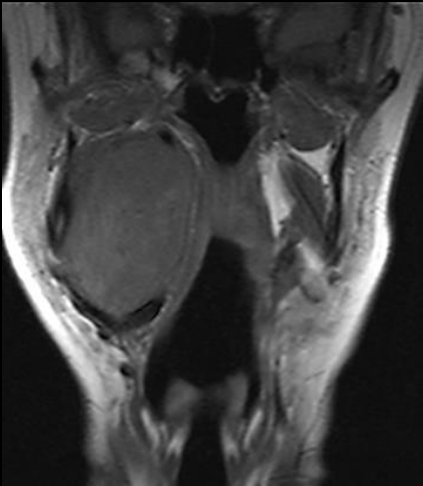
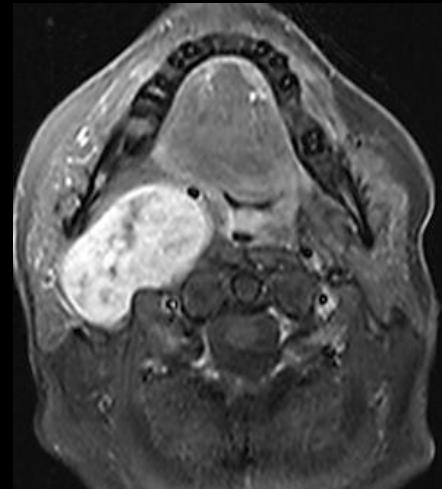
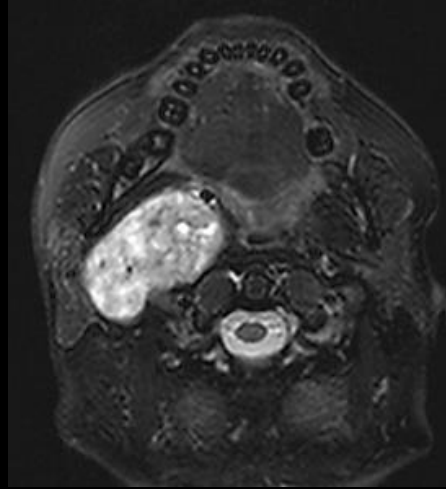
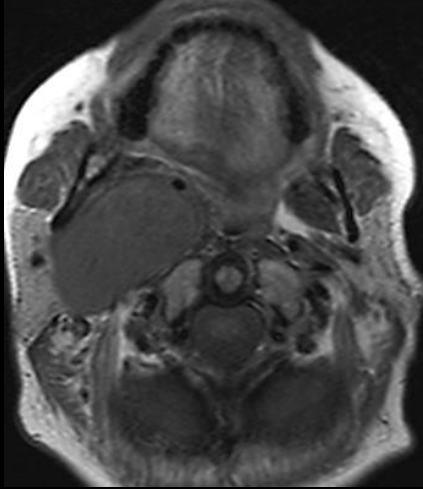
- Arises from Schwann cells wrapping around CNs IX-XII. CN X most common (50%)
- Typically asymptomatic but may have Horner syndrome, VCP, dysphagia, sore throat
- Well-circumscribed; Vagal schwannomas displace ICA and PPS anteriorly
- CT: CS enhancing mass, solid, +/- cystic component
- MRI: T1: iso to hyperintense; T2: hyperintense; enhance. No flow voids



Vagal Schwannoma

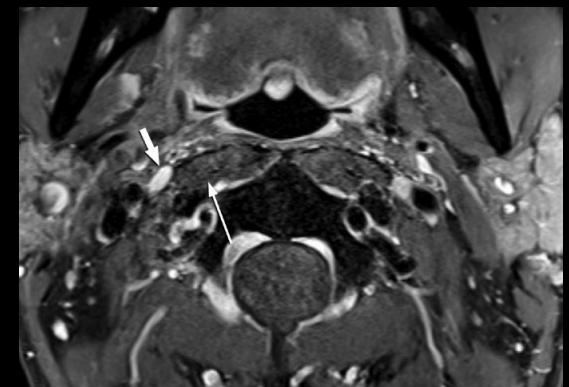
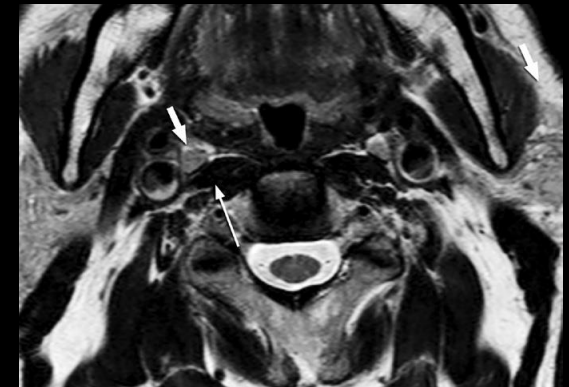
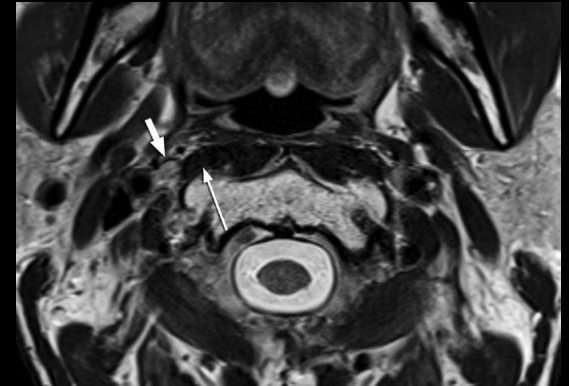


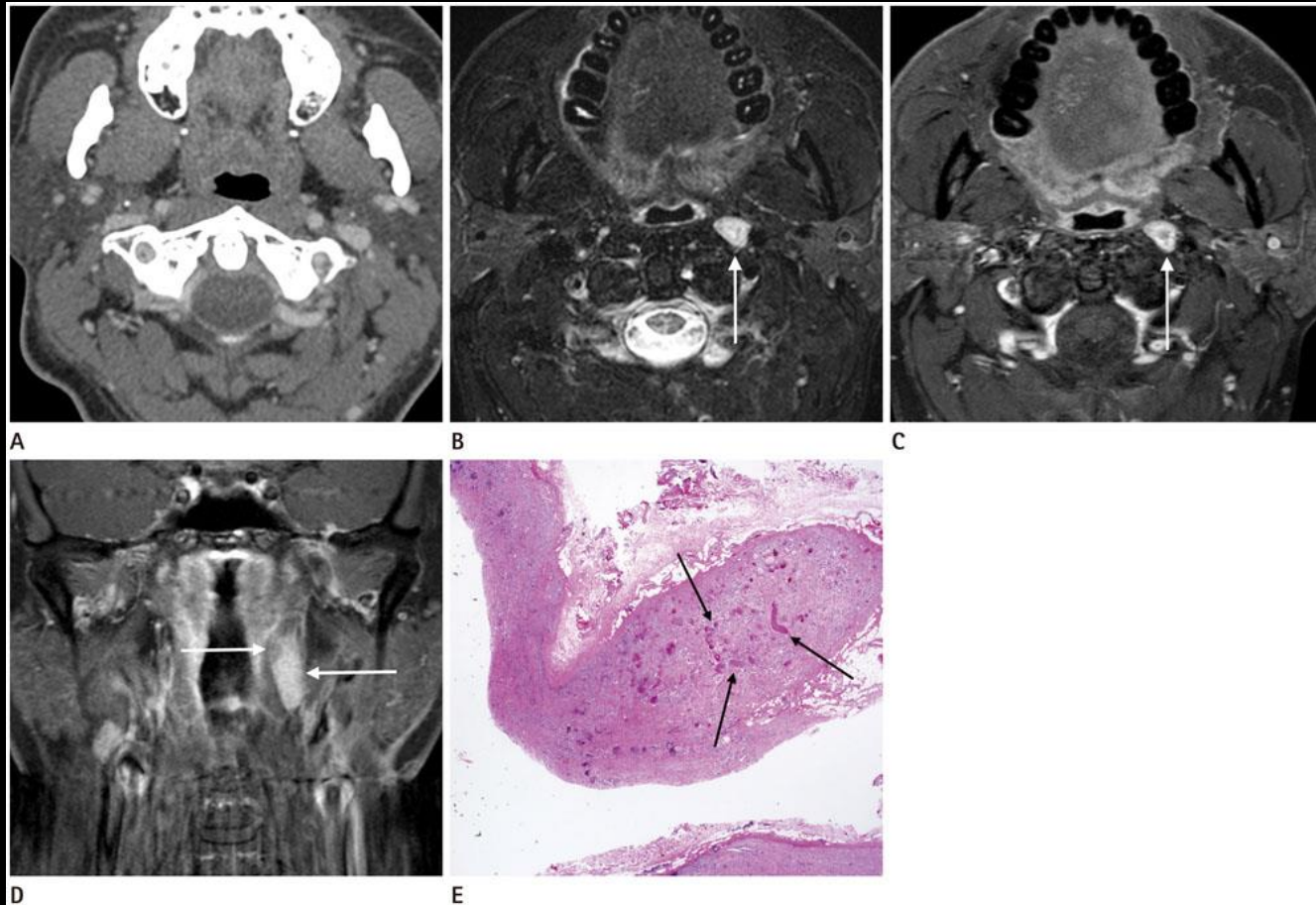
Vagal Schwannoma



Cervical Sympathetic Chain

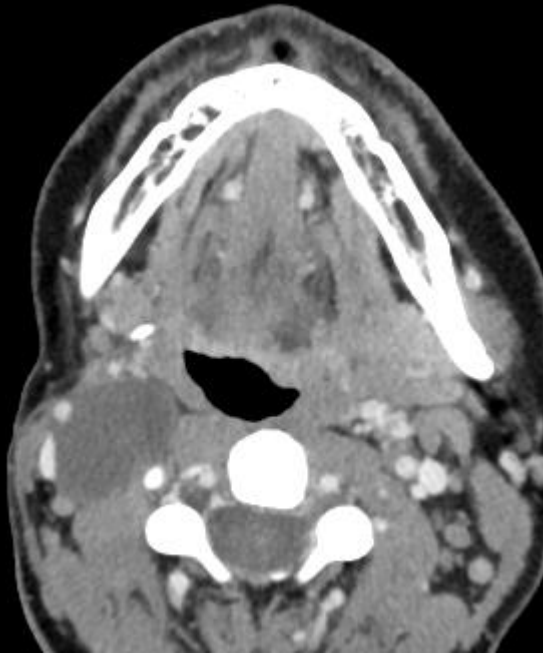
- Cervical sympathetic trunk is located posteromedial to the carotid vessels as it runs longitudinally over the longus capitis and longus colli muscles, deep to the prevertebral fascia
- There are 3 ganglia in the cervical sympathetic chain. The superior one is the largest and most consistent in location, often found at the level of the carotid sinus, usually between the C2 and C4 levels. The middle sympathetic ganglion is the smallest and is located at a level where the inferior thyroid artery crosses the trunk (usually around C6). The inferior ganglion is variable in position, and it often fuses with the first thoracic ganglion to form the stellate ganglion.





Kim JM, Kim J, Kim SH, Choi EC. J Korean Soc Radiol. 2017 Apr;76(4):278-281.

