NECK EXAMINATION
&
THYROID STATUS EXAMINATION

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INTRODUCTION

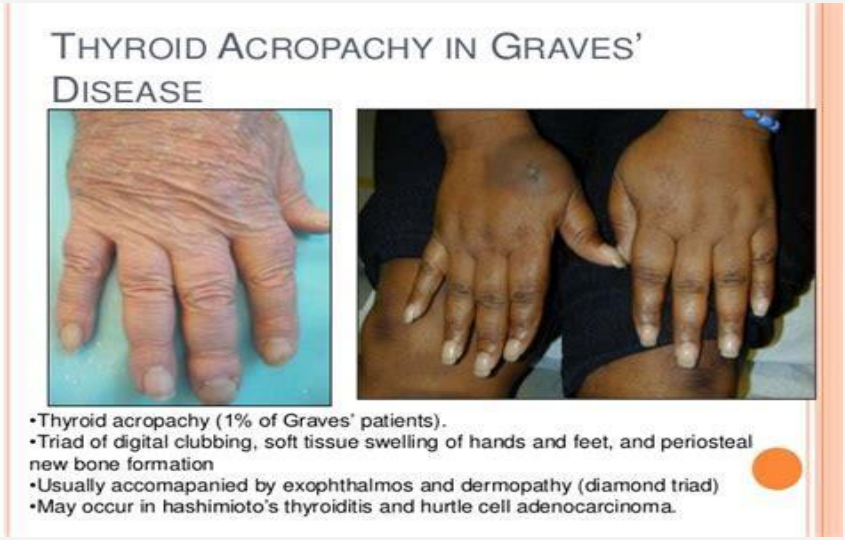
- **W**ash your hands
- **I**ntroduce yourself
- **I**dentity of patient – Confirm the patient's details (i.e. name and date of birth)
- **P**ermission (Gain consent and explain the examination)
- **P**ain?
- **P**osition appropriately: Sitting in chair with room behind the chair for the examiner to stand
- **P**rivacy
- **E**xpose neck and clavicles: Adequately expose the neck to the clavicles (patient may need to tie hair back/ remove necklace)
- **E**quipment – have a glass of water to hand

GENERAL INSPECTION

- **Surroundings**
  - Monitoring / walking aids / Treatments / Paraphernalia
- **Patient**
  - Well or unwell?
  - Listen to the patient's voice for abnormalities (e.g., **hoarse voice**)
  - Note whether there is any **dyspnea** on sitting/ lying down or **stridor**
  - **Exophthalmos**/proptosis may suggest a diagnosis of Graves' disease
  - Hyperthyroid
    - Heat intolerant, flushed, sweaty, fidgety (restless), thin
  - Hypothyroid
    - Cold intolerant, lethargic, hoarse voice, overweight
  - **Look for systemic signs that may relate to neck pathology: Cachexia** may suggest underlying malignancy

SYSTEMIC EXAMINATION : HANDS

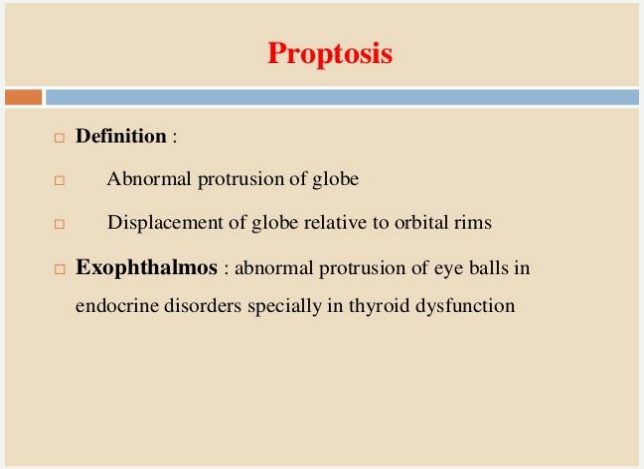
- Inspect
  - Palmar erythema (hyperthyroid)
  - Thyroid acropachy
    - Clubbing and digit swelling in Graves' disease
- Palpate
  - Temperature
    - Hot and clammy if hyperthyroid
    - Cold if hypothyroid
  - Pulse
    - Tachycardia or atrial fibrillation (hyperthyroid)
  - Tremor
    - Best seen by resting a piece of paper on patient's outstretched hands
    - Fine tremor (hyperthyroid)



SYSTEMIC EXAMINATION : FACE

- **Hypothyroid**:
  - Coarse facies
  - Thin hair
  - Loss of the lateral third of the eyebrows (Hertoghe's sign; Queen Anne's **sign**) is highly variable

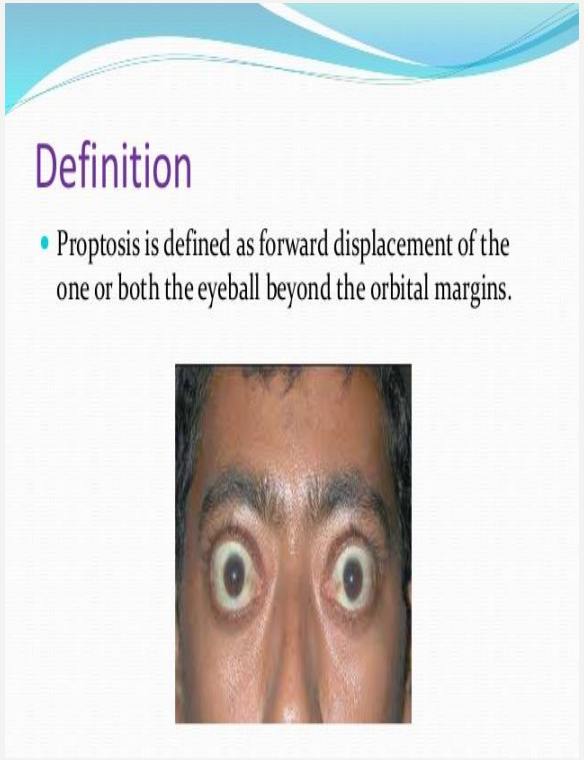
SYSTEMIC EXAMINATION : EYES

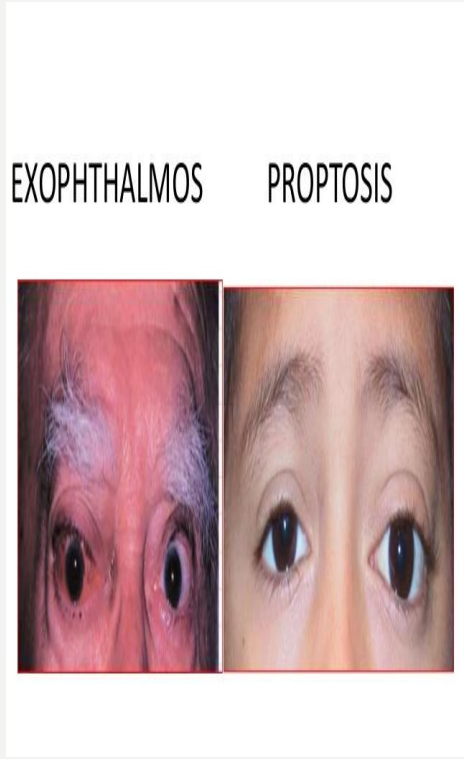


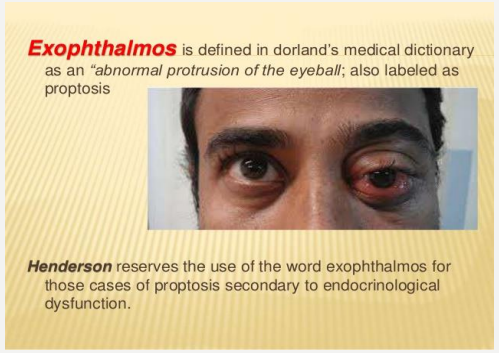
Inspection

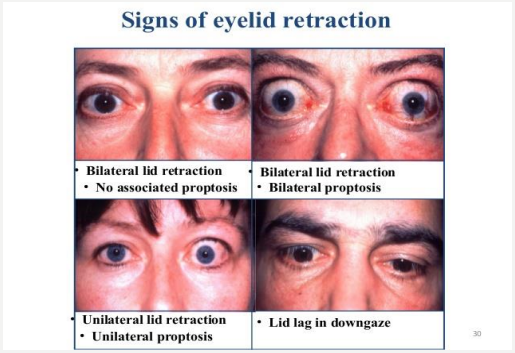
- Sclera (Jaundice)
- Conjunctiva (pallor)
- Chemosis (conjunctival edema)
- Exophthalmos (Graves' Disease)
  - Warn the patient you will go behind them. From behind, look down to see if the patient's eyes protrude
- Test eye movements
  - Complex ophthalmoplegia (diplopia not consistent with one cranial nerve palsy)
  - Lid retraction
    - Upper lid is retracted upwards and lower lid is retracted downwards
  - Lid lag
    - Sclera can be seen between iris and upper eyelid when patient looks down due to delay in eyelid movement
- Relative afferent pupillary defect (RAPD – hyperthyroid)

EXOPHTHALMOS






Exophthalmos is defined in dorland's medical dictionary as an *"abnormal protrusion of the eyeball*; also labeled as proptosis
Henderson reserves the use of the word exophthalmos for those cases of proptosis secondary to endocrinological dysfunction.


