

BMUS Head & Neck Ultrasound Study Day May 2026

Disease processes in the Neck

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Aims

- Surgical neck anatomy and clinical relevance
- Assessing a neck Lump
- Review of 7 Sweeps in Neck
- Salivary Glands
- Lateral Neck Masses
- Top Neck Pathology
- Clinical cases :

Why Ultrasound of the Neck ?



Ultrasound become the primary imaging modality for investigation of head and neck lumps

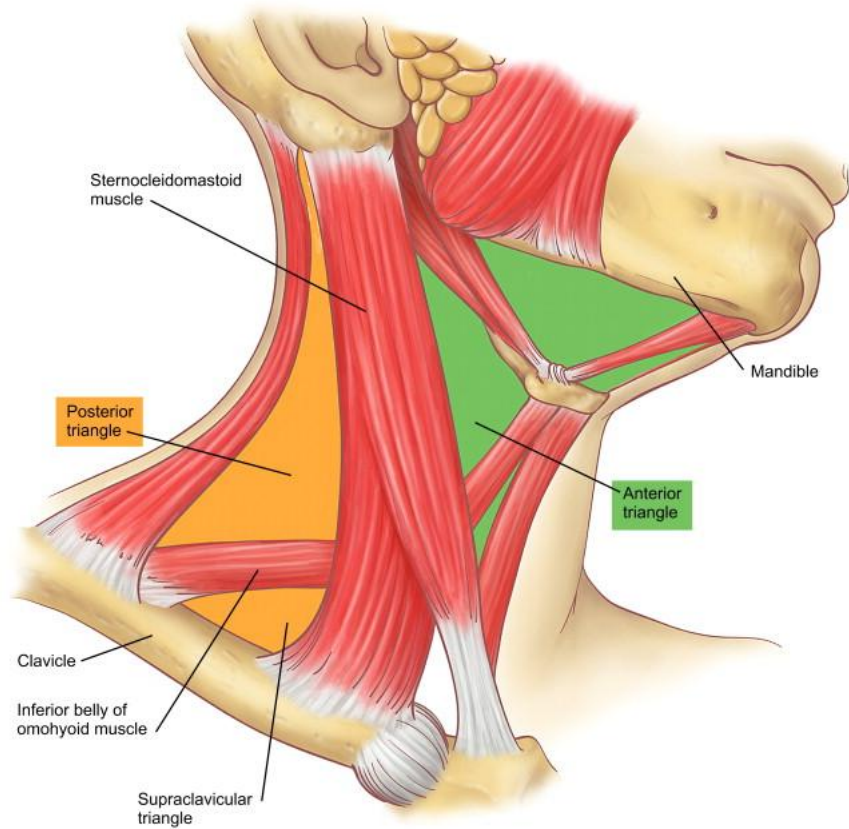


Due to its portability, ideal for One stop / rapid access neck lump clinics



Understanding the anatomy and site specific nature of neck lumps will aid in the differential diagnosis.

Anterior & Posterior Triangles



Facial Nerve and Branches



To
Zanzibar
By
Motor
Car

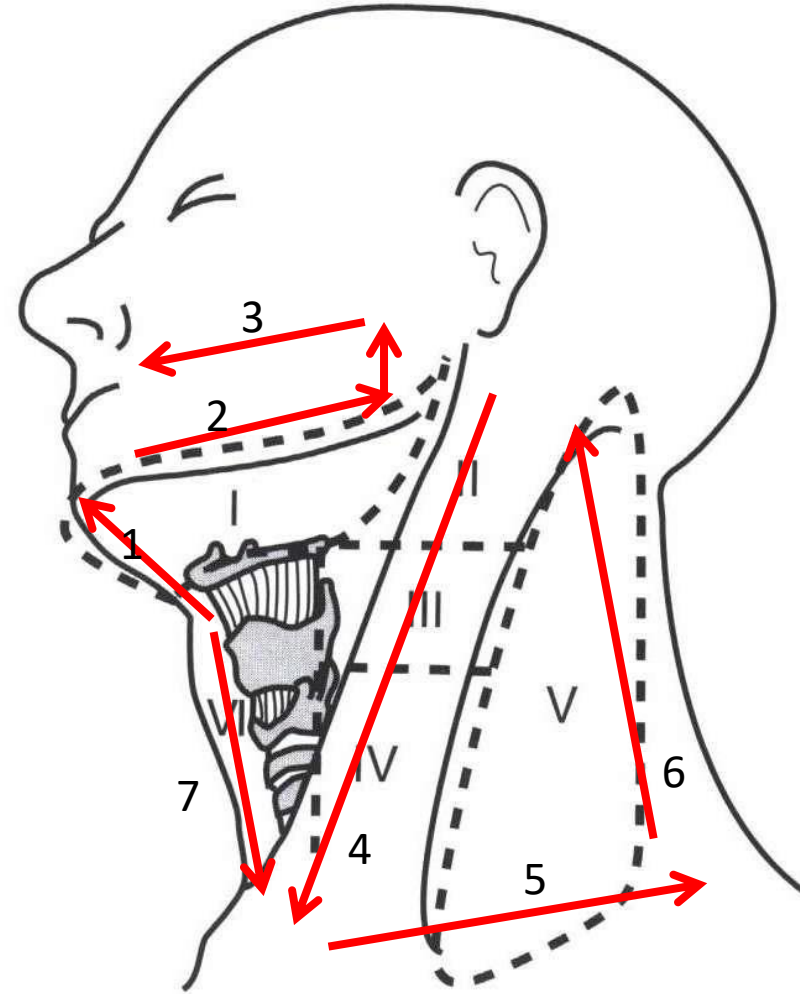
Clinical Anatomy: Overview

Why 7 Sweeps approach?

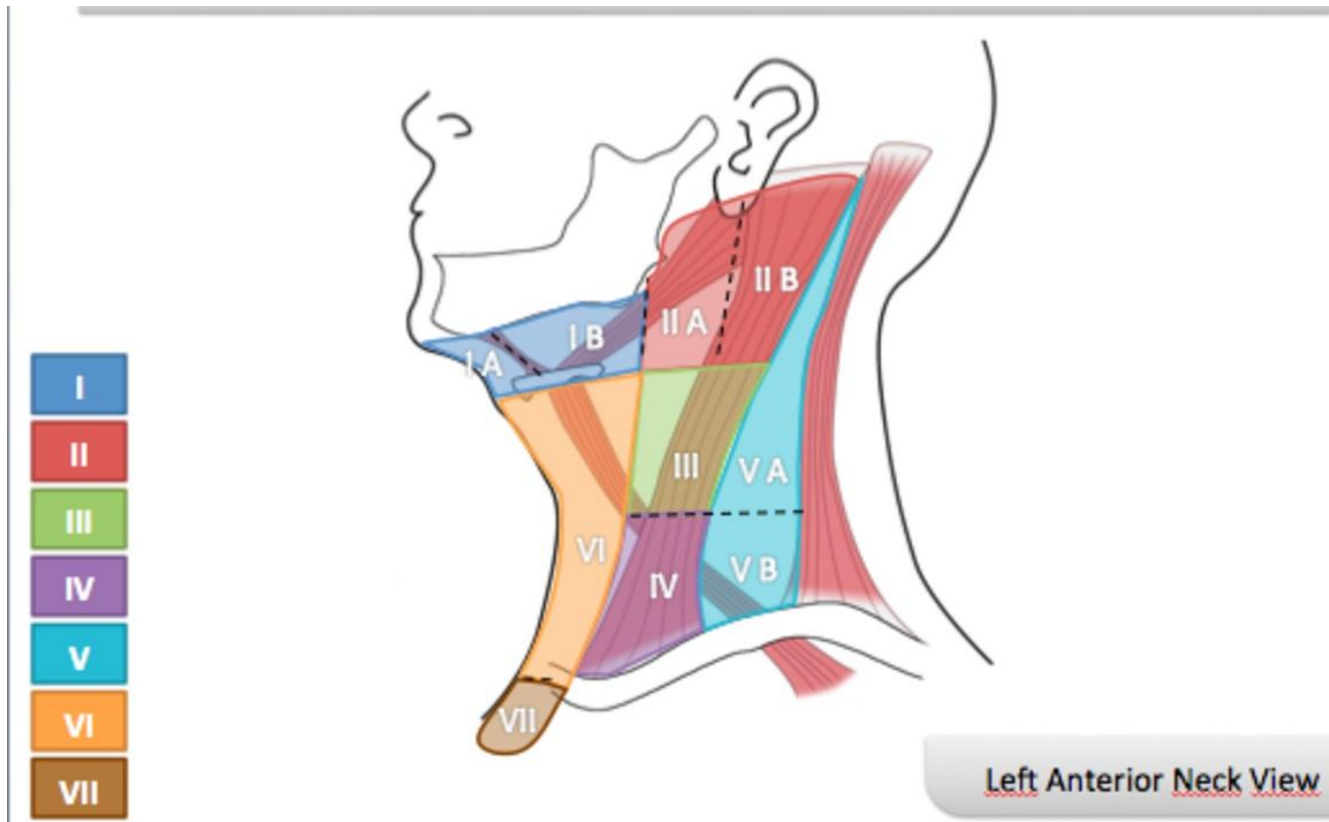
- Standardisation, less likely to miss pathology, eliminates Target scanning
- Aids and facilitates reproducible teaching method
- Less likely to be surprised
- Follows the paths of the surgical neck levels
- Anatomical location of the pathology will allow the practitioner to be more accurate with differential diagnoses.
- Better patient outcomes

US Neck in 7 Sweeps

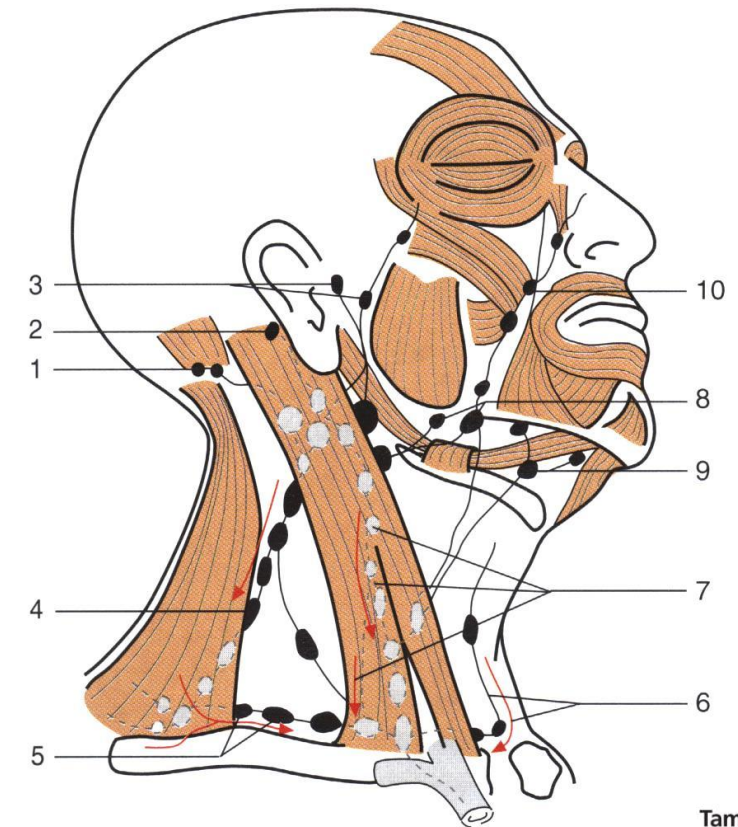
- The Neck in 7 Sweeps
 1. Submental (Ia)
 2. Submandibular (Ib)
 3. Parotid and Buccal Region (IIb)
 4. Deep Cervical (IV)
 5. Transverse Cervical or (V) Supraclavicular
 6. Posterior Cervical (V)
 7. Anterior Cervical (VII)