Schwannoma of the Cervical Sympathetic Chain



Carotid Body Paraganglioma

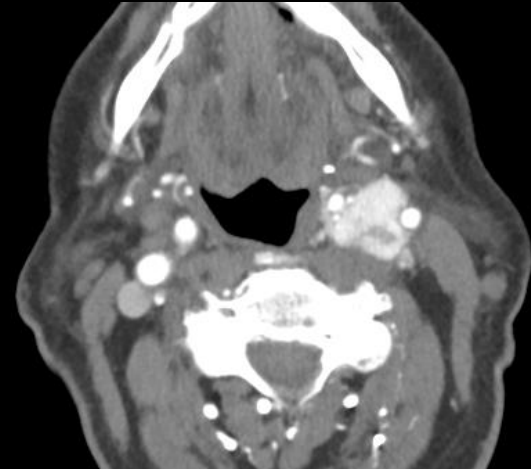
Arise from paraganglia located in the “crotch” of the carotid bifurcation-most common location

Pathognomonic finding is “splaying” of the ECA and ICA and “filling-in” of the bifurcation

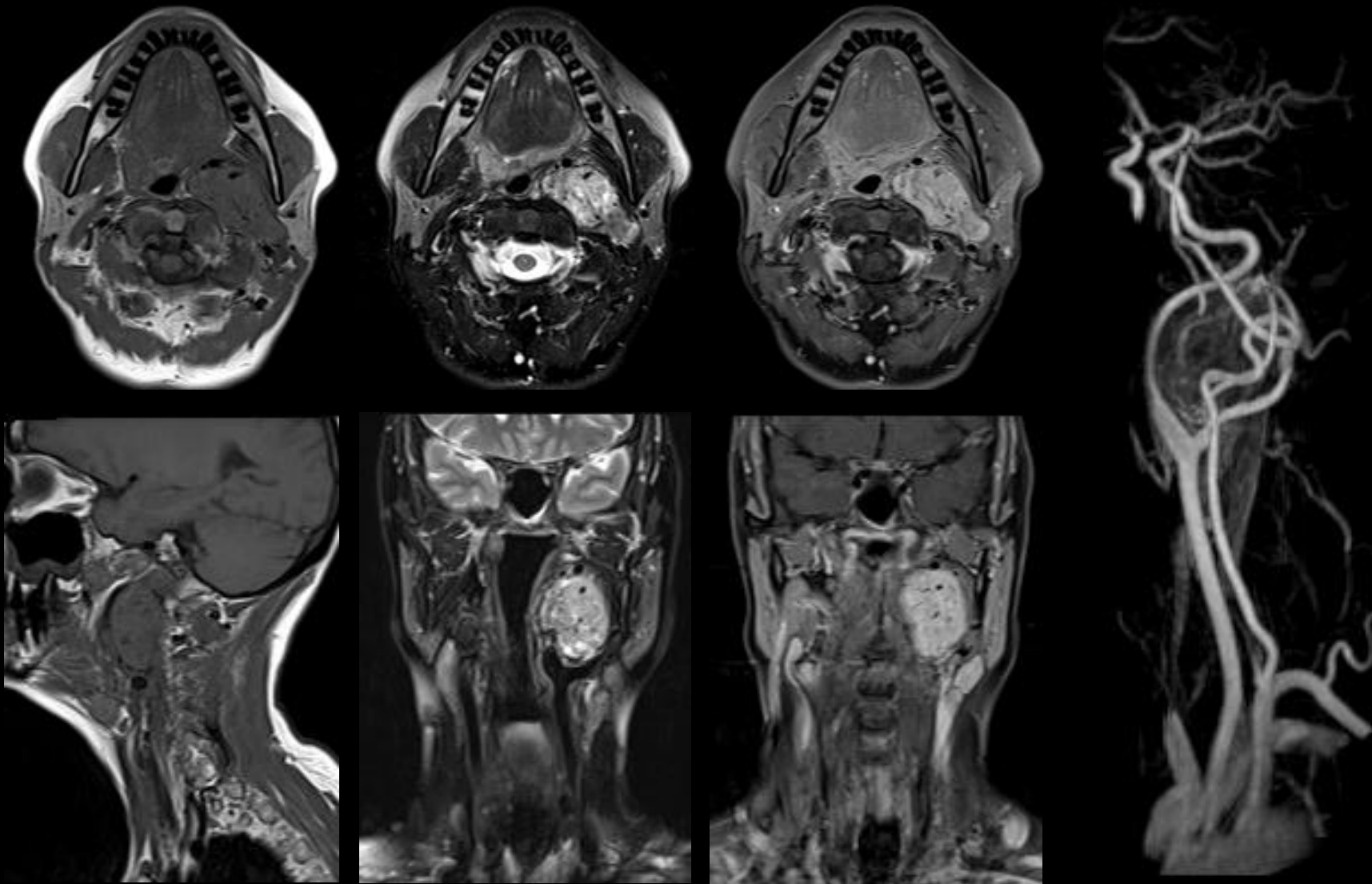
Multiple in up to 33% of familial cases

Sx: Only 8% of these lesions are large enough to present as carotid space mass; may have X and/or XII neuropathy

Malignant in 10%-15% of cases

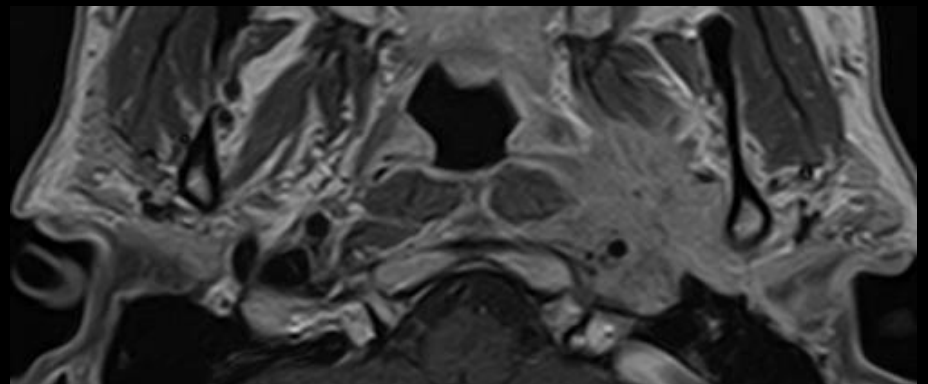
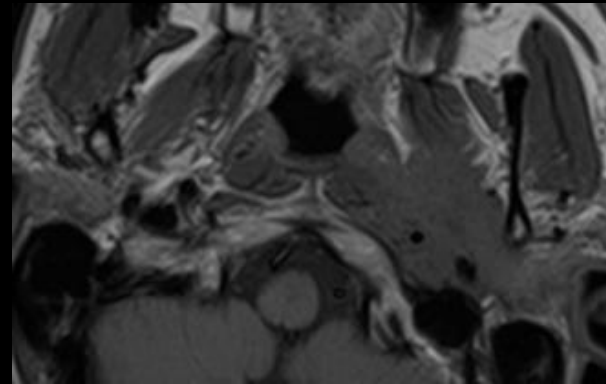
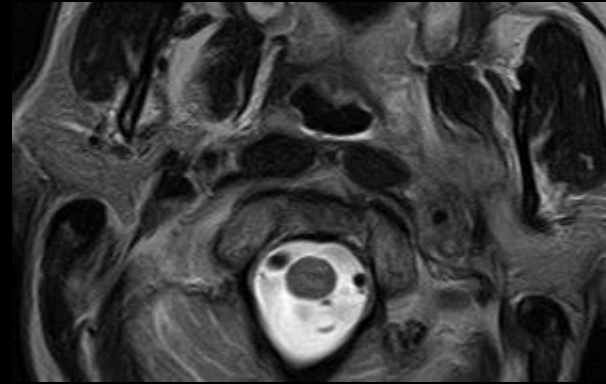


CB Paraganglioma

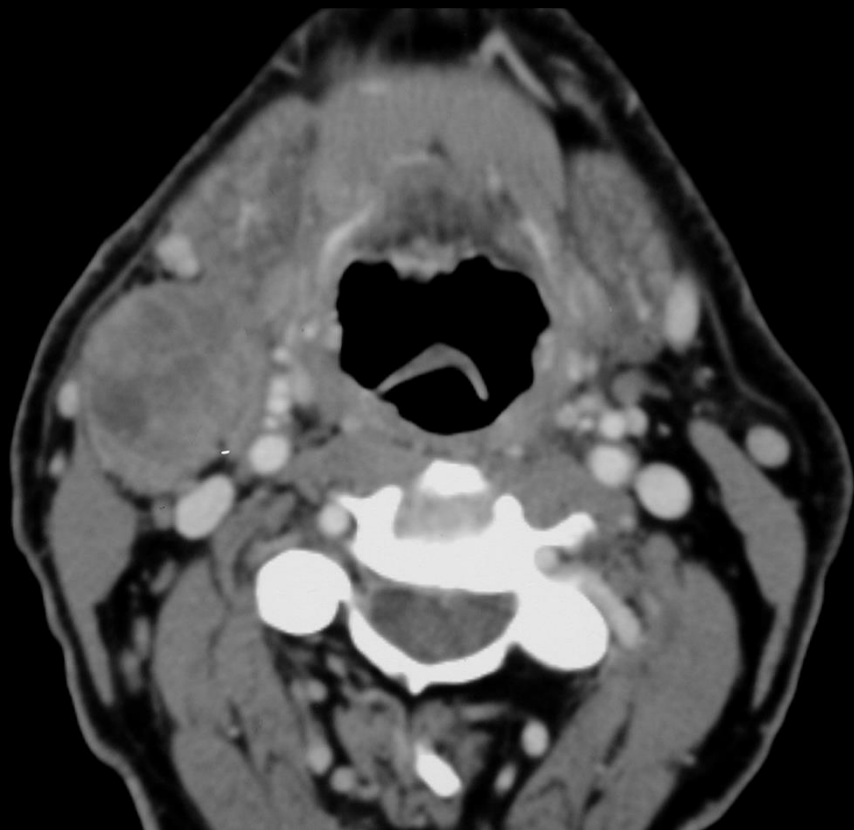




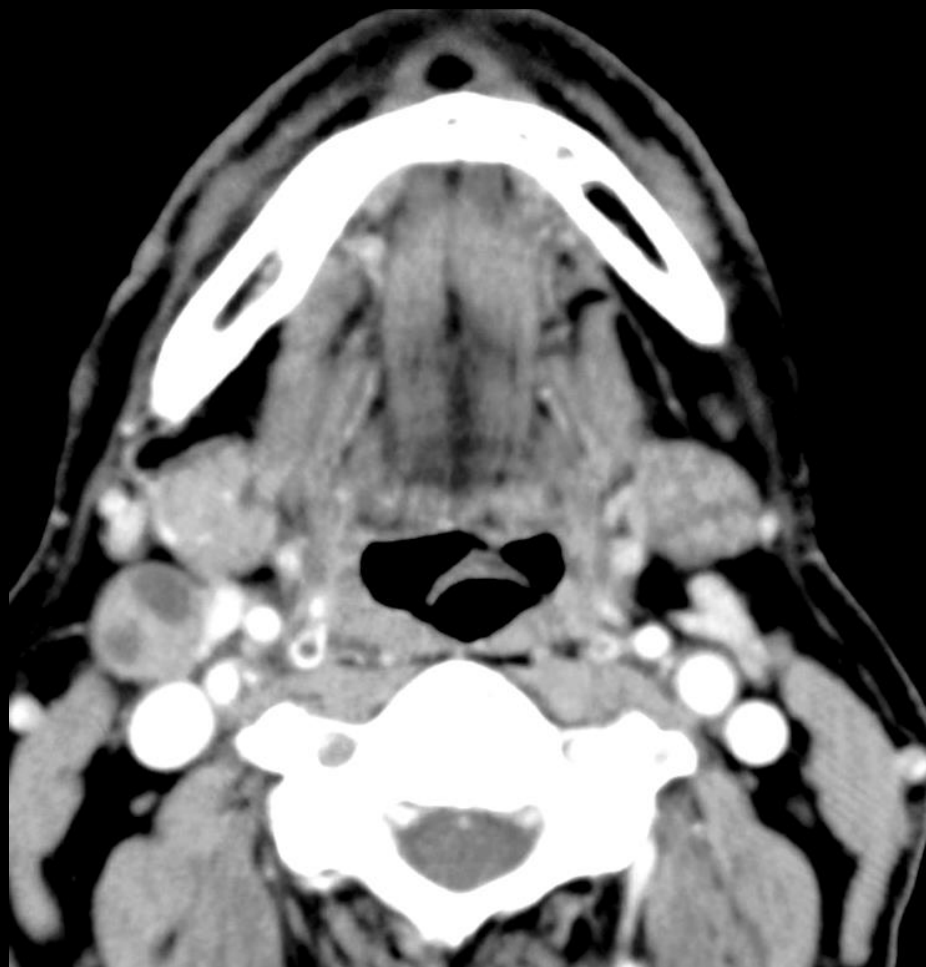
Poorly differentiated squamous cell carcinoma



CS Nodal Pathology



Level IIA SCCa Nodes

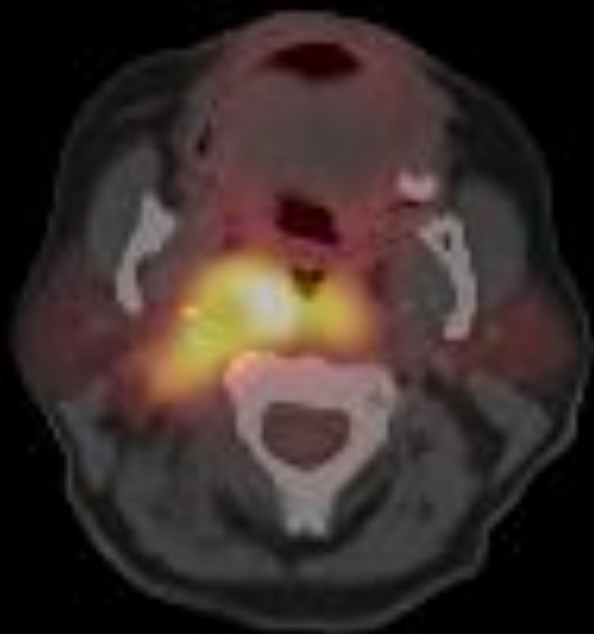


Retropharyngeal/Perivertebral Space

- Midline space just posterior to the pharynx and cervical esophagus.
- Deep Layer separated the RPS from the PVS



