Things that Go Bump in the Night: Evaluation of Neck Masses

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Disclosures

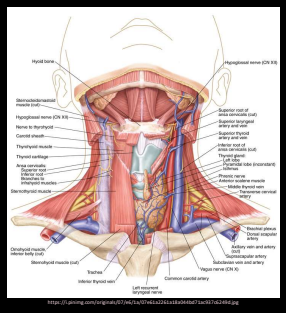
- I have no relevant relationships with ineligible companies to disclose within the past 24 months. *(Note: Ineligible companies are defined as those whose primary business is producing, marketing, selling, re-selling, or distributing healthcare products used by or on patients.)*

Educational Objectives

- At the conclusion of this session, participants should be able to:
  - Describe appropriate evaluation, including history and physical exam, of a patient presenting with a neck mass
  - Develop a prioritized differential diagnosis for a patient presenting with a neck mass
  - Select appropriate diagnostic testing for a patient presenting with a neck mass

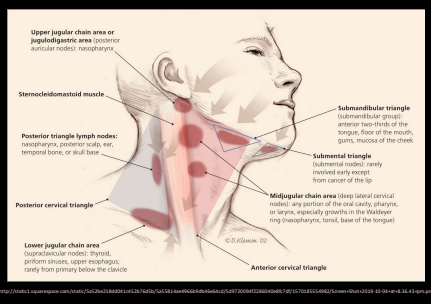
Anatomy

Neck Anatomy

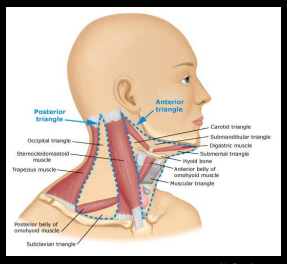


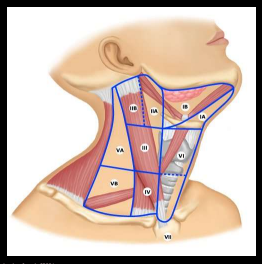
- Submandibular glands
- Lymph nodes
- Carotid artery
- Jugular vein
- Thyroid
- Musculature
- Nerves

Lymph Node Drainage



Levels of Lymph Nodes





http://www.aboutcancer.com/lymph_node_levels_of_neck_0509.jpg

History

HPI

- When did you first notice it?
- How did you notice it?
  - Were you sick at the time?
- Is it painful?
- Is it there all the time?
- Is it changing?
  - Does anything cause it to change?
  - Growing?
  - Any new lumps?
- Trauma to that area?
- Previous surgery to that area?

HPI – Associated Symptoms

- Throat or mouth pain
- Otalgia
- Hoarseness or dysphonia
- Dysphagia
- Odynophagia
- Numbness
- Weakness
- Skin changes or lesions
- Weight loss?
- Night sweats?
- Itching all over?
- Pain in the mass when drinking alcohol?
- Cough/ hemoptysis

Social and Past Medical History

- Smoker?
  - How much and how long
- Drink alcohol?
  - How much and how long
- Occupation
  - Carpenter/woodworker, boat making, manufacturing, masonry
- History of HPV?
- Childhood illnesses?
  - Radiation exposure

History Clues

- Long term masses are likely benign
- Rapidly growing or changing are likely infectious or malignant
- Change with URI symptoms likely congenital cysts
- Change with eating and drinking likely salivary gland/duct masses
- Non-painful more likely to be malignant
- Hoarseness, dysphonia, dysphagia, and otalgia more likely to be malignant (unless acutely ill)
- Night sweats, weight loss, itching all over, pain with alcohol more likely to be lymphoma

Physical Exam

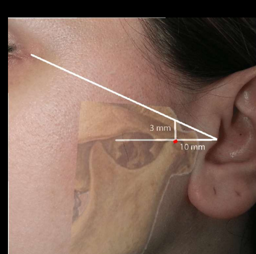
With Your Greeting

- Assess voice
  - Pitch
  - Clarity
  - Hoarseness
  - Nasal intonation
- Assess face
  - Symmetry
  - Facial movement

https://en.wikipedia.org/wiki/Joe_Mantegna

Head and Face

- Inspect and palpate skull/scalp
  - Skin lesions
  - Masses
- Palpate face
  - Parotid gland
  - Temporal mandibular joint (TMJ)
    - Crepitus
    - Subluxation



