



Ultrasound of the Tonsils and Base of Tongue

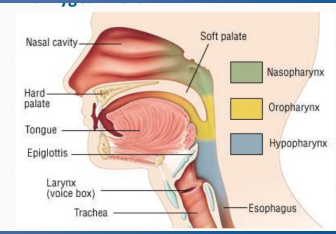



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Nothing to Disclose

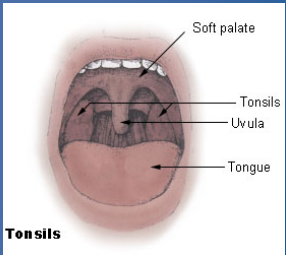


Oropharynx NOT Oral Cavity



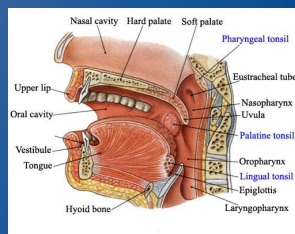
- Oropharynx
 - Tonsils
 - Base of tongue
 - Soft palate
 - Posterior oropharyngeal wall

Palatine Tonsils



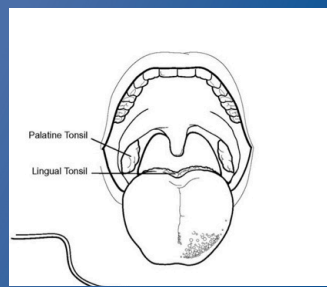
- Pair of soft tissue masses located at back of throat in pharynx
- Part of lymphatic system
- Protect body against respiratory and GI infections

Lingual Tonsils



- Pair located on each side of posterior aspect of tongue
- Blood supply
 - Lingual artery, branch of external carotid artery
 - Tonsillar branch of facial artery
 - Ascending pharyngeal branch of external carotid artery

Tonsils



Base of Tongue

- Back third of tongue
- Different embryological origin

Labels in diagrams: Base of tongue, Circumvallate papilla, Oral tongue, Vallecule, Epiglottis, J. Langens


Labels: Pharyngeal Tonsil (Adenoid), Nasopharynx, Soft Palate, Uvula, Palatine Tonsil, Oropharynx, Tongue, Lingual Tonsil, Laryngopharynx, Hard Palate, Nasal Cavity

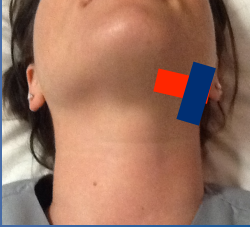
Tonsils and Throat

Ultrasound Protocol

- Variety of transducers
 - Linear
 - 9 MHz
 - 14 MHz
 - Curved Linear
 - 8MHz
 - 3.5-5 Mhz
 - Speciality
 - X6-1
 - High Density Transducers
- Transverse
- Coronal
- Sagittal
- Look for neck nodes
 - Level 2 and 3
- Have patient move tongue can help identify tonsil

Transducer Position For Scanning the Palantine Tonsils






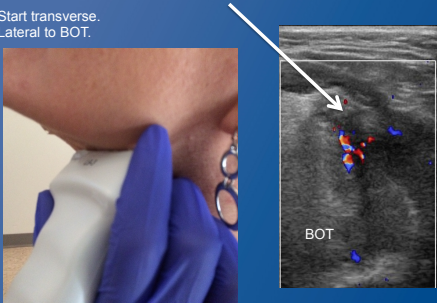
- Blue rectangle is sagittal oblique plane to obtain longitudinal image
- Red rectangle is coronal oblique plane to obtain transverse

Courtesy of Dr. Coquia


Normal Tonsil: Coronal Position



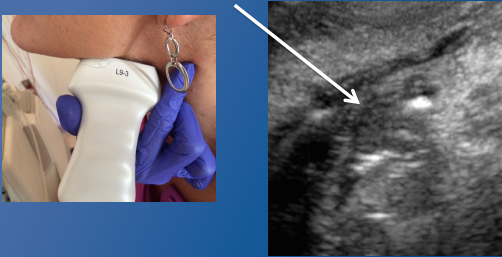
Start transverse.
Lateral to BOT.