Surgical Levels in the Neck

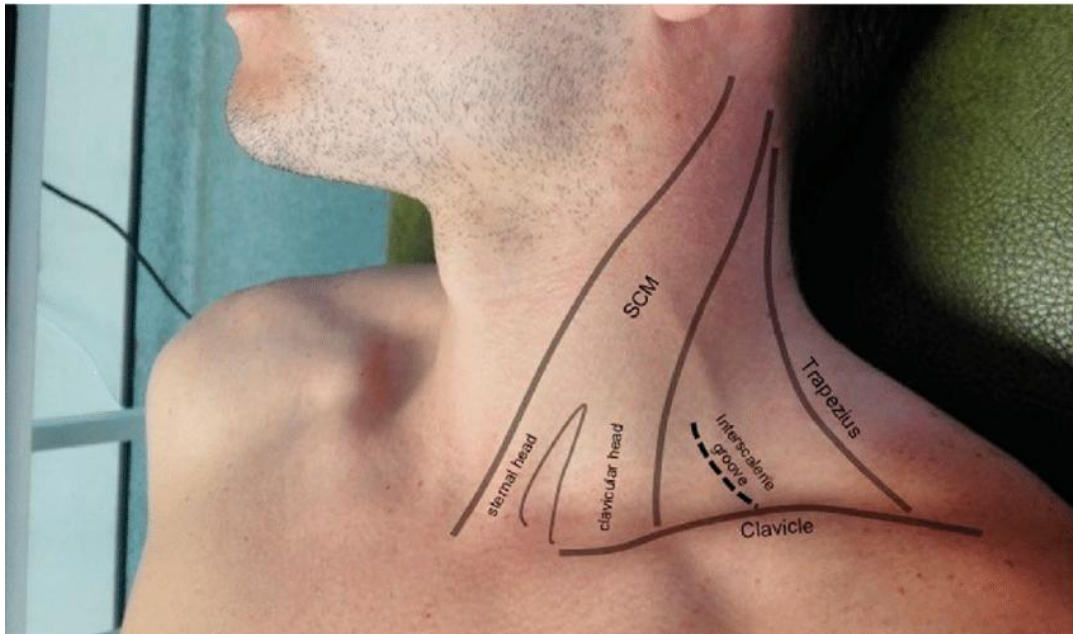


Rouveire

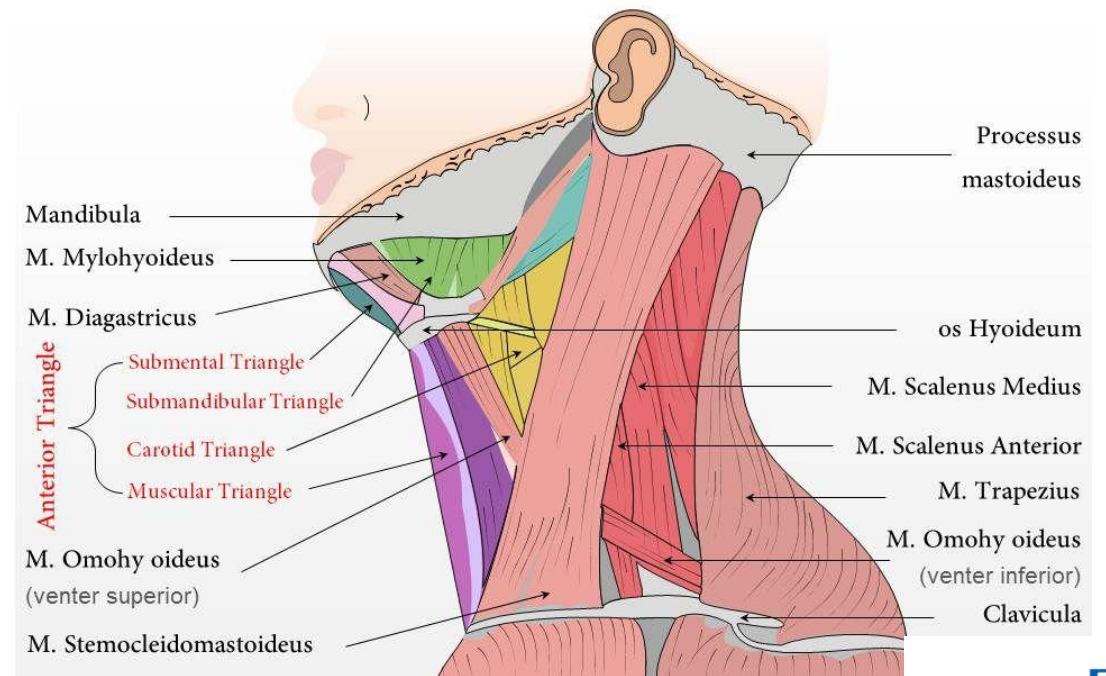


AJCC

Neck Muscles

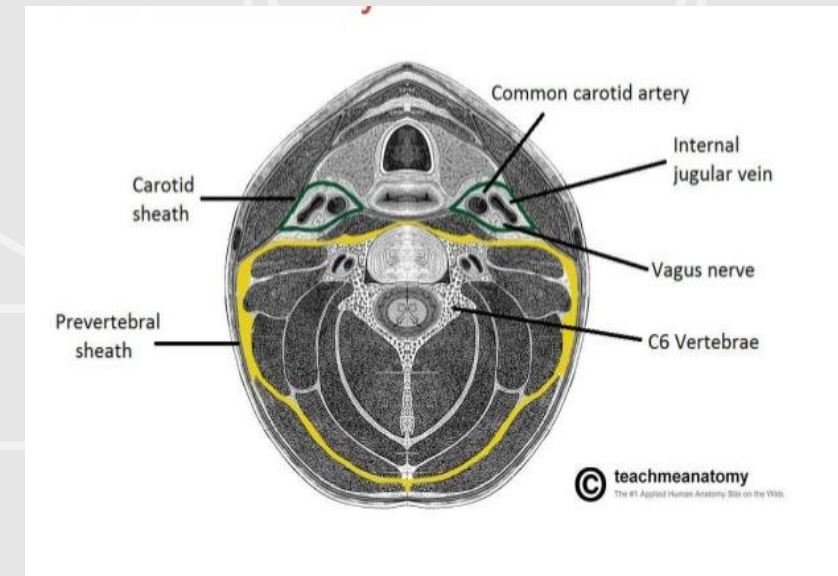
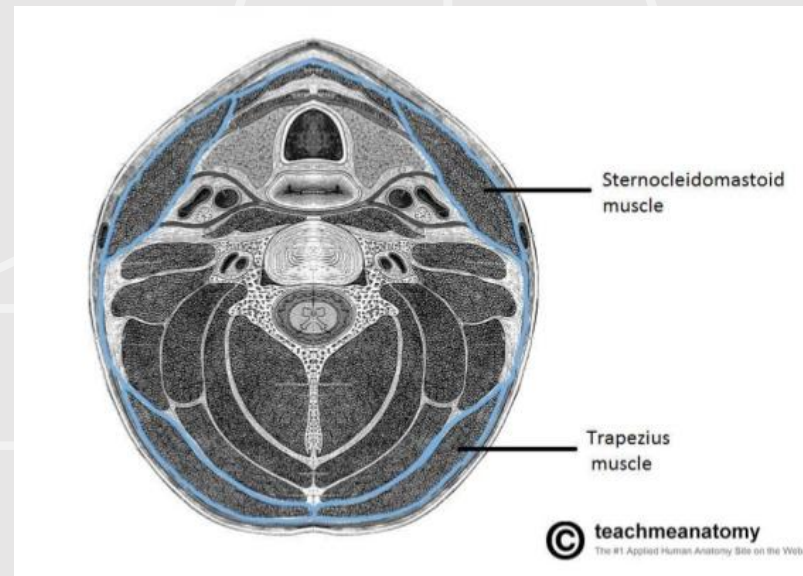
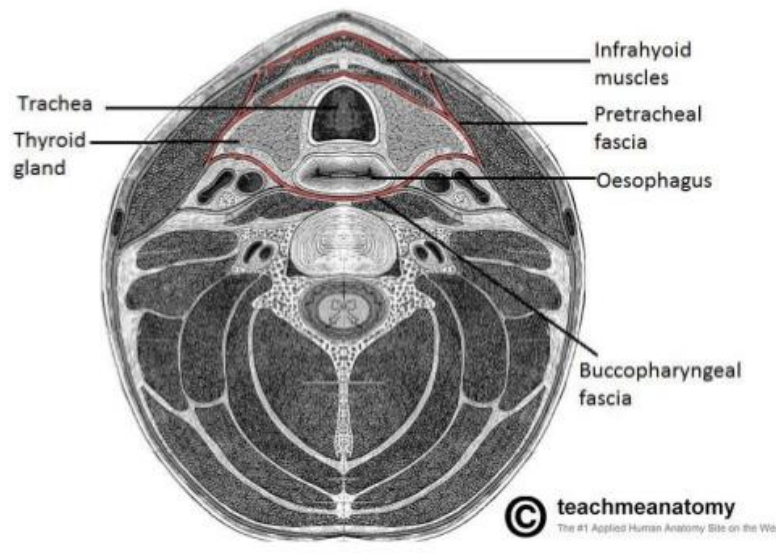


Anterior Triangle of Neck



Neck Fascia: Clinical relevance

- 3 discrete neck layers
- Investing layer
- Pretrachea layer
- Prevertebral layer
- The **neck** fascia compartmentalises structures within the **neck**. These **layers** of tough fascia can limit the spread of infection (for example, a superficial skin abscess may be prevented from spreading deeper into the **neck** by the **investing** fascia).



Preauricular nodes:

Drain scalp, skin

Differential diagnosis:

Scalp infections,
mycobacterial infection

Malignancies:

Skin neoplasm, lymphomas,
head and neck squamous
cell carcinomas

Posterior cervical nodes:

Drain scalp, neck, upper
thoracic skin

Differential diagnosis:

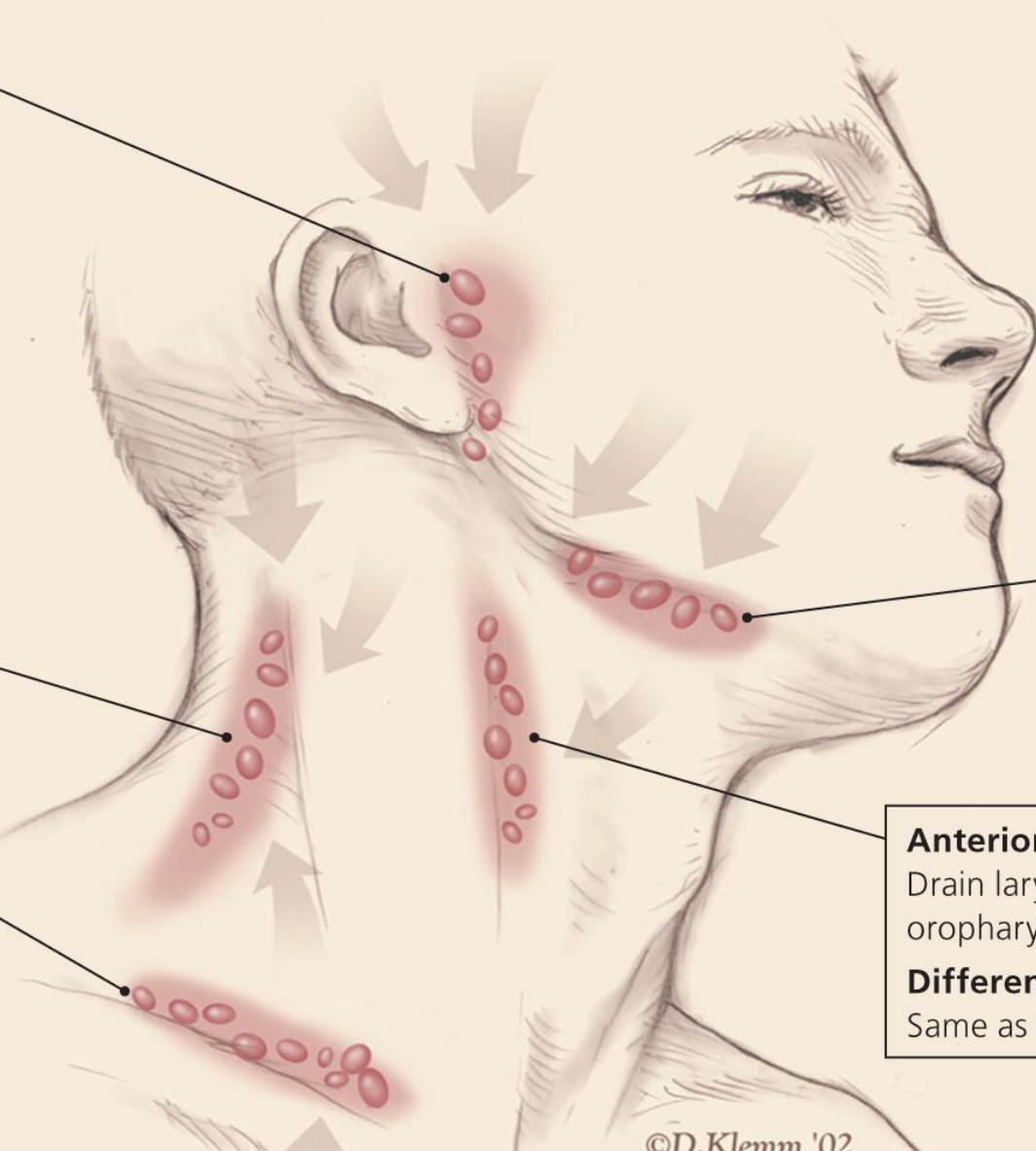
Same as preauricular nodes

Supraclavicular nodes:

Drain gastrointestinal tract,
genitourinary tract, pulmonary

Differential diagnosis:

Thyroid/laryngeal disease,
mycobacterial/fungal infections



Submandibular nodes:

Drain oral cavity

Differential diagnosis:

Mononucleosis, upper
respiratory infection,
mycobacterial infection,
toxoplasma, cytomegalovirus,
dental disease, rubella

Malignancies:

Squamous cell carcinoma
of the head and neck,
lymphomas, leukemias

Anterior cervical nodes:

Drain larynx, tongue,
oropharynx, anterior neck

Differential diagnosis:

Same as submandibular nodes

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D. KLEMM

Systematic Approach to Neck Lump

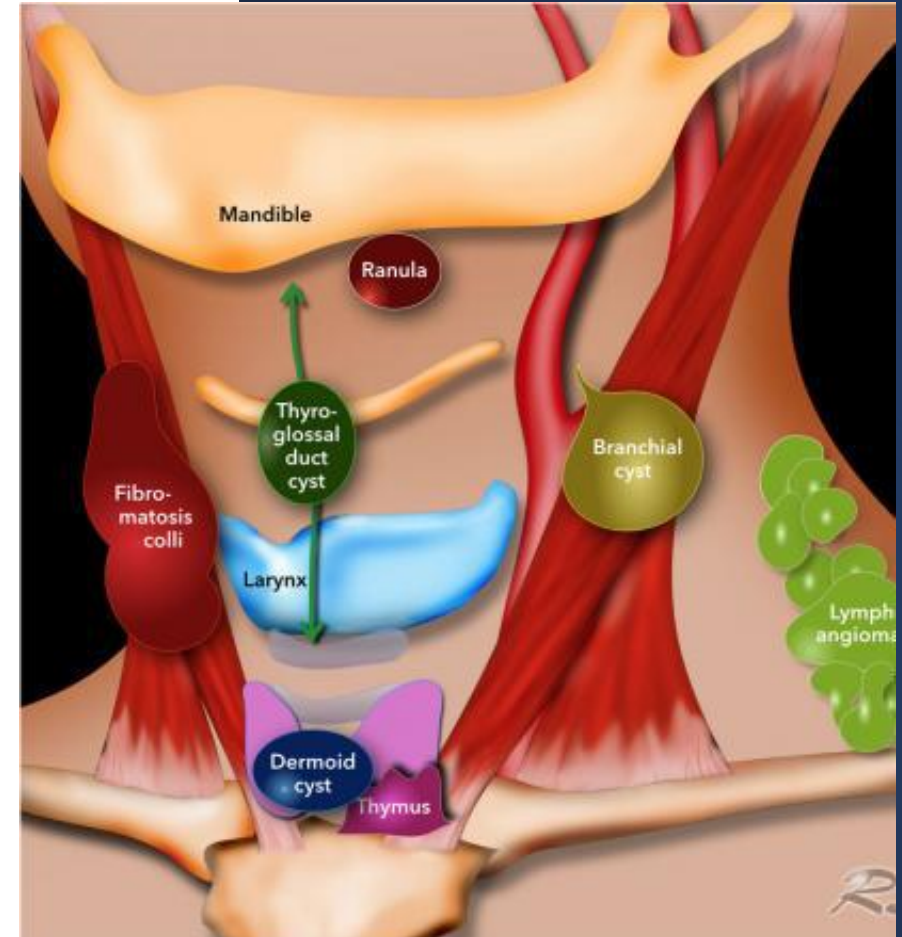
- What is it?
- History , slow/fast
- ? Red flags
- Smoking, age of patient
- voice hoarseness , night sweats, weight loss, family hx, other primary head and neck cancer
- Examination of Lump
- Is it fixed / mobile
- Punctum
- Discharge? Colour red/yellow/black
- Surgical level
- Neurology / Palsy/ weakness

Top Neck Lumps

- Reactive Lymphadenopathy
- Abscess
- Thyroid MNG
- Lipoma
- Sebaceous Cyst
- Lymphadenitis
- Sialadenitis/ Calculi
- Salivary Tumours
- Dermoid Cyst
- Branchial Cleft Cyst
- Thyroglossal Duct Cyst
- Lymphoma / SCC
- Cystic Hygroma
- Carotid Body Tumour

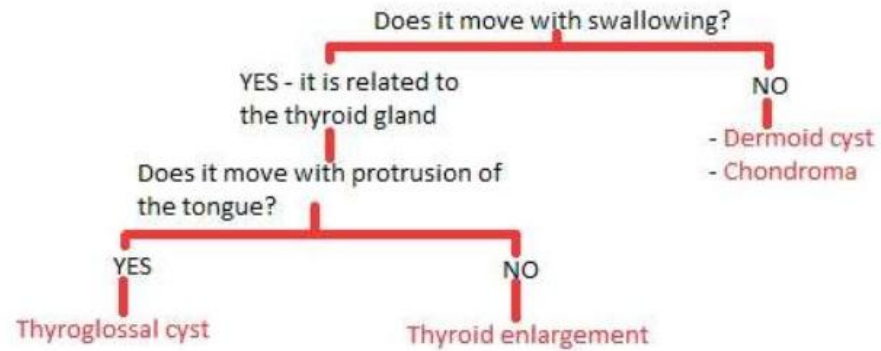
Neck Masses : Location is everything

- **Location of cystic lesions**
- Once you have decided that the lesion is cystic its location will often point to its nature (figure).
- **Midline lesions**
Midline lesions are either thyroglossal duct cysts, dermoid cysts or ranulas.
- Patient can be asked to protrude their tongue.
A thyroglossal duct cyst will move upward with the hyoid bone.
- Ranulas have a typical location in the floor of the mouth.
- **Off-midline lesions**
- Off-midline lesions can be branchial cleft cysts or lymphangiomas. (Level II)
- Branchial cleft cysts often contain debris.
Anteriorly located lymphangiomas are often multicystic.
In the posterior neck they are often single

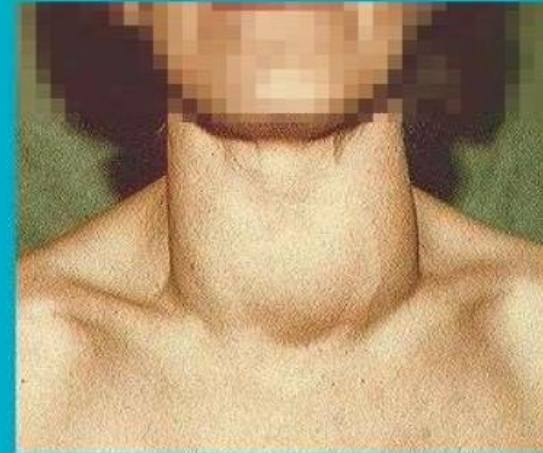


Clinical Perspective to Imaging

Midline lump



Goitre



Salivary Pathology

Uncommon: 2-10% of Head and Neck neoplasms

70% in the Parotid gland, 8% in the Submandibular gland

70-80% of tumours are benign

75-90% are either pleomorphic adenoma or Warthin's tumour (adenolymphoma)

Sialadenitis

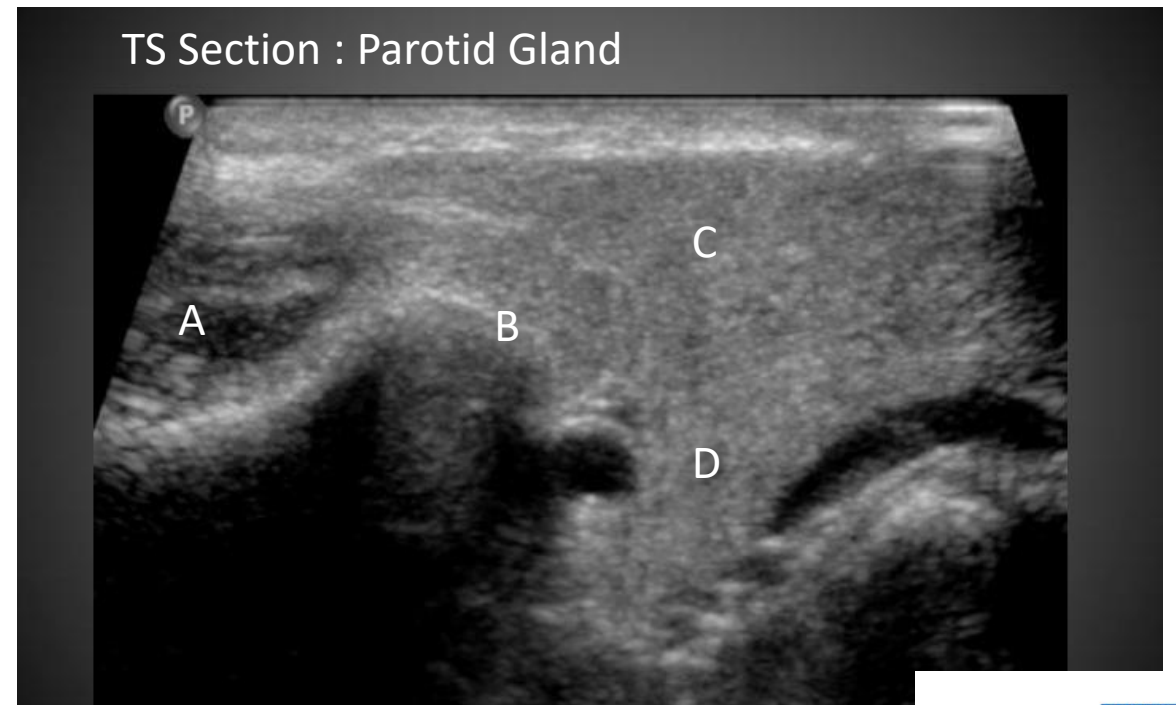
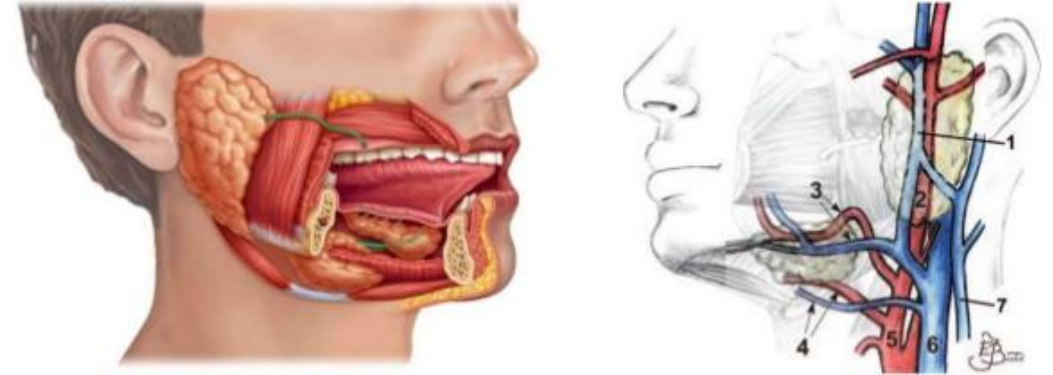
Calculi

Sjogren's

Adenocarcinoma

Parotid Gland

- The border between the superficial and deep lobes is created by a plane which the facial nerve and its branches are located (not visible on US)
- US Landmark : Retromandibular Vein
- Use of Hockystick transducer can be used to visualize behind mandibular ramus or when undertaking FNAC, to reduce the transducer footprint size
- Common Pathologies: 80% rule
- PSA, Warthin's, Parotitis, Sjogren's



A: Masseter Muscle B: Angle of Mandible C: Superficial Lobe Parotid D: Retromandibular Vein

US Salivary Glands: Parotid

- Technique
- Highest frequency transducer possible
- Large tumours located in the deep lobe of Parotids use 5-10MHz, transdominal transducer useful
- Use Colour / Power Doppler, Microvascular flow (if available) to determine nature of the lesion