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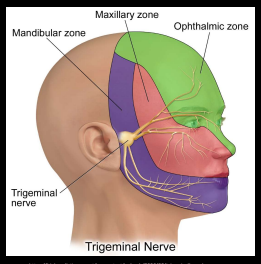
Head and Face

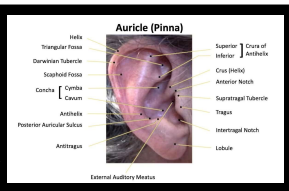
- Trigeminal nerve sensation

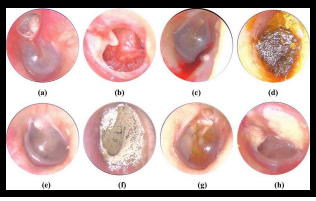


https://biologydictionary.net/wp-content/uploads/2020/05/trigeminalbranches.png

Ears

- Inspection of Auricles
- Palpation of Auricle
- Inspection of post auricular area
- Palpation of post auricular area
- Otoscopic exam of external auditory canal
- Otoscopic exam of tympanic membrane





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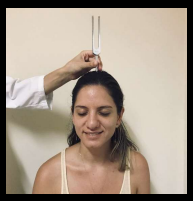
https://media.springernature.com/full/springer-static/image/art%3A10.1038%2Fs41598-021-90345-w/MediaObjects/41598_2021_90345_Fig1_HTML.jpg

Hearing

- Webber
  - Differentiates between ears
- Rinne
  - Air versus bone conduction



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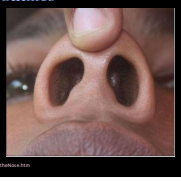
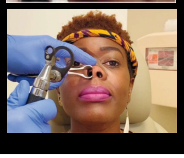
https://upload.wikimedia.org/wikipedia/commons/thumb/2/23/Weber_Test.jpg/1200px-Weber_Test.jpg

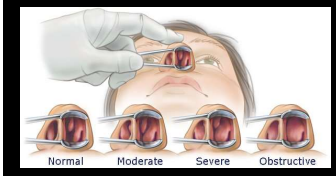
Nose

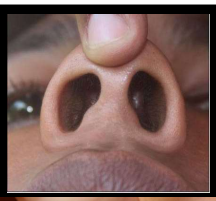
- Inspection of external nose
- Anterior rhinoscopy
  - Septum
  - Inferior and middle turbinates
  - Mucosa

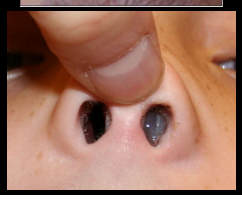




Turbinate vs Polyp



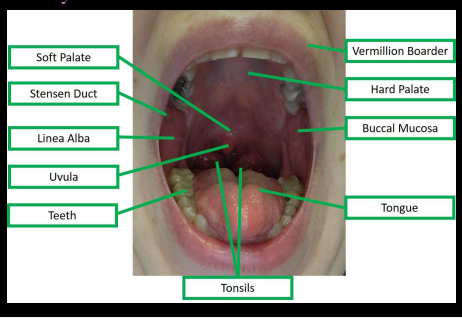




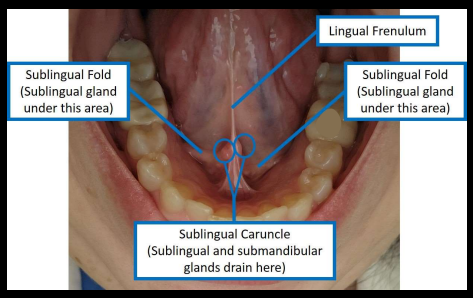
Mouth

- Inspection
  - Lips
  - Gingiva and teeth
  - Tongue
  - Uvula
  - Tonsillar fossae
  - Posterior pharynx
  - Hard palate
  - Soft palate
- Palpation
  - Floor of mouth
    - Bimanual exam
      - Sublingual and submandibular glands
  - Buccal mucosa
  - Base of tongue