Nasopharyngeal Tumor with nodal disease



10/10
Treated with
radiation
therapy

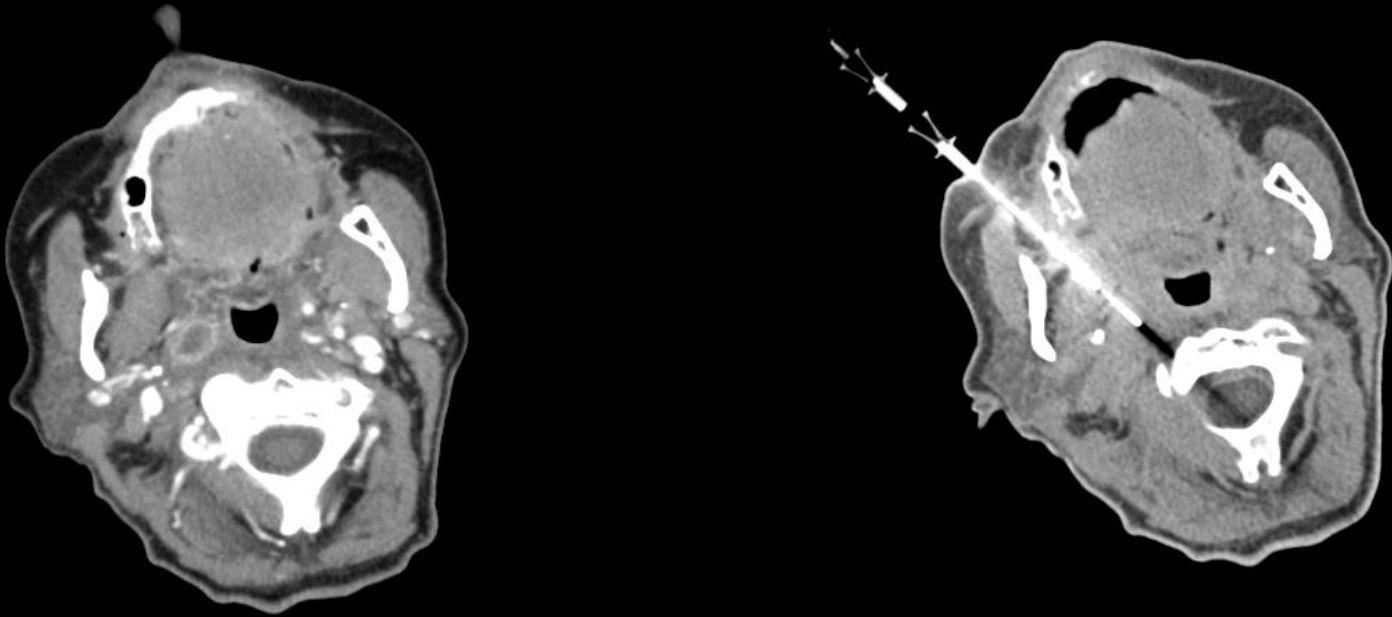


02/11



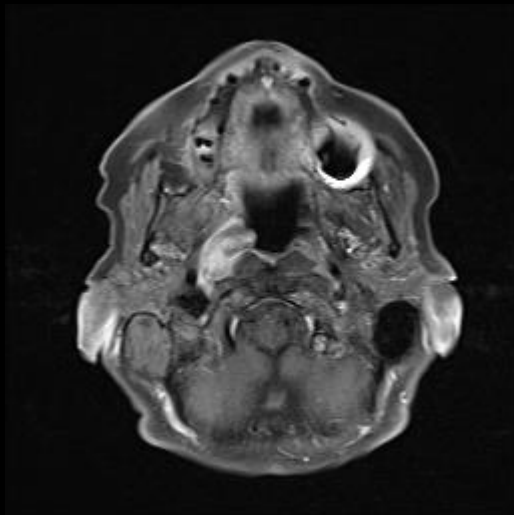
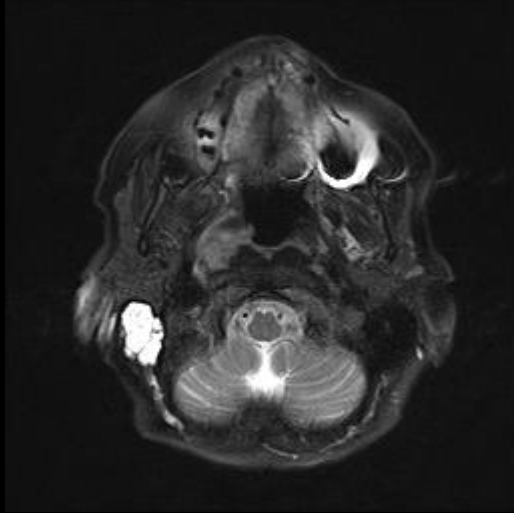
5/11

Suspected recurrent disease



Anterior approach

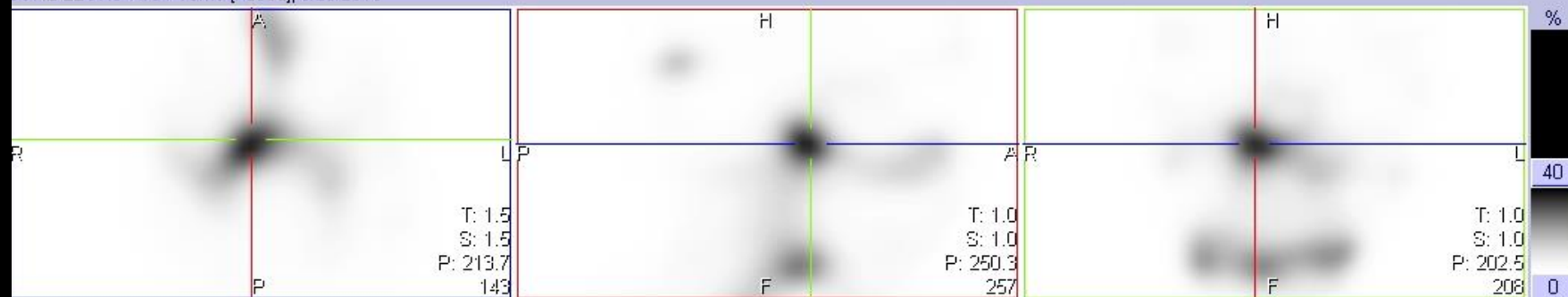
75 yo female with right sided hearing loss and sensation of blockage in the right ear





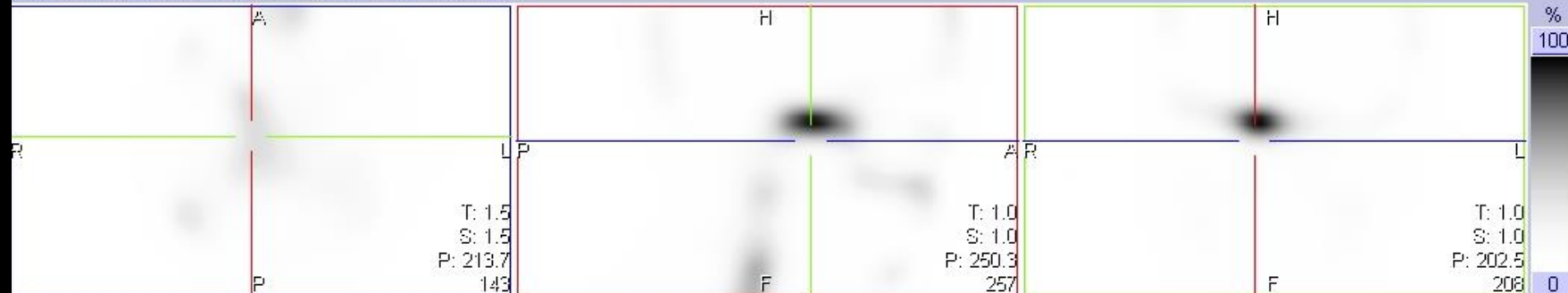
1: (B:0%,T:40%) 2: HU(B:-85,T:165) 1: (B:0%,T:40%) 2: HU(B:-85,T:165) 1: (B:0%,T:40%) 2: HU(B:-85,T:165)

BONE LEUKO W/CT Tomo [Fused], 5/28/2015



(B:0%,T:40%) (B:0%,T:40%) (B:0%,T:40%)

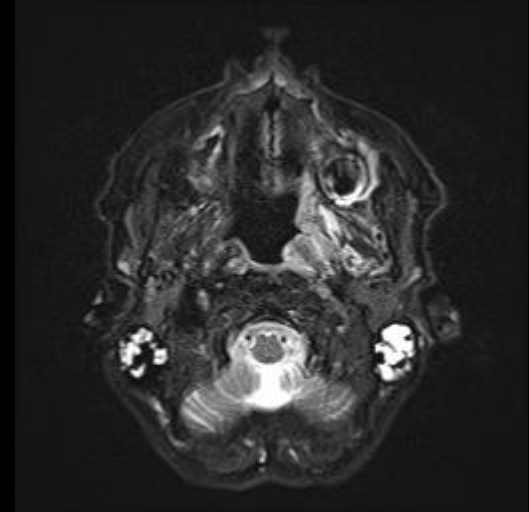
BONE LEUKO W/CT Tomo [Tc99m - Recon AC - AC], 5/28/2015



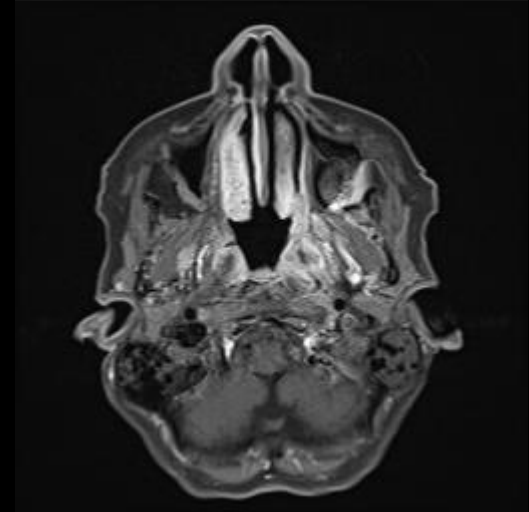
Pseudomonas Aeruginosas



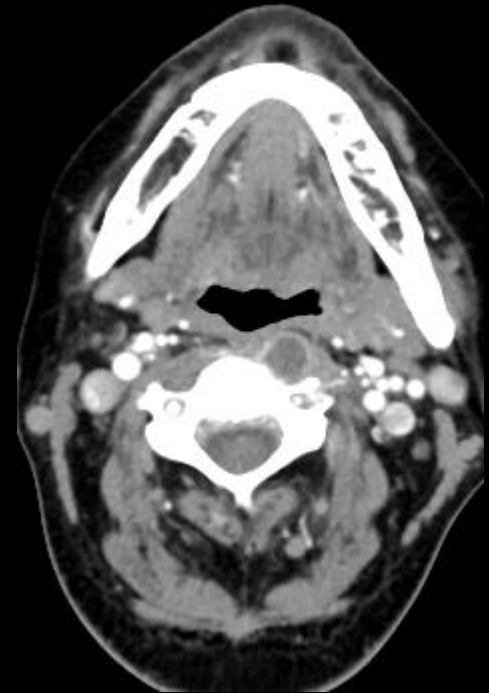
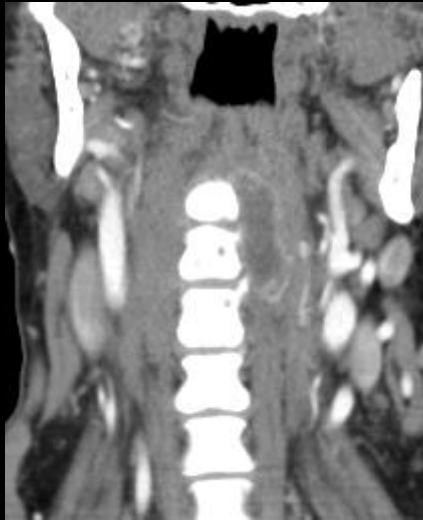
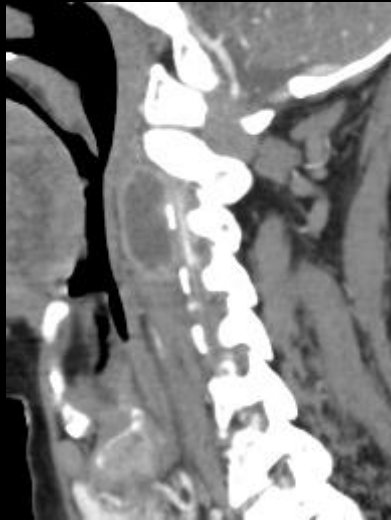
3 mo f/u