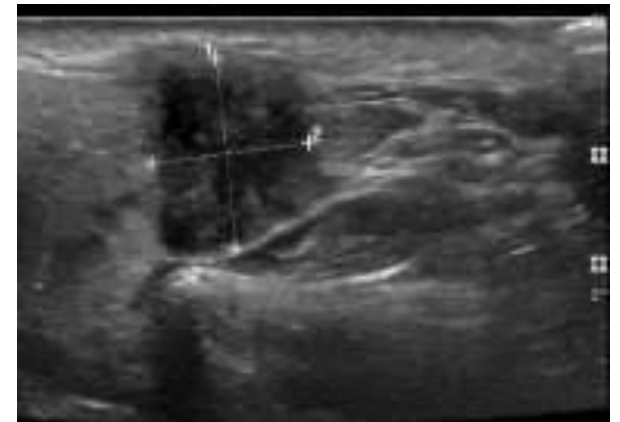
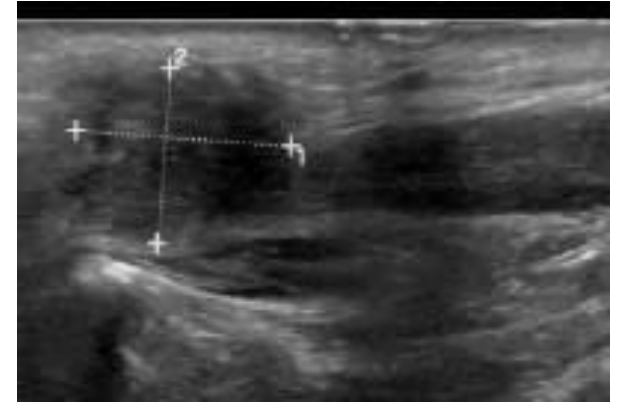


Malignancy Risk Salivary Glands

Parotid	20-30%
Submandibular	45-60%
Sublingual	70-85%
Minor salivary glands	49-80%

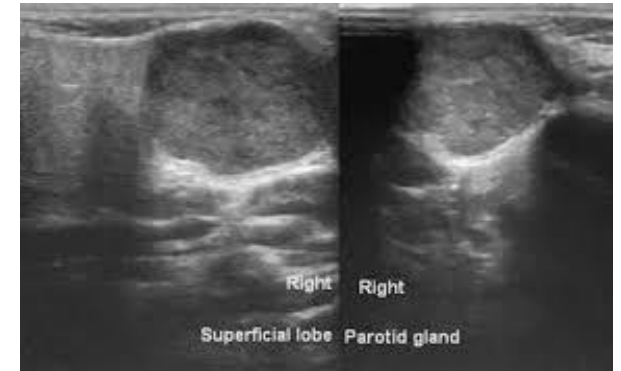
Salivary Gland MALIGNANT TUMOUR

- Classical features”:
- *Margin*
ill defined, irregular
- *Echotexture* heterogeneous
- *Vascularity*
heterogeneous, may be chaotic
- *Acoustic enhancement*
- less common, +/- shadowing
- +/- *Abnormal lymph nodes*



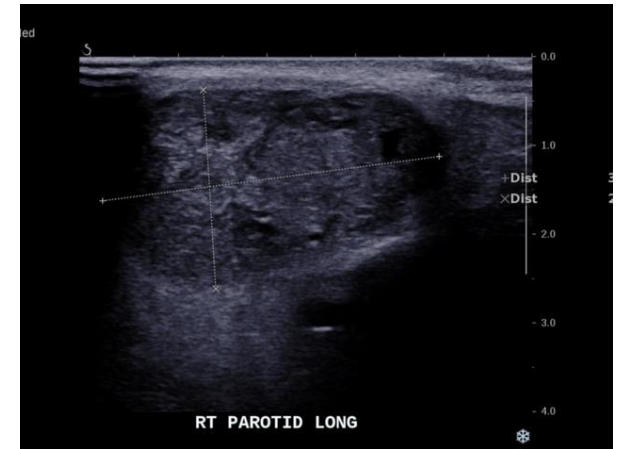
Salivary Gland PSA TUMOUR

- Classical features”:
- *Margin*
well defined, often lobulated
- • *Echotexture*
usually hypoechoic, +/- calcification
- • *Vascularity*
present, +/- peripheral
- • *Acoustic enhancement*
Common



Parotid Benign Tumour Warthins

- Classical features”:
- *Margin*
well defined, often lobulated
- • *Echotexture*
usually hypoechoic, +/- calcification
- • *Vascularity*
present, +/- peripheral
- • *Acoustic enhancement*
Common



Lymphadenitis vs Lymphoma

Lymphadenitis

Heterogenous appearance

Central necrosis liquefaction

Unilateral, single level

Tender ++

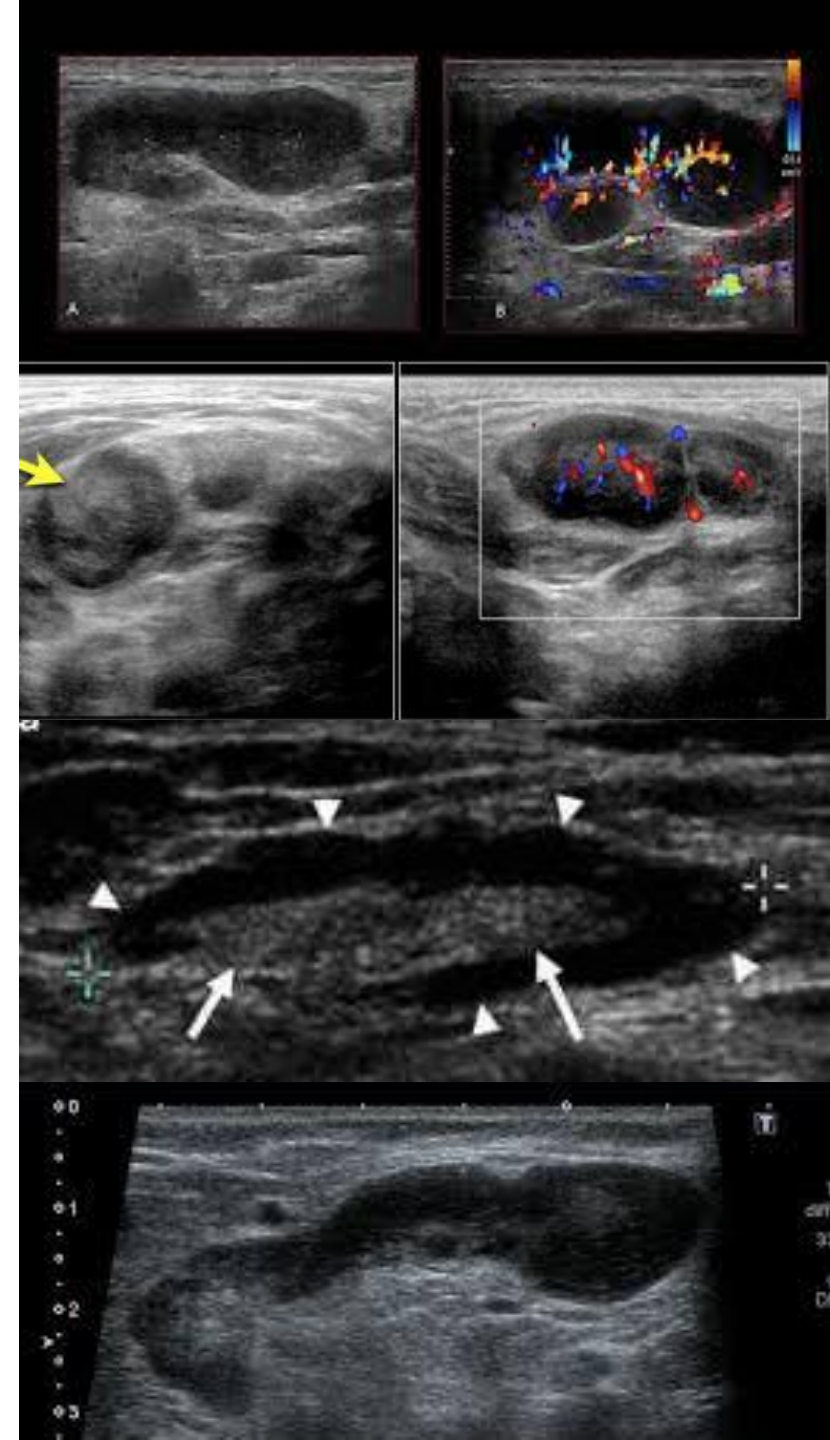
Rapid onset

Lymphoma

- Lymphoma US Features
- Sharply delineated
- Homogenous
- Hypoechoic
- Multiple LN at various levels
- “String of masses / bunch of Grapes”
- Non tender, loss of Vascular pedicle, globally enlarged

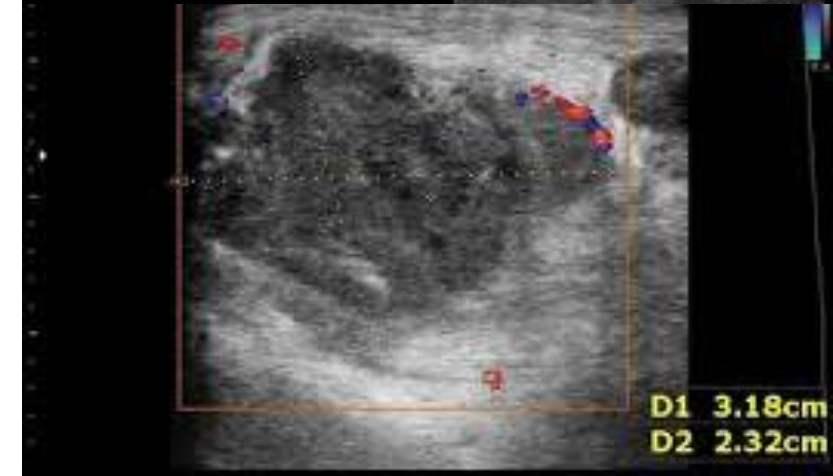
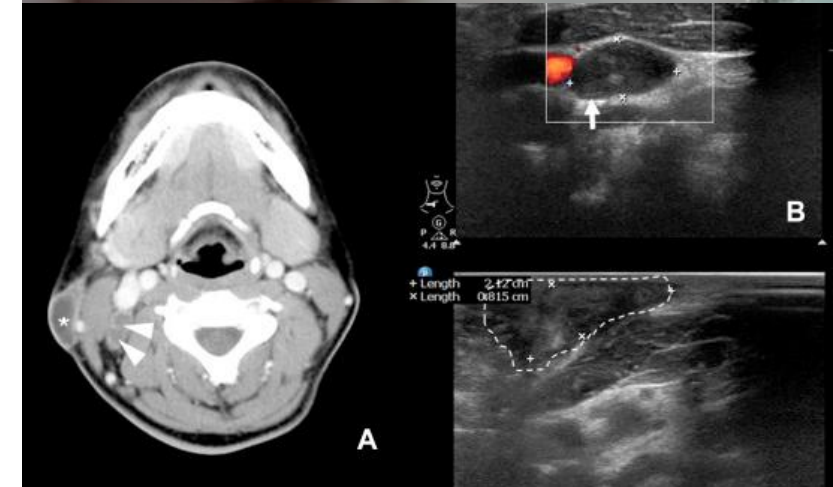
Reactive Lymphadenopathy

- Classical features”:
- Ovoid shape, normal less than 12mm short axis
- Preservation of vascular pedicle
- Common finding up to 300 in the neck
- Can be longstanding associated with infections

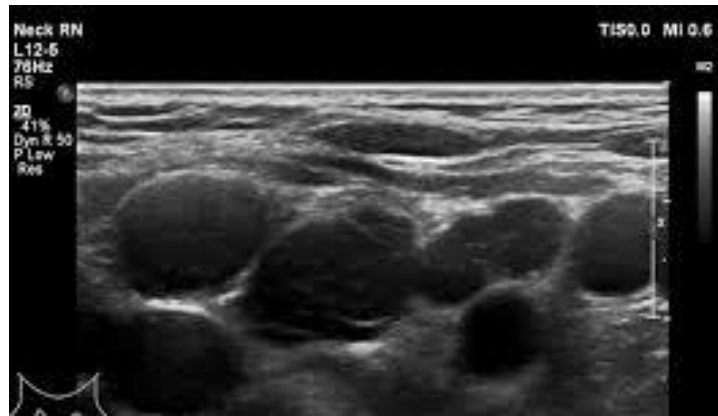
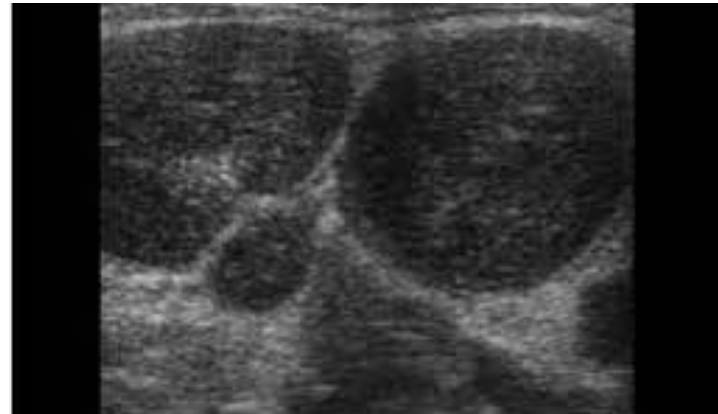