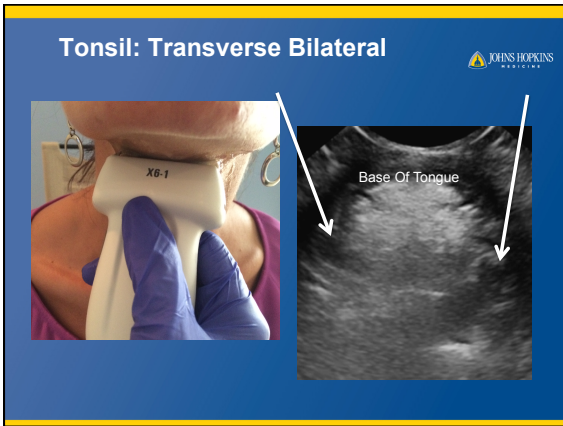


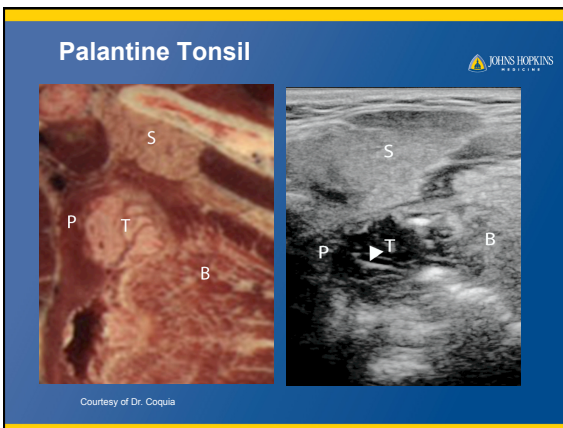
Normal Tonsil: Sagittal Position

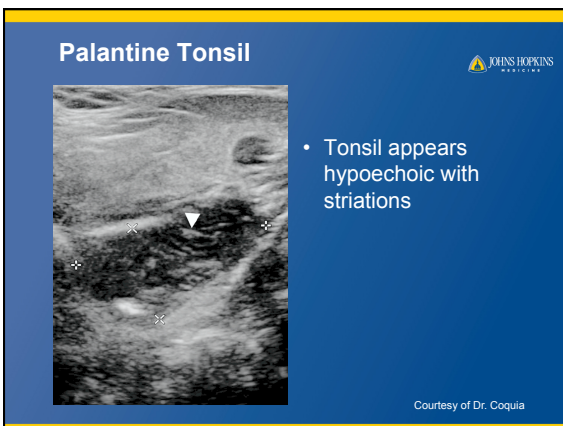


Turn to sag position.

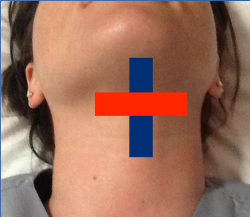








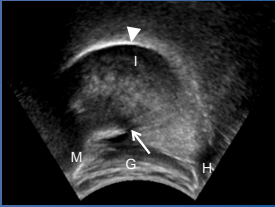
Transducer Position for Base of Tongue



- Blue rectangle is sagittal plane to obtain longitudinal images
- Red rectangle submental region to obtain coronal images

Courtesy of Dr. Coquia

Sagittal Tongue

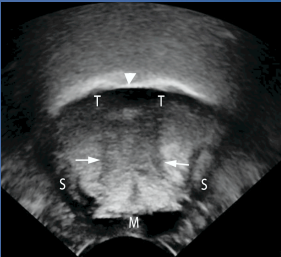


- Arrowhead - mucosal surface of the tongue
- I = intrinsic muscles of the tongue
- Arrow = fanlike structure of the genioglossus muscle
 - Best seen on US and MRI
- M = mandible
- G = geniohyoid muscle
 - Runs from mandible to hyoid
- H = hyoid bone

Start sag. Flip top - bottom

Courtesy of Dr. Coquia


BOT - Transverse




- Arrowhead = mucosa
- T = transverse muscles
- Arrows = genioglossus muscle
- S = shadowing from the hyoid bone
- M = mylohyoid

Courtesy of Dr. Coquia


MRI and CT Issues



- Motion artifact
 - Swallowing
 - Tongue motion
- Dental artifacts
- Unable to appreciate striations
- Difficulty in determining if base of tongue cancer has spread past midline and is tonsil cancer has invaded base of tongue
 - Determines treatment
- Contrast