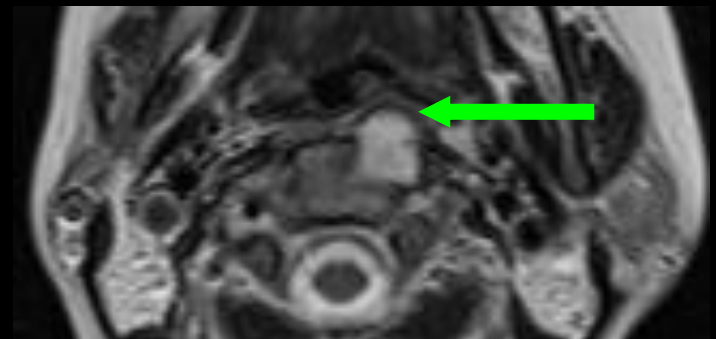
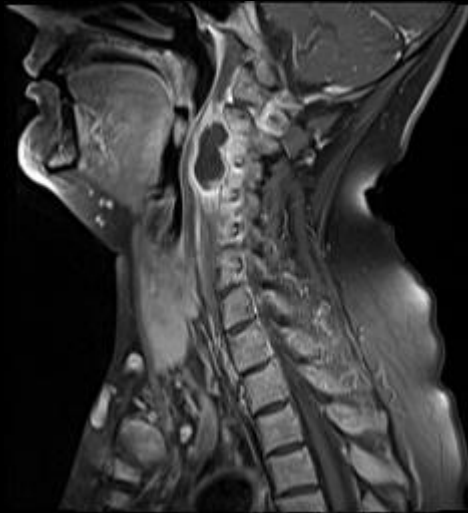
6 mo f/u



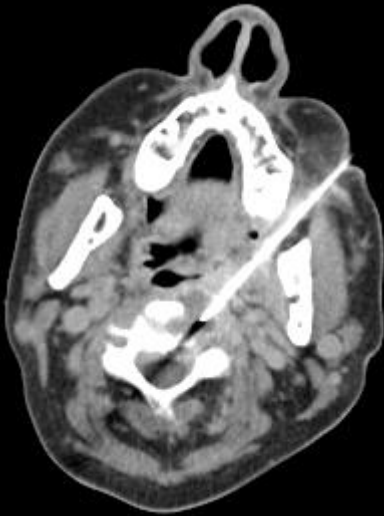
45 yo male with congenital cardiac disease presenting with neck pain



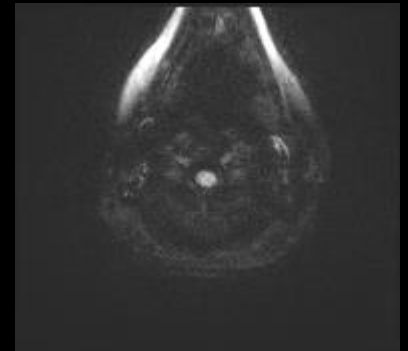
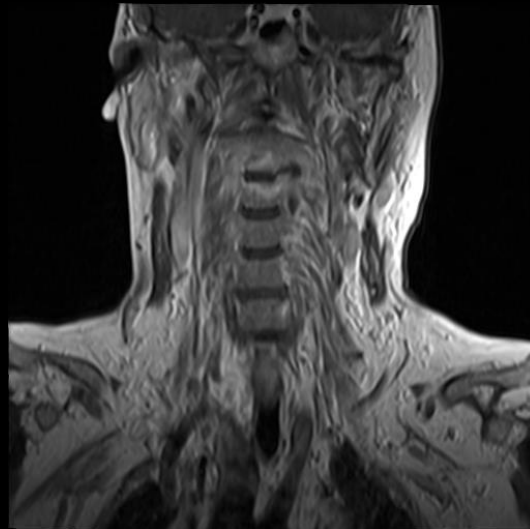
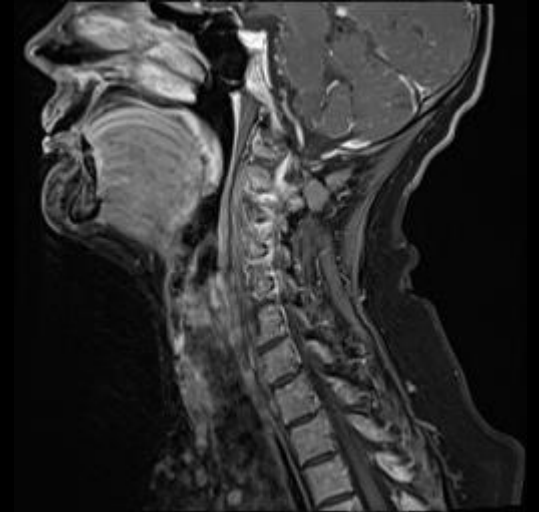
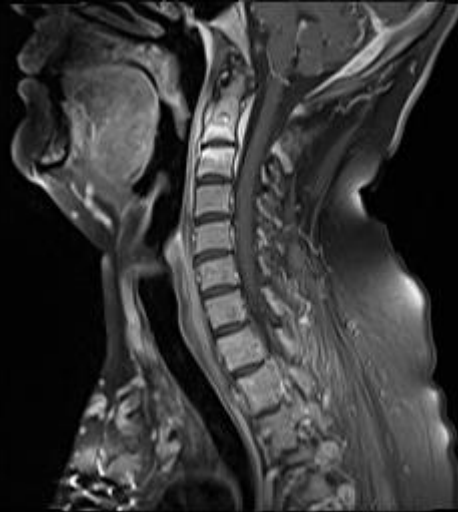
Prevertebral PVS



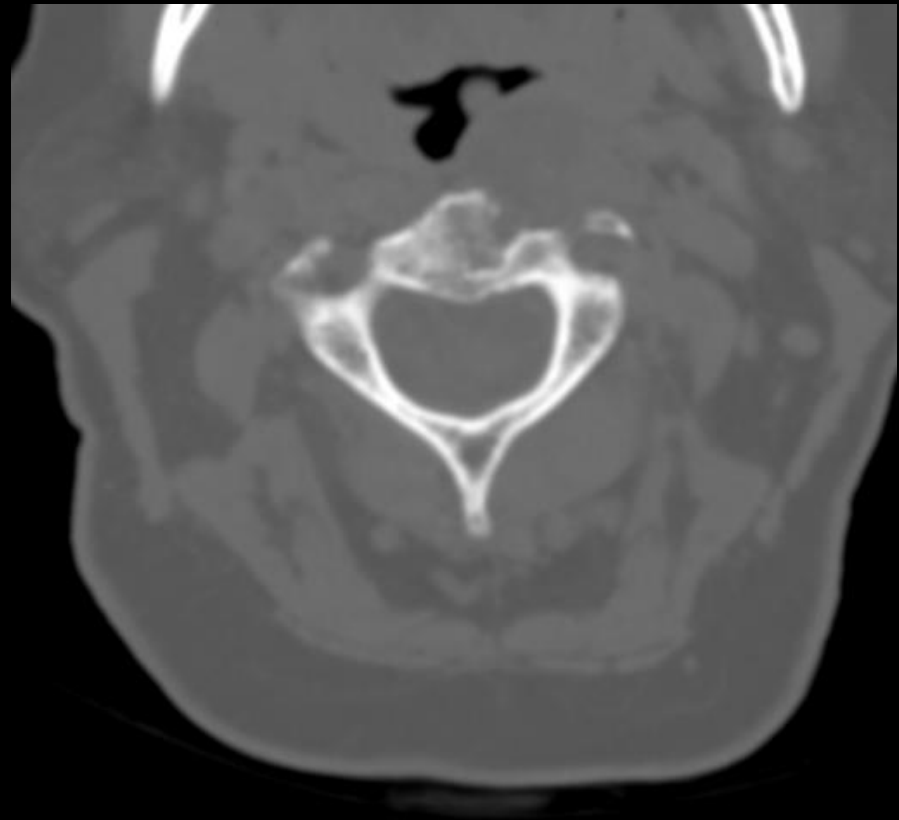
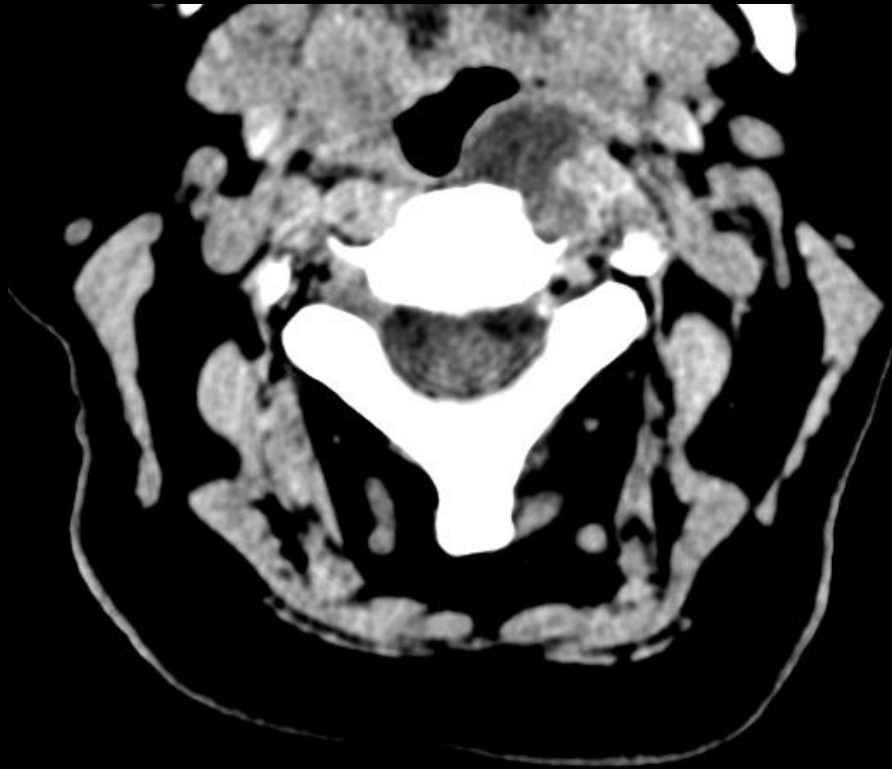
1 month follow-up on ATB



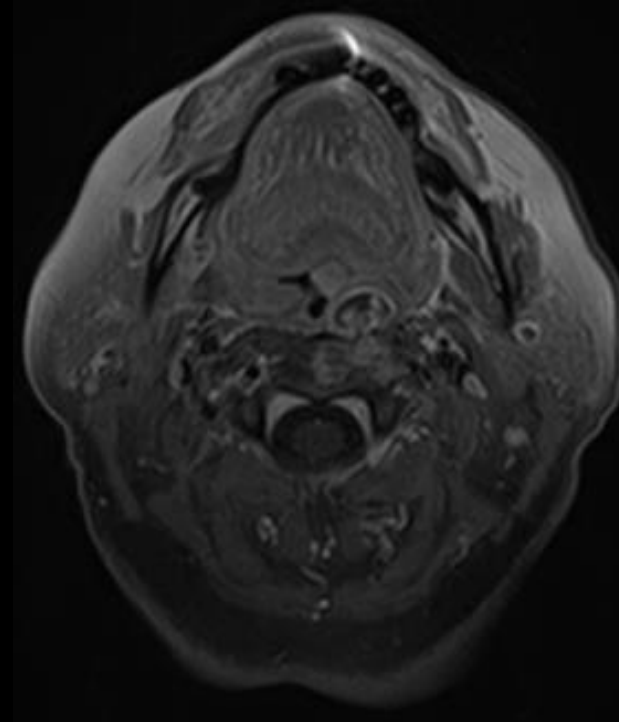
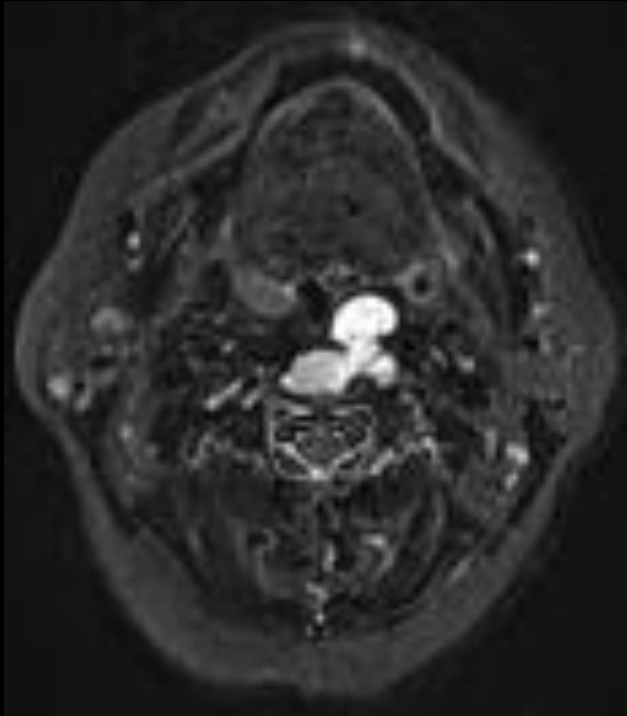
7 cc pure pus (Staph
Aureus)