Lymphadenitis

- Classical features”:
- Enlarged level II lymph nodes, measure up to 15mm
- Associated with TB / infections
- Can mimic lymphoma
- Normal resolve with antibiotic therapy
- Perform follow up scan



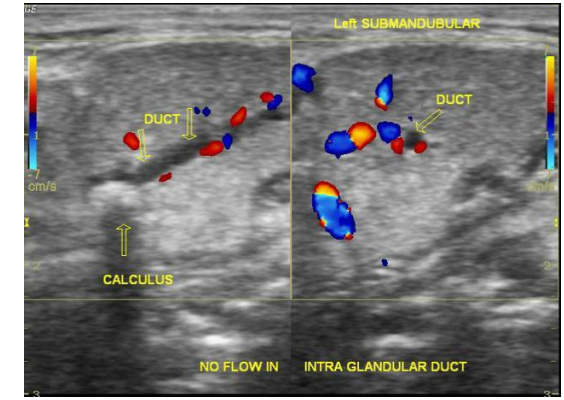
Neck Lymphoma



- Classical features”:
- Multiple neck level
- Rounded appearance, loss of vascular pedicle
- Assoc with night sweats / weight loss.

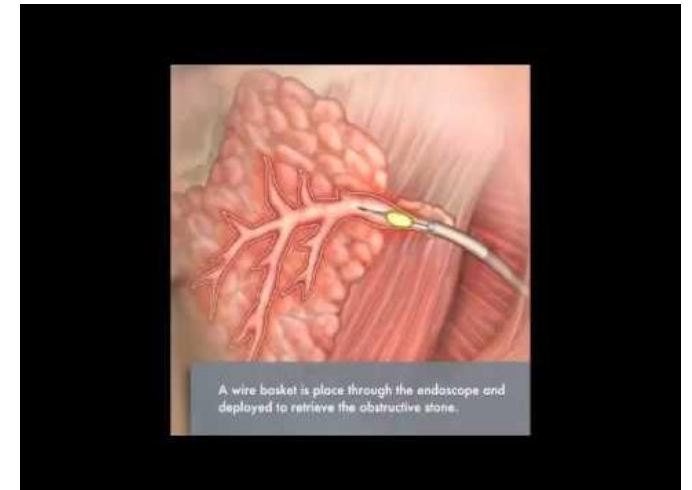
Salivary Calculi

- Classical features”:
- Males > females
- Peak incidence between 30-60 years of age
- • Multiple calculi in 25% of cases
- Bilateral calculi in approximately 2% of cases
- Submandibular gland 80-90%¹
- Parotid gland 5-20%¹
- Sublingual gland rarely

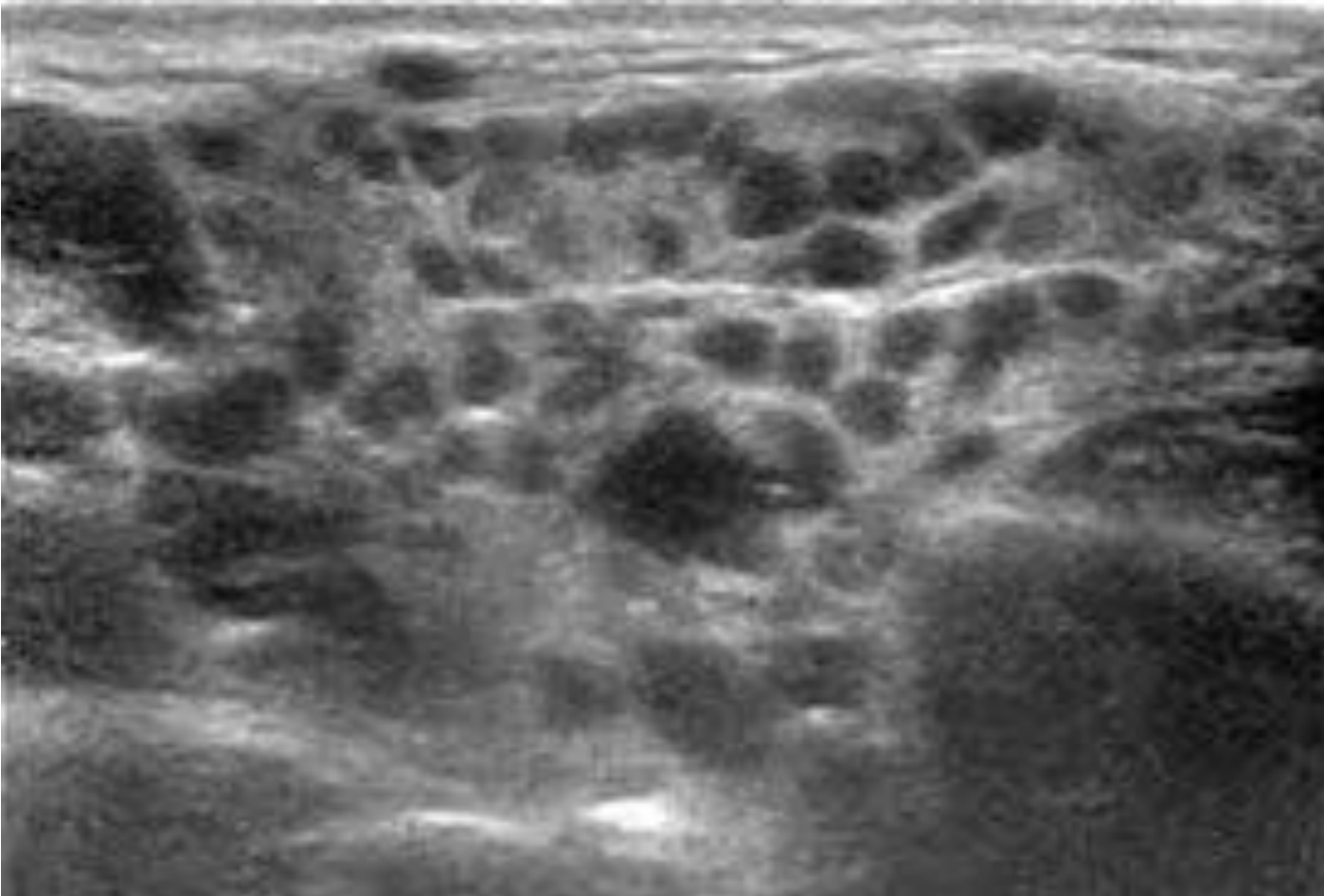


Submandibular Gland	%
Distal half of main duct	50.3
Proximal half of main duct	18.7
Hilus and Intraglandular	31

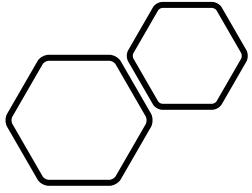
Parotitis



Sjögren's Syndrome

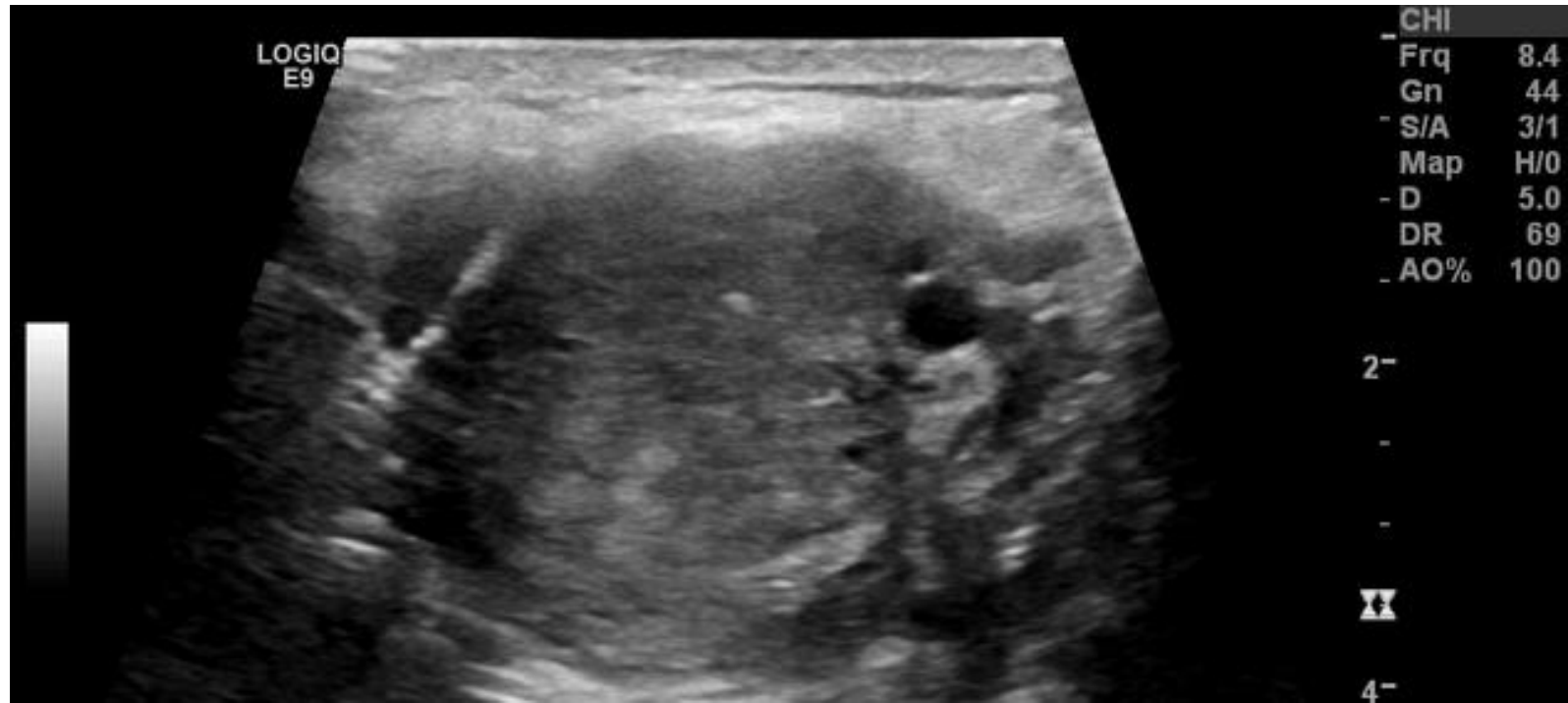
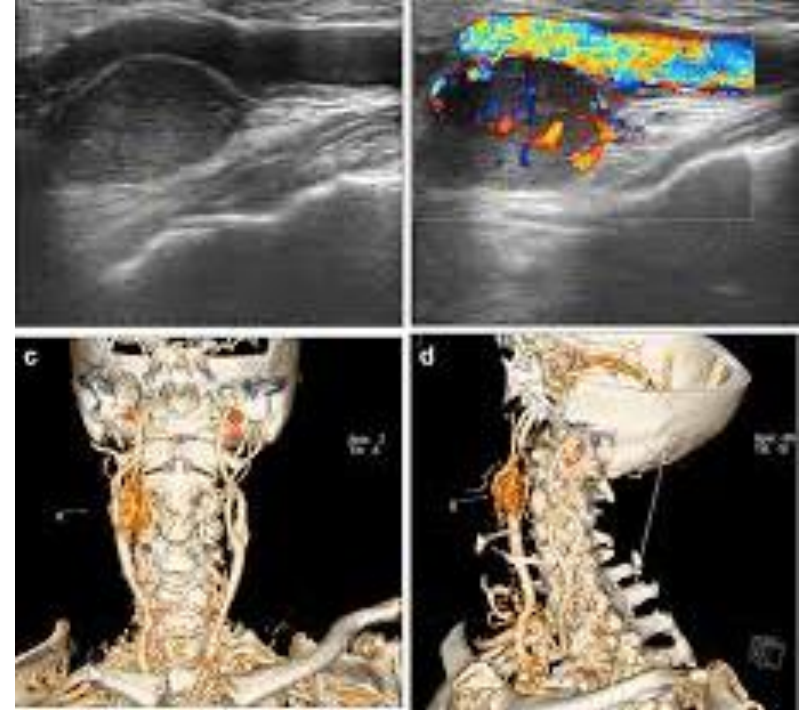
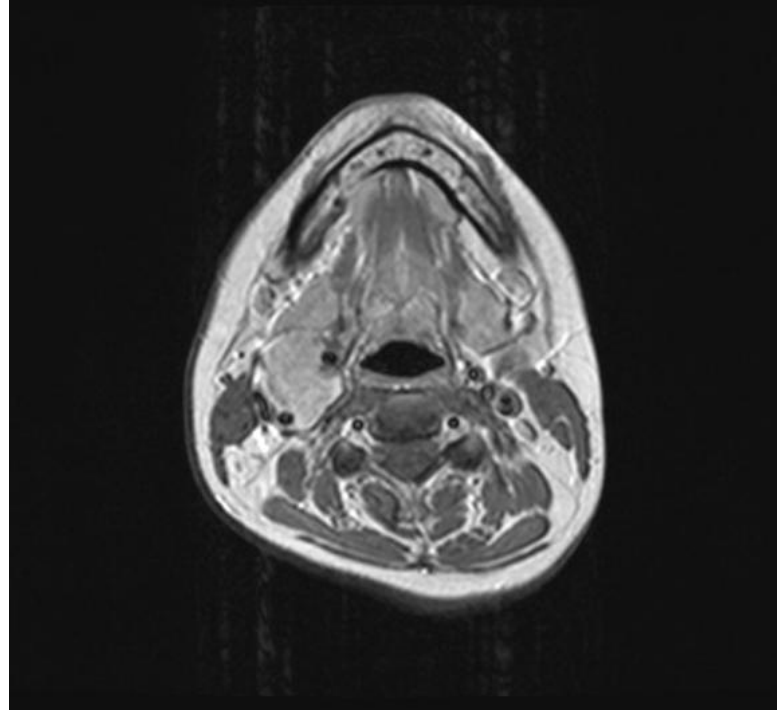