Signs of eyelid retraction
• Bilateral lid retraction
• No associated proptosis
• Bilateral lid retraction
• Bilateral proptosis
• Unilateral lid retraction
• Unilateral proptosis
• Lid lag in downgaze
30


Eyelids retract
Bulging eyes
Redness
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SYSTEMIC EXAMINATION : TRUNK

- **Proximal myopathy** (hyper/hypothyroid)

  Ask patient to cross arms and stand up from chair

SYSTEMIC EXAMINATION : LEGS

- **Pretibial myxedema** (Graves' Disease): Waxy, discolored induration of the skin (infiltrative dermatopathy)

- **Reflexes**
  - Brisk (hyperthyroid)
  - Slow-relaxing (hypothyroid)

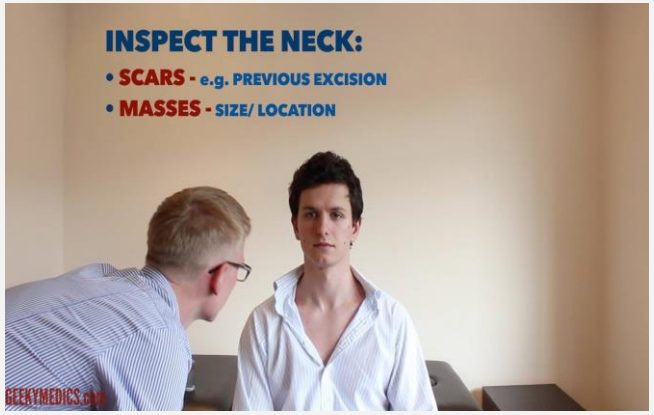
INSPECTION:

- From front and sides
  - **Lumps**/ asymmetry: Observe for any obvious masses in the neck
  - **Scars**: Identify any scars on the neck**:**

    Previous surgery (e.g., thyroidectomy/ parathyroidectomy scars using a pen torch)

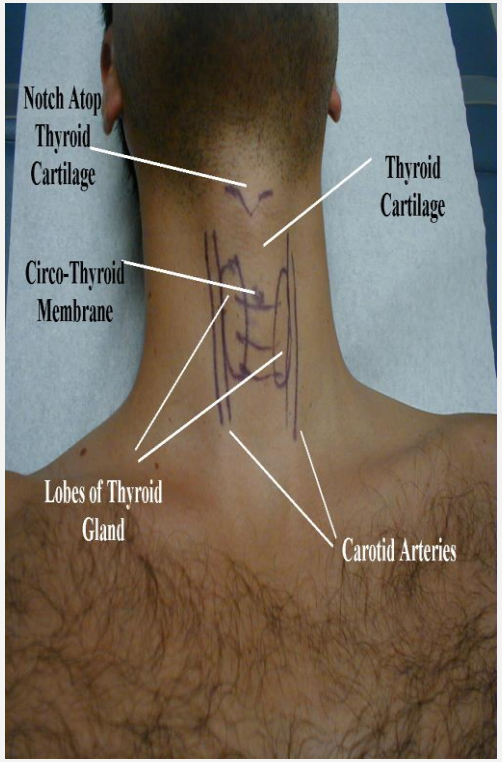
    Radiotherapy-related scarring
  - **Skin** changes, facial plethora (SVC obstruction)
  - **Distended neck veins** (SVC obstruction)

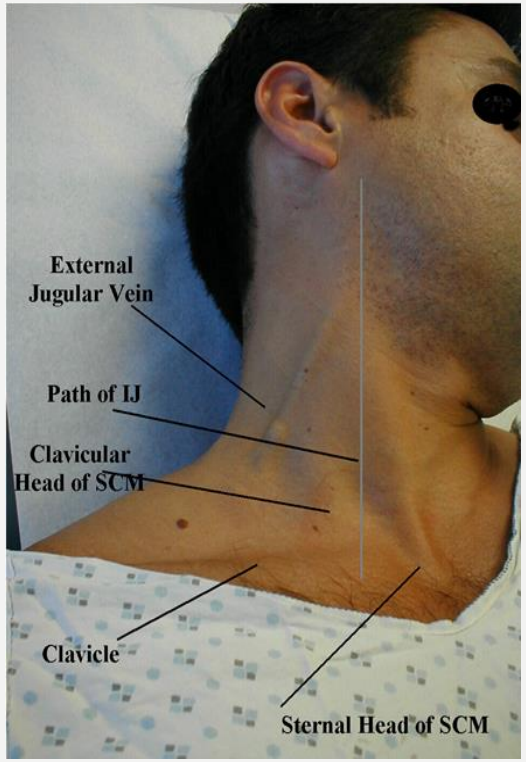
Pemberton's sign

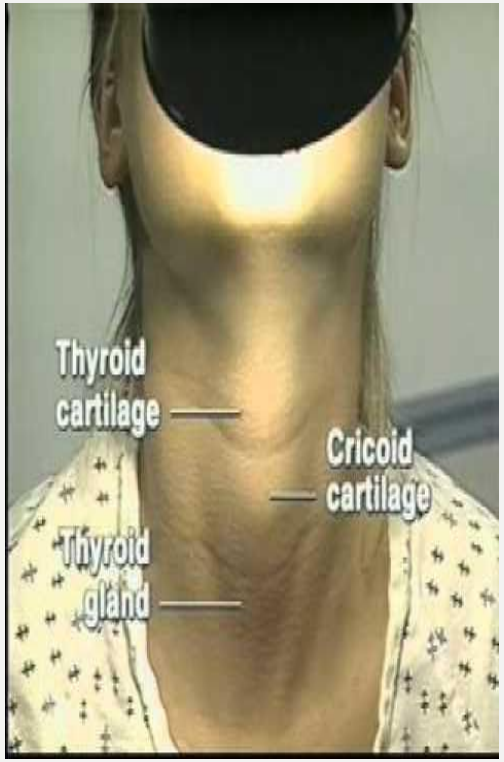


A multinodular thyroid goiter, that rises upon swallowing

SURFACE ANATOMY







DRAINING AREA:

- Cervical lymph nodes receive lymphatics from – head, face, mouth , pharynx and neck.
- Left supra –clavicular lymphnodes(virchow's) receives lymphatics from upper limb, left sids of chest including the breast and also viscera of abdomen.

It is named after Rudolf Virchow (1821-1902), the German pathologist who first described the association. The presence of an enlarged Virchow's node is also referred to as Troisier's sign, named after Charles Emile Troisier, who also described this

Lipoma- nape of the neck –most common site- solitary swelling

IF A MID-LINE NECK LUMP IS SEEN :

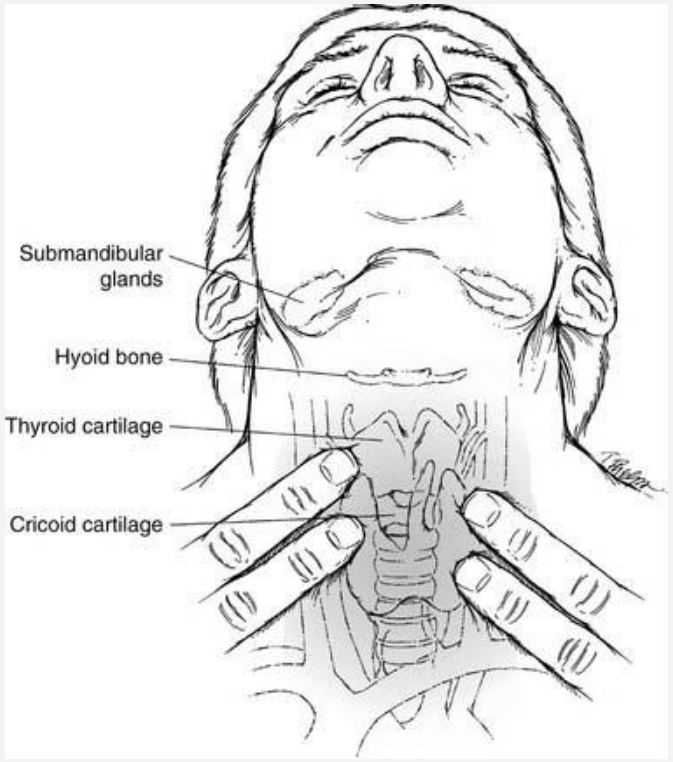
- **If there is a mid-line lump or systemic signs suggestive of thyroid disease, ask the examiner if a full thyroid status examination should be performed.**
- Ask the patient to 1) take a sip of water, 2) hold it in their mouth 3) and then swallow it
  - The three-part command gives the examiner time to position themselves to observe the movement of neck lump on swallowing
  - Any lump attached to the pretracheal fascia will move upwards on swallowing i.e., a thyroid lump or thyroglossal cyst
- Ask the patient to 1) open their mouth 2) and protrude their tongue. whilst you observe the mass.
  - A midline lump that moves upwards on tongue protrusion is a thyroglossal cyst (a thyroid mass will not move)

Further imaging (e.g., ultrasound) would be required to confirm the etiology of a mid-line neck lump.

