THYROID/NECK ULTRASOUND PROTOCOL (UTHYR or UHEADN)

TO BE USED FOR EVALUATION OF THE THYROID AND NECK AREA: Use the following protocol for ultrasound scans that include the area between the mandible and the clavicle and between the lateral margins of the right and left sternocleidomastoid muscles, including pre-surgical thyroidectomy planning and post thyroidectomy surveillance.

PATIENT PREP: No prep.

FOCUSED EXAMS OF PALPABLE AREAS – A focused exam may be performed on a palpable lump that does not involve the central cervical neck. (If the lump is located in the central neck, include a full thyroid exam.) Label images "Palpable area"

- Include a cine sweep of the neck on the side of concern assessing for other pathology or lymph adenopathy.
- Measure any pathology seen in 3 dimensions.
- Include color flow images of palpable area and any other pathology noted.
- If thyroid nodules are incidentally seen, perform a full thyroid exam.

PREFERRED SCANNING ORDER:

- Start with the right thyroid/neck and end with the left thyroid/neck.
- Document thyroid nodules and abnormal lymph nodes from superior to inferior on each side of the neck.

ULTRASOUND SETTINGS:

- Place the middle of the focus at the inferior portion of the thyroid gland or at the level of the inferior carotid artery. Extend the ultrasound depth to include several centimeters posterior to the thyroid gland. This will reduce the chance of missing a posterior lesion.

Use a VIEWPOINT drawing to illustrate any abnormal lymph nodes for the following patients (see below for more specific instructions on how to create and attach illustration)-

- Pre-surgical thyroidectomy patients. The extension of lymph node involvement determines how radical the incision will be.
- Known thyroid cancer patients
- Post thyroidectomy surveillance patients. Drawing is not needed if no abnormal nodes are seen.

IMAGES TO OBTAIN

THYROID IMAGES:

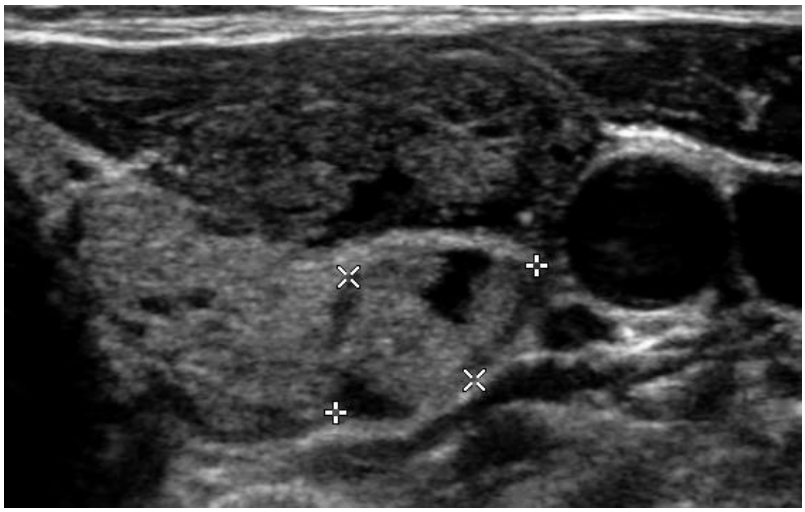
Always take an image with and without measurements.

- Thyroid isthmus in transverse section with AP measurement.
- Right and Left lobe of thyroid, measured in 3 dimensions. Two measurements to be done in transverse, one in sagittal. Include volume in report.
- Transverse view of each lobe in superior, mid, and inferior regions.
- Transverse cine clip of each lobe, superior to inferior.
- Sagittal views of each lobe in mid, lateral and medial regions.
- Sagittal cine clip of each lobe, medial to lateral.
- Color doppler image of each lobe showing perfusion.

NODULE IMAGES:

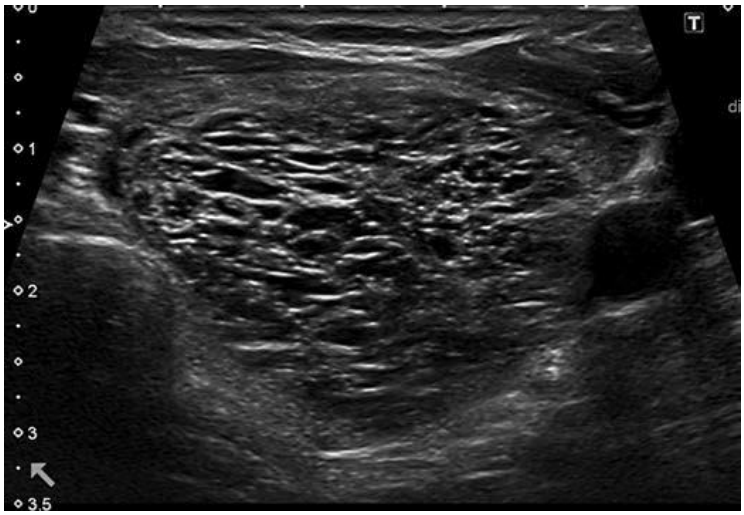
Always take an image with and without measurements. Use Dual Screen to group measurements together.

