The Neck

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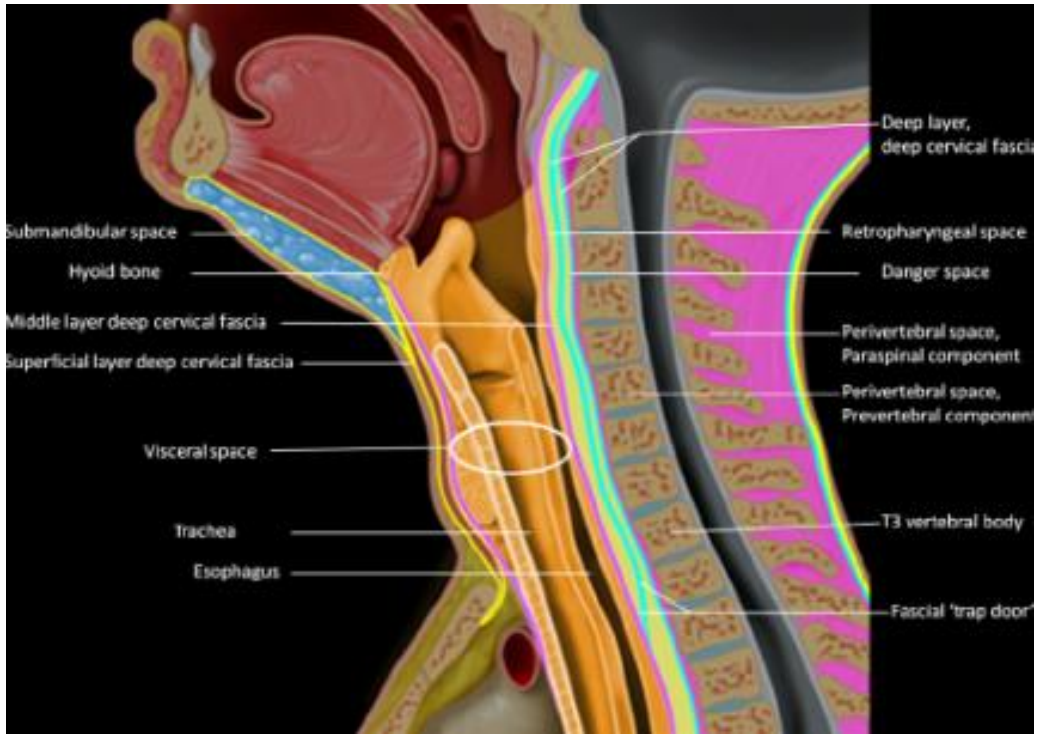
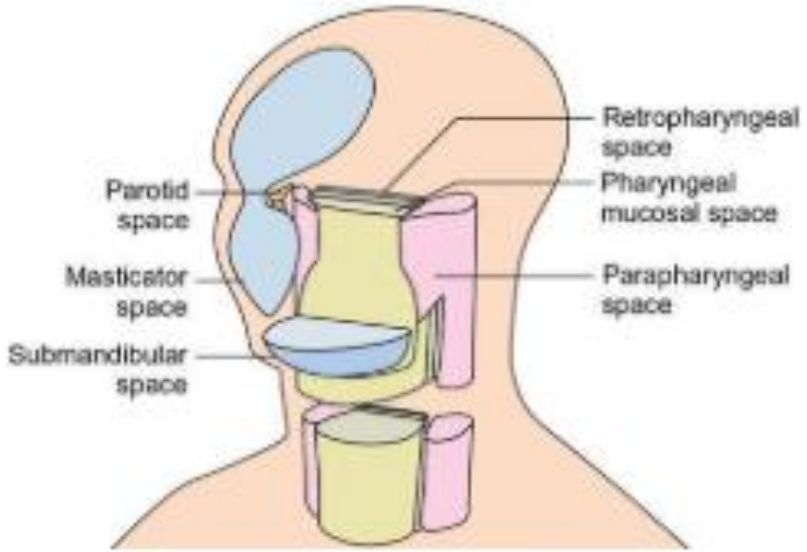
Anatomy of the neck

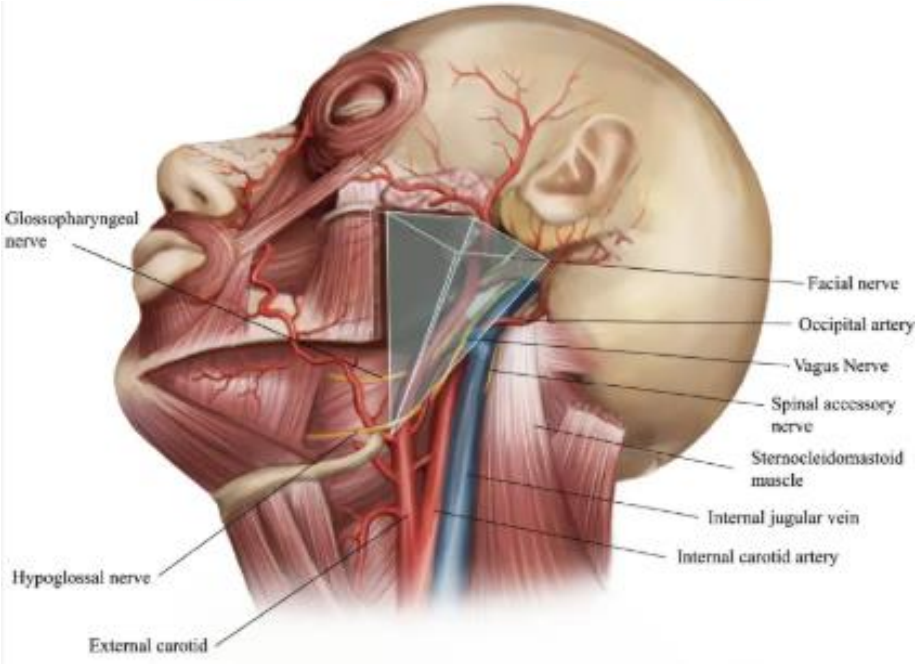
- The neck spaces are often divided into the **suprahyoid** (between the base of the skull and hyoid bone) and **infrahyoid** (between the hyoid bone and clavicles) spaces, as the anatomy of the deep cervical fascia is slightly different above and below the hyoid bone.
- Some spaces cross the hyoid bone and course the entire neck.