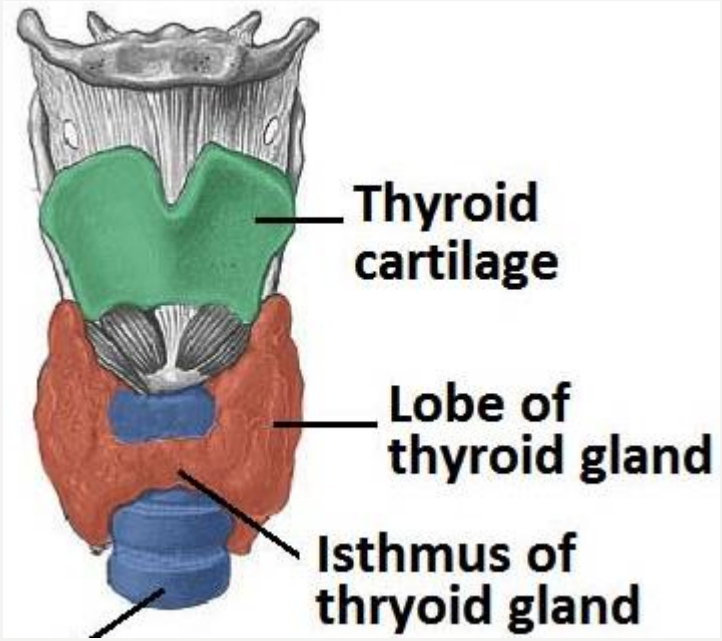
PALPATION:

- **Palpate: anterior**
  - **Trachea**
    - For tracheal deviation (support back of neck whilst doing this and warn patient it may feel uncomfortable)
  - **Carotid pulse** (one side at a time)
- **Palpate: posterior**
  - Explain to the patient that you will be moving behind them to palpate their neck. Take this opportunity to inspect the back of the neck.
  - **Thyroid gland**
    - Palpate one lateral lobe at a time then isthmus (nodules and thrills)
    - Ask the patient the swallow another sip of water whilst palpating the thyroid gland (thyroid masses that move upwards on swallowing)
  - Anterior and posterior triangles
  - Parotid glands
  - Submandibular gland
  - **Lymph nodes**
    - Cervical
    - Supraclavicular

SURFACE ANATOMY



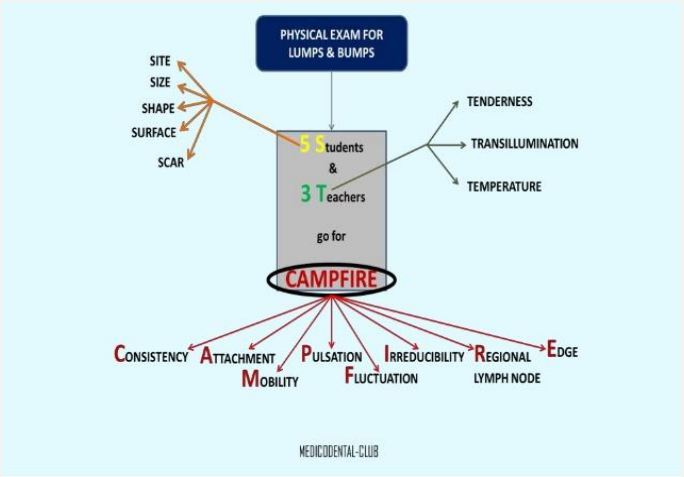
SURFACE ANATOMY

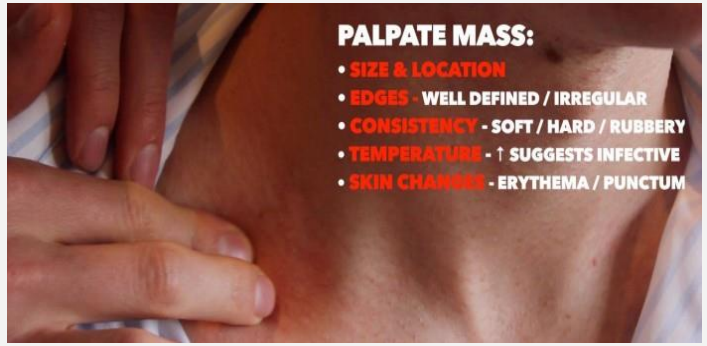


ASSESSING A NECK LUMP

When assessing any neck lump, you should consider each of the following characteristics:

- **Site (Location)**: anterior triangle / posterior triangle / mid-line
- **Size:** width / height / depth
- **Shape**
- **Surface –** smooth/ nodular
- **Scar + Overlying Skin changes** – erythema / ulceration / punctum
- **Tenderness**
- **Trans-illumination** – suggests mass is fluid-filled (i.e., **cystic hygroma**)
- **Temperature** – increased warmth may suggest an inflammatory or infective cause
- **Consistency** – soft / rubbery / hard
- **Attachment + Mobility: Relation to underlying/overlying tissue** – tethering/mobility (ask the patient to turn their head)
- **Pulsatility** – suggests vascular origin (i.e. carotid body tumor/aneurysm)
- **Fluctuance** – if fluctuant, this suggests it is a fluid-filled lesion (i.e. cyst)
- **Irreducibility**
- **Regional Lymph nodes**
- **Edges**: well defined / irregular
- **Auscultation** – to assess for bruits (i.e., Carotid artery aneurysm)