- Parenchyma heterogeneous with multiple scattered small hypoechoic or anechoic areas
- May be multiple small cysts
- Hypervascular in the acute phase
- In later stages glands become small
- For hypoechoic lesions larger than 2cm and for rapidly growing lesions consider MALT lymphoma and carry out biopsy



Carotid Body Tumour

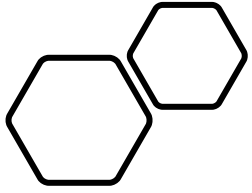
- Classical features”:
- Known as Paraganglioma
- Highly vascular
- Normal location carotid bifurcation
- Characteristic splaying of ICA and ECA
-



Congenital Anomalies

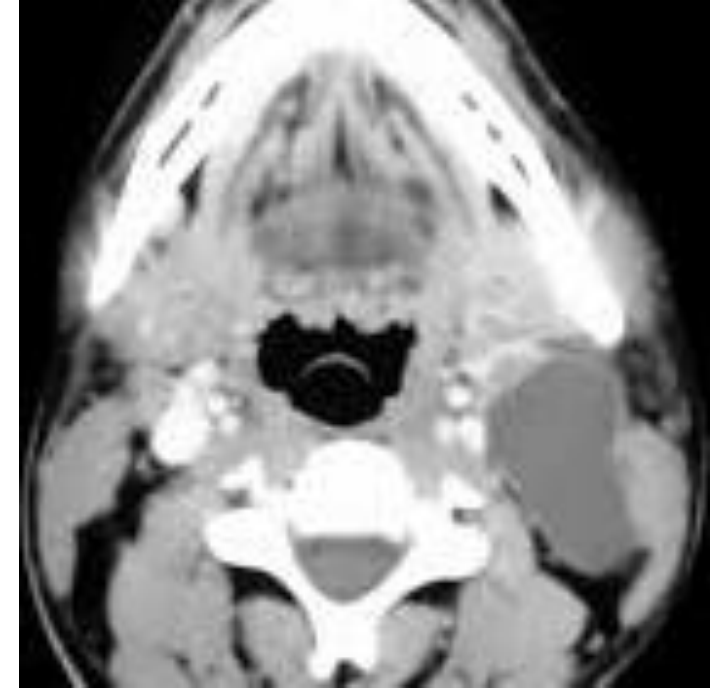
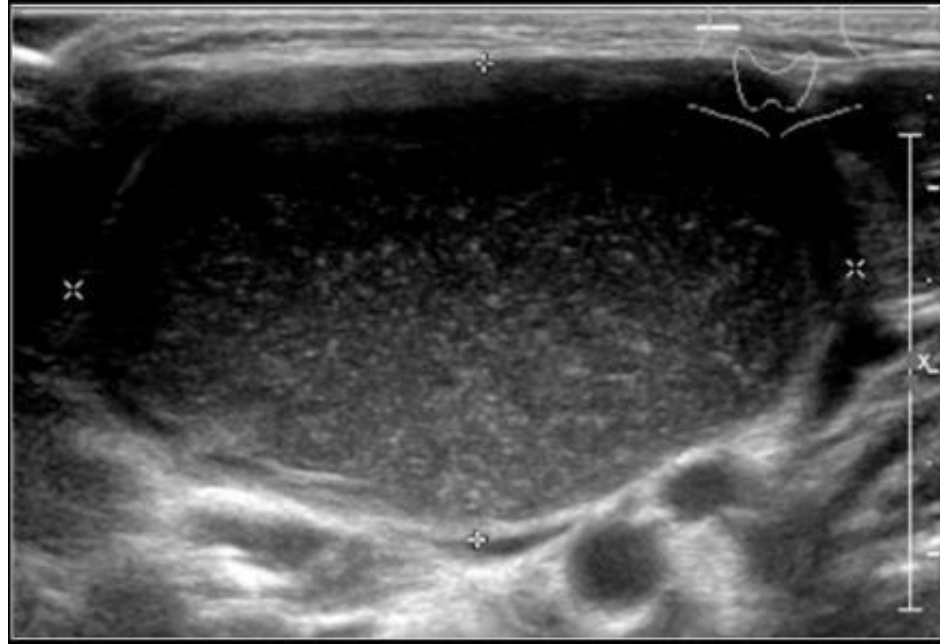
Thyroglossal Duct Cyst





Branchial Cleft Anomalies

- Second most common head and neck congenital lesion
- 20% of congenital cervical masses in children
- Thought to occur secondary to incomplete obliteration of the branchial clefts and pouches during embryogenesis
- Second: 40-95%
- First: 5-25%
- Third/Fourth: 2-8%



Dermoid cyst



- Dermoid cysts are inclusion cysts, that contain epithelium and skin adnexa like hair follicles, sebaceous glands and sweat glands.
7% of dermoid cysts occur in the head and neck region, especially around the orbit and in the midline of the neck, with a predilection for the suprasternal notch.
- Here a typical homogeneous hyper-echoic oval lesion, representing a dermoid cyst, which was located in its favourite location, the suprasternal notch.



New Technologies in Head & Neck

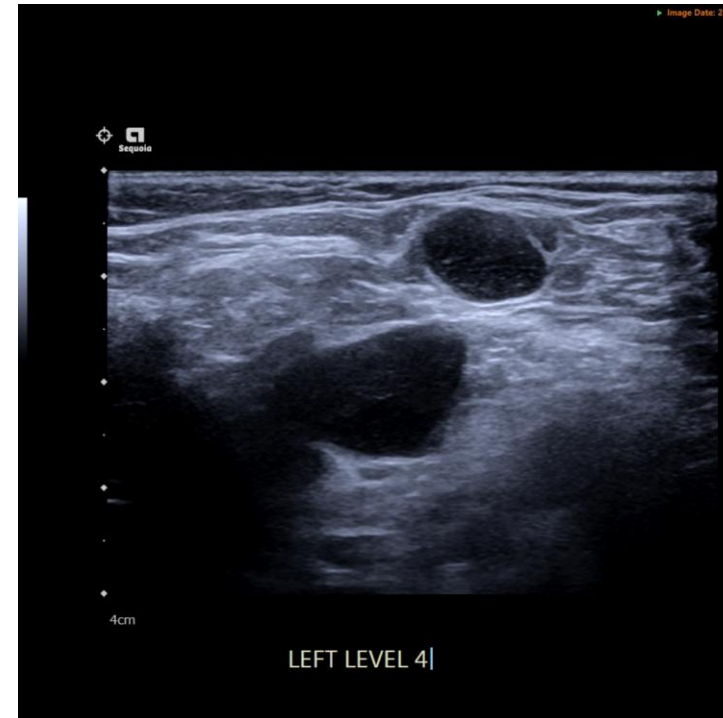
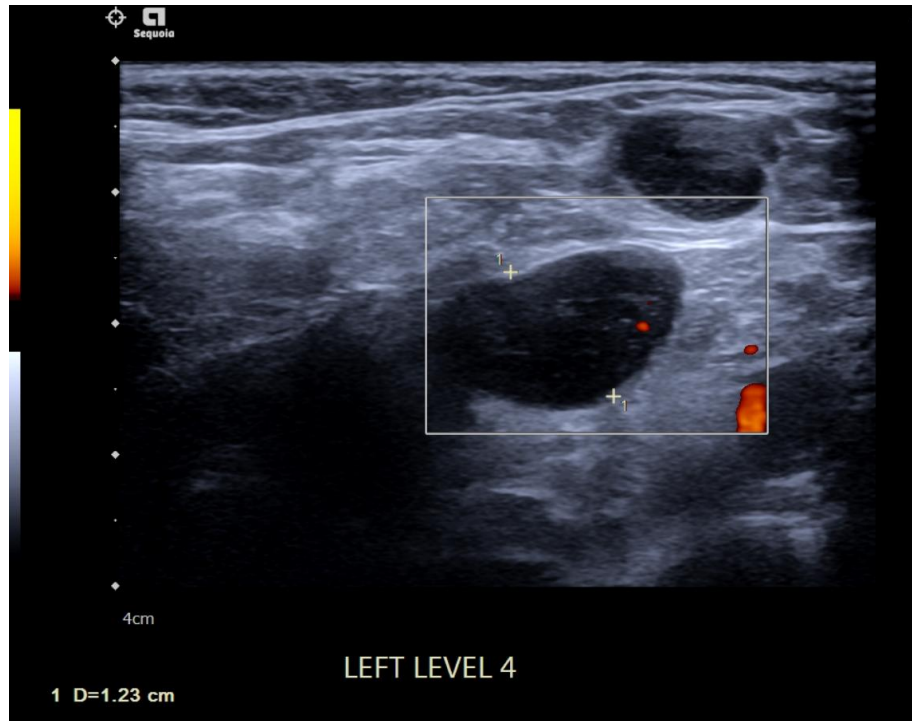
- Microvascular flow
- imaging mode designed to improve the visualization of
- blood flow, especially slow flow signals from microscopic
- vessels, through a new adaptive algorithm which removes
- clutter dramatically while maintaining very high frame
- rates (> 50 fps)
- AI