Suprahyoid neck

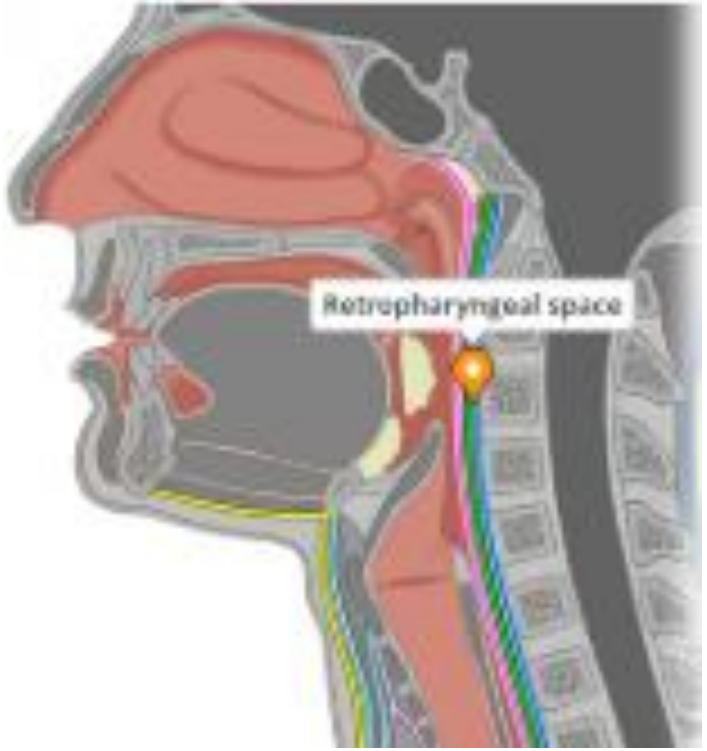
1. **Parotid space**
2. **Masticator space**, including or contiguous with the buccal space
3. **Submandibular space**, including or contiguous with the sublingual space and submental space
4. (prestyloid) **parapharyngeal space**

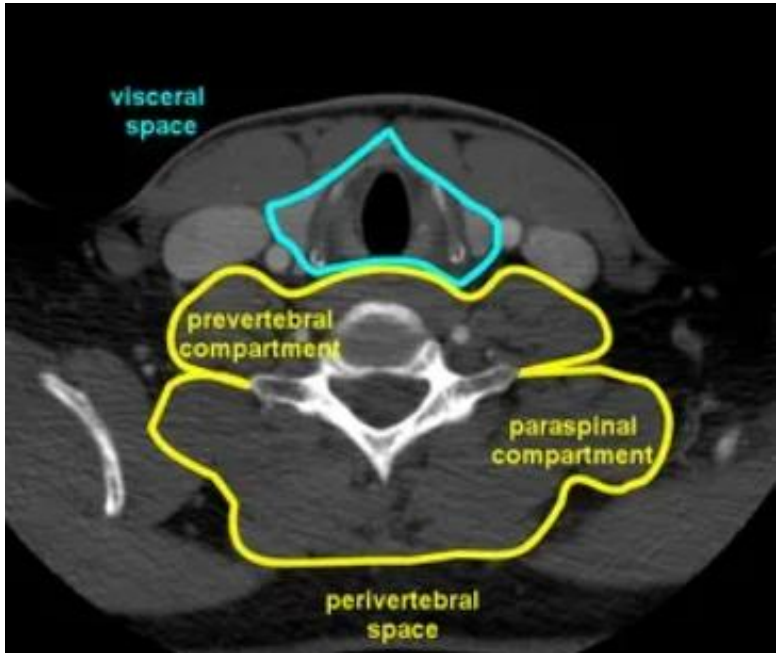


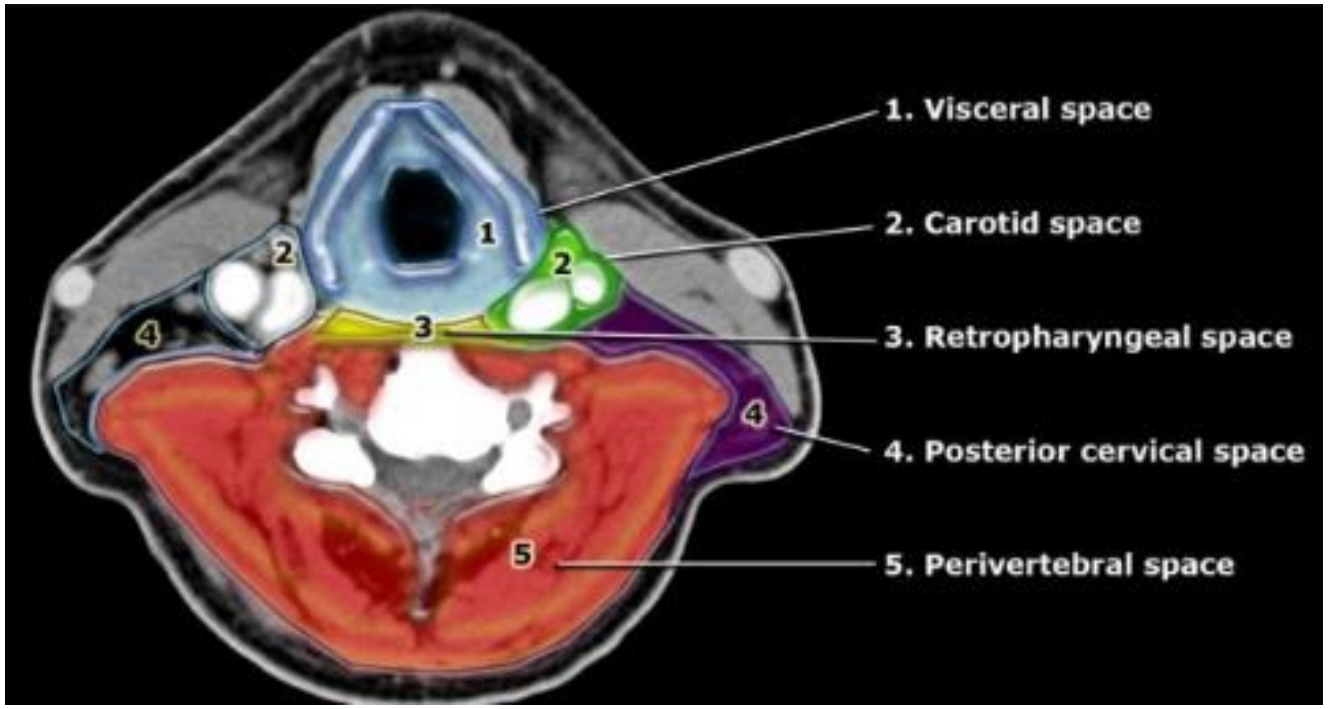


Suprahyoid and infrahyoid neck

1. **Carotid space**
2. **Visceral space**
3. **Retropharyngeal space**, including or contiguous with danger space
4. **Perivertebral space**, including prevertebral space
5. **Posterior cervical space**
6. **Sternocleidomastoid-trapezius compartment**




visceral space
prevertebral compartment
paraspinal compartment
perivertebral space