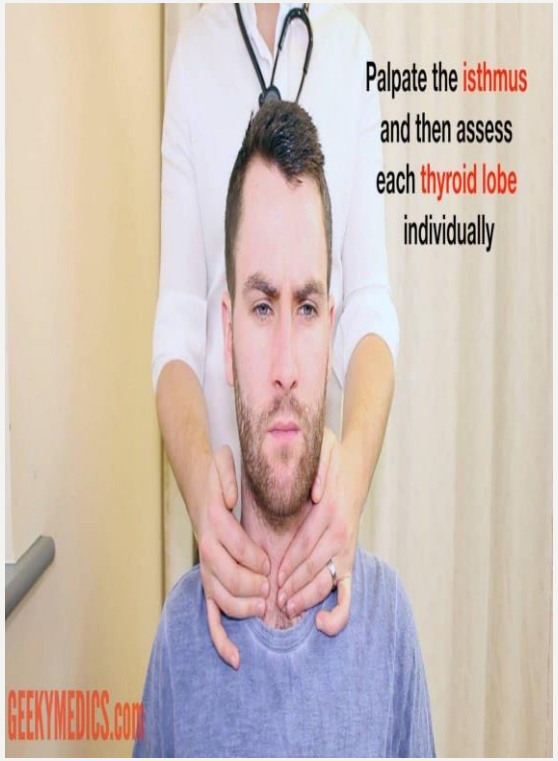


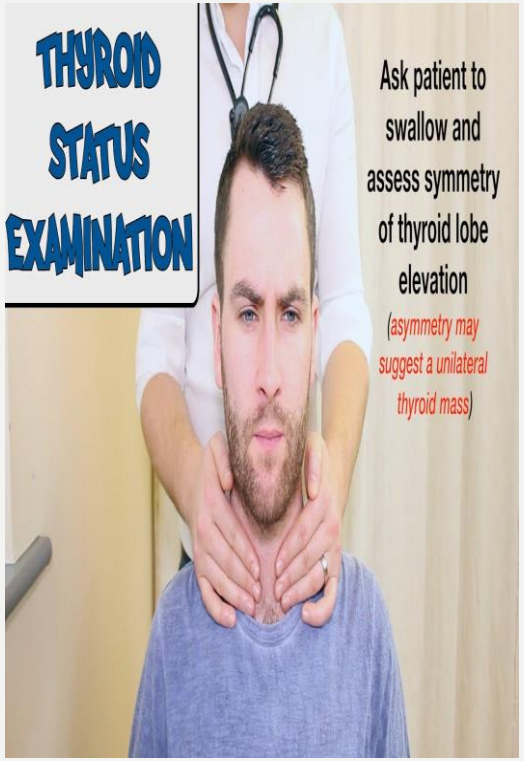


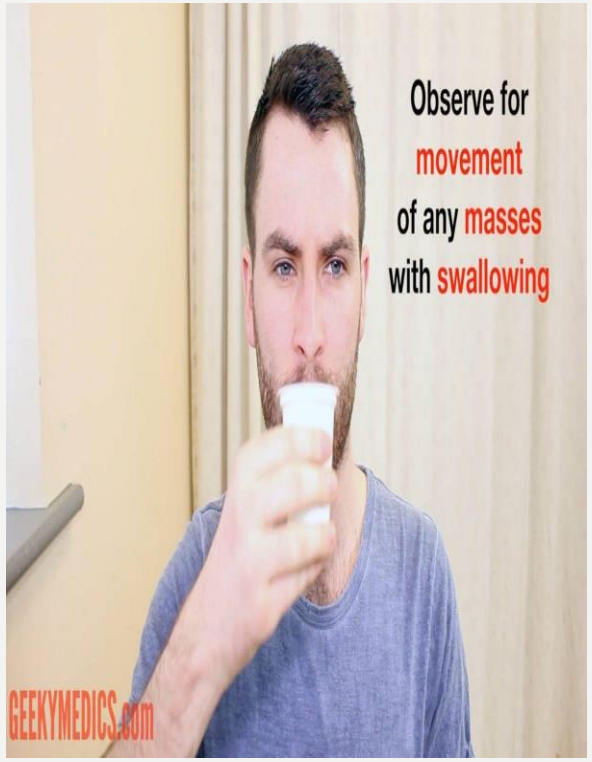
PALPATION: THYROID GLAND

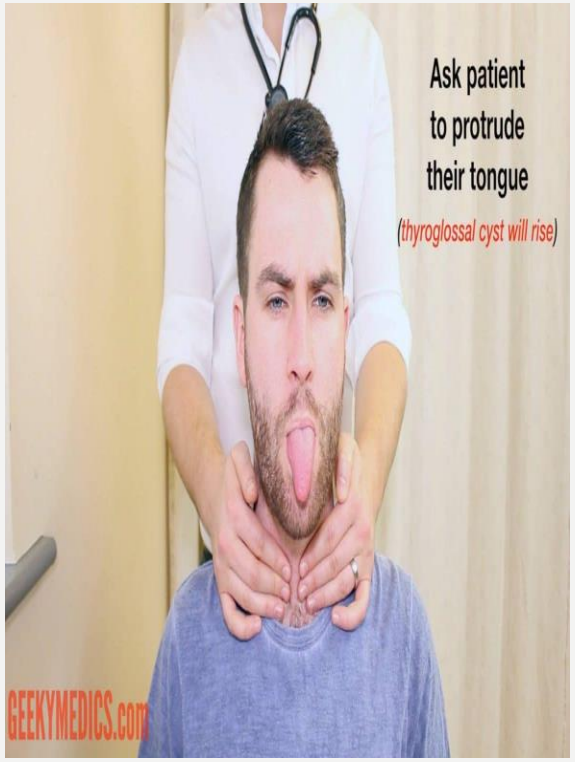
- Palpation of the thyroid gland may not be expected in an OSCE with a neck lump that is not related to the thyroid. However, to perform a thorough examination of the neck, this should ideally be included as part of the assessment. It is important to note that a normal thyroid gland is typically impalpable.
- **1.** Place the three middle fingers of each hand along the midline of the neck below the chin.
- **2.** Locate the upper edge of the thyroid cartilage (referred to as the "Adam's apple").
- **3.** Move inferiorly until you reach the cricoid cartilage/ring.
- **4.** The first two rings of the trachea are located below the cricoid cartilage and the thyroid isthmus overlies this area.
- **5.** Palpate the thyroid isthmus using the pads of your fingers.
- **6.** Palpate each lobe of the thyroid in turn by moving your fingers out laterally from the isthmus.
- **7.** Ask the patient to swallow some water, whilst you feel for the symmetrical elevation of the thyroid lobes (asymmetrical elevation may suggest a unilateral thyroid mass).
- **8.** Ask the patient to protrude their tongue once more (if a mass is a thyroglossal cyst, it will rise during tongue protrusion).
- **9.** If a thyroid mass is present, feel above and below it. Assess retrosternal extension by percussion on the sternum and assess vascularity by auscultation.

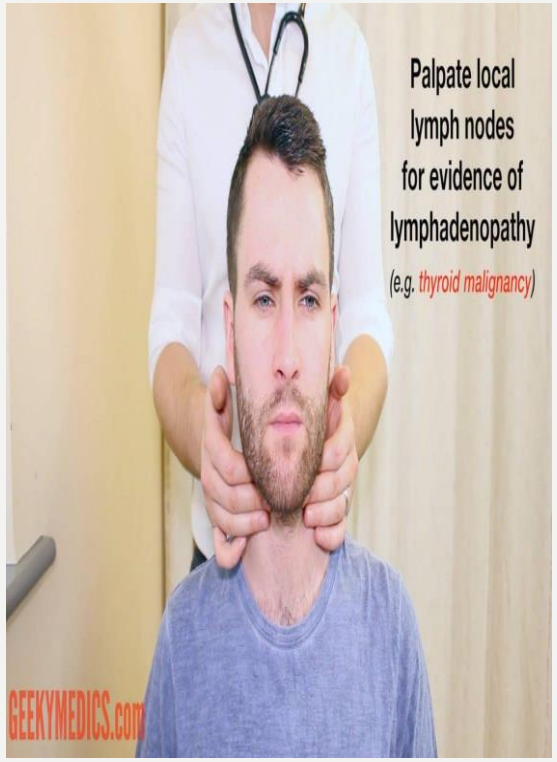
PALPATION: THYROID GLAND

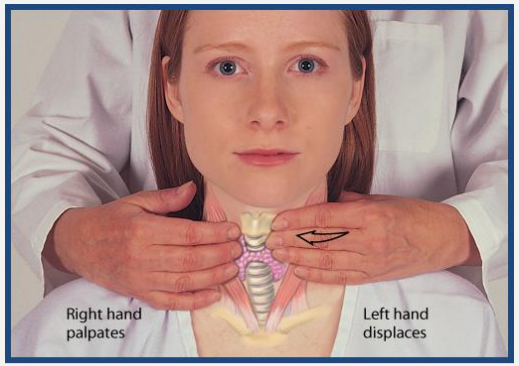


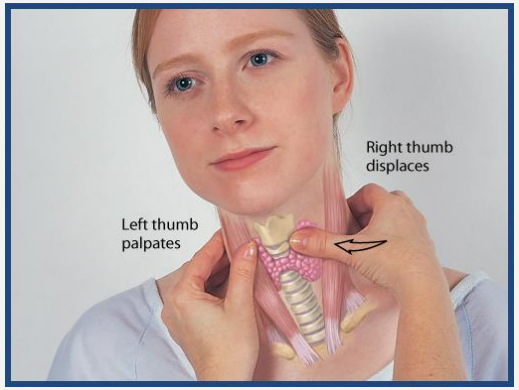



Observe for
movement
of any masses
with swallowing
GEEKYMEDICS.com


Ask patient
to protrude
their tongue
(thyroglossal cyst will rise)
GEEKYMEDICS.com


Palpate local
lymph nodes
for evidence of
lymphadenopathy
(e.g. thyroid malignancy)
GEEKYMEDICS.com


Right hand
palpates
Left hand
displaces


Right thumb
displaces
Left thumb
palpates

PERCUSSION:

- Over sternum for retrosternal goiter

AUSCULTATION:

- Carotid bruits
- Thyroid bruits
- Any other neck lumps (if pulsatile with bruit suspect carotid artery aneurysm)

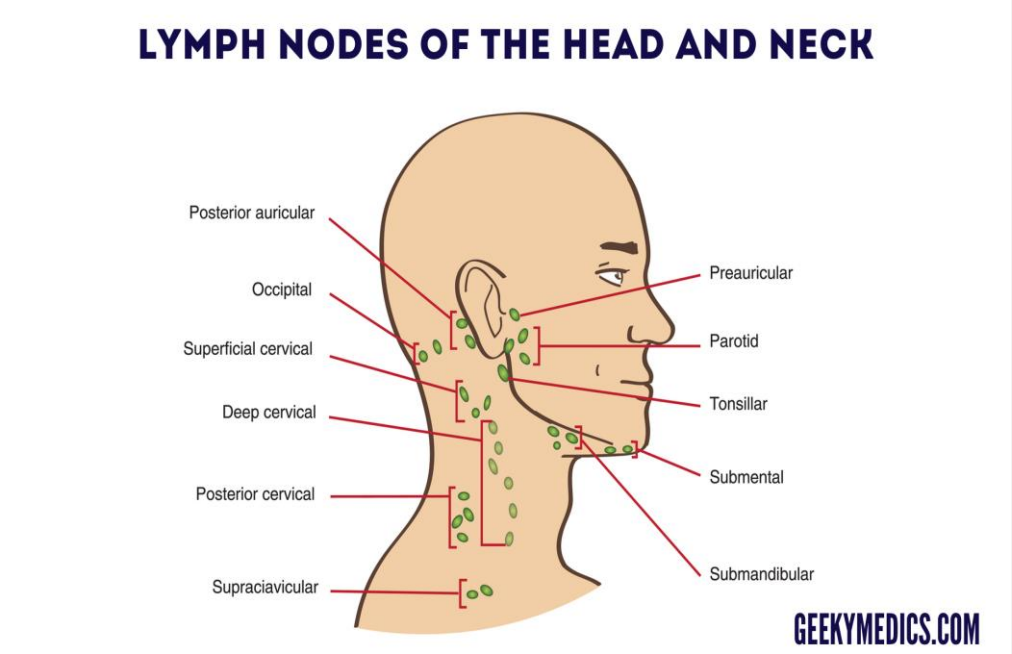
PALPATION: SUBMANDIBULAR GLAND

- Each submandibular gland can be palpated inferior and posterior to the body of the mandible.
- Move inwards from the inferior border of the mandible near its angle with the patient's head tilted forward.
- Submandibular gland swellings are usually singular (whereas lymph node swelling often involves multiple nodes).
- Salivary duct calculi are relatively common and may be felt as a firm mass within the gland.

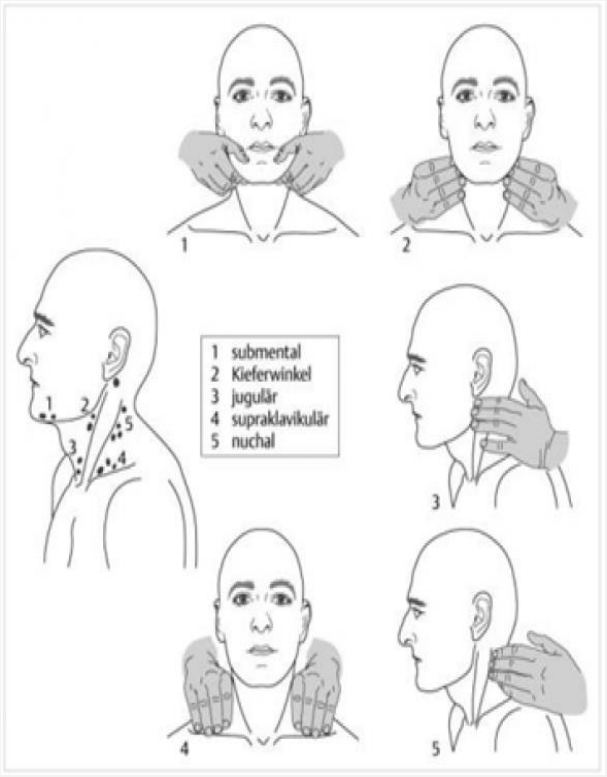
PALPATION: LYMPH NODES

Palpate each of the following groups of lymph nodes: (Asking the patient to tilt their head slightly forward can help to relax the neck muscles).