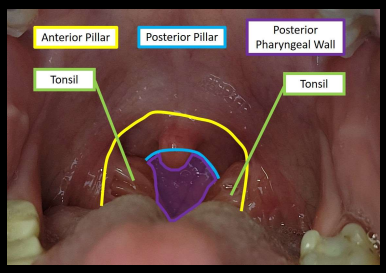
Oral Cavity

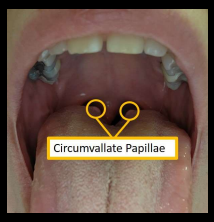


Floor of Mouth

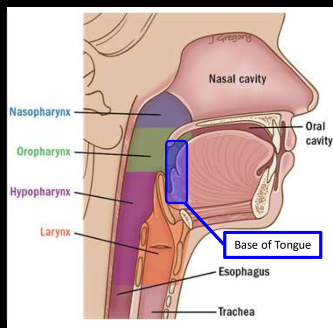


Posterior Oral Cavity and Oropharynx





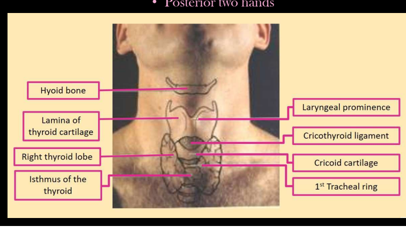
Base of Tongue



Adapted from https://thancguide.org/cancer-types/throat/pharyngeal/hypopharyngeal/anatomy/

Neck

- Palpation
  - Lymph node chains (bimanual)
    - Anterior cervical
    - Posterior cervical
    - Submental
    - Submandibular
  - Submandibular glands
  - Parotid gland
  - Hyoid
  - Thyroid cartilage
  - Cricoid
  - Trachea
  - Thyroid gland
    - Anterior one hand
    - Posterior two hands



Adapted from https://encrypted-tbn0.gstatic.com/images?q=tbn:ANd9GcQJlkQaBPCmirlOlde7ouQ95n3gEFRQzue3eg&usqp=CAU

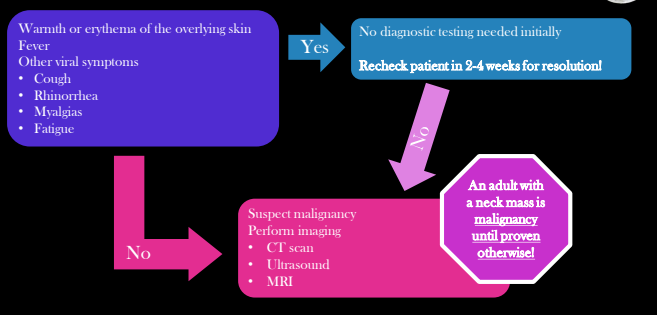
Physical Exam Clues

- Age
  - The older the patient the more likely the neck mass is a malignancy
- Location
  - Look at area of drainage for lymph nodes for origin
- What does it feel like?
  - Mobile, firm or rubbery but not rock hard, and slightly tender- reactive or infectious lymph node
  - Rock-hard, fixed – malignancy
  - Isolated, asymmetric, tender, warm, and erythematous- infectous
  - Soft, ballotable, mobile- congenital cysts
    - In an adult may be a cystic metastatic lesion
  - Pulsatile quality or bruit- vascular

Physical Exam Clues

- How is it behaving?
  - Firm, lateral neck mass that moves from side to side but not up and down -involvement with the carotid or nerve sheath
  - Immobile midline neck mass that elevates with swallowing or sticking out the tongue- thyroid or thyroglossal duct cyst

Diagnostic Workup



How to Choose Imaging

- Ultrasound
  - Best for thyroid evaluation
  - If you suspect benign lymphadenopathy
- CT scan with and without contrast
  - If you suspect a malignancy
  - If the mass appears to be something other than a lymph node
- MRI with gadolinium
  - If you suspect a nerve tumor or CT scan is not diagnostic
- Positron emission tomography – PET/CT
  - Once malignancy has been diagnosed

Lab Evaluation?