Oropharyngeal Cancer




- U.S. Centers for Disease Control and Prevention estimates that about 8,400 Americans are diagnosed with HPV-related oropharyngeal cancer annually
 - 45,780 adults (32,670 men and 13,110 women) for both oral and oropharyngeal cancers
- Fastest growing segment of the oral and oropharyngeal cancer population are healthy, non-smokers in the 25-50 age range
- White, non-smoking males age 35 to 55 are most at risk, 4 to 1 over females


Oropharyngeal Cancer




- Leading cause is from HPV
 - HPV family contains almost 200 strains
 - Only 9 are associated with cancer
 - HPV16 manifests itself primarily in the posterior regions such as the base of the tongue, the back of the throat, the tonsils
- Other causes
 - Smoking
 - Alcohol
- Squamous cell most common cell type
- HPV-positive cancers generally have a better prognosis
- Even if you have had tonsils removed you can still get tonsil cancer because some tonsil tissue is left behind

Reference 

- Human papilloma virus positive oropharyngeal squamous cell carcinoma: A growing epidemic
 - Aru Panwar , Rishi Batra , William M. Lydiatt , Apar Kishor Ganti
 - University of Nebraska Medical Center, Omaha, NE, USA


Other Risk Factors 

- > 40 years
- Men > women
- Tobacco use
 - Smokers 5x risk
- Heavy alcohol intake
- Smoking and heavy drinking increases the risk

HPV 


- Genital human papilloma virus is most common sexually transmitted infection in U.S.
- Most types of HPV are not harmful
- Most people who become infected with HPV do not know that they are infected
- Infects the epithelial cells of skin and mucosa
- Transmission of virus occurs when these areas come into contact with virus
- Sexual contacts, both conventional and oral, are means of transferring the HPV virus through direct skin to skin contact

Clinical Symptoms




- *Persistent sore throat or hoarse voice*
- *Difficult or painful swallowing*
- Pain when chewing
- Ulcer or sore that does not heal within 2-3 weeks
- Swelling or lump in the mouth
- Painless lump felt on the outside of the neck, which has been there for at least two weeks
- Numb feeling in the mouth or lips
- Constant coughing
- Ear ache on one side which persists for more than a few days

How These Cancers Are Found and Diagnosed



- Most common presenting symptom is enlarged neck lymph nodes
- Few symptoms in early stages
- Biopsy of node
- Imaging of oropharynx
- Biopsy of the found mass

Base of Tongue



- 1/3 of all tongue cancers
- Present more advanced
- More aggressive
- Prognosis is more guarded
 - HPV associated have better outcomes
- Nodes may be bilateral
- Not considered oral cancer
 - Throat cancer
- **Treatment**
 - Surgery
 - Removal of tumor
 - Chemotherapy
 - Spread beyond neck
 - Radiation Therapy
 - Non surgical candidates
 - Prevent reoccurrence
 - Combination

5-Year Survival Rates

JOHNS HOPKINS MEDICINE

- 8,650 deaths both types
 - 6,010 men (69%)
 - 2,640 women
- Overall is 63% for both
- BOT
 - Local – 78%
 - Regional – 63%
 - Distant – 36%
- Tonsil – 66%

www.cancer.net

- Due to fact diagnosed late in development
- Usually diagnosed when neck lymph nodes are discovered
- By this time cancer has had time to invade deep

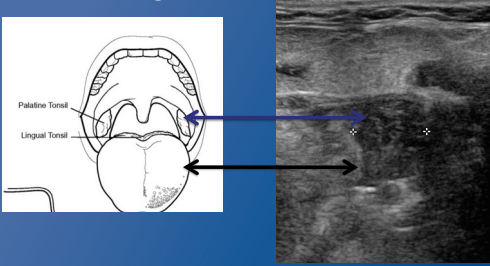
Patient History

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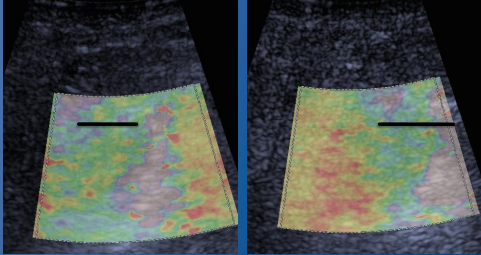
- 47 year old man
- Difficulty swallowing
- Physical exam revealed enlarged left tonsil