1. Sub-mental
2. Sub-mandibular
3. Tonsillar
4. Parotid
5. Pre-auricular
6. Post-auricular
7. Occipital
8. Anterior cervical chain (superficial & deep)
9. Posterior cervical chain
10. Supraclavicular



- You do not need to follow this specific routine but be clear in your own mind so that you cover all regions of the neck.
- Lymph nodes can become enlarged for a number of reasons, including infection and malignancy. Lymph nodes in any of these regions can also be caused by lymphoma and tuberculosis, so a comprehensive history is key to provide a clinical context for your findings.
- Lymph nodes are usually smooth and rubbery, with a degree of mobility.
- An enlarged, hard, irregular lymph node is suggestive of malignancy.



A recommended order of lymph node examination is to start in the submental triangle with the head bent forward, then the submandibular triangle **(Figures 2 & 3)**

Figure 2. Submental triangle

Figure 3. Submandibular triangle

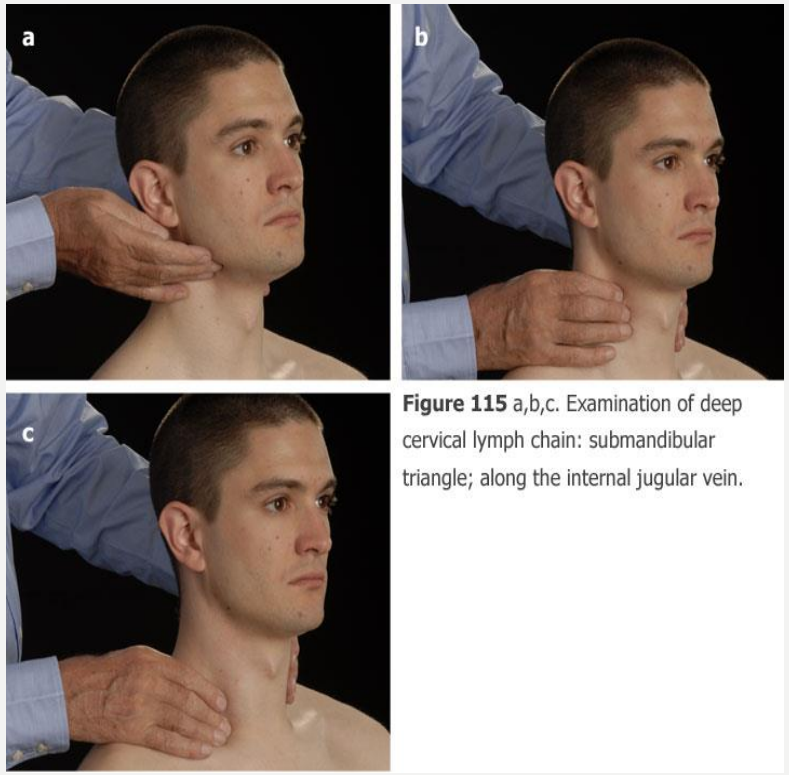


Figure 115 a,b,c. Examination of deep cervical lymph chain: submandibular triangle; along the internal jugular vein.

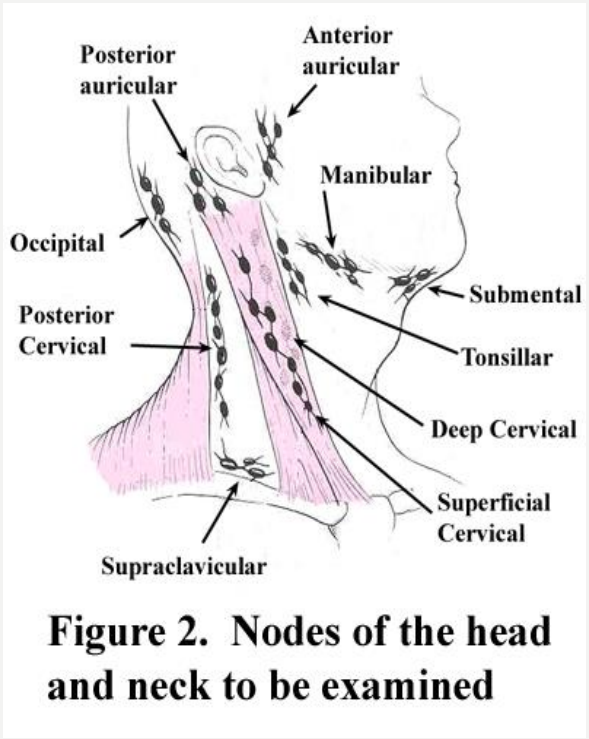
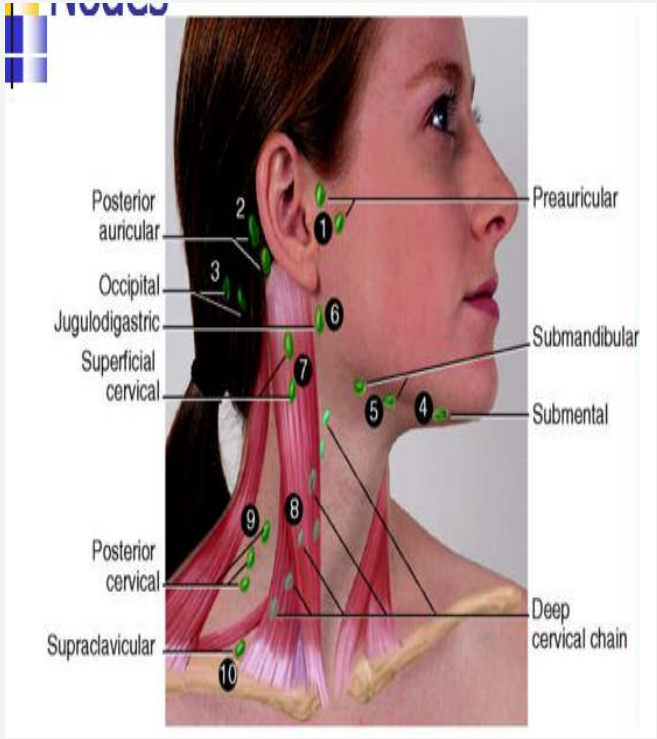
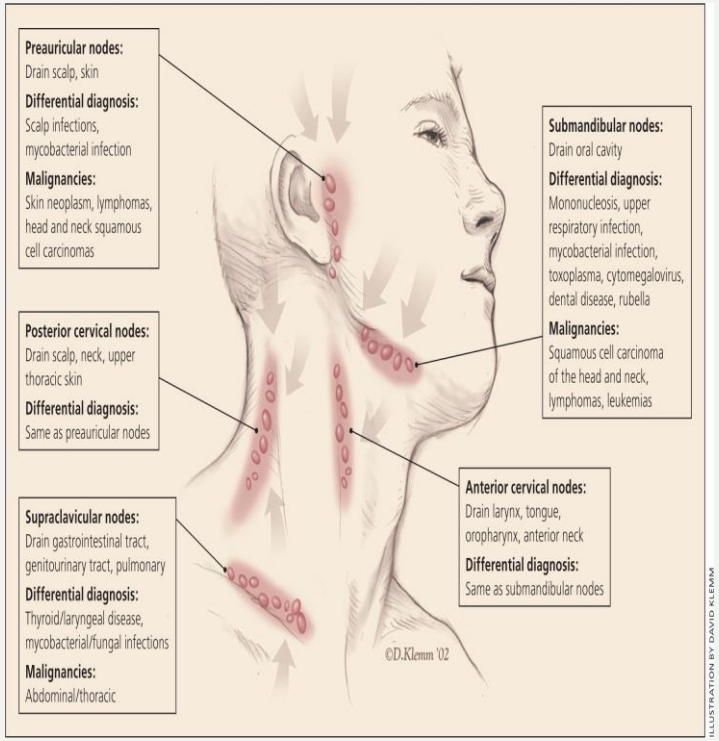


Figure 2. Nodes of the head and neck to be examined





DIFFERENTIAL DIAGNOSIS OF A NECK LUMP

- The location of the lump within the neck can sometimes be useful in narrowing the differential diagnosis. However, it should be noted that this is not an absolute rule, with further investigations required to confirm a particular diagnosis.
- The following features are **red flags** that should raise your suspicion of malignancy in the context of a neck lump:
  - Hard, fixed mass
  - The patient is > 35 years old
  - Presence of mucosal lesion in the head or neck
  - A history of persistent hoarseness or dysphagia
  - Trismus (lockjaw) : is a painful condition in which the jaws do not open fully.
  - Ear pain (referred from tongue base)

MID-LINE LUMP:

- **Thyroid gland –** located below the thyroid cartilage
- **Thyroid nodule –** can be single or multiple – adenomas/cysts/malignancy
- **Thyroglossal cysts –** painless/smooth /cystic – rises on tongue protrusion