1
2
2
3
4
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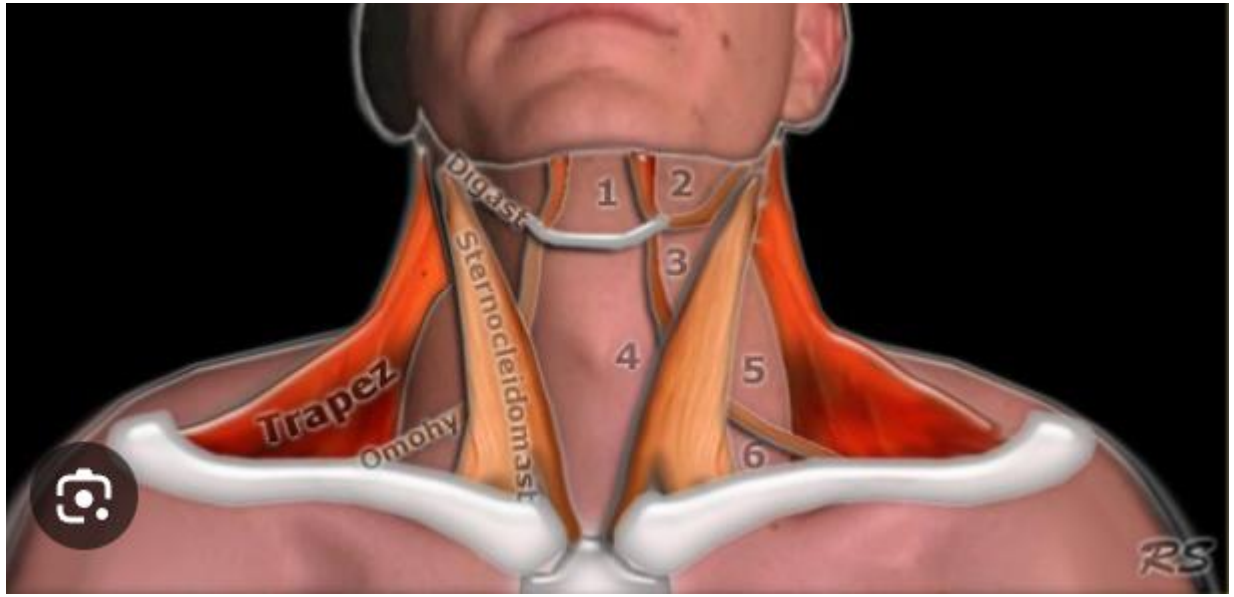
1. Visceral space
2. Carotid space
3. Retropharyngeal space
4. Posterior cervical space
5. Perivertebral space

Infrahyoid neck

1. Anterior cervical space
2. Suprasternal space
3. Strap muscle compartment



Imaging of neck masses

- Although CT and MR imaging can be used for the evaluation of a variety of head and neck disorders
- Ultrasound may be the **initial modality** for evaluating superficial structures.
- Ultrasound may also be preferred for **guiding needle aspirations** of all types of lesions in the neck.
- Ultrasound, and if necessary ultrasound-guided fine-needle aspiration cytology, is also useful for evaluating **thyroid** and **parathyroid gland** lesions, for evaluating **cervical nodes**, and for the diagnostic evaluation of **salivary gland tumors.**
- The noninvasiveness of ultrasound makes this an ideal modality for evaluating neck masses in infants and children.

The patient is examined in a supine position with the neck mildly hyperextended.

The neck should be examined with a high-frequency linear array transducer ranging from 7.5 to 10 MHz.

Blood flow can be studied using Duplex sonography, in which gray scale 2D sonography is combined with pulsed Doppler

CT

- CT is useful in the evaluation of head and neck lesions such as lesions of base of skull, nasopharynx, larynx and neck areas.
- CT added the horizontal plane in the evaluation of these structures.
- The transaxial orientation of CT planes is particularly useful in certain locations such as pterygopalatine fossa.

CT

- Spiral CT permits the rapid scanning of large volumes of tissue during quiet respiration and it is less susceptible to patient motion
- Volumetric helical data permits the optimal multiplanar and 3D reconstructions.
- CT is standard one for imaging neck tumours.
- Secondary coronal reconstructions of axial scans are very helpful in the evaluation of the crossing of the midline by small tumors of the palate or tongue base , it also **improves the assessment of tumor spread and lymph node metastases** in arbitrary oblique planes.