- Not usually needed
- If infectious and persistent or severe illness consider
  - CBC with differential
  - CRP/ESR
  - Blood Cultures if appear septic
  - Infection specific labs
- LDH?

Put it all together....What could it be?

Differential Diagnosis

- Bacterial lymphadenopathy
- Branchial cleft cyst
- Dermoid cyst
- Laryngocele
- Lipoma
- Lymphoma
- Metastatic head and neck malignancy
- Non-infectious inflammatory lymphadenopathy
- Paraganglioma
- Parasitic lymphadenopathy
- Ranula
- Reactive viral lymphadenopathy
- Salivary gland mass
- Schwannoma
- Skin cyst
- Teratoma
- Thymic cyst
- Thyroglossal duct cyst
- Thyroid mass
- Vascular anomalies

How to Wrap Your Head Around the Differential Diagnosis

- Categorize them in a logical manner
  - Location
  - Type
  - Age range
  - Risk factors
  - Length of time mass has been present
- Biopsy it
- Refer to an Otolaryngologist

Biopsy

- Ultrasound or CT guided
  - Fine needle aspirate
  - Core biopsy
    - Needed to diagnose lymphoma to do flow cytometry
- Open
  - Rarely needed
  - Consider if biopsy is non-diagnostic and high suspicion for lymphoma
  - Avoid if possible when other malignancy
- Not always appropriate!

How I Group My Differential Diagnosis

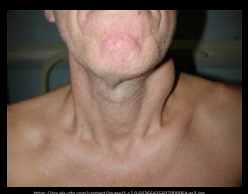
- Neoplastic/malignancy
  - Metastatic head and neck malignancy
  - Lymphoma
  - Salivary gland mass
  - Thyroid mass
  - Paraganglioma
  - Schwannoma
  - Lipoma
  - Skin cysts
- Inflammatory
  - Reactive viral lymphadenopathy
  - Bacterial lymphadenopathy
  - Parasitic lymphadenopathy
  - Non-infectious inflammatory lymphadenopathy
- Congenital
  - Branchial cleft cyst
  - Thyroglossal duct cyst
  - Ranula
  - Teratoma
  - Dermoid cyst
  - Thymic cyst
  - Laryngocele
  - Vascular Anomalies

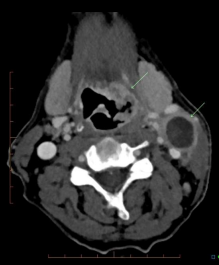
Neoplastic/Malignancy

Metastatic Head and Neck Malignancy

- Predominantly squamous cell cancers of the aerodigestive tract
  - Can be skin malignancy metastasis also
- Look at the lymphatic drainage pathways for primary site
  - Ensure patient's airway is stable

Metastatic Head and Neck Malignancy

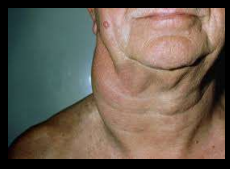




Lymphoma

- Up to 80 percent of patients with Hodgkin's Lymphoma have neck lymph nodes involved
- More than two-thirds of patients with Non-Hodgkin's Lymphoma have painless lymphadenopathy
- Waldeyer's ring (tonsils, base of the tongue, nasopharynx) often involved

Lymphoma



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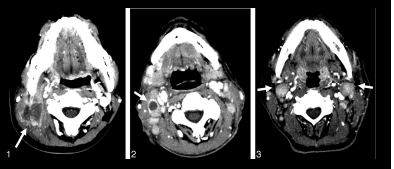


http://www.ajnr.org/content/ajnr/27/5/1079/F2.large.jpg

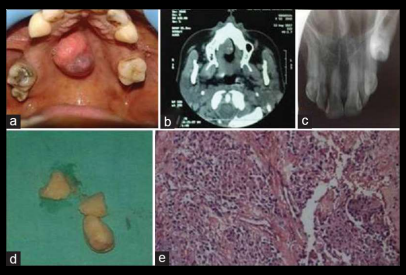
Salivary Gland Masses

- 80% of salivary neoplasms arise in the parotid gland
  - 80% of parotid masses are pleomorphic adenomas
- Up to 50% of submandibular masses are malignant
- Cranial nerve deficits are a sign of malignancy

