

Ultrasound of the Tonsils and Base of Tongue

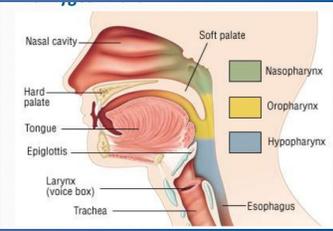


M. Robert De Jong, RDMS, RVT, FSDMS, FAIUM
The Johns Hopkins Hospital
Department of Radiology and Radiological Sciences
Baltimore, MD

Nothing to Disclose

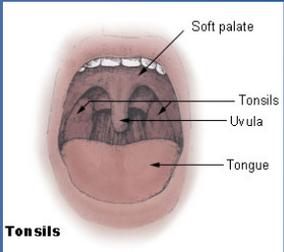


Oropharynx NOT Oral Cavity



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

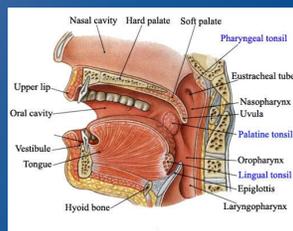
Palatine Tonsils



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

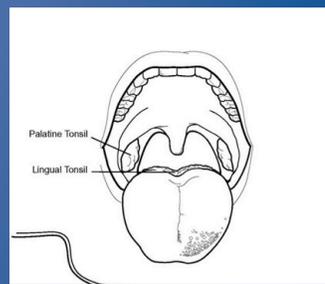
Tonsils

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

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- Back third of tongue
- Different embryological origin

Labels in diagrams: Base of tongue, Circumvallate papilla, Oral tongue, Vallecula, Epiglottis.

Tonsils and Throat

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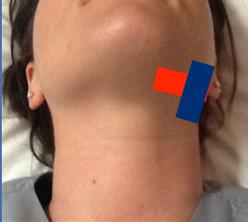
Labels: Pharyngeal Tonsil (Adenoid), Nasopharynx, Soft Palate, Uvula, Palatine Tonsil, Oropharynx, Tongue, Lingual Tonsil, Laryngopharynx, Hard Palate, Nasal Cavity.

Ultrasound Protocol

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- 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. Coquila

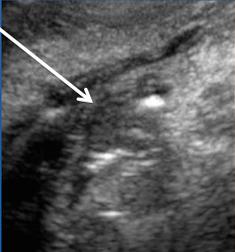
Normal Tonsil: Coronal Position

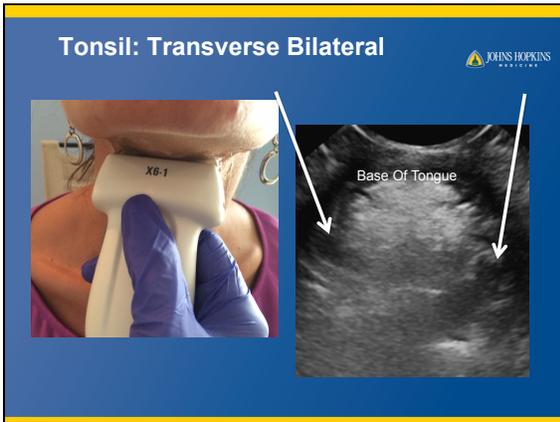
Start transverse.
Lateral to BOT.

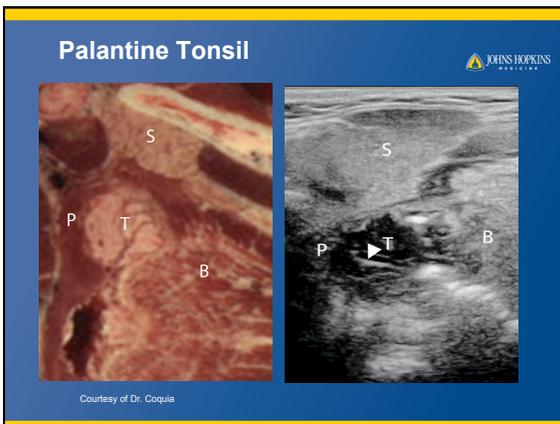


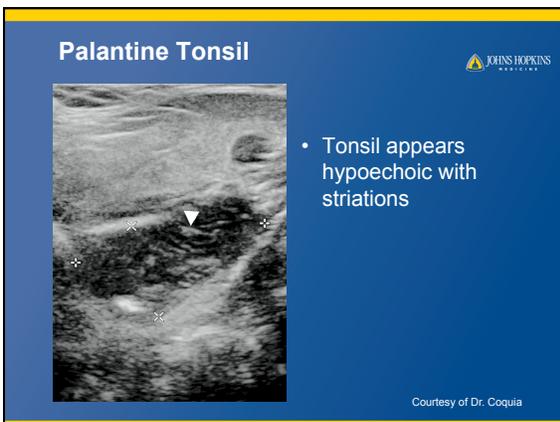
Normal Tonsil: Sagittal Position

Turn to sag position.