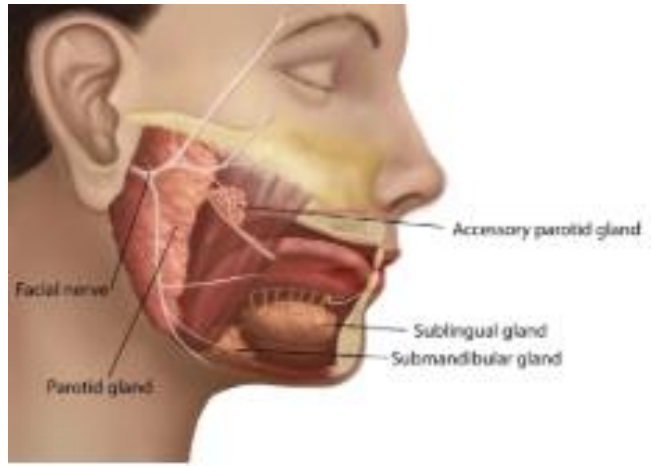
CT

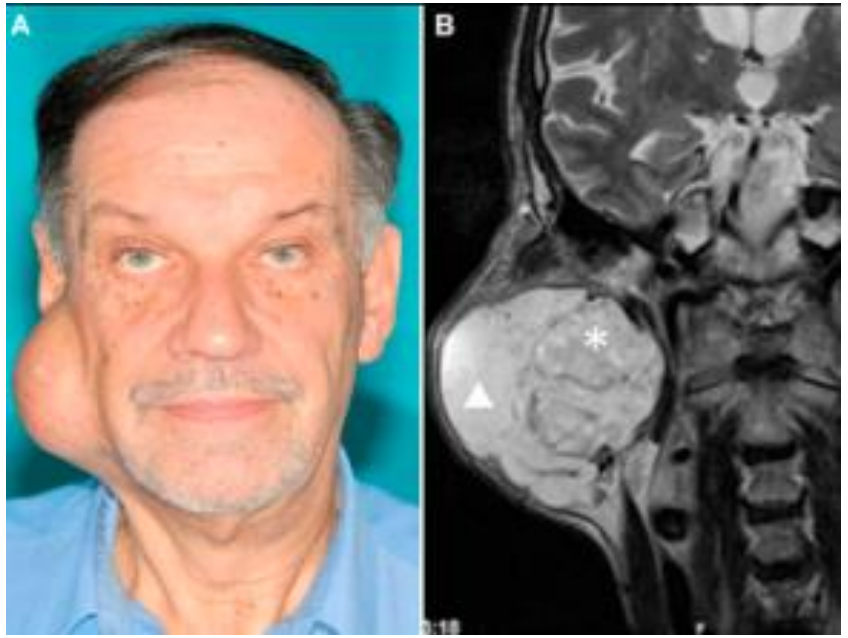
- Contrast-enhanced CT scans of the neck has improved the localization and characterization of the neck lesions.
- If there is an accurate delineation of disease by CT scan provides a reliable pre-operative diagnosis, plan for radiotherapy ports and post-treatment follow-up.
- The most important advantage lies in it, is ability to detect bony lesions (erosions and expansion) .

- CT and MRI ensure accurate anatomical localization and lesion characterization in benign lesions.
- MRI has obvious advantages over CT in neck imaging like better soft tissue resolution, imaging modality or for those tumors that have higher chance of perineural spread , lack of ionizing radiation and safer contrast agents.
- By comparison CT examinations offer the advantages of superior assessment of osseous integrity, shorter examination time, wider patient access and lower cost.

The parotid gland

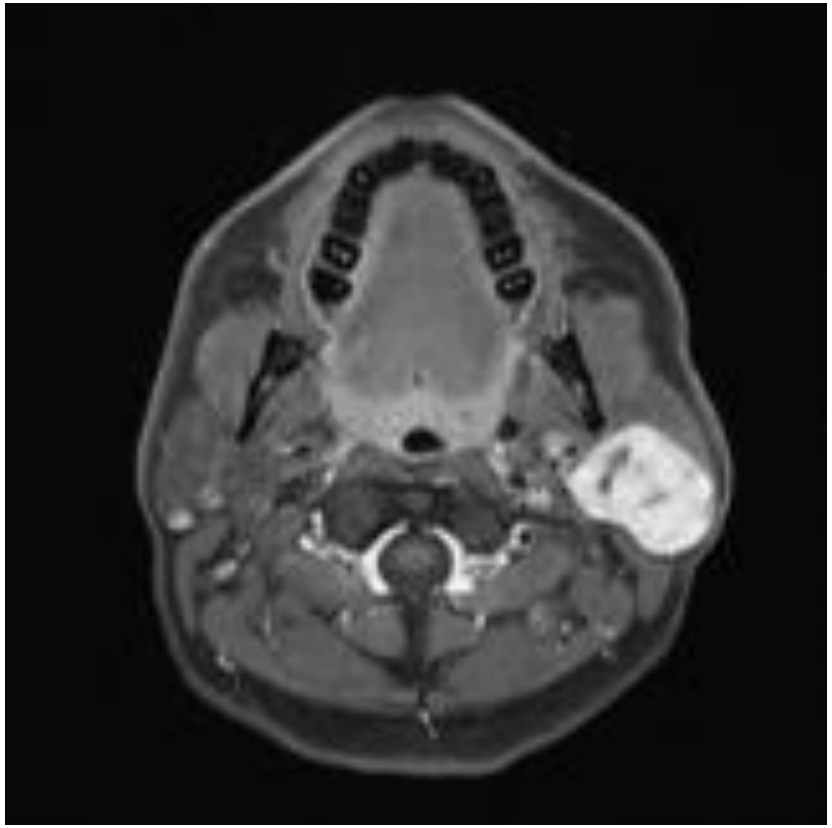
- Pleomorphic adenoma is the most common (75%) benign salivary neoplasm.
- Clinical: unifocal mass, slow growing, well demarcated , Malignant transformation, 5%.