Clinical Cases

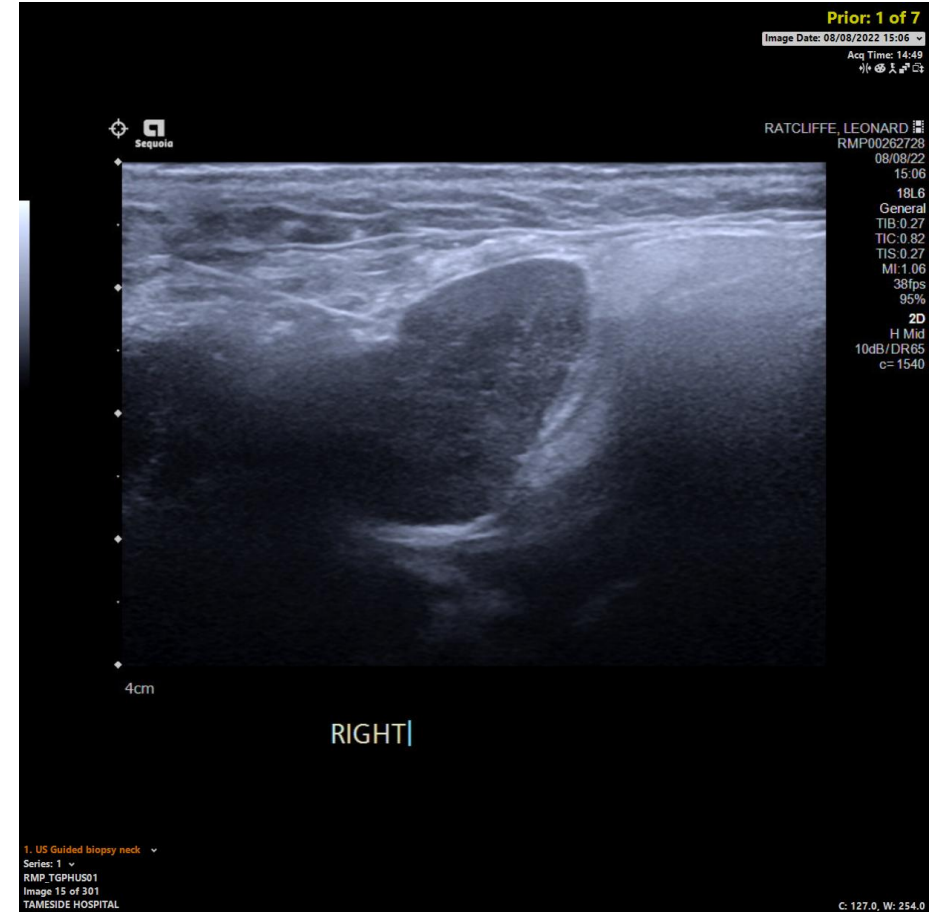
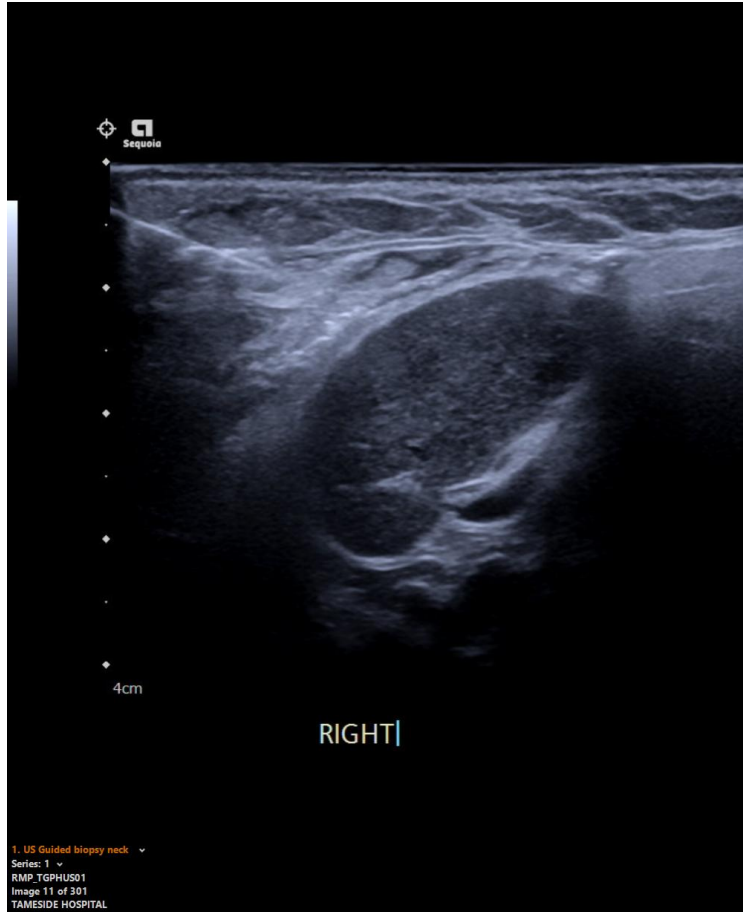
Case 1: Left SCF Mass

- 68 yr old male presented with neck trauma, referred to our Rapid diagnosis clinic,
- CT showed multiple enlarged mediastinal and cervical LN
- USS FNAC and Core Bx performed

Case 1: Bilateral Neck Masses



Case 1: Bilateral SCF Masses



Case 1: Mantle Cell Lymphoma: MCL

- 68 yr old male presented with neck trauma, referred to our Rapid diagnosis clinic
- CT showed multiple enlarged mediastinal and cervical LN
- USS FNAC and Core Bx performed
- Histology : Mantle cell Lymphoma
- Referred to Christies under the Haematologist
- Mantle Cell Lymphoma
- Type of NHL accounts for 5% all case
- Mean age Men ~60yr (male predilection 4:1)
- Staging similar to NHL Stage 1 – IV
- Survival is short ~ 50% 5yr survival, over 1/3 die within 1 year, despite aggressive combination of chemotherapy

Micro: The preparations comprise frequent, predominantly small, lymphocytes. In the immunostains performed in house, they express CD20, BCL2, CD5 (weak), cyclinD and SOX11 (patchy) with strong expression of P53 in most cells. They are negative for CD10, BCL6, CD23 and MUM1. The proliferation on the Mib 1 preparation is approximately 10%. T lymphocytes are not numerous.

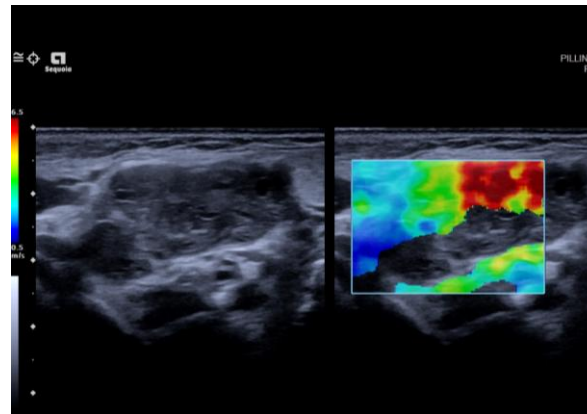
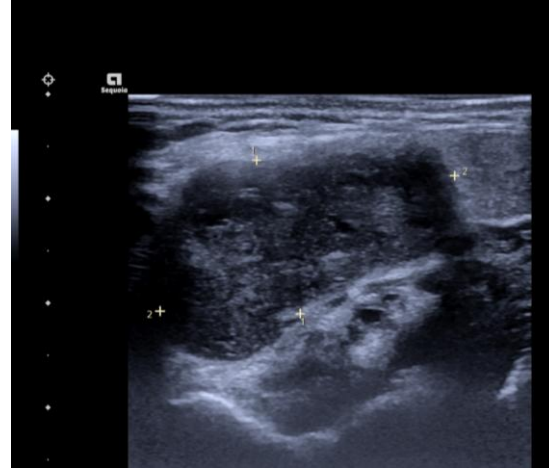
The features are those of a mantle cell lymphoma (classical). P53 mutation will be requested.

Conclusion

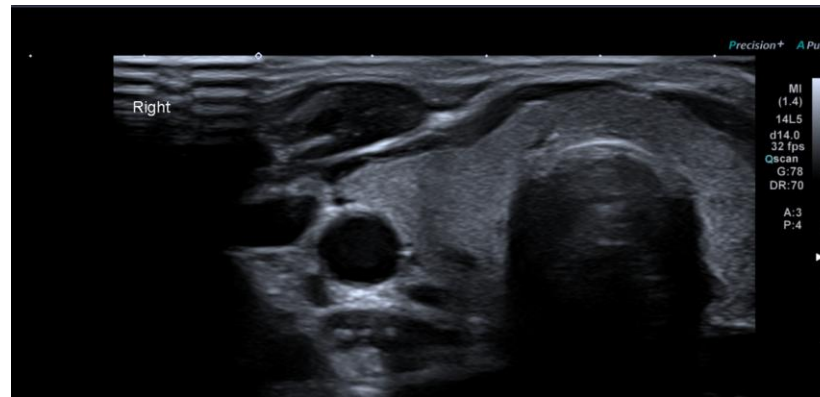
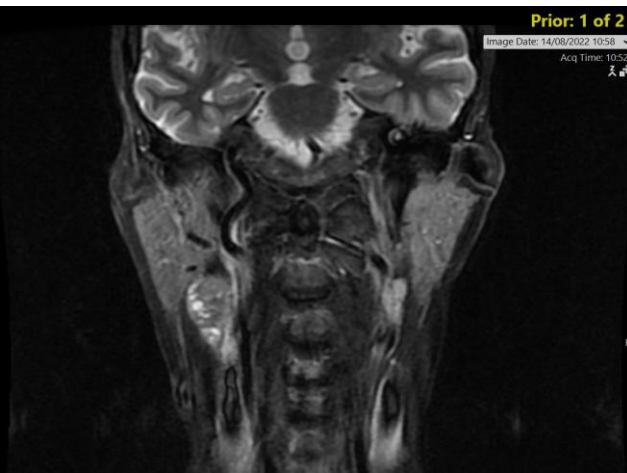
LN (cytology): Mantle cell lymphoma; see text of report

Case 2:

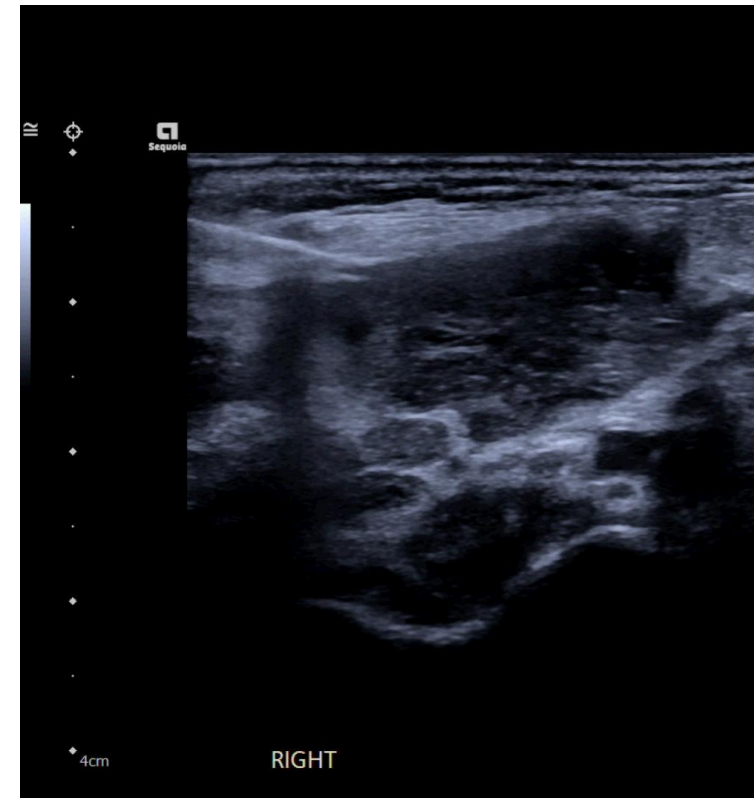
Case 2: Right Level II Mass



- 75yr old lady, blood test positive for potential H&N cancer
- Referred to One Stop Neck lump clinic. Subsequently found right side neck lump
- No other UADT symptoms, had 1stone intentional weight loss.
- Flexible nasendoscopy, normal nasal space, tongue base, hypopharynx and vocal cords
- Right level II node, “feels suspicious” for FNAC +/- Core Bx
- PET CT also requested



Case 2: Right Level II Mass (Galleri trial, asymptomatic!)