- When multiple nodules are present, number the nodules on each side starting superiorly with number 1. This makes it easier for subsequent, comparative scans.
- Measure and report the largest 3 nodules on each side. Prioritize the largest and any that look suspicious.
- Document thyroid nodules that are less than 1cm if they look suspicious for thyroid cancer (ie very hypoechoic, irregular margins, internal calcifications or taller than wide shape.)
- In multinodular goiter, include an estimate of the number of nodules in the report “at least 6 nodules." Only measure the largest 3, or most suspicious, on each side.
- Document calcifications (micro vs macro) in nodules.
- Color flow image of each lobe and any significantly sized nodule.
- Nodules should be measured in 3 dimensions. Use dual screen to group measurements together.
- Nodule measurement technique: In a transverse plane, measure the longest dimension (width) then the 2nd measurement should be 90 degrees to the first (AP measurement). In a longitudinal plane, the 3rd measurement must be in the longest dimension (length).



- Include TIRADS evaluation of nodules in the Viewpoint report. Refer to ACR TIRAD charts below.
- For a spongiform nodule, the points assigned should be 0. Spongiform nodules are classified as TIRADS 1. Do not add points for calcifications or other features. A spongiform nodule should be reported similarly to the following example:

  Nodule 3: 1.2 x 0.8 x 0.6 cm [prior 1.1 x 0.7 x 0.6 cm]
  Location: superior pole
  Composition: spongiform = 0 points
  Score: 0
  ACR-TIRADS score: TIRADS 1 (To be entered by Radiologist)



Example of spongiform nodule –

Spongiform nodules have a sponge-like appearance, with at least 50% cystic composition and multiple microcystic spaces separated by thin septae or intervening isoechoic parenchyma.

PARATHYROID ULTRASOUND: Include for thyroid ultrasounds that include rule out parathyroid disease. Document the thyroid using the thyroid protocol.

IMAGES TO OBTAIN: ***Patient's neck should be turned to the contralateral side to evaluate for presence of parathyroid glands.***

- Dedicated parathyroid images should be taken and labeled "Parathyroid area" even if none are seen.
- Have the patient look to the left side when scanning the right neck. Take a sagittal and transverse sweep through the right neck while the head is turned.
- Have the patient look to the right side when scanning the left neck. Take a sagittal and transverse sweep through the left neck while the head is turned.
- Document any parathyroid glands if seen and measure in 3 dimensions.
- Color flow doppler of any suspected parathyroid gland to evaluate for flow pattern.

Please be aware that parathyroid lesions can be located in different areas in the neck and can be easily missed. When scanning through the neck, make sure that there is adequate scanning depth with your focus centered at the posterior thyroid. On sagittal cine – scan from the carotid into the tracheal groove (some parathyroid adenomas can hide in behind the trachea). In patients that have abnormal Ca+ levels, the parathyroid lesion(s) can often be found with ultrasound.

LYMPH NODE AND NECK DOCUMENTATION:

- Only document abnormal lymph nodes –rounded, no fatty hilum, calcifications, cystic spaces, peripheral blood flow. Consider >1cm enlarged, however since size is a less useful indicator, the other features listed above override node size and smaller nodes should still be documented if abnormal in appearance.
- For lymph nodes over 1cm in size that otherwise appear normal, measure the largest one. If multiple are seen state, "Multiple enlarged lymph nodes are seen in the R/L neck but otherwise are normal in appearance. Largest of these measures LxWxHcm"
- Submandibular lymph node can use an upper limit of normal of 2cm.
- Measure any abnormal appearing lymph nodes in two dimensions (height and length), label with appropriate lymph node neck level (see diagram below.)
- Use Color flow imaging of abnormal appearing lymph nodes. Use MFI color imaging if possible.