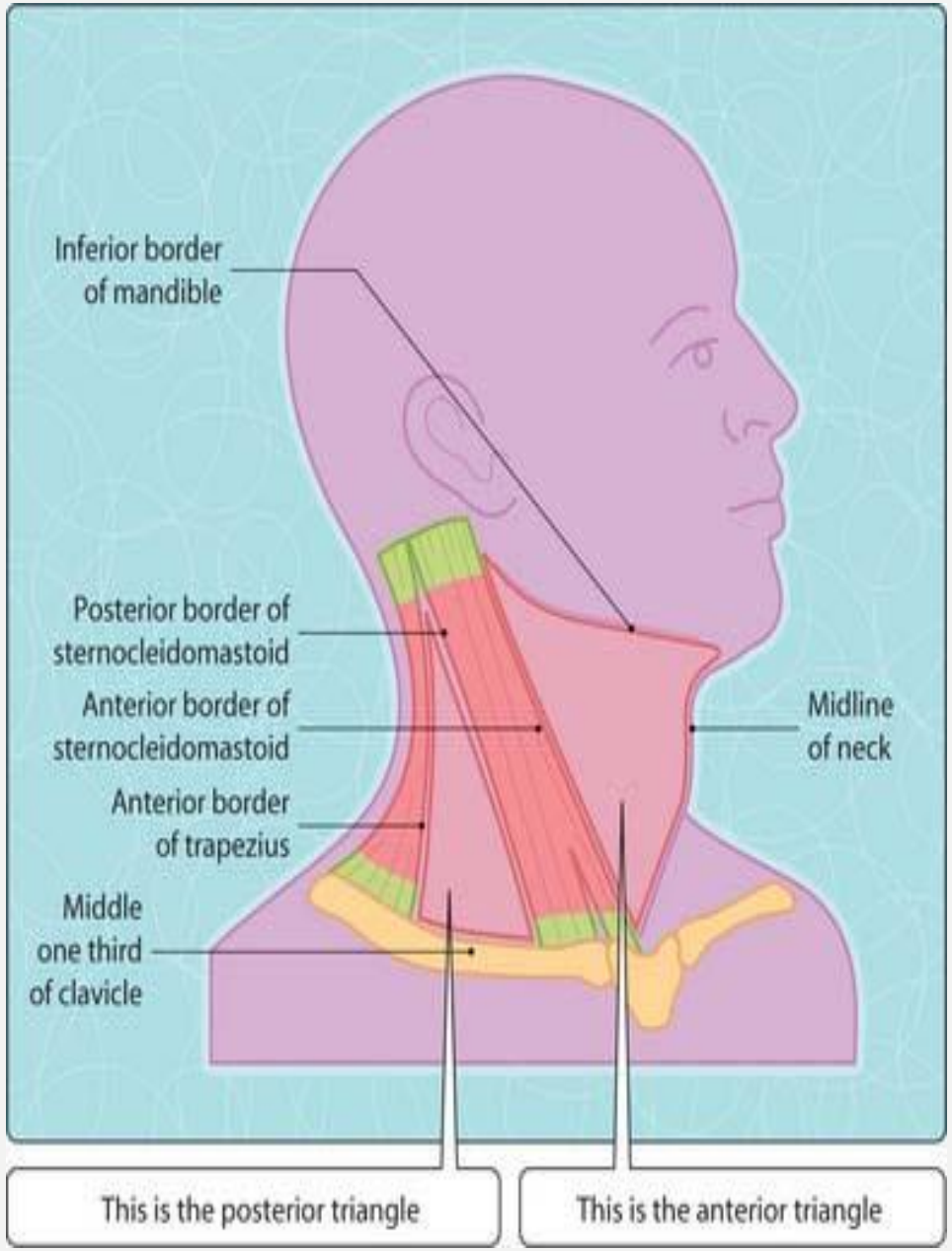
- **Lymph nodes –** often multiple, may suggest infection or malignancy

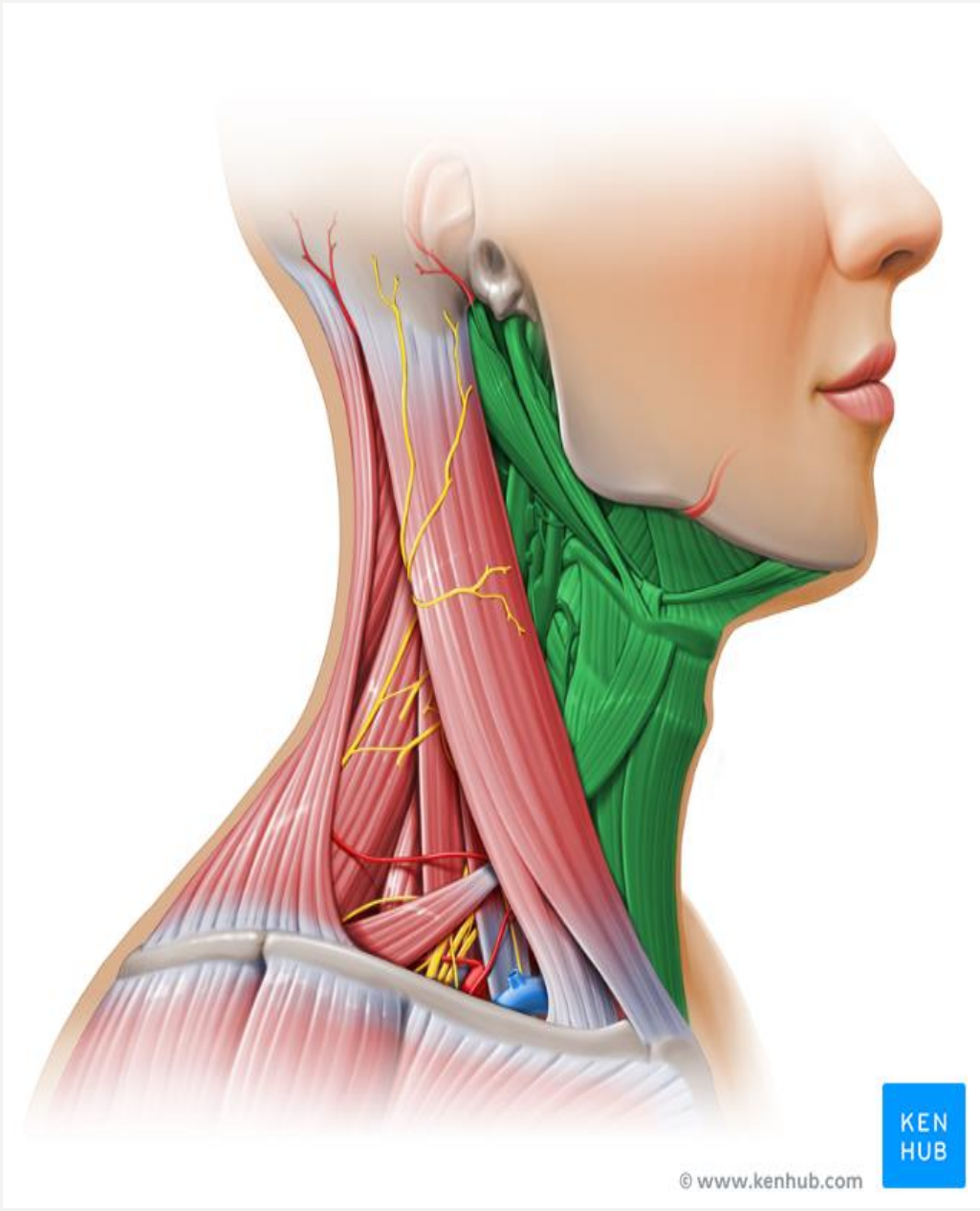
- **Lipoma –** painless/smooth mass

- **Dermoid cyst –** cysts formed along the lines of embryological fusion, painless swellings that do not move with tongue protrusion (more common in children and young adults)

- **Sebaceous cyst –** typically have an associated punctum

- **Laryngocele –** reducible tense mass – mass returns on sneezing or nose blowing


Inferior border of mandible
Posterior border of sternocleidomastoid
Anterior border of sternocleidomastoid
Anterior border of trapezius
Middle one third of clavicle
Midline of neck
This is the posterior triangle
This is the anterior triangle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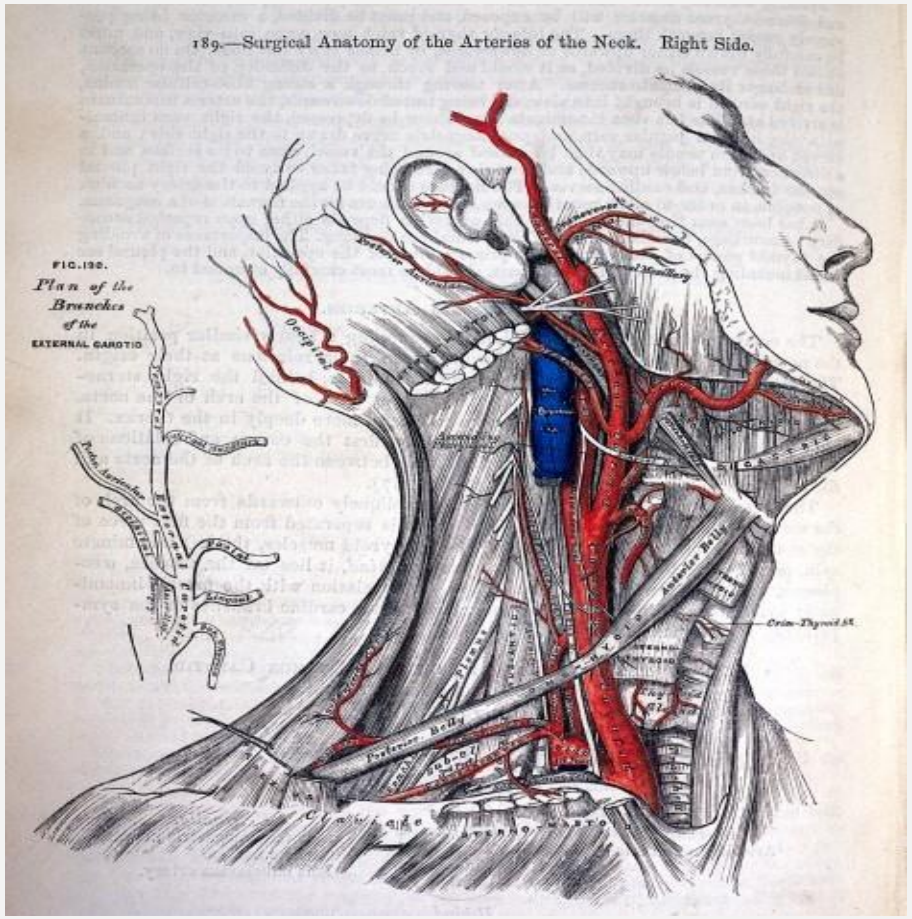
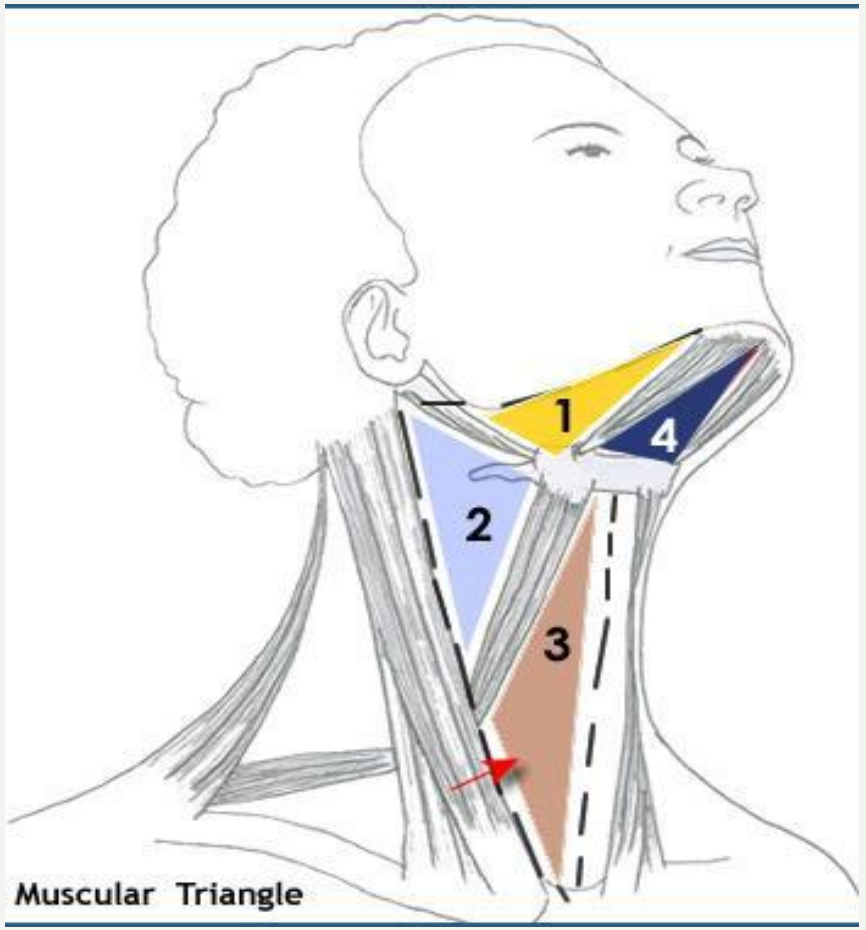