Normal Tonsil Striation Pattern: Just Enlarged, No Mass

JOHNS HOPKINS MEDICINE



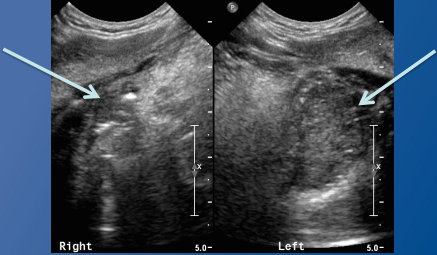
**Elastography: Enlarged Left
Normal Right, Both Soft**



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The image displays two side-by-side elastography scans. The left scan shows a larger, more heterogeneous area with a mix of green and yellow colors, indicating increased stiffness or strain. The right scan shows a smaller, more uniform area with predominantly green and light yellow colors, indicating softer tissue. Both scans include a black horizontal scale bar at the top.

**37 year old female
with a left tonsil mass**

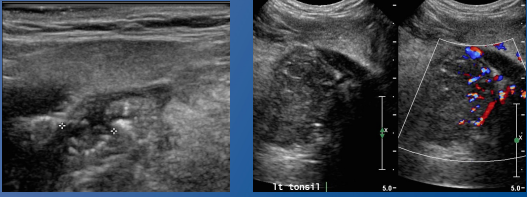


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MEDICINE

Right 5.0- Left 5.0-

The image shows two longitudinal B-mode ultrasound scans of the tonsils. The left scan has a white arrow pointing to a hypoechoic, irregular mass. Both scans include a vertical scale bar labeled '5.0-'.

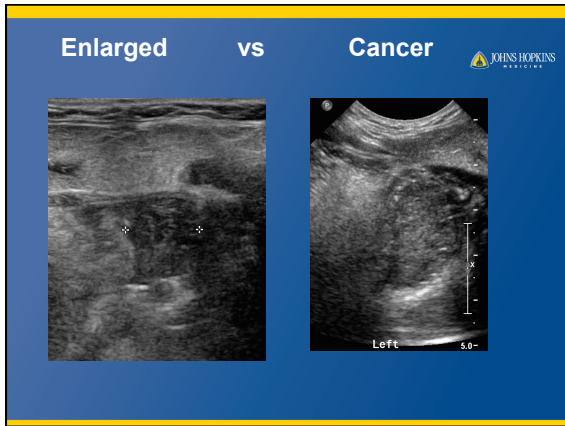
**37 year old female
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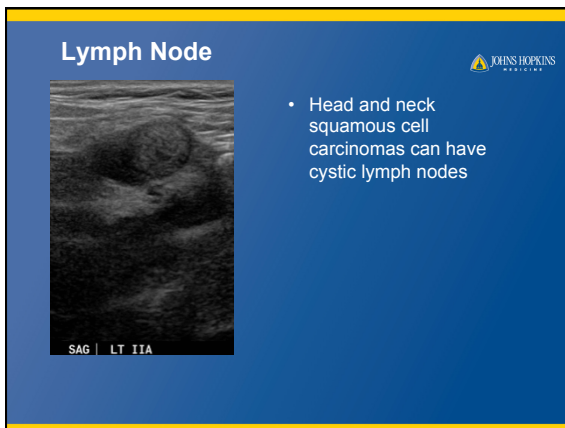