CINE SWEEPS TO OBTAIN: ***Still images are not needed unless abnormal nodes are seen.***

1. Right cervical neck area, from the carotid bulb to just superior to clavicle. (This should include visualization of neck Levels 2,3,4 and a portion of 6)
2. Right posterior cervical neck area, just behind the sternocleidomastoid muscle. (Level 5)
3. Left cervical neck area, from the carotid bulb to just superior to clavicle. (This should include visualization of neck Levels 2,3, 4 and a portion of 6)
4. Left posterior cervical neck area, just behind the sternocleidomastoid muscle. (Level 5).

Use a VIEWPOINT drawing to illustrate any abnormal lymph nodes and attach the illustration to the Viewpoint exam for the following patients - See directions below.

- Pre-surgical thyroidectomy patients. The extension of lymph node involvement determines how radical the incision will be.
- Known thyroid cancer patients
- Post thyroidectomy surveillance patients. It is not needed if only normal nodes are seen.

PRE THYROIDECOMY ULTRASOUND: In addition to a full thyroid ultrasound, a full evaluation of the neck for abnormal lymph nodes should be done. This information is very important for surgical planning and the extent of the incision needed.

- **ALL** abnormal lymph nodes should be measured, not just the largest ones.
- Provide accurate and precise description of the location of any abnormal nodes.
- Be sure to describe the farthest lateral and farthest superior/inferior nodes seen. Location of these nodes will determine extent of incision needed.
- Abnormal lymph nodes less than 1cm should also be reported if other suspicious characteristics are seen, these lymph nodes need to be excised as well.
- If you see an entire chain of abnormal nodes, you could say something similar to this, "Chain of 6 abnormal lymph nodes is seen extending from the Level 2A/carotid bulb to the clavicle. Largest of these measures LxHxWcm."
- Use a **VIEWPOINT** drawing to illustrate any abnormal lymph nodes and attach the illustration to the **VIEWPOINT** exam. If no abnormal lymph nodes are found, this is not needed. See VIEWPOINT drawing directions below

POST THYROIDECOMY ULTRASOUND:

- In post thyroidectomy cases document right and left thyroid beds and along the left and right carotid beds. It is important to see deep locations in the neck, especially posterior to the carotid where there is a high risk of recurrence
- Measure the most suspicious and/or largest 3 nodes on each side. Characteristics like calcifications and peripheral vascularity are more important than size, so list the most suspicious appearing 3 first. If they are all similar in appearance, list the largest 3 on each side of the neck.

CINE SWEEPS TO ACQUIRE FOR POST THYROIDECTOMY PATIENTS:

1. Right thyroid bed and medial right neck from just inferior to the hyoid bone to just superior to the clavicle. (Levels 1 and 6)
2. Right side of the neck, lateral to the carotid artery from the carotid bulb to just superior to the clavicle (Levels 2, 3 and 4).

3. Right posterior triangle, just behind the sternocleidomastoid muscle. (Level 5)
4. Left thyroid bed and medial left neck from just inferior to the hyoid bone to just superior to the clavicle. (Levels 1 and 6)
5. Left side of the neck, lateral to the carotid artery from the carotid bulb to just superior to the clavicle (Levels 2, 3, and 4).
6. Left posterior triangle, just behind the sternocleidomastoid muscle. (Level 5)

Use a **VIEWPOINT** drawing to illustrate any abnormal lymph nodes and attach the illustration to the **VIEWPOINT** exam. If no abnormal lymph nodes are found, this is not needed. See VIEWPOINT drawing directions below.

NECK LYMPH NODES OF THE NECK:

Lymph nodes in the neck have been divided into **7 levels**, generally for the purpose of squamous cell carcinoma staging. This is however not all inclusive as several groups such as the supraclavicular, parotid and retropharyngeal space nodes are not accounted for in this system.

Level I

- below myohyoid muscle and above the lower margin of the hyoid bone
- anterior to the posterior border of the submandibular glands
    - **level Ia** : sub mental - between the anterior bellies of the digastric muscle
    - **level Ib** : sub mandibular - posterolateral to the anterior belly of digastric

Level II

- jugulodigastric
- base of skull to lower margin of hyoid bone
- anterior to the posterior border of sternocleidomastoid (SCM)
- posterior to the posterior border of the submandibular glands
    - **level IIa** : anterior, lateral, or medial to the vein or posterior to the internal jugular vein and inseparable from it.
    - **level IIb** : posterior to the internal jugular vein and have a fat plane separating the nodes and the vein

Level III

- middle jugular nodes
- lower margin of hyoid to lower margin of cricoid cartilage
- anterior to the posterior border of SCM
- lateral to the medial margin of the CCA / ICA