64 y.o. female with a history of 2 weeks of globus and dysphagia



Chordoma



Anterior approach Chordoma

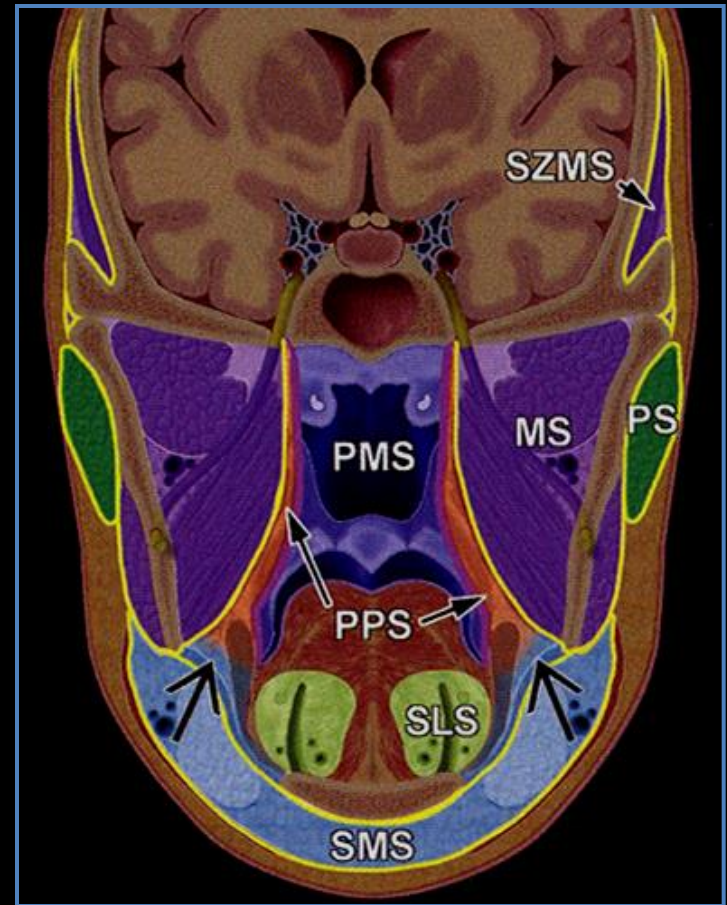


Chordoma

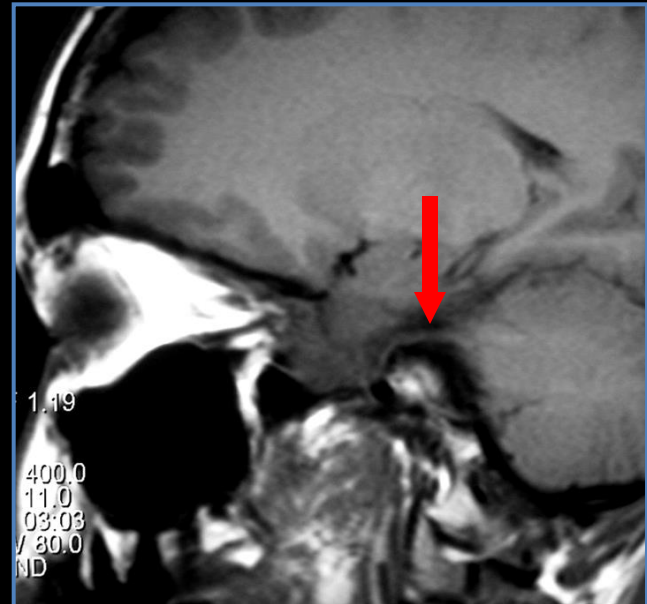
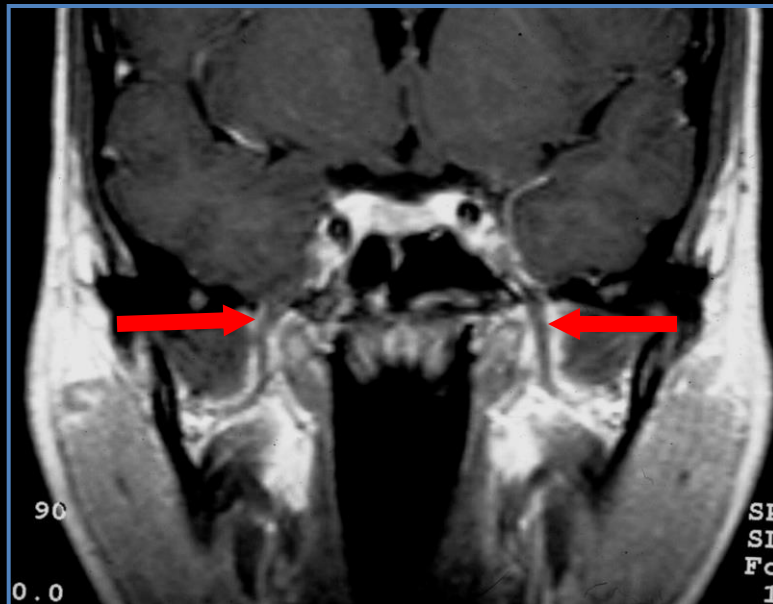
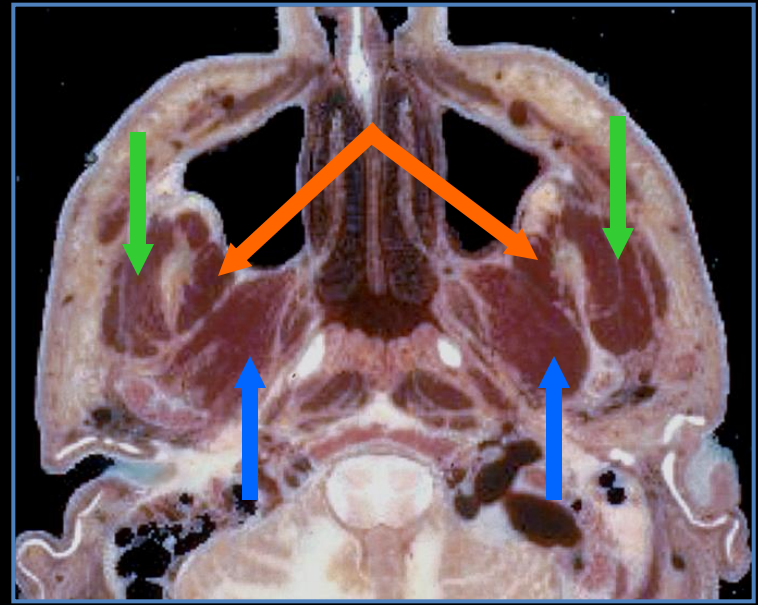
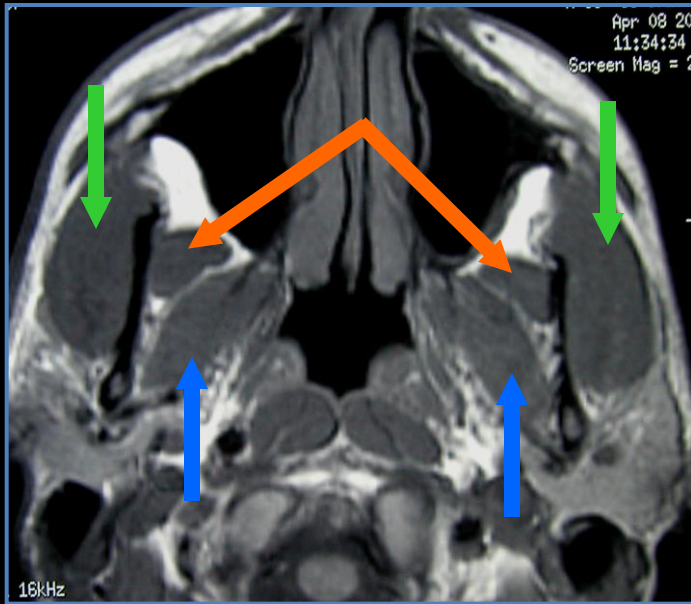
- Destructive process with disproportionately large soft tissue mass.
- Located in clivus or sacrum.
- Mass is hyperintense to disc on T2WI, with multiple septa

Masticator Space--Contents

- Muscles of Mastication
 - Lateral and medial pterygoid muscles
 - Masseter muscle
 - Temporalis muscle
- Inferior alveolar nerve (branch of V3)
- Inferior alveolar artery and vein
- Ramus and posterior body of the mandible

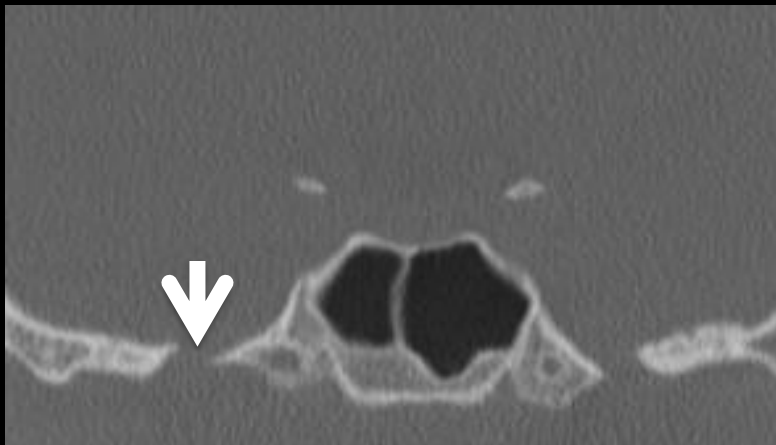


From: Harnsberger HR, et al.
Diagnostic Imaging: Head and Neck

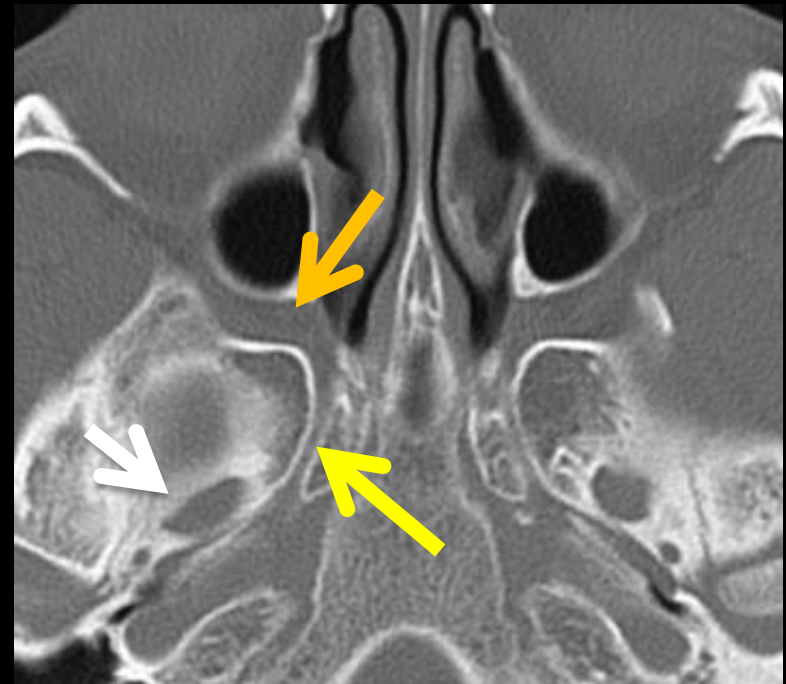


Foramen Ovale

- Located posterolateral to **vidian canal**
- Mandibular nerve (**V3**), accessory meningeal nerve, lesser petrosal nerve and emissary veins