This anterior triangle is subdivided into four smaller triangles by the

Digastricus above, and the superior belly of the omohyoid.

These smaller triangles are named:

1. The submandibular triangle
2. The carotid triangle
3. The muscular triangle
4. The submental triangle



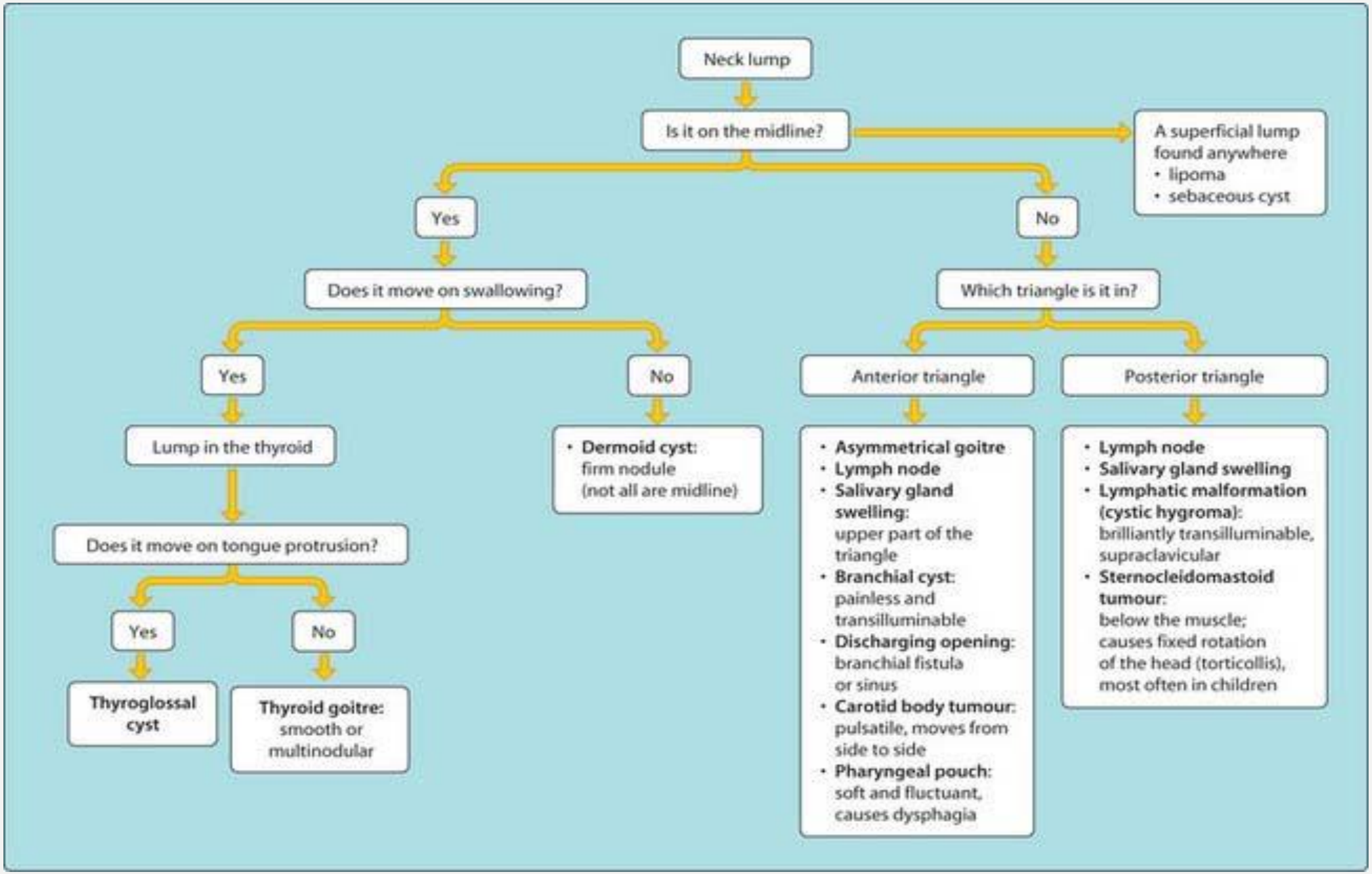
The **inferior carotid triangle** (or **muscular triangle**), is bounded, in front, by the median line of the neck from the hyoid bone to the sternum; behind, by the anterior margin of the sternocleidomastoid; above, by the superior belly of the omohyoid.

ANTERIOR TRIANGLE LUMP:

- **Lymph nodes**
- **Lipoma –** painless/smooth mass
- **Sebaceous cyst**
- **Salivary gland swelling –** doesn't move on swallowing
- **Branchial cyst –** present from birth – noticed in early adulthood when it manifests as an infected neck lump
- **Carotid artery aneurysm –** pulsatile mass – bruit present on auscultation
- **Carotid body tumor –** transmits pulsation – can be moved side to side but not up and down (due to carotid sheath)
- **Laryngocele –** reducible tense mass – mass returns on sneezing or nose blowing

POSTERIOR TRIANGLE LUMP:

- **Lymph nodes** – often multiple – can be rubbery or hard depending on etiology
- **Lipoma** – painless/smooth mass
- **Sebaceous cyst**
- **Subclavian artery aneurysm** – pulsatile mass
- **Pharyngeal pouch** – may present as a reducible mass
- **Cystic hygroma** – most commonly on the left side – fluctuant mass – transilluminates
- **Branchial cyst** – less common site
- **Mass in the tail of the parotid gland** – could be a pleomorphic adenoma or malignancy


Neck lump
Is it on the midline?
A superficial lump found anywhere
• lipoma
• sebaceous cyst
Yes
No
Does it move on swallowing?
Which triangle is it in?
Yes
No
Anterior triangle
Posterior triangle
Lump in the thyroid
• Dermoid cyst: firm nodule (not all are midline)
• Asymmetrical goitre
• Lymph node
• Salivary gland swelling: upper part of the triangle
• Branchial cyst: painless and transilluminable
• Discharging opening: branchial fistula or sinus
• Carotid body tumour: pulsatile, moves from side to side
• Pharyngeal pouch: soft and fluctuant, causes dysphagia
• Lymph node
• Salivary gland swelling
• Lymphatic malformation (cystic hygroma): brilliantly transilluminable, supraclavicular
• Sternocleidomastoid tumour: below the muscle; causes fixed rotation of the head (torticollis), most often in children
Does it move on tongue protrusion?
Yes
No
Thyroglossal cyst
Thyroid goitre: smooth or multinodular

TO COMPLETE THE EXAMINATION (CLOSURE)

- Thank the patient
- Patient comfortable?
- Help getting dressed?
- Wash your hands
- Summarize your findings

- Turn to examiner, hands behind back, holding stethoscope (try not to fidget!) before saying: "**To complete my examination**, I would like to…"
  - Further examination
    - Take a full history
    - Perform a thyroid status examination
    - Perform an Examination of the lymphoreticular system
    - Perform an examination of oral cavity, oropharynx and nasal cavity to exclude mucosal lesion
  - Suggest further assessment and investigations as indicated
    - Routine bloods – FBC/U&Es/CRP – may be useful if considering infection or malignancy
    - TFTs
    - Ultrasound scan of the lesion
    - Fine needle aspiration/ core biopsy of lump – to allow histological diagnosis
    - Early referral to ENT – if there is suspicion of malignancy or red flags are present

COMMON EXAM QUESTIONS FOR MEDICAL FINALS, OSCES AND MRCP PACES

WHAT ARE THE BORDERS OF THE ANTERIOR AND POSTERIOR TRIANGLE?