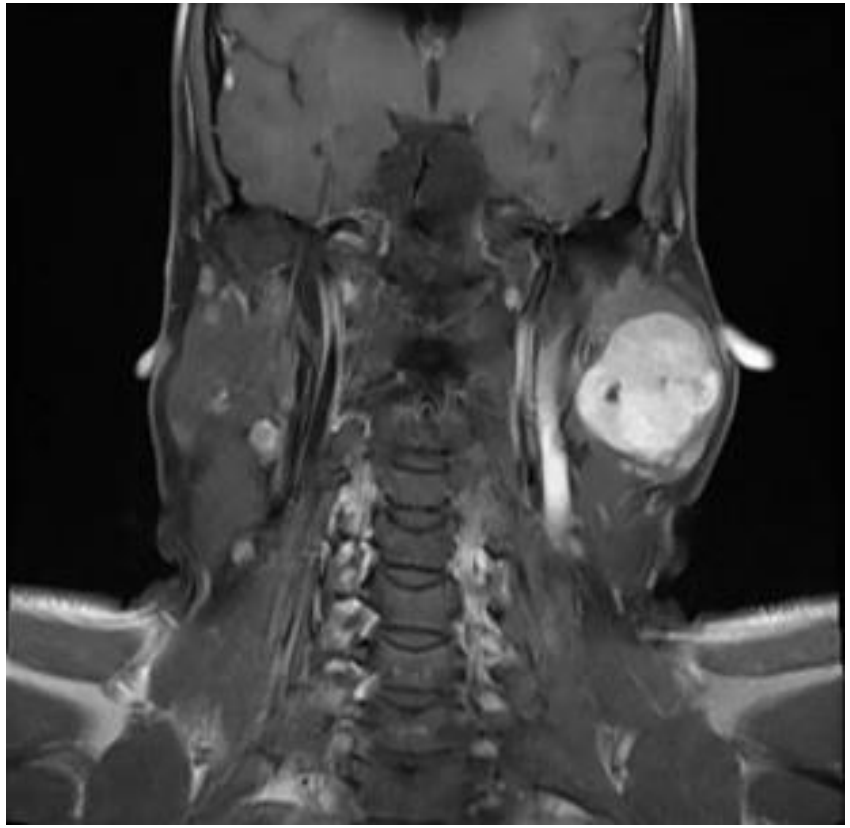


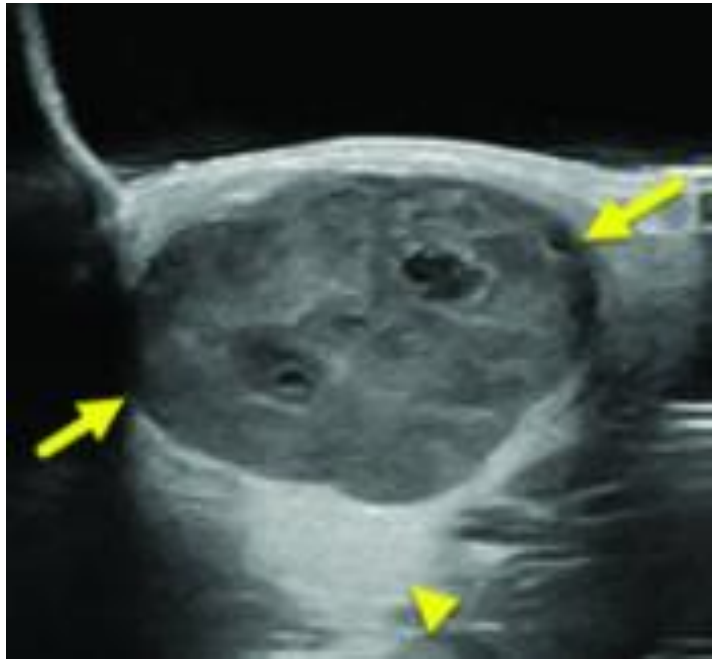


Radiographic features:

1. Well-circumscribed, encapsulated mass
2. Lesions are hypoechoic by ultrasound (US)
3. Moderate enhancement by CT
4. Calcification in a parotid mass is very suggestive of pleomorphic adenoma
5. T1 hypointense, T2 hyperintense moderate enhancement on MRI
6. MRI characteristics that suggest malignancy include: Irregular margins , Heterogeneous signal , Lymphadenopathy , Adjacent soft tissue or bone invasion and Facial perineural spread

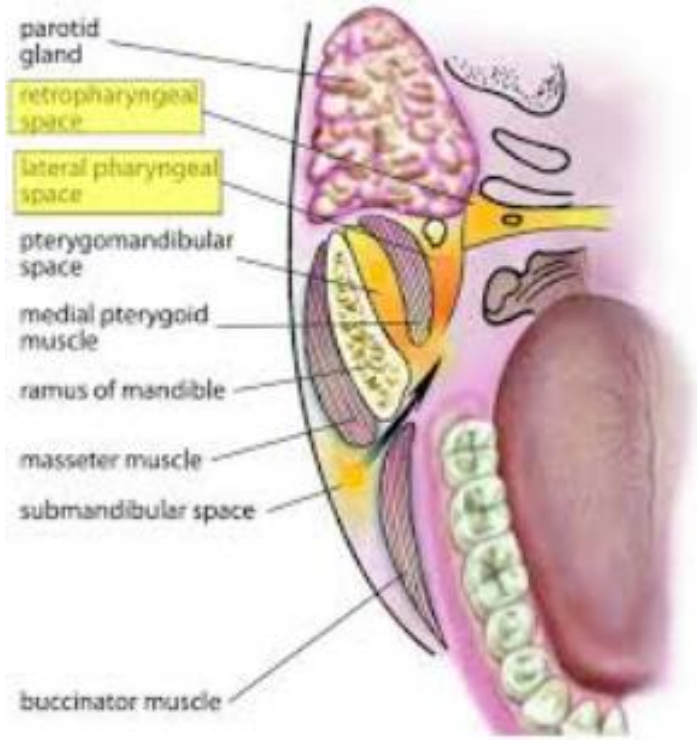






Masticator space

The masticator spaces are paired suprahyoid cervical spaces on each side of the face , common pathology is abscess

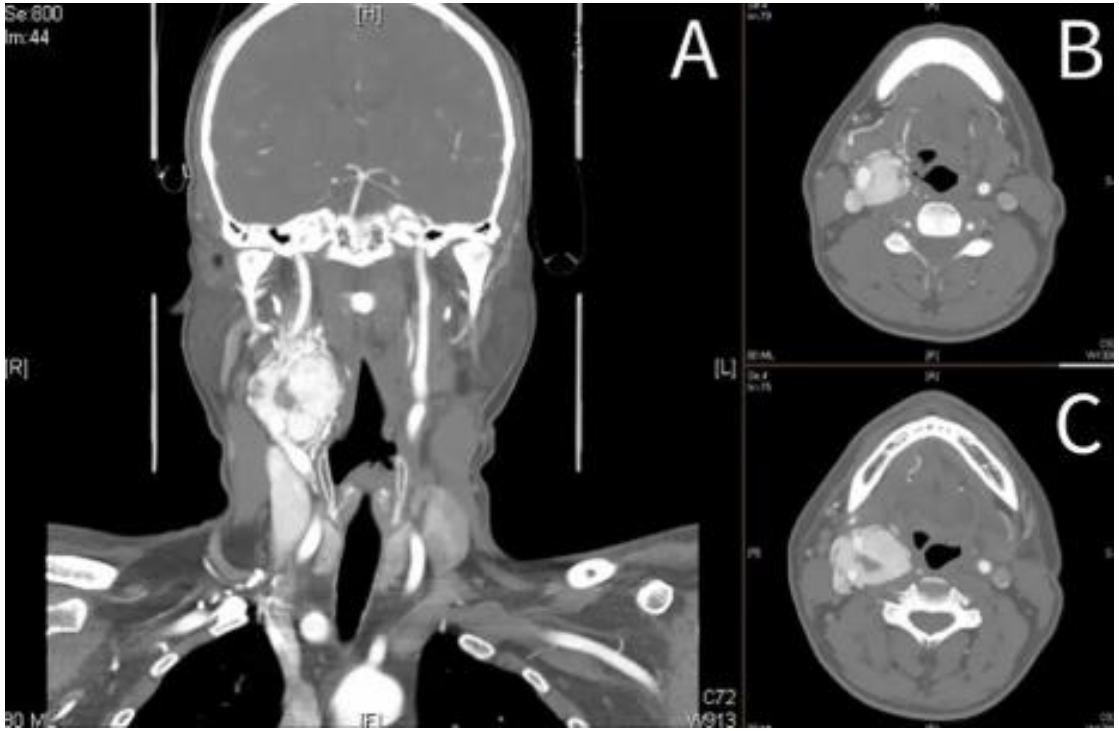


The parapharyngeal space (PPS)