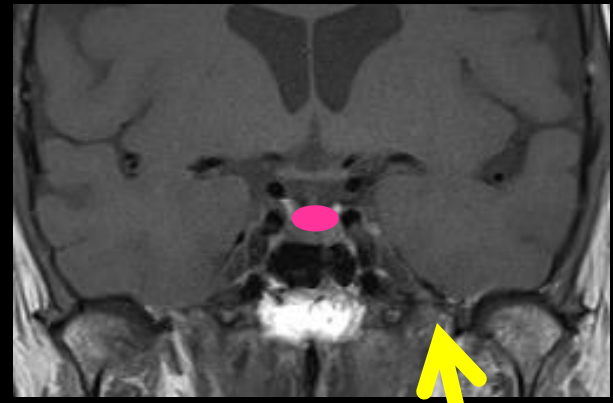
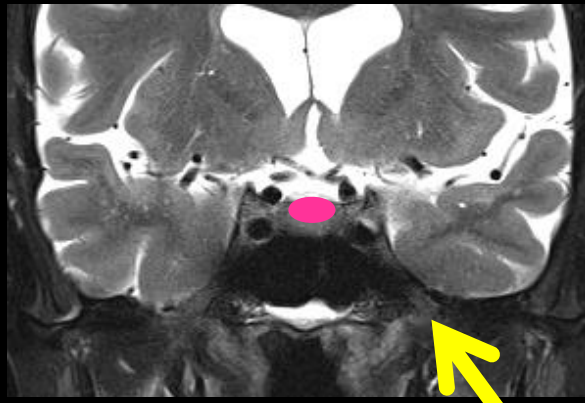
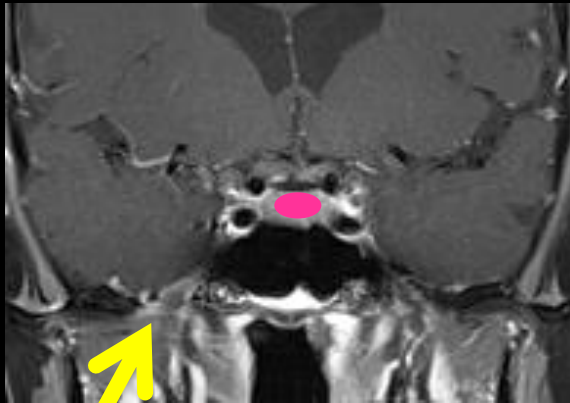
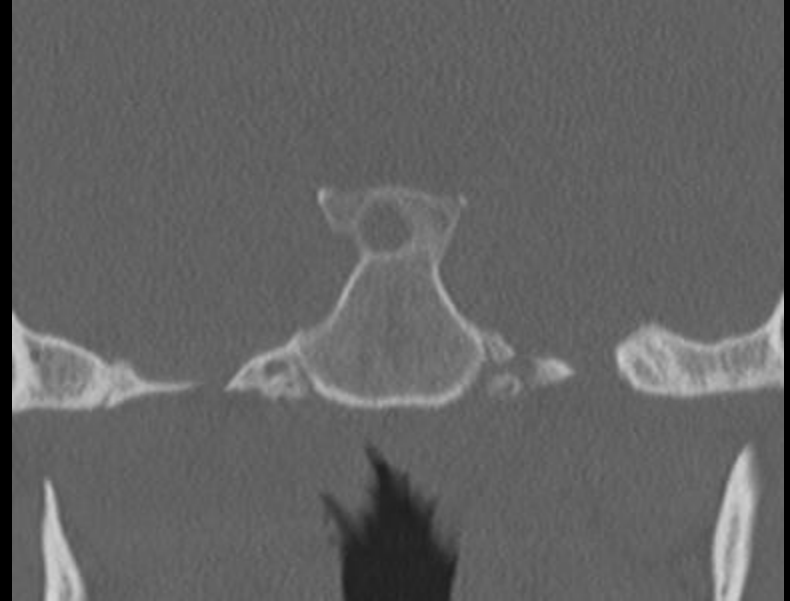
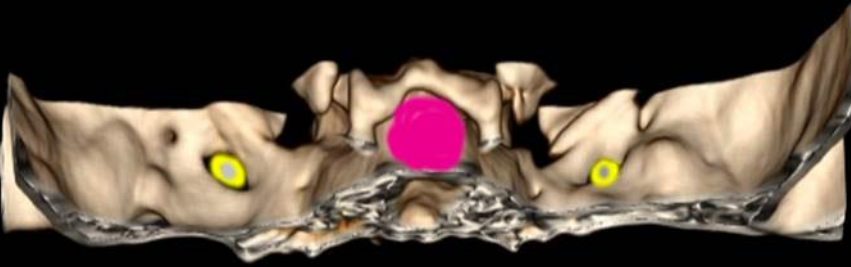


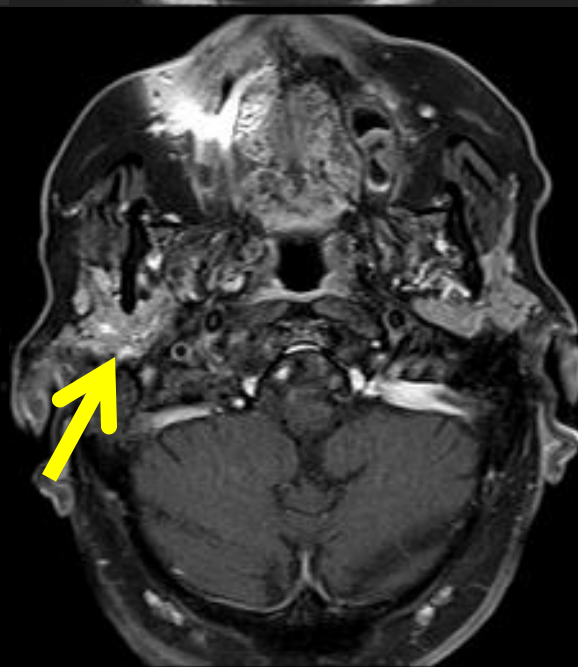
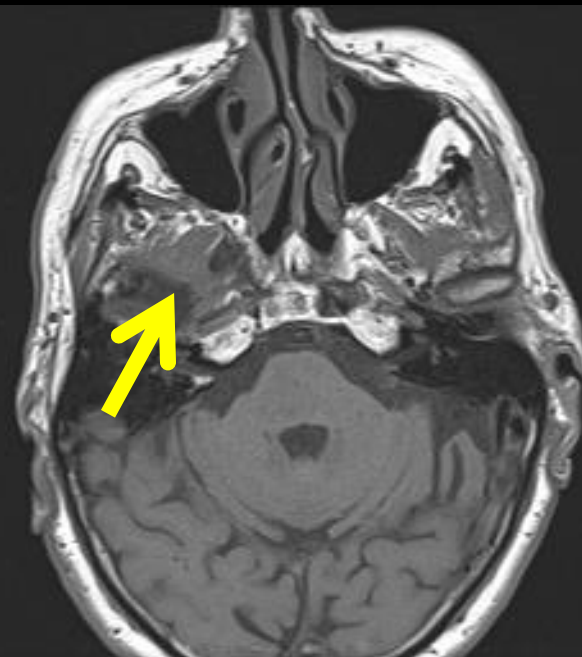
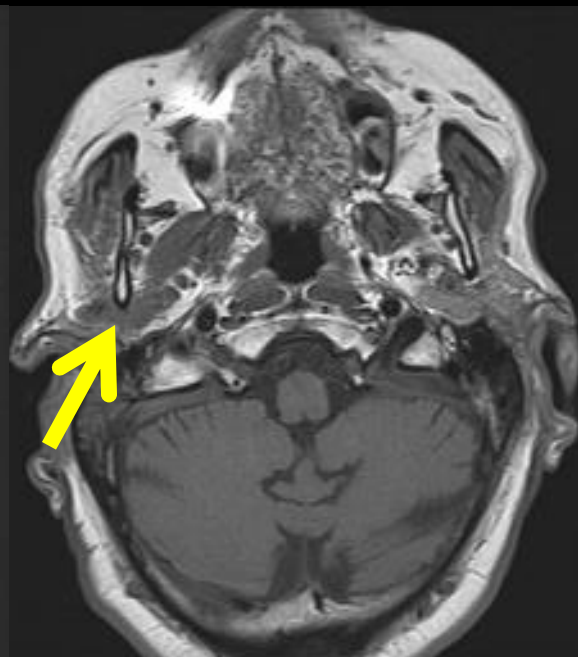
- **Pterygopalatine fossa**

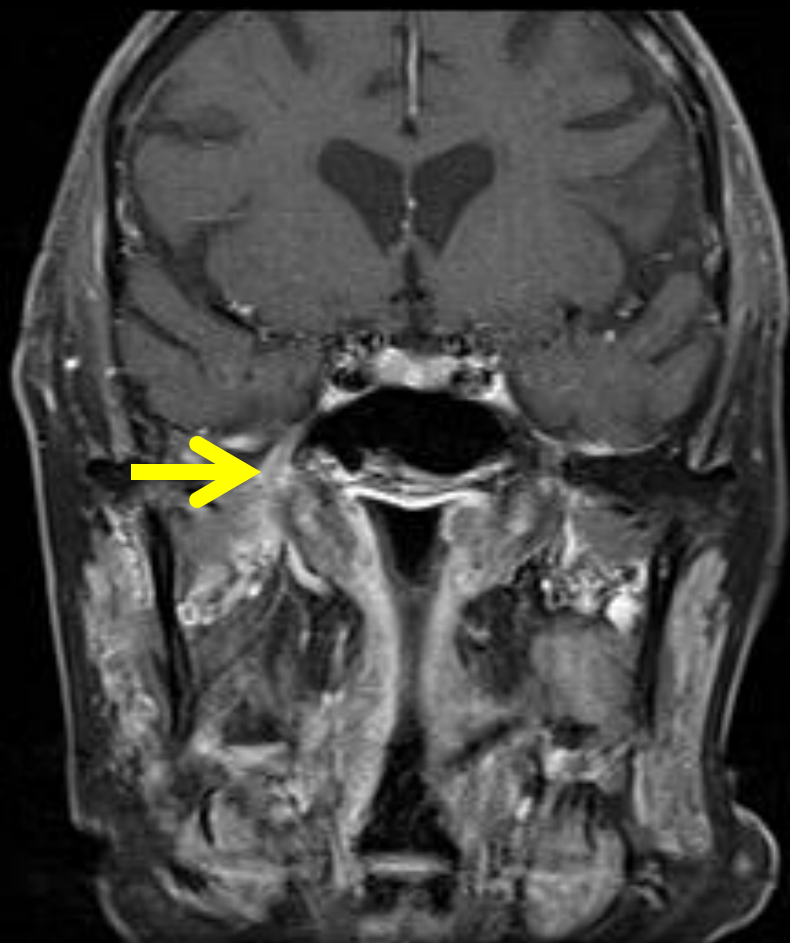


Foramen Ovale

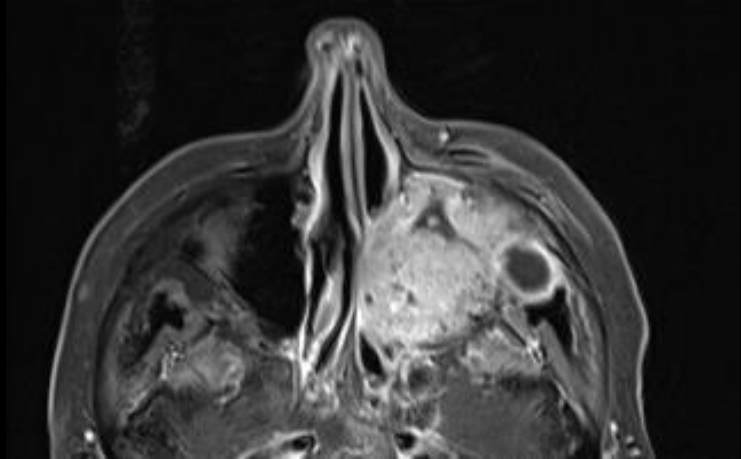
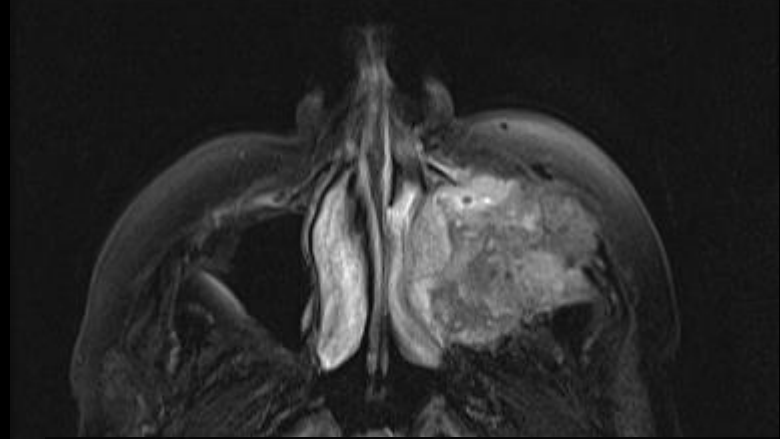
To find **f. ovale** on a coronal image, find the **pituitary gland**