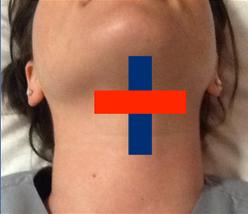








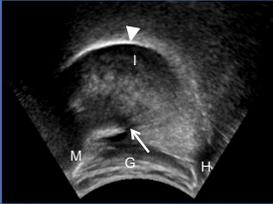
Transducer Position for Base of Tongue



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

Courtesy of Dr. Coquia

Sagittal Tongue

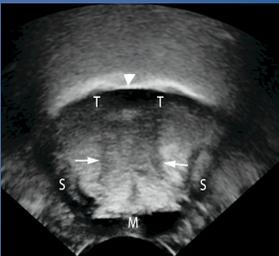


- Arrowhead - mucosal surface of the tongue
- I = intrinsic muscles of the tongue
- Arrow = fanlike structure of the genioglossus muscle
 - Best seen on US and MRI
- M = mandible
- G = geniohyoid muscle
 - Runs from mandible to hyoid
- H = hyoid bone

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

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- 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

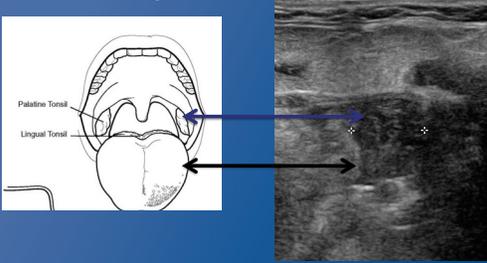
Patient History

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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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MEDICINE

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

Right 5.0- Left 5.0-

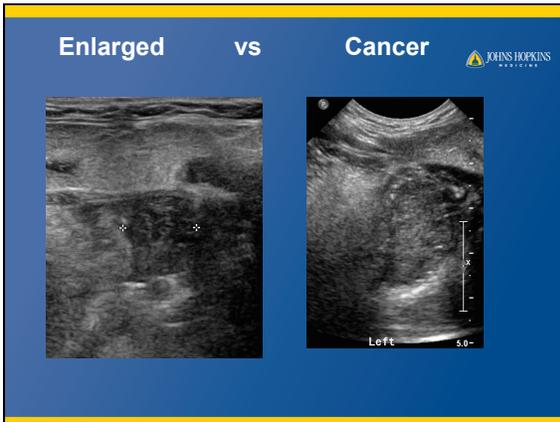
JOHNS HOPKINS
MEDICINE

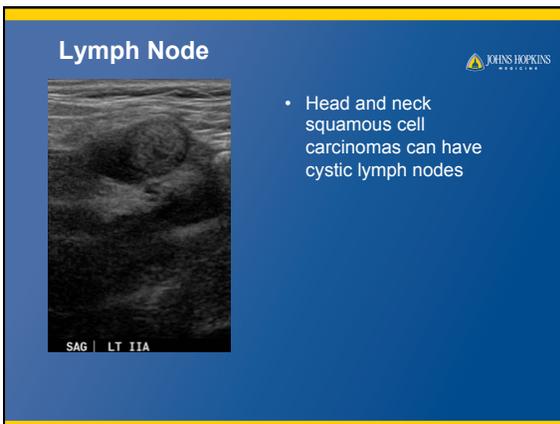
**37 year old female
with a left tonsil mass**