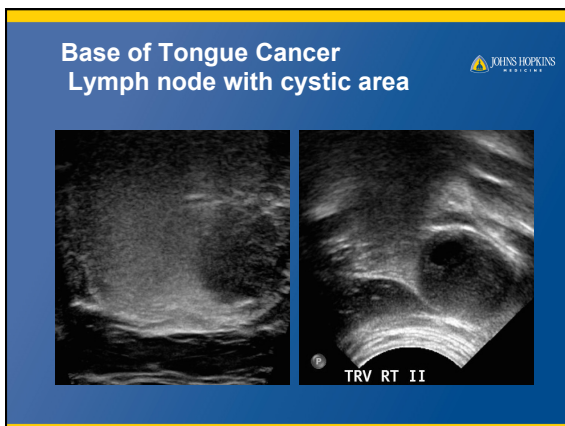
JOHNS HOPKINS
MEDICINE

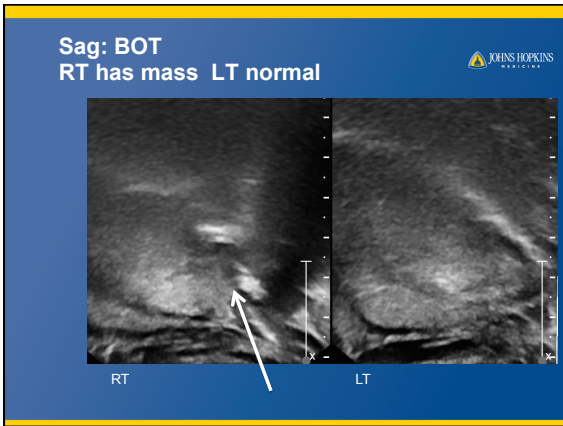
Normal Right Tonsil

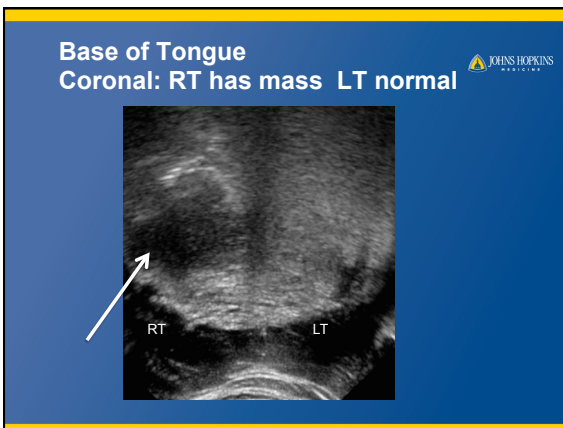
The image contains three panels. The left panel shows a normal right tonsil. The middle panel shows a left tonsil with a mass, labeled 'Lt tonsil' and '5.0-'. The right panel shows a color Doppler image of the same mass, with red and blue areas indicating blood flow. A scale bar labeled '5.0-' is also present.

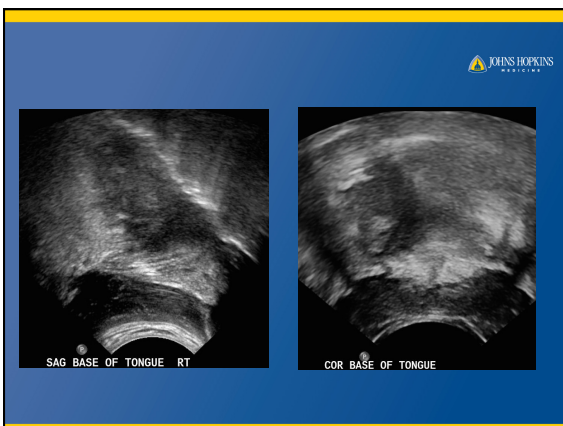





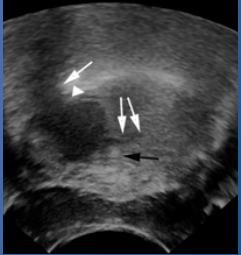








66 year old male with right base of tongue tumor 




- Single arrow shows break in mucosal surface extending into oropharynx
- Black arrow denotes lingual septum
- Double arrows show tumor extending past the lingual septum into the left base of tongue
 - Important clinical implications