- Also known as the prestyloid parapharyngeal space, is a deep compartment of the head and neck around which most other suprahyoid fascial spaces are arranged.
- It consists largely of fat and neurovascular structures .
- Primary lesions are rare , usually pathology came from secondary local malignancy or infection

Carotid space

- The carotid space is a roughly cylindrical space that extends from the skull base through to the aortic arch.
- Common pathology is **carotid body tumor**, also known as a chemodectoma or carotid body paraganglioma, is a highly vascular paraganglioma that arises from the paraganglion cells of the carotid body.
- It is located at the carotid bifurcation with characteristic splaying of the ICA and ECA.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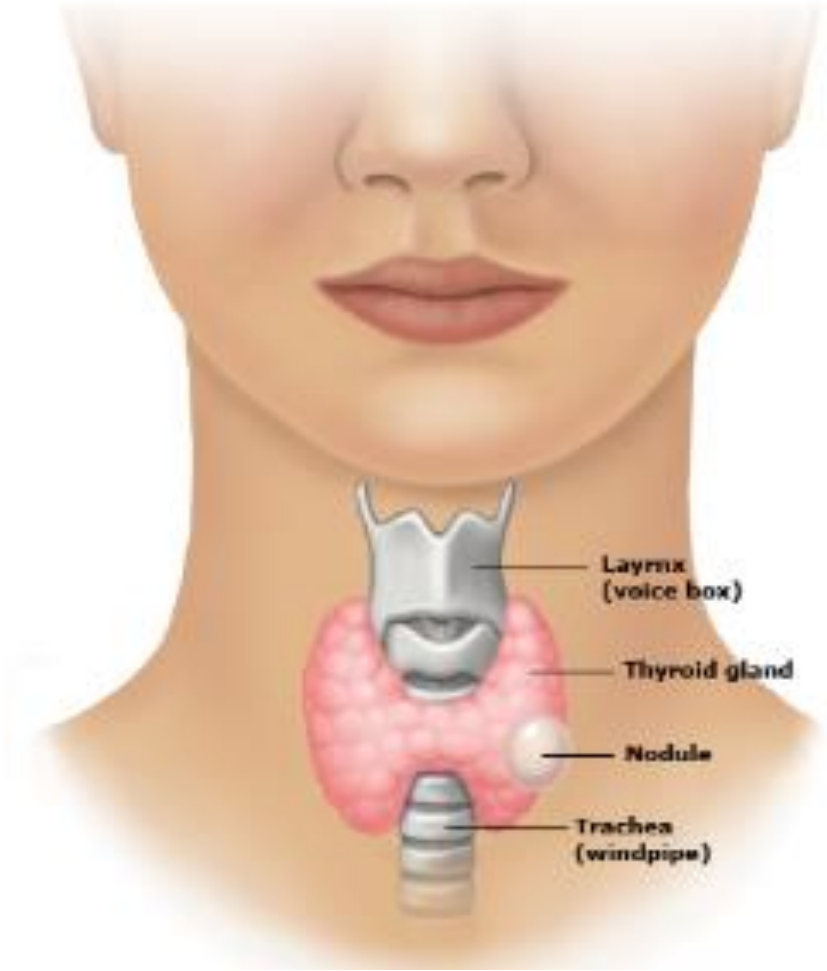
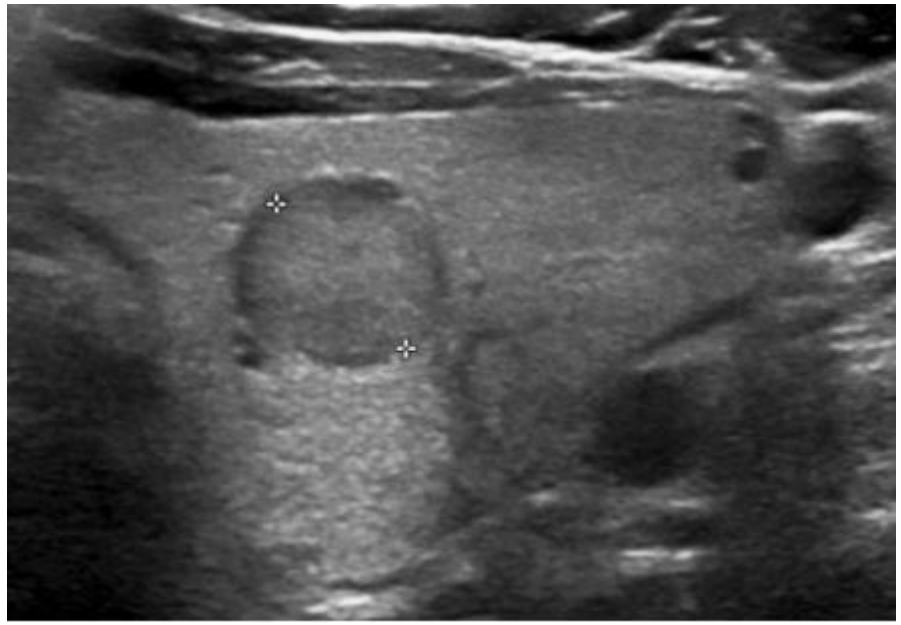
The thyroid gland

- **Thyroid nodules** are any discrete lesion that can be delineated on imaging studies from the adjacent thyroid parenchyma. They can represent a range of benign or malignant conditions.
- Benign nodules : follicular adenoma and colloid nodule
- Malignant nodules : primary thyroid cancer , thyroid lymphoma: primary or secondary ,metastases to the thyroid ACR TI-RADS is a reporting system for thyroid nodules on ultrasound proposed by the American College of Radiology (ACR)


Larynx
(voice box)
Thyroid gland
Nodule
Trachea
(windpipe)



PARATHYROID ADENOMA

Adenomas may consist of pure or mixed cell types, 80% single, 20% multiple.