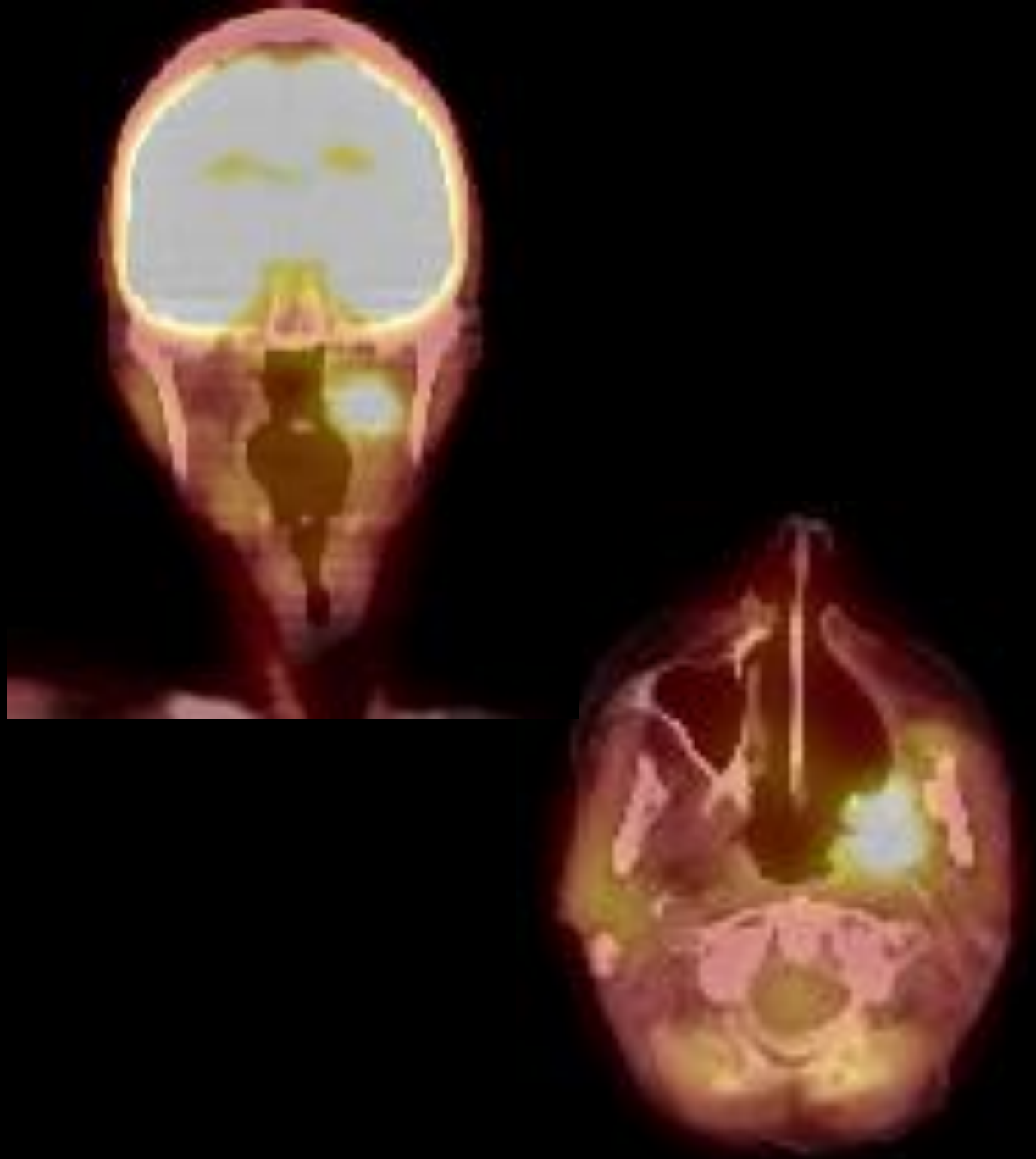




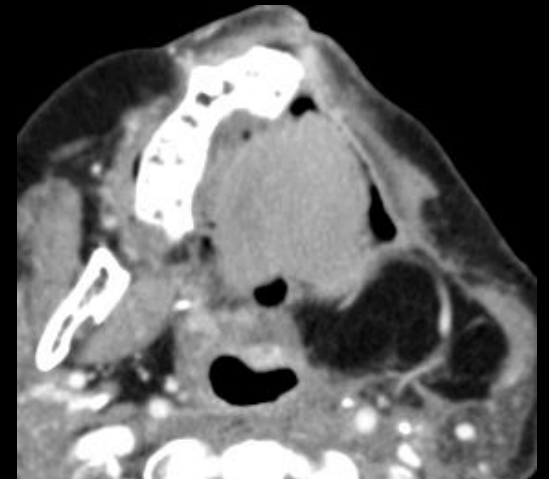
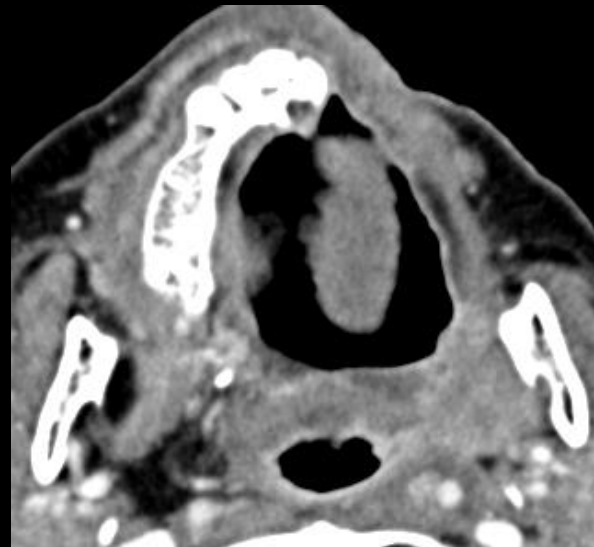
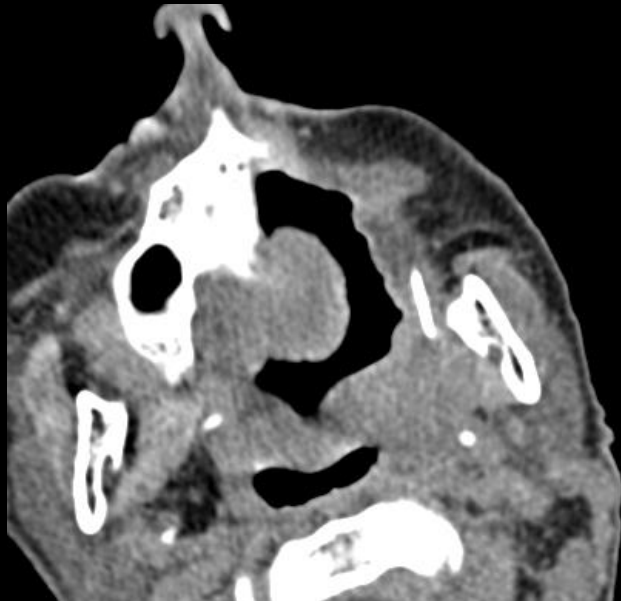
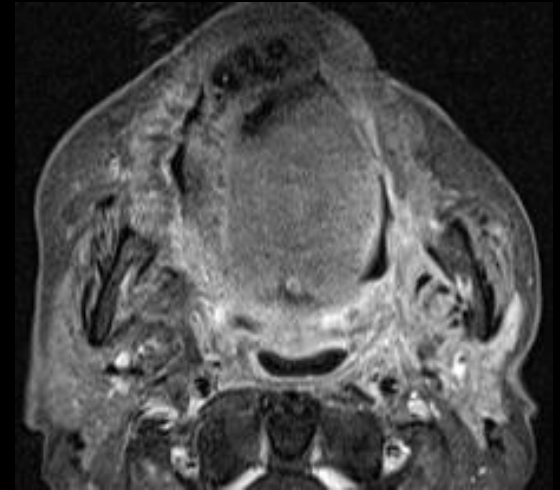
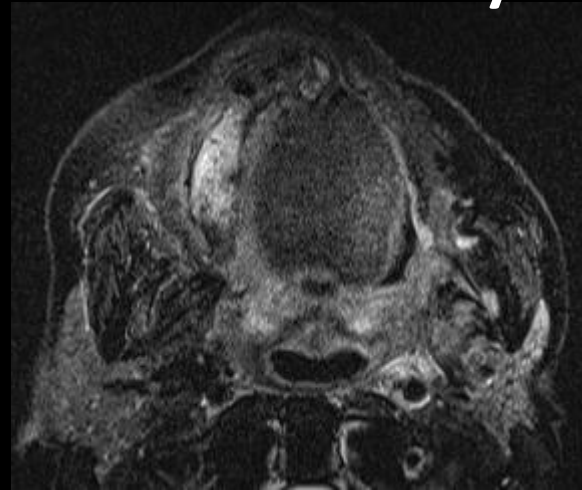
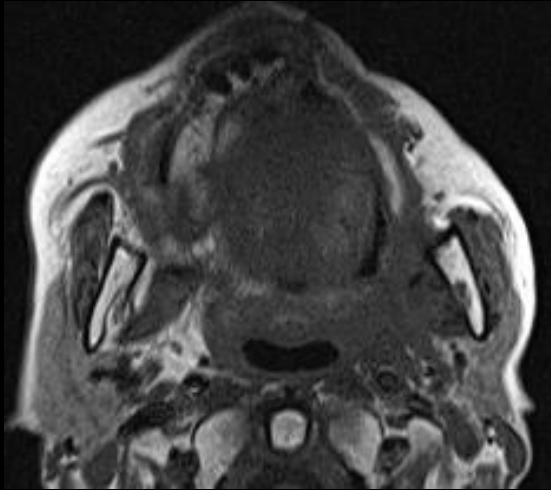
58 y.o.
female
Treated
with
surgery
and
radiation
Sep 2008