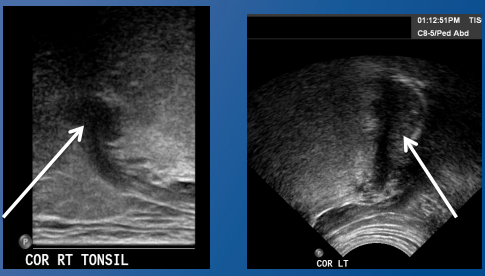
Courtesy of Dr. Coquia

66 year old male with right base of tongue tumor 



- Arrowhead shows break in mucosal surface extending into oropharynx

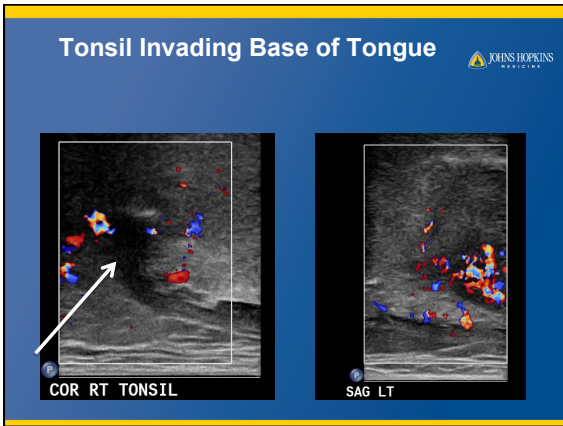
Tonsil Invading Base of Tongue 

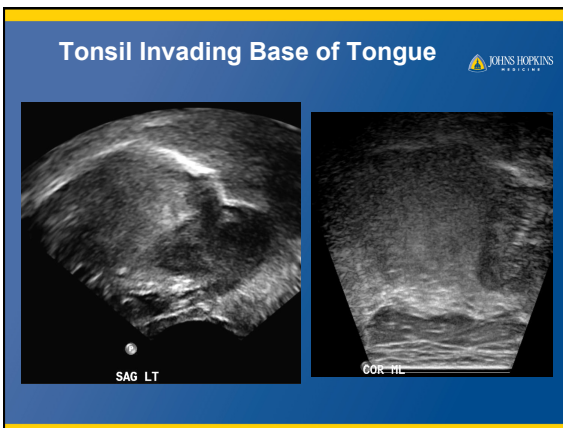


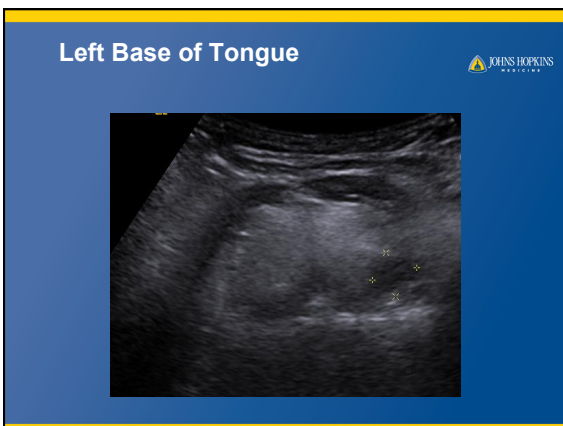
01:12:51PM TIS
CS-5iPad Abd

COR RT TONSIL

COR LT







Base of Tongue – Lymph Node


The slide features two images. On the left is a coronal CT scan of the neck, with a red arrow pointing to a lymph node in the submandibular region. On the right is an ultrasound image of the same area, showing a hypoechoic lymph node. The ultrasound image includes technical details: '12:15:45PM TIS', 'L9-3Vasc Ven', 'SAG LT TIA', and 'C81 C81'.

You Can Do This Too!!


- Start with tongue
 - Practice on each other
- Very attenuative of sound beam
 - C5-1
 - X6-1 on Philips
- Don't have to flip

You Can Do This Too!!

- Next start looking for palantine tonsils
 - Make sure your model has their tonsils!
- Have anatomy drawing handy
- Look for submandibular gland
 - The tonsil is located deep to the submandibular gland and posterolateral to the base of tongue
- Use linear array
 - L9-3 (DVT / carotid transducer)
- Curved linear array
 - C 8-5 (Baby head peds abdominal transducer)
- Compare with CT, MR, and PET findings

Conclusion 

- Exciting and new application for ultrasound
- Talk to your surgeons after you have some confidence or if they are interested in working with you
 - Show them how US is better than CT and MRI
- Your patients will thank you
- PS – make sure you tell physicians and especially patients that this is NOT intra-oral scanning
 - They will Google!

Thank you 

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