Benign Salivary Gland Masses

- Pleomorphic adenoma
  - 85% of salivary tumors
- Warthin's tumor
  - Strongly associated with smoking
  - May be bilateral
- Lymphoepithelioma
  - Seen in HIV
- Oncocytoma
- Monomorphic adenoma

Benign Salivary Gland Masses

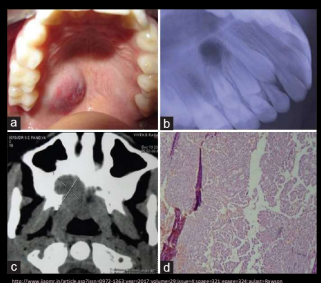


http://www.jaomr.in/article/2017/29/4/images/IndianJAcadOralMedRadiol_2017_29_4_321_225541_f1.jpg

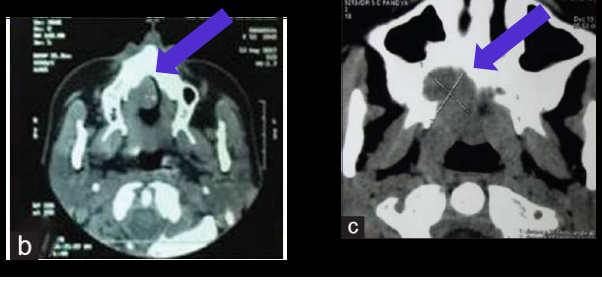
Malignant Salivary Gland Masses

- Mucoepidermoid carcinoma
  - 30-35% of salivary malignancies
- Adenoid cystic carcinoma
  - Commonly in minor salivary glands
- Adenocarcinomas
- Salivary duct carcinoma
- Squamous cell carcinoma
- Carcinoma ex pleomorphic adenoma

Malignant Salivary Gland Masses



Malignant vs. Benign



Thyroid Mass

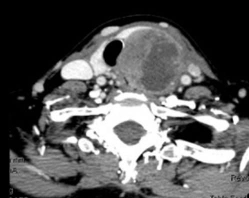
- Thyroid nodules are common and are commonly benign
- Prevalence of 2-6% with palpation, 19-35% with ultrasound, and 8-65% in autopsy data
- Nodule incidence increases with age, and is increased in women, in people with iodine deficiency, and after radiation exposure.

Thyroid Masses

- Benign
  - Multinodular Goiter
  - Follicular Adenomas
  - Hurthle-Cell Adenomas
  - Hashimoto's Thyroiditis
  - Cysts (colloid, simple, complex)
- Malignant
  - Papillary Carcinoma
  - Medullary Carcinoma
  - Anaplastic Carcinoma
  - Primary Thyroid Lymphoma
  - Metastatic Carcinoma (breast, renal cell, and others)
  - Follicular Carcinoma

Thyroid Masses

https://www.omicsonline.org/articles-images/2167-7948-1-103-g001.gif

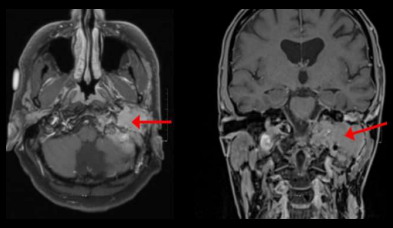


https://www.thyroidcancer.com/attachments/store/56e22c033fff e8a4564f53b65c9ef14119b78ac9bbea5efbcf8dc1c8742a/image.jpg

Paraganglioma

- Carotid body (most common) and jugulotympanic paraganglia
- Highly vascular, typically benign tumors
- Almost all are from the parasympathetic paraganglia
- 10-20% are multicentric
- 33% are inherited as part of a genetic syndrome
  - Hereditary paraganglioma-pheochromocytoma
- 10% of patients have a family history