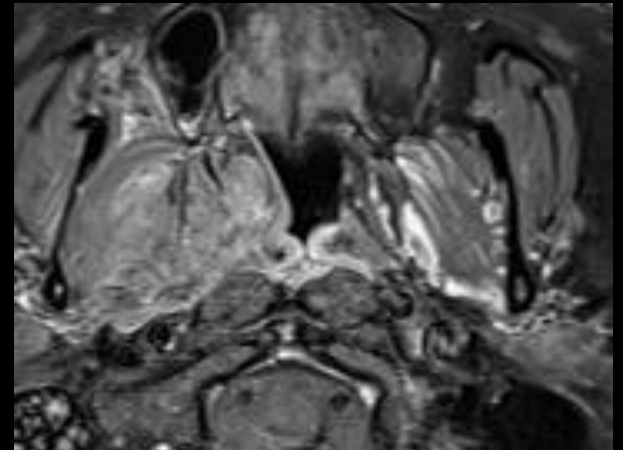
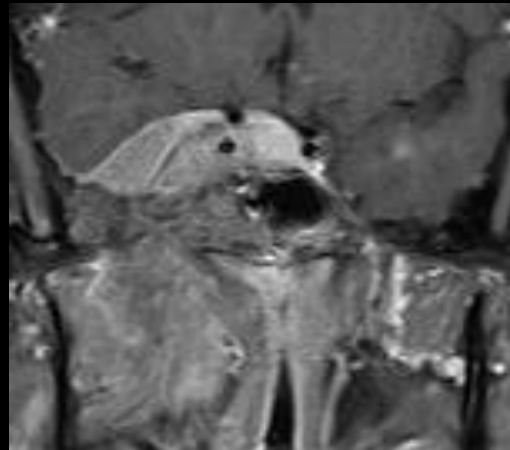
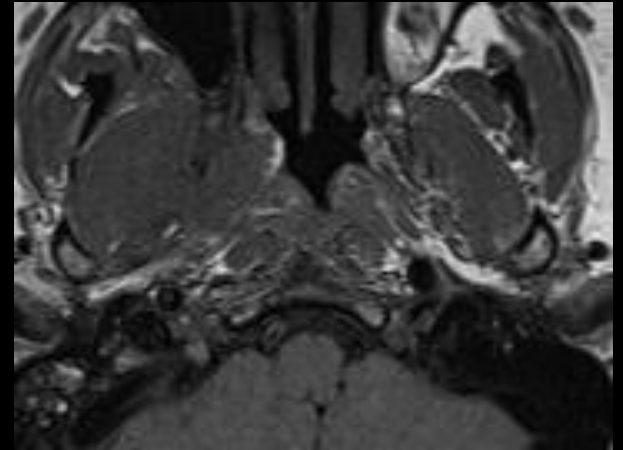
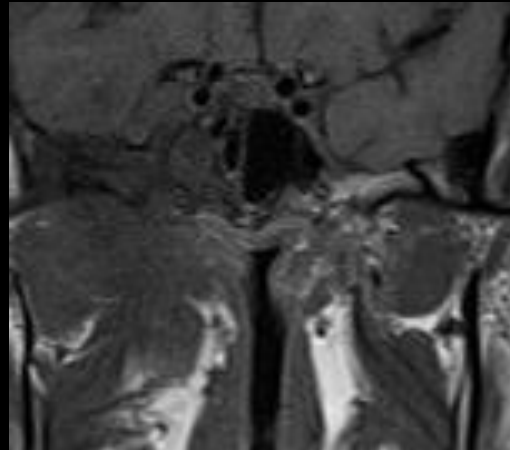
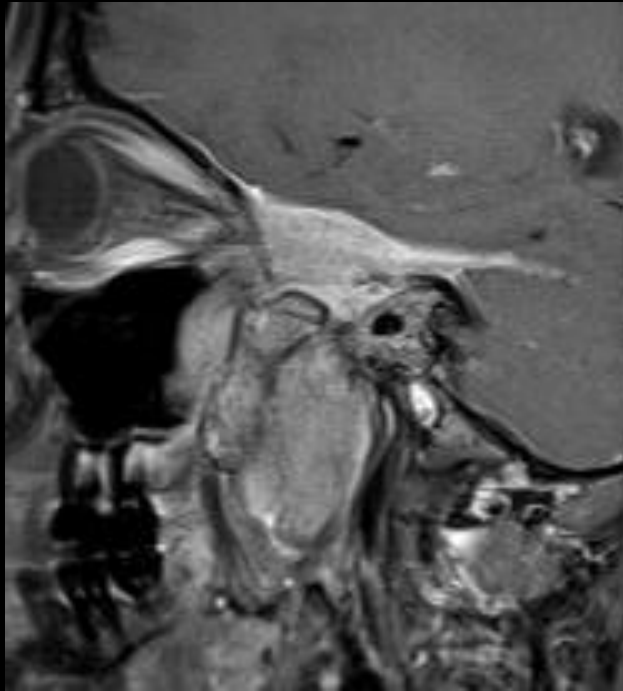
Surveillance
PET Oct
2009:
Recurrence
versus
trismus

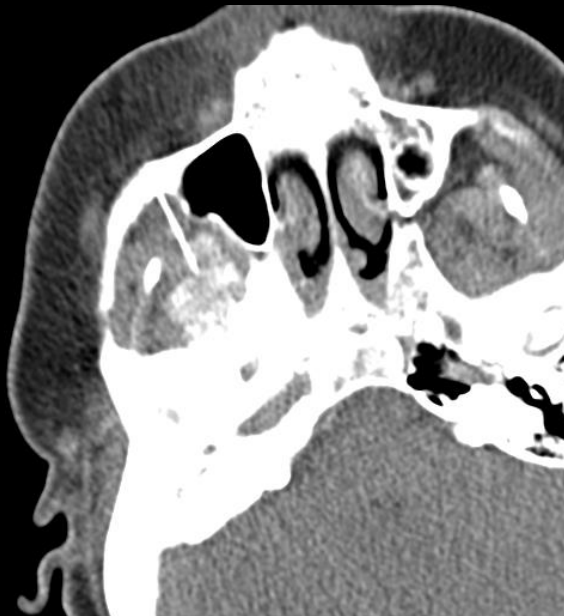
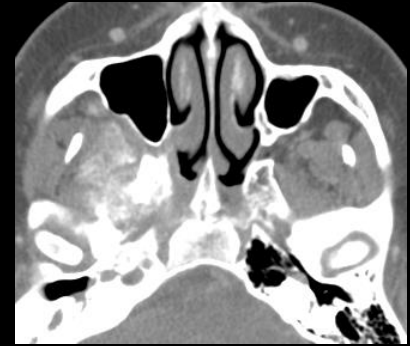
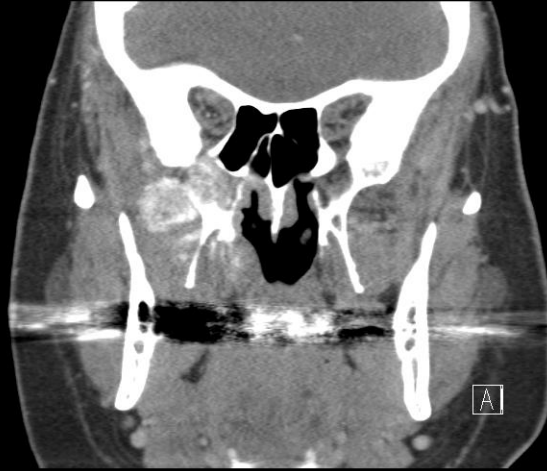


Recurrent squamous cell carcinoma of the left maxillary sinus

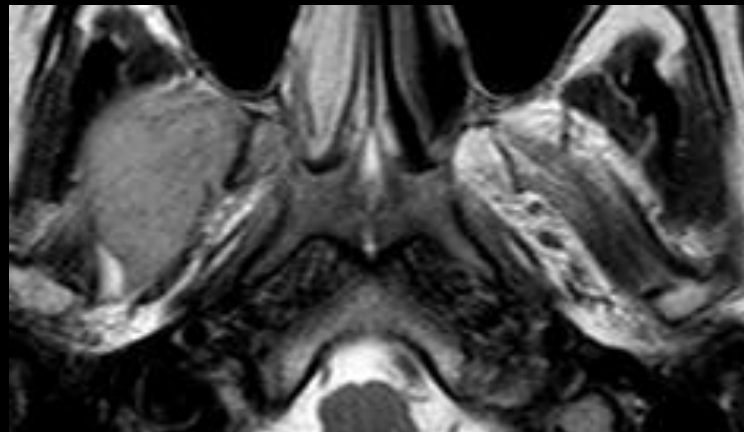
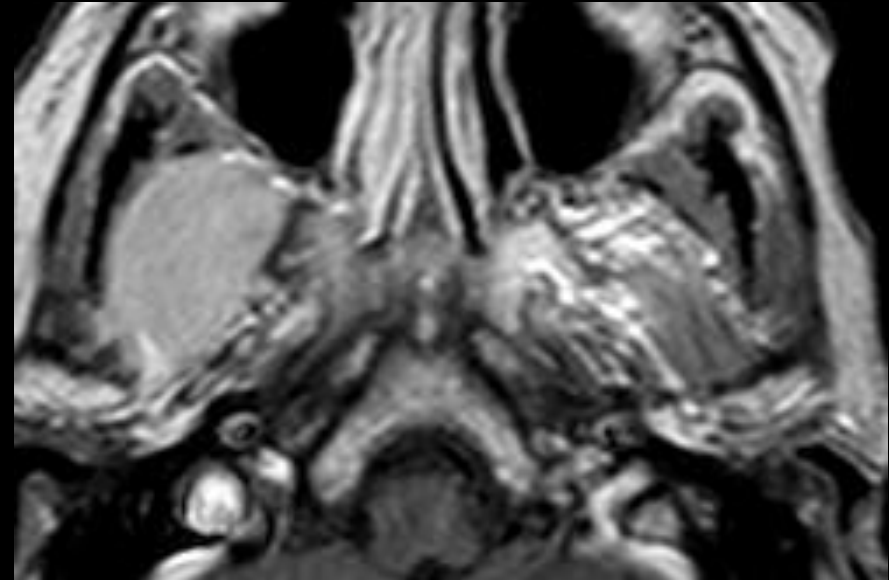
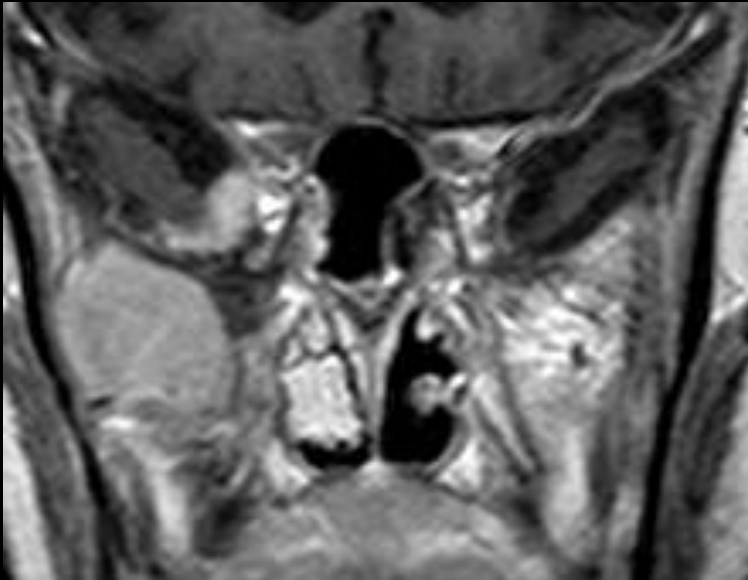


Fall on the ice

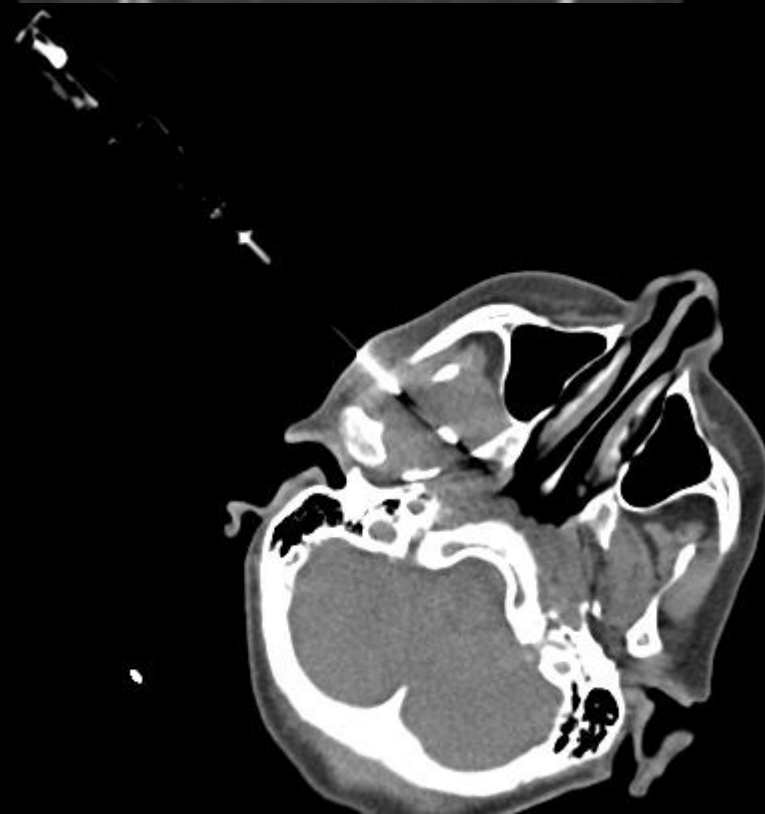
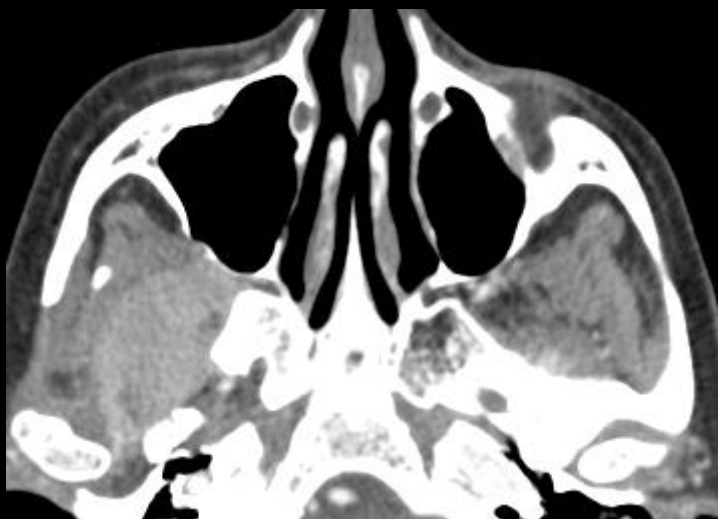




68 y.o. female TIA



Meningioma



Thank you