- Anterior triangle = midline, anterior border of sternocleidomastoid, inferior border of mandible

- Posterior triangle = middle third of clavicle, posterior border of sternocleidomastoid, anterior border of trapezius

WHAT ARE THE COMMON POSSIBLE CAUSES OF A LUMP IN THE NECK?

- **Superficial** (anywhere)
  - Sebaceous cyst
  - Lipoma
  - Abscess
- **Midline**
  - Thyroid lump
  - Thyroglossal cyst
  - Dermoid cyst
- **Anterior triangle**
  - Lymph node
  - Thyroid lump
  - Salivary gland swelling (parotid/ submandibular)
  - Carotid artery aneurysm
  - Carotid body tumor
  - Branchial cyst
  - Sternocleidomastoid tumor
- **Posterior triangle**
  - Lymph node
  - Subclavian artery aneurysm
  - Cervical rib
  - Cystic hygroma (newborns)

WHAT ARE THE POSSIBLE CAUSES OF A PAROTID SWELLING?

- Infection
  - Viral parotitis e.g. mumps (unilateral/ bilateral, painful, self-resolving)
  - Acute bacterial parotitis (unwell patient, unilateral, painful)
- Autoimmune i.e. Sjögren's syndrome
- Malnutrition
- Alcohol abuse
- Drugs e.g. anti-retroviral therapy
- Tumors
  - Benign (80-90%)
    - Most common = pleomorphic adenoma

HOW MIGHT A LUMP IN THE NECK BE INVESTIGATED?

- TFTs (and Abs)
- USS
- FNA / core biopsy
- Radioactive iodine uptake test

WHAT THYROID EXAMINATION SIGNS ARE SPECIFIC TO GRAVES' DISEASE?

- Exophthalmos
- Chemosis
- Ophthalmoplegia
- Thyroid acropachy
- Pretibial myxedema

HOW CAN THE SEVERITY OF THYROID EYE DISEASE BE GRADED?

American Thyroid Association NO SPECS system

- **N**o signs
- **O**nly signs (upper lid retraction ± lid lag)
- **S**oft tissue involvement (chemosis)
- **P**roptosis
- **E**xtraocular muscle involvement (usually with diplopia)
- **C**orneal involvement
- **S**ight loss (due to optic nerve involvement)

WHAT IS THE DIFFERENTIAL DIAGNOSIS OF THYROID ENLARGEMENT?

- **Smooth**
  - Simple Goiter
  - Graves
  - Hashimoto's thyroiditis
  - Thyroiditis
    - Acute tenderness, pain and swelling.
    - May be hyperthyroid.
- **Multinodular goitre (MNG)**
  - Usually benign, but in MNG with a dominant single nodule, 5% chance of malignancy.
- **Fibrotic goiter (Riedel's Thyroiditis)**
  - Irregular, hard, 'woody' thyroid gland
  - Impossible to clinically distinguish from carcinoma
- **Solitary nodule**
  - Thyroid adenoma
  - Solitary toxic adenoma can occur (giving T_3 toxicosis) but are uncommon
  - Thyroid cysts
  - Single nodule in multinodular goiter
  - Carcinomas

WHAT IS THE DIFFERENTIAL DIAGNOSIS OF A PAINFUL THYROID?

- De Quervains
  - Hyperthyroid, then hypo. Probably post-viral.
- Infectious thyroiditis
  - Euthyroid
- Radiation thyroiditis

WHAT ARE THE POSSIBLE COMPLICATIONS OF A LARGE GOITERS?

- Upper airway obstruction
- Dysphagia
- Recurrent laryngeal palsy
- Jugular compression
- Horner's syndrome

WHAT IS THE DIFFERENTIAL DIAGNOSIS OF PROPTOSIS?

- Grave's disease
- Cavernous sinus thrombosis
- Carotico-cavernous fistula
- Orbital cellulitis
- Retro-orbital malignancy

WHAT ARE THE INITIAL INVESTIGATIONS OF A NECK LUMP?

- **Bloods**
  - Thyroid function tests
  - Thyroid peroxidase antibodies (TPO Abs)
  - TSH receptor antibodies (TR Abs)
- **Ultrasound (USS)**
- **Fine needle aspiration (FNA)**

WHAT ARE THE COMPLICATIONS OF HYPOTHYROIDISM?

- Depression
- Bradycardia and associated symptoms
- Hyperlipidemia
- Carpal tunnel syndrome
- Heart failure
- Coma eventually

WHAT ARE POSSIBLE TREATMENTS FOR HYPERTHYROIDISM?

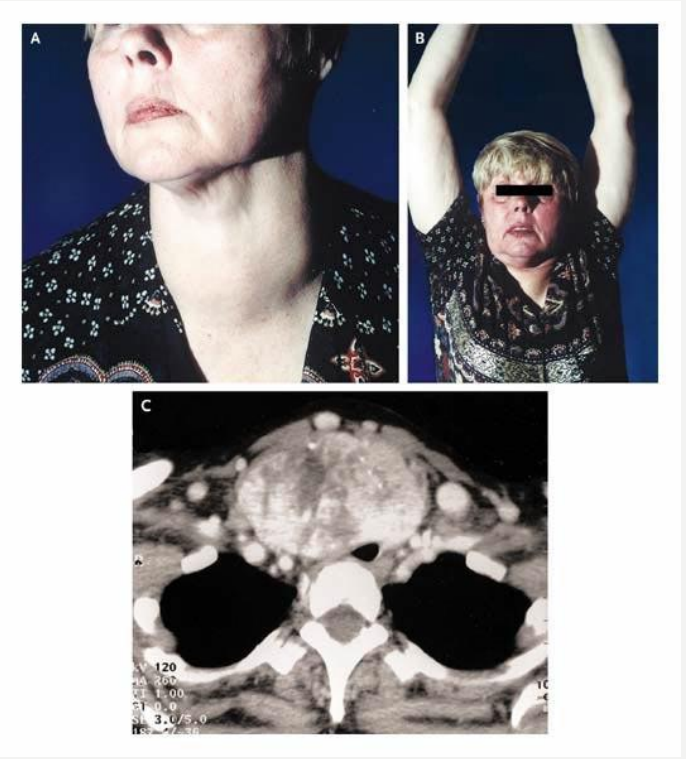
- Symptoms
  - Beta-block
- Disease control
  - Carbimazole
    - NB. If pregnant, do not give carbimazole in high doses (use propothiuracil). Also do not use block and replace as thyroxine does not cross the placenta
  - Radioactive Iodine
    - Contraindicated in pregnancy and lactation, must avoid close contact with children under 11 for two weeks, and pregnancy for four months
  - Subtotal thyroidectomy
    - Only done once patient has been rendered medically euthyroid

PEMBERTON'S SIGN

- Was named after Dr. Hugh Pemberton, who characterized it in 1946.
- The Pemberton maneuver is a physical examination tool used to demonstrate the presence of latent pressure in the thoracic inlet. The maneuver is achieved by having the patient elevate both arms until they touch the sides of the face. A positive Pemberton's sign is marked by the presence of facial congestion and cyanosis, as well as respiratory distress after approximately one minute.
- Causes: A positive Pemberton's sign is indicative of superior vena cava syndrome (SVC), commonly the result of a mass in the mediastinum. Although the sign is most commonly described in patients with **substernal goiters** where the goiter "corks off" the thoracic inlet, the maneuver is potentially useful in any patient with adenopathy, tumor, or fibrosis involving the mediastinum. SVC syndrome has been observed as a result of diffuse mediastinal lymphadenopathy of various pathologies such as cystic fibrosis and Castleman's disease.

PEMBERTON'S SIGN

A 58-year-old woman with a 20-year history of goiter presented with a two-month history of progressive dyspnea on exertion, occasional stridor, and a choking sensation while supine. She had previously been asymptomatic. Physical examination revealed a diffusely enlarged thyroid with no palpable nodules (Panel A), but the lower poles of the thyroid were not palpable. Within 30 seconds after she raised both arms simultaneously (Pemberton's maneuver), marked facial plethora (Pemberton's sign) developed, indicating compression of the jugular veins (Panel B). The patient's serum thyrotropin and free thyroxine concentrations were normal. Computed tomography of the neck revealed a large goiter extending . . .



- Pemberton's sign is used to evaluate venous obstruction in patients with goiters. The sign is positive when bilateral arm elevation causes facial plethora. It has been attributed to a "cork effect" resulting from the thyroid obstructing the thoracic inlet, thereby increasing pressure on the venous system. According to some, the "cork effect" is caused by the thyroid descending into the thoracic inlet during arm elevation. According to others, the obstruction is due to elevation of the thoracic inlet against the thyroid.
- In the present case, we demonstrated that when eliciting Pemberton's sign, facial plethora and venous engorgement were due to the clavicles moving and compressing venous vasculature against the enlarged thyroid and not to a "cork effect." Rather, the clavicular motion observed during arm elevation could be compared to the movement of a "nutcracker" compressing major venous structures within a narrowed thoracic inlet against a relatively fixed and enlarged thyroid.