Case 2: Right Level II Mass

- PET CT scan
- “ the right level II cervical LN is metabolically active, consistent with metastatic LN, site of primary not evident. Bx advised
- USS Scan
- The palpable lump noted at right level II, reveals a hypoechoic mass has a solid appearance, no vascular pedicle 15mm x 31mm, DDx SCC
- MDT recommendation: Radiotherapy

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\Clinical Details:  
\(R) level II mass, positive galleri trial ? SCC  
\MACROSCOPIC DESCRIPTION  
\A: Described and labelled as: "USG (R) neck levell II core bx + FNA"  
\Approx 10mls clear pink fluid, received in CRR pot.  
\B: Described and labelled as: "USG (R) neck level II core bx / FNAC"  
\4 slides received: 2 fixed and 2 air dried.  
\Microscopic description  
\This sample shows groups and sheets of malignant squamous epithelium  
\with high nuclear cytoplasmic ratio and hyperchromatic pleomorphic  
\nuclei. There are lymphocytes in the background confirming origin  
\within from a lymph node.  
\The features are consistent with metastatic squamous cell carcinoma.  
\Immunohistochemistry has been requested for further confirmation and  
\supplementary reporty will follow.
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Case 2 : Galleri Trial Information

- NHS England trial with Kings College London, how useful is a blood test for finding cancer early?
- Cell-free DNA based multi-cancer detection test in asymptomatic screening population (NHS-Galleri) <https://doi.org/10.3390/cancers14194818>
- As of 2022 140,000 people have been invited from the general population (England)
- Aged between 50-77 (not being investigated for cancer)

Case 3: Right SCF Mass

Case 3: Right SCF mass

Background

80yr old female presented to ENT clinic, notice right sided neck lump

Recent voice change, haemoptysis

Swelling of the right arm, extensive bruising

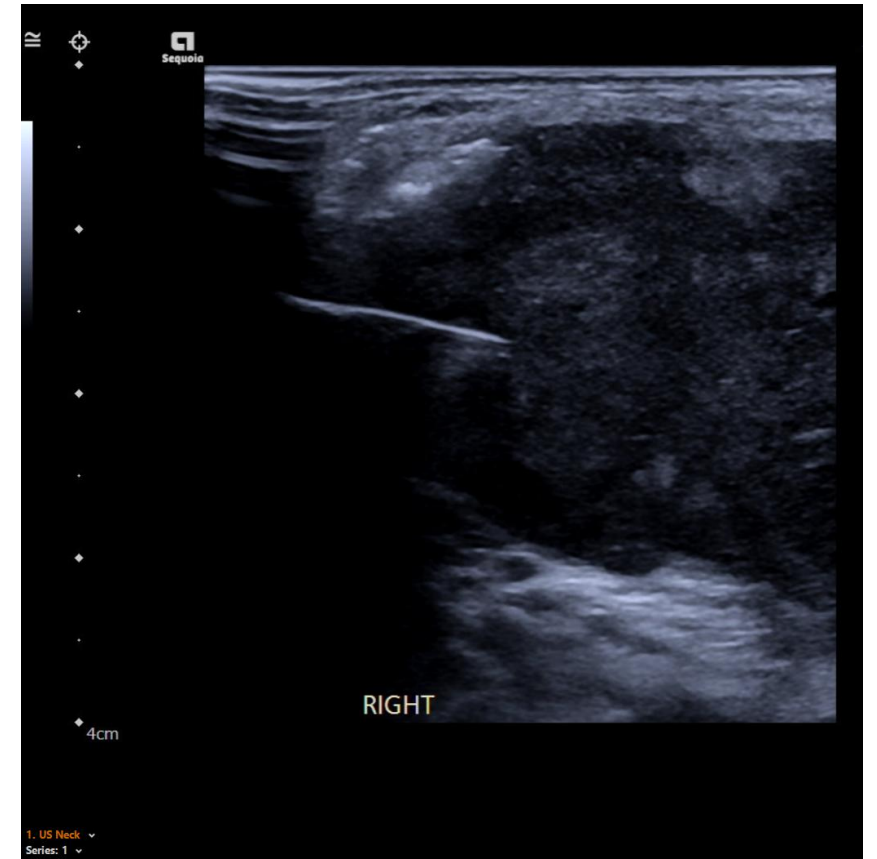
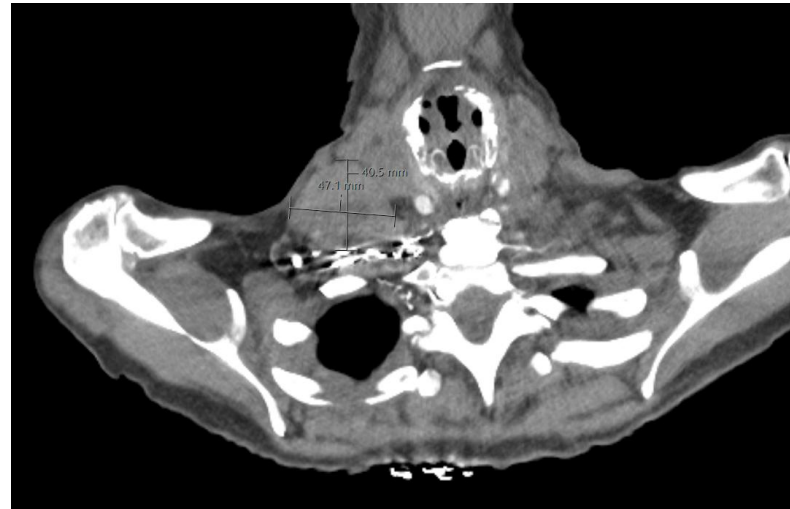
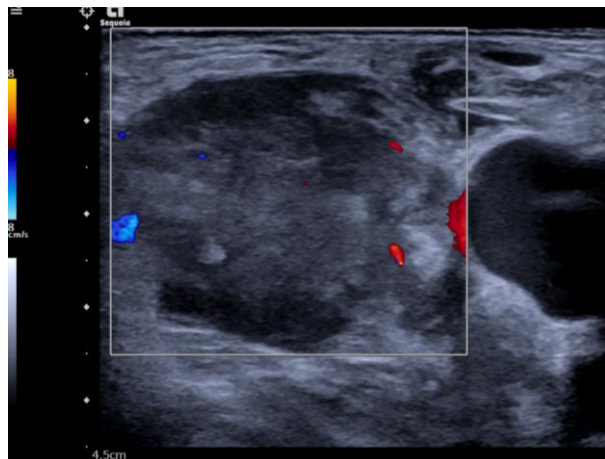
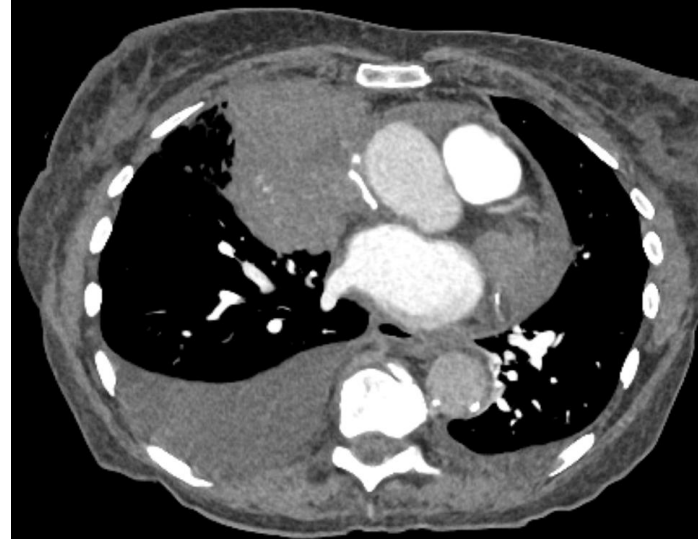
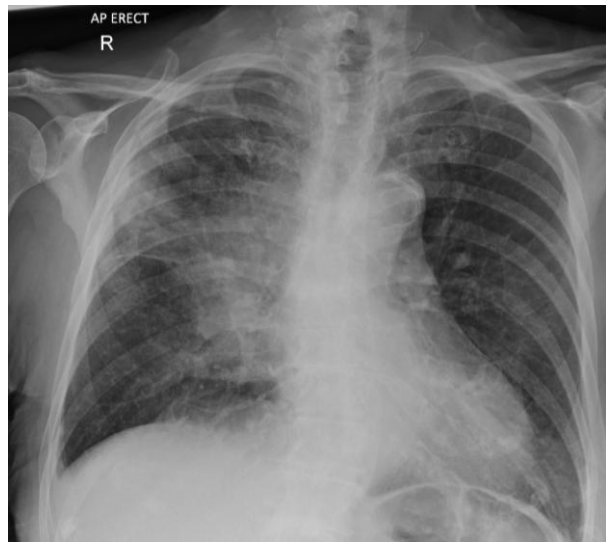
Ex- smoker stopped 15yr ago

Previous AE admission with SOB

Clinical Assessment

- O/E
- Unremarkable Oral cavity, fixed firm mass in right SCF
- Nasendoscopy left vocal cord palsy
- Core Bx and FNAC performed in clinic, using 14G

Case 3: Right SCF LN mass

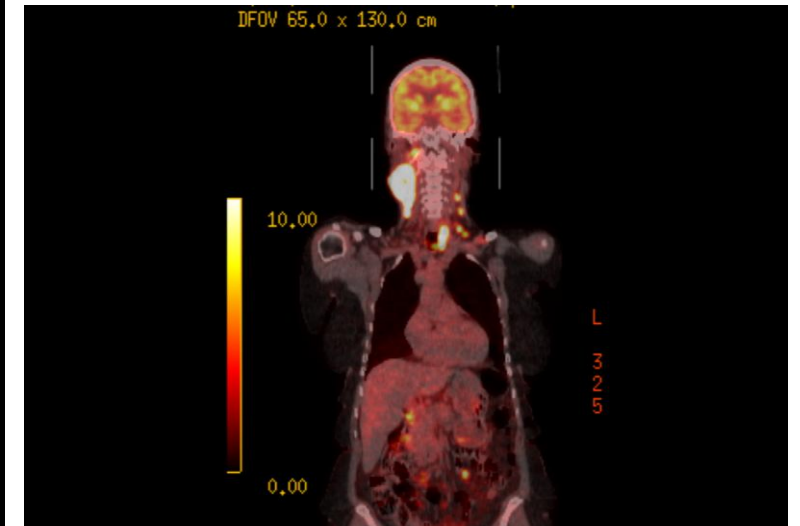
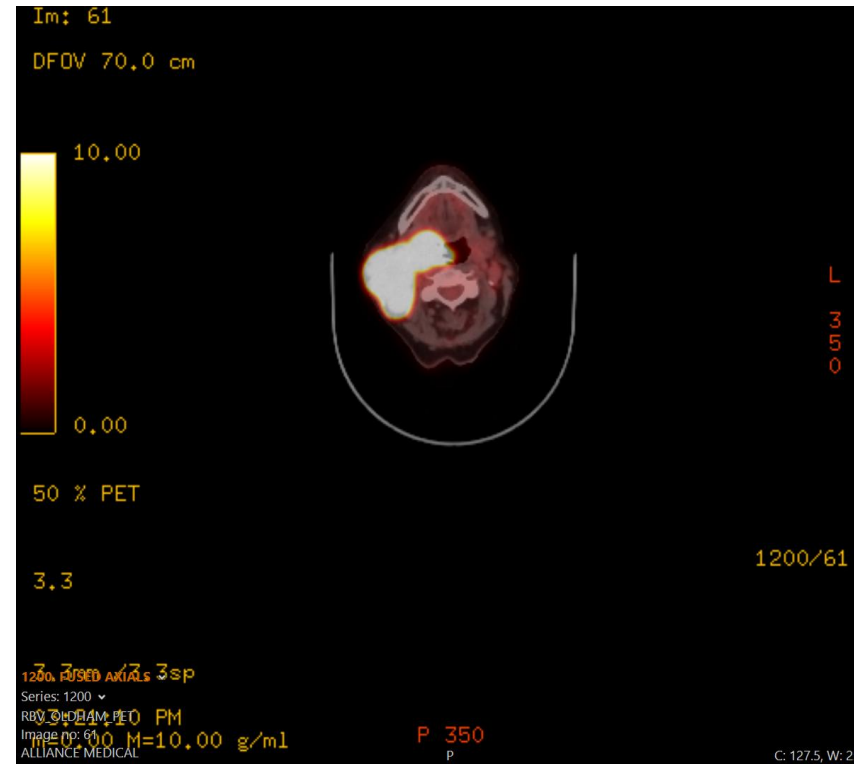


Case 3: Right SCF Mass:

- CT: Stage 4 lung carcinoma
- Large mass extending into the subcarinal region and contralaterally
- Encirclement of the right main pulmonary artery and narrowing of SVC
- Staging T4 N3 M1a
- Histology from mass: x2 pale and dark brown core of tissues received, sections show extensively necrotic metastatic malignancy, Immunostains show positivity for Cam 5.2 CD56
- Findings consistent with SMALL CELL CARCINOMA, with superior vena cava obstruction as evident by upper limb oedema
- MDT: Plan commence dexamethasone with PPI

Case 4: Right level II Mass

- 71yr lady under the care of Rheumatology for seropositive RA
- Developed right neck mass at right level II mass
- No otalgia, mild voice changes, no night sweats
- O/E ; FNE node
- Matted right tonsil
- On MTX
- Histology: Core Bx performed Diffuse large B cell Lymphoma (NHL) and tonsil
- Plan: Chemotherapy, commence prednisolone , curative treatment



Take Home

- Review 7 surgical levels, correspond to 7 sweeps
- Know your Anatomy
- Location, location , location
- Pitfall: not all cystic lumps appear cyst or solid lumps appear solid!!
- Find a friendly Head & Neck Radiology Consultant / ENT
- Practice , Practice
- Good luck