Radiographic features

Detection

- US and scintigraphy are the best screening modalities
- Adenomas are hypoechoic by US
- If US is negative, further evaluation with CT or MI21 may be helpful

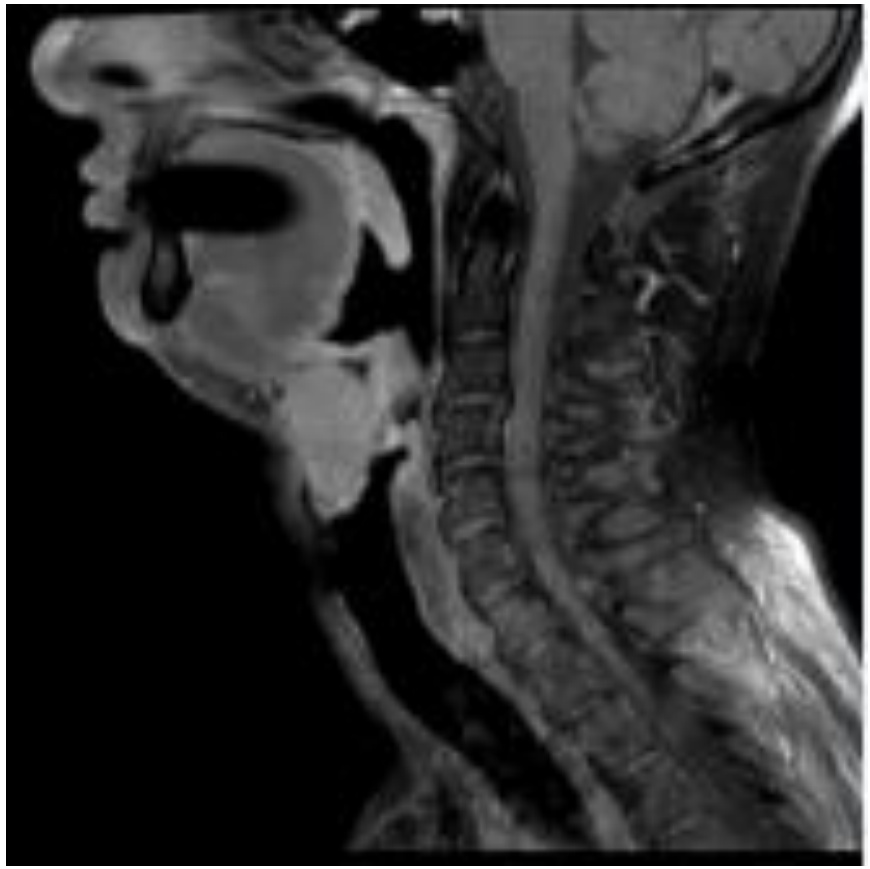
Pharynx

- **Oropharyngeal squamous cell carcinoma** is the most common type of head and neck cancer in the Western world .
- Typically, it will be further categorised by the anatomical location within the oropharynx, as this may affect prognosis and treatment modality.

Larynx

- **Squamous cell carcinoma of the larynx** is the most common primary malignant tumor that affects the laryngeal framework.
- Typically it is categorized by the laryngeal subsite affected, which affects presentation, treatment and prognosis.
- **Classification :**The tumor is classified according to its relation to the glottis, which affects the treatment options:

1. Supraglottic carcinoma (20-30%)
2. Glottic carcinoma (50-60%)
3. Subglottic carcinoma (5%)
4. Transglottic carcinoma: involving two or more of these spaces



BRANCHIAL CLEFT CYST

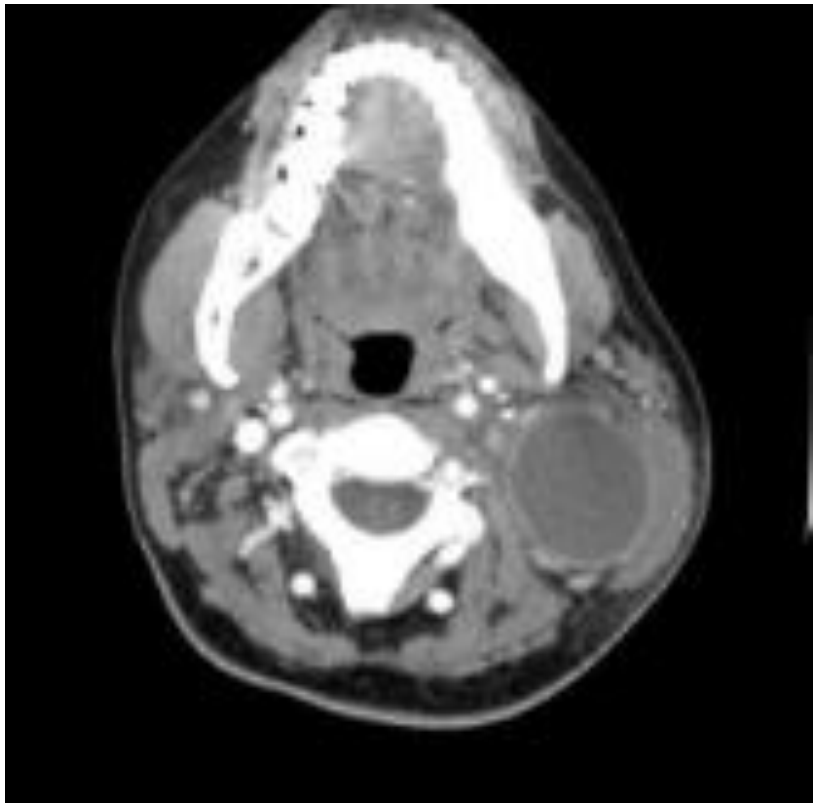
Embryologic cysts derived from 1st or 2nd (most common) cervical pouch.

Clinical: anterior triangle mass; may be infected.

Cyst location : Type 1: EAC or parotid ,Type 2: anterior triangle, angle of mandible

Radiographic features : It is of water density (< 20 HU) unless infected (debris) , Intense rim enhancement in infected cysts (CT and MRI)


1A
1B



THYROGLOSSAL DUCT CYST

Extends from thyroid to foramen cecum.