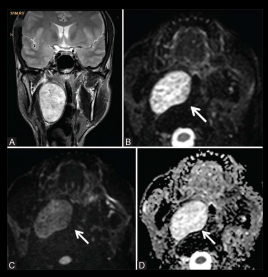
Paraganglioma



Schwannoma

- Closely associated with, but relatively circumscribed from, peripheral nerves
- Can arise from any peripheral nerve
  - Vagus nerve
    - Hoarseness or aspiration
  - Superior cervical sympathetic chain
    - Horner's syndrome

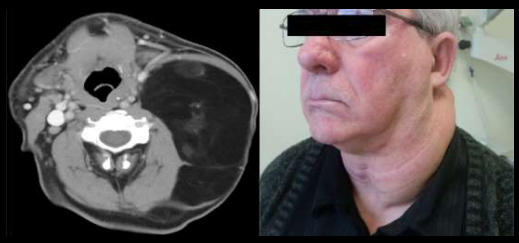
Schwannoma



Lipoma

- Benign neoplasms comprised of fat
- Often asymptomatic
- Pain, rapid growth, or radiographic abnormality
  - Need to rule out liposarcoma
    - Surgical excision

Lipoma



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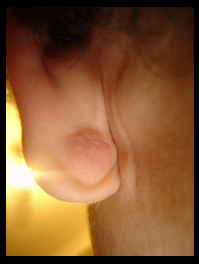
Skin Cysts

- Often
  - Epidermoid inclusion cysts
  - Dermoid
  - Pilomatrixoma

Skin Cysts



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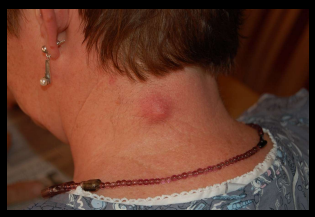

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Inflammatory

Reactive Viral Lymphadenopathy

- Common in level 2A with viral illnesses
- Imaging showing lymph nodes less than 1 cm (or 1.5 cm in the upper jugulodigastric chain), oblong in shape, with preserved fatty hilum
  - Larger, 2 cm lymph nodes on imaging associated with EBV
- Resolve within 2 weeks of symptom resolution
  - EBV lymphadenopathy resolves in 4-6 weeks

Bacterial Lymphadenopathy

- Most commonly caused by Staphylococcus aureus and group A beta-Streptococcus in the skin or pharynx
  - Consider MRSA

Bacterial Lymphadenopathy- Uncommon Bacteria

- Tularemia (Francisella tularensis)
  - Transmission via rabbits, ticks, or contaminated water
  - Tonsillitis/pharyngitis and painful lymphadenopathy
- Brucellosis (Brucella)
  - Transmission via cows, pigs, goats, elk, and bison
  - Afternoon fever peaks
- Cat-scratch disease (Rochalimaea henselae)
  - Transmission via cats
  - Submandibular and/or preauricular lymphadenopathy
- Actinomycosis
  - Associated with dental procedures
  - Submandibular region
  - Biopsy shows granulomas with sulfur granules
- Mycobacterial
  - Mycobacterium tuberculosis
    - Bilateral
  - Atypical mycobacterium
    - Single lymph node in upper neck or parotid
    - Overlying skin purple
- HIV
  - Present in up to 45 percent of patients with HIV infection

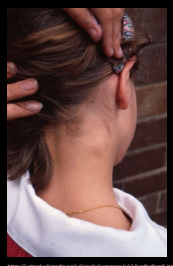
Non-Infectious Inflammatory Lymphadenopathy