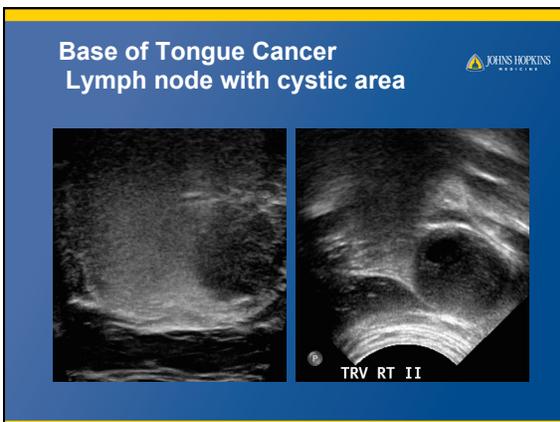
Normal
Right Tonsil

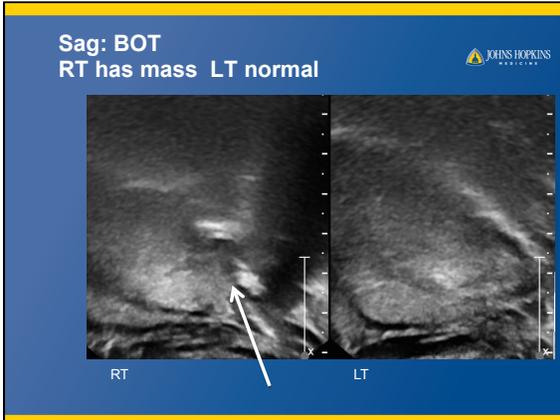
5.0- 5.0-

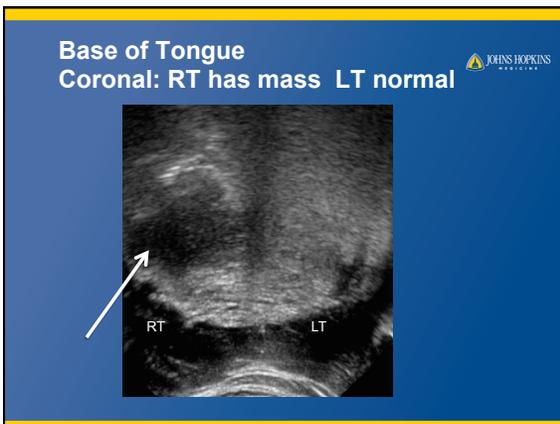
JOHNS HOPKINS
MEDICINE

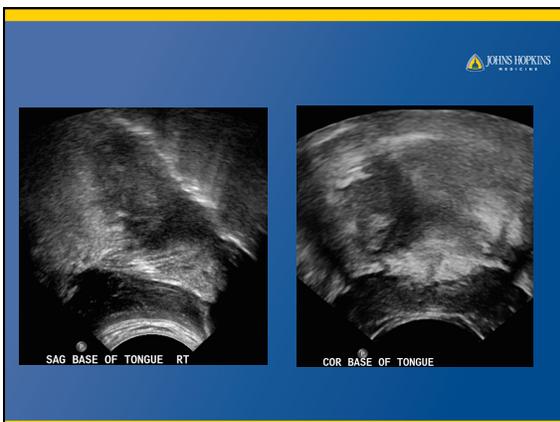












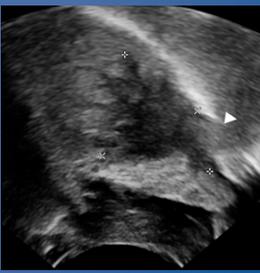
66 year old male with right base of tongue tumor 



- 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

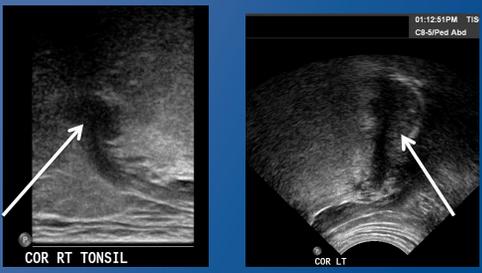
Courtesy of Dr. Coquia

66 year old male with right base of tongue tumor 



- Arrowhead shows break in mucosal surface extending into oropharynx

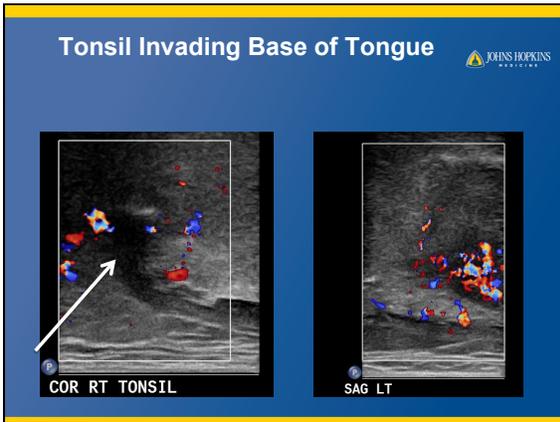
Tonsil Invading Base of Tongue 

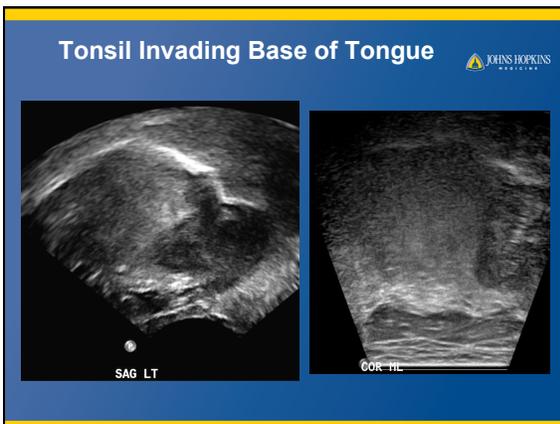


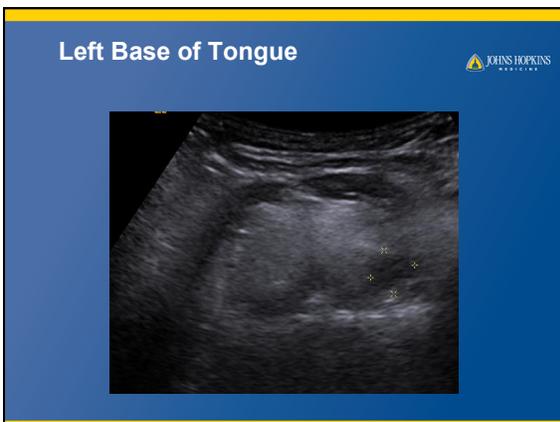
01:12:51PM TIS
CB-5Psd Abd

COR RT TONSIL

COR LT







Base of Tongue – Lymph Node

The slide features two images side-by-side. 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 dark, oval-shaped structure. The text 'SAG LT TIA' is visible at the bottom of the ultrasound image.

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 

- rdejong@jhmi.edu