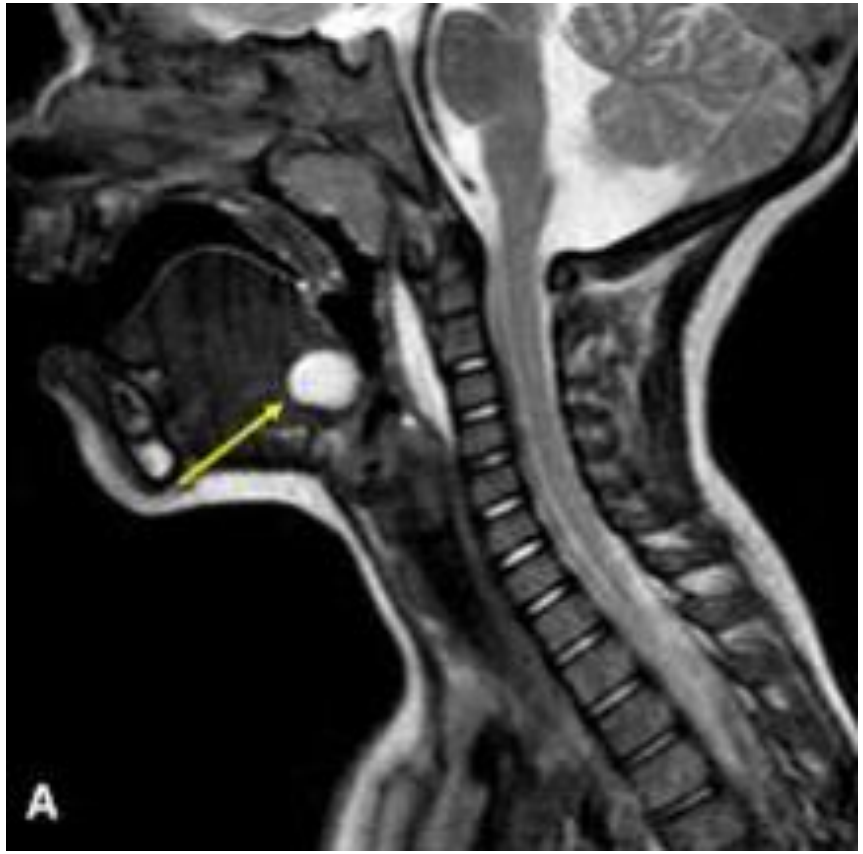
Clinical: palpable midline mass (80%). Represent 70% of congenital neck lesions.

Location : Suprahyoid, 20% , hyoid bone 15% , Infrahyoid, 65%

Radiographic features

1. Thin-walled cystic structure ,water density (< 20 HU)

2.Thickening and enhancement of wall indicates infection


A

Lymphoma

Lymphoma is a malignancy arising from lymphocytes or lymphoblasts.

It can be restricted to the lymphatic system or arise as extranodal disease.

This, along with variable aggressiveness, results in a diverse imaging appearance.

Gray scale parameters (u/s)that favor malignancy of the lymph node

1- size: larger - more likely malignant

2- shape: round, long axis:short axis <2

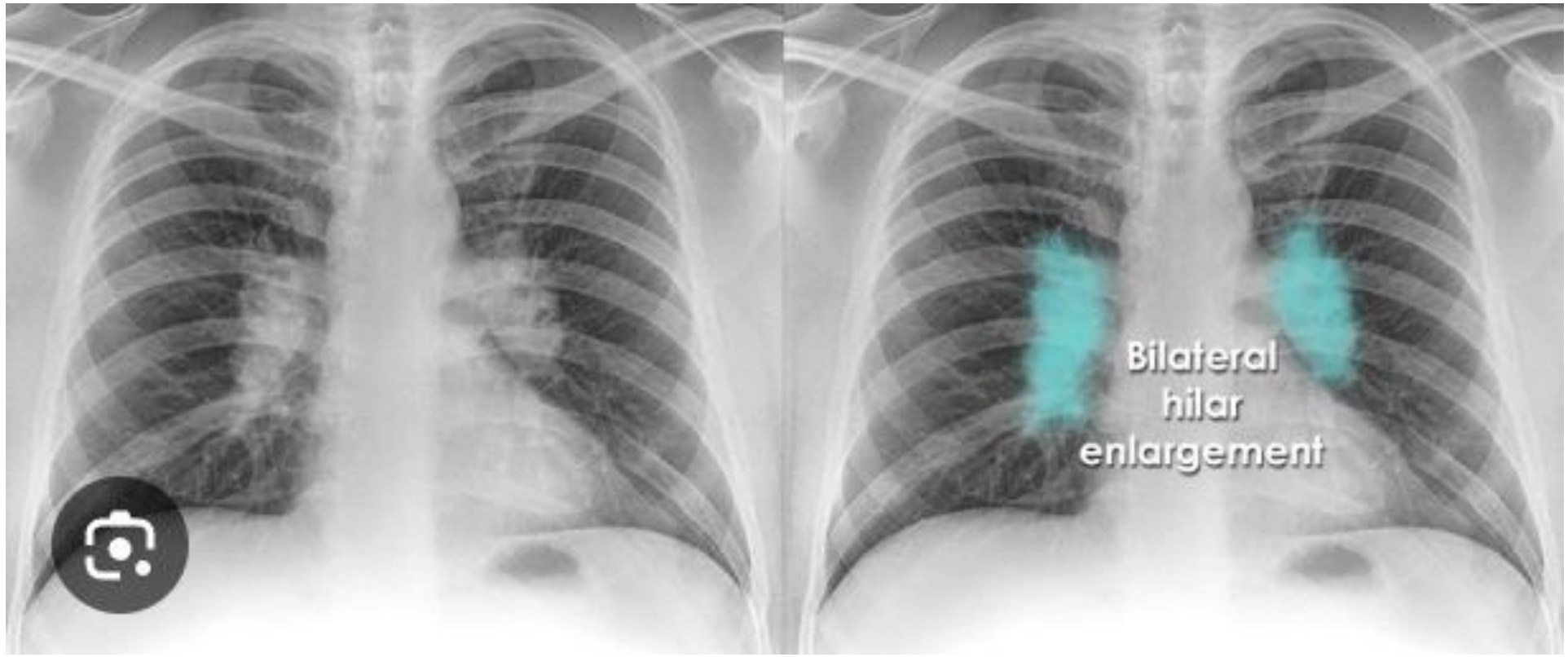
3- echogenicity: predominantly hypoechoic although metastatic lymph nodes from papillary thyroid carcinoma tend to be hyperechoic due to the intranodal deposition of thyroglobulin

4- heterogeneous echotexture

5- loss of central fatty hilum/thinning of hilum

6- eccentric versus concentric thickening of cortex

7- presence of microcalcifications


Bilateral
hilar
enlargement