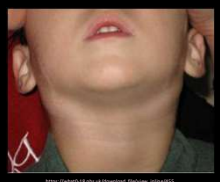
- Castleman disease
  - Lymphoproliferative disease
  - Multifocal associated with human herpes virus type 8 (HHV-8) and HIV
- Rosai-Dorfman disease
  - Histiocytic disorder which involves the over-production of a type of white blood cell called non Langerhans sinus histiocyte which accumulate in lymph nodes
- Sarcoidosis
  - Inflammatory disease causing growth of granulomas
    - Most commonly the lungs and lymph nodes
- Kawasaki disease
  - High fever that lasts longer than 5 days
  - Swollen lymph nodes in the neck
  - Rash on the mid-section and genital area
  - Red, dry, cracked lips and a red, swollen tongue
  - Red, swollen palms of the hands and soles of the feet
  - Redness of the eyes
- COVID-19 vaccine
  - 5-10% ipsilateral cervical lymphadenopathy
  - Appear within 2-3 weeks of vaccine
  - Often >1cm

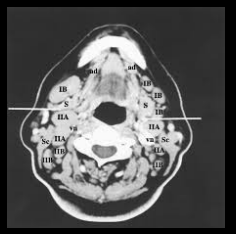
Parasitic Lymphadenopathy

- Toxoplasma gondii
  - Protozoan parasite
  - Ingestion of inadequately cooked meat or the ingestion of cat feces

Lymphadenopathy





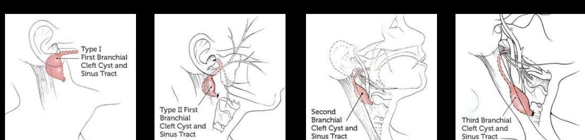


Congenital

Branchial Cleft Cyst

- Due to incomplete obliteration during embryogenesis
- Accounts for 20% of pediatric neck masses
- Present anterior to the sternocleidomastoid muscle
  - First branchial cleft cyst (1%) appear near the auricle
  - Second branchial cleft cyst (majority) appear anterior to the angle of the mandible
  - Third branchial cleft cyst appear lower in the neck

Branchial Cleft Cyst Levels



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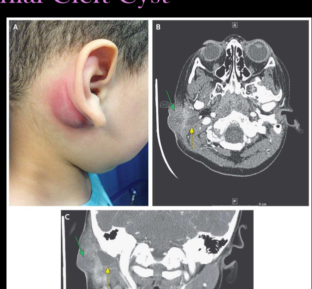
First Branchial Cleft Cyst



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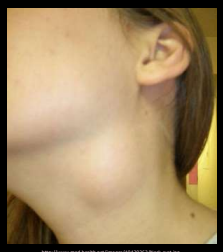
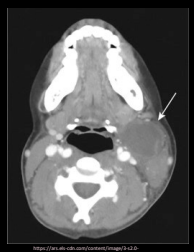
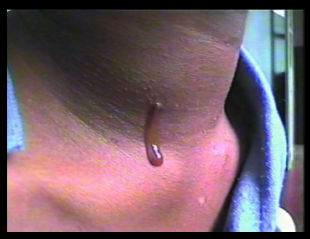
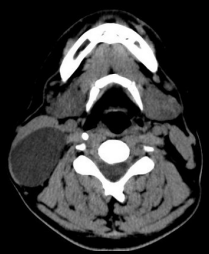
Second Branchial Cleft Cyst





Third Branchial Cleft Cyst

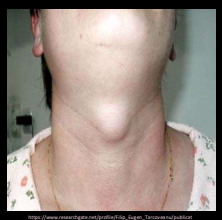


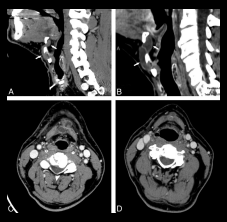


Thyroglossal Duct Cyst

- Cysts of epithelial remnants of the thyroglossal tract
- Midline cystic upper neck mass that elevates with protrusion of the tongue
- Must check thyroid US

Thyroglossal Duct Cyst

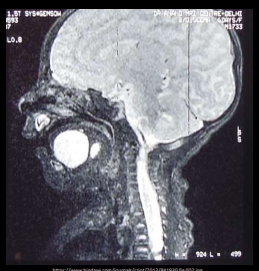




Ranula

- Mucocele or retention cyst arising from an obstruction in the sublingual glands in the floor of mouth
- Cystic mass located in the submental region
  - Plunging ranula
    - Extension through the mylohyoid muscle into the neck
- Grow or change with eating and drinking

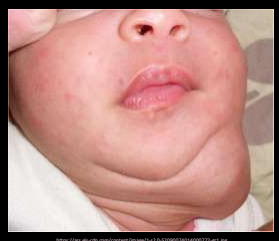
Ranula

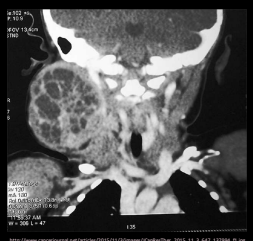


Teratoma

- Arise from pluripotential cells and contain all three germ layers
- Large, encapsulated, and contain a cystic component.
- Noted in the first year of life and can cause significant aerodigestive obstruction

Teratoma





Dermoid Cyst

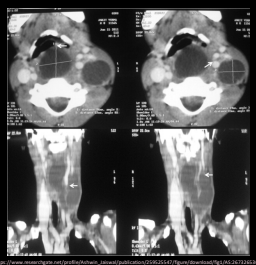
- Arise due to entrapment of epithelium in deeper tissue
- Occurs developmentally or post-trauma.
- Usually midline, nontender, mobile, submental neck masses

Dermoid Cyst

Thymic Cyst

- Arise from implantation of thymic tissue during its embryologic descent
- Usually located in the midline neck
  - Can present anywhere between the angle of the mandible and the midline of the neck

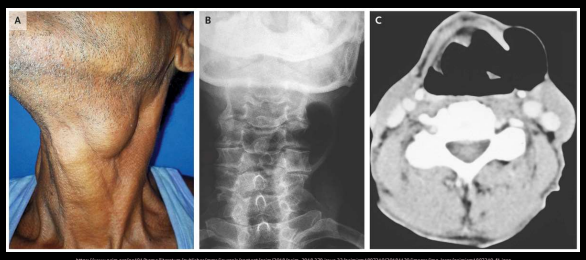
Thymic Cyst



Laryngocele

- Caused by herniation of the saccule of the larynx
  - Internal laryngocele
    - Limited to the anatomic boundaries of the larynx
  - External or mixed laryngocele
    - Extend through the thyrohyoid membrane
- When extend into the neck presents as an air filled cyst in the anterior neck
- Present with hoarseness, cough, and a foreign body sensation
- Laryngoscopy
  - Dilation at the level of the false cord, involving both the false cord and aryepiglottic fold

Laryngocele



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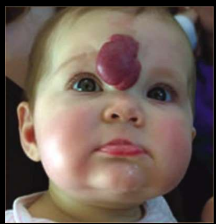
Vascular Anomalies

- Vascular tumors
  - Endothelial neoplasms characterized by increased cellular proliferation
    - Hemangioma (most common)
      - Occur almost exclusively in infants
      - Rapid growth phase followed by a slow regression
    - Hemangiopericytoma
    - Hemangioendothelioma
    - Angiosarcoma
- Vascular Malformations
  - Anomalies arising from errors of embryonic and fetal development
    - Lymphatic malformations (most common)

Vascular Anomalies



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https://www.enttoday.org/wp-content/uploads/springboard/image/2009_06_a08_03.gif

Take Home Points

- History and physical will often tell you the type of neck mass (or significantly limit the differential)
- ANY ADULT WITH A NECK MASS HAS CANCER UNTIL PROVEN OTHERWISE
- Imaging for further characterization, look for tract when it is cystic, and evaluate for primary lesion when metastatic
- Biopsy it!
- Timely referral

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Questions?

Feel free to email me with any further questions not answered today:

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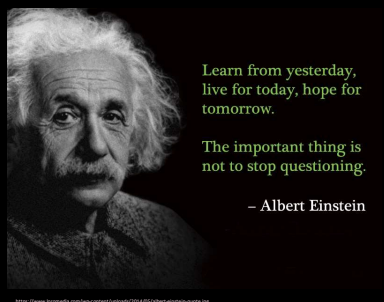

Learn from yesterday, live for today, hope for tomorrow.

The important thing is not to stop questioning.

– Albert Einstein

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