Level IV

- low jugular nodes
- lower margin of cricoid cartilage to level of the clavicle
- anterior and medial to an oblique line drawn through the posterior edge of the sternocleidomastoid muscle and the posterolateral edge of the anterior scalene muscle[4]
- lateral to the medial margin of the CCA

Level V

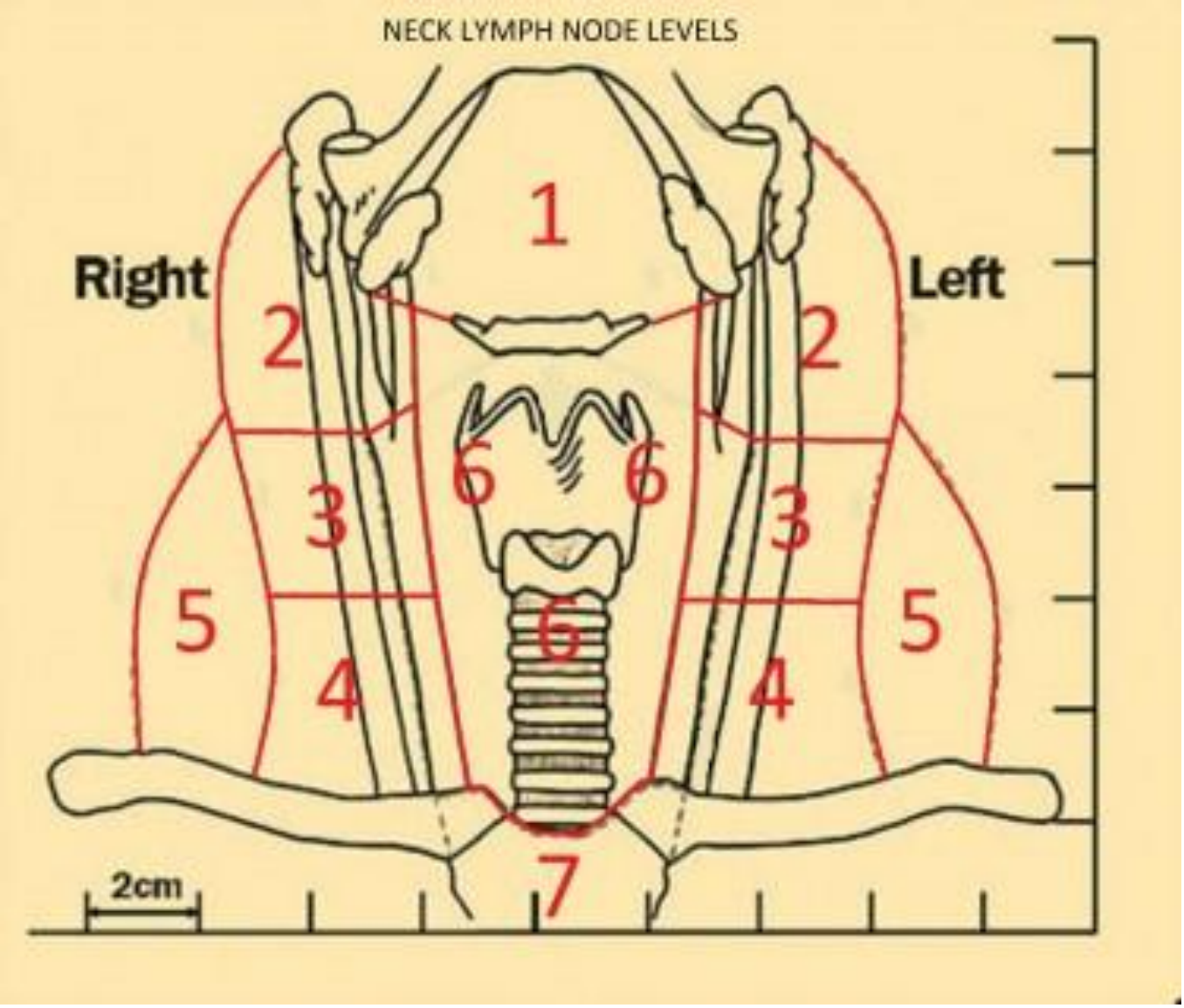
- posterior triangle nodes
    - **level Va** : superior half, posterior to levels II and III
    - **level Vb** : inferior half, posterior to level IV

Level VI

- prelaryngeal / pretracheal / Delphian node
- from inferior margin of hyoid to manubrium
- in front of levels III and IV

Level VII

- superior mediastinal
- between CCAs, below top of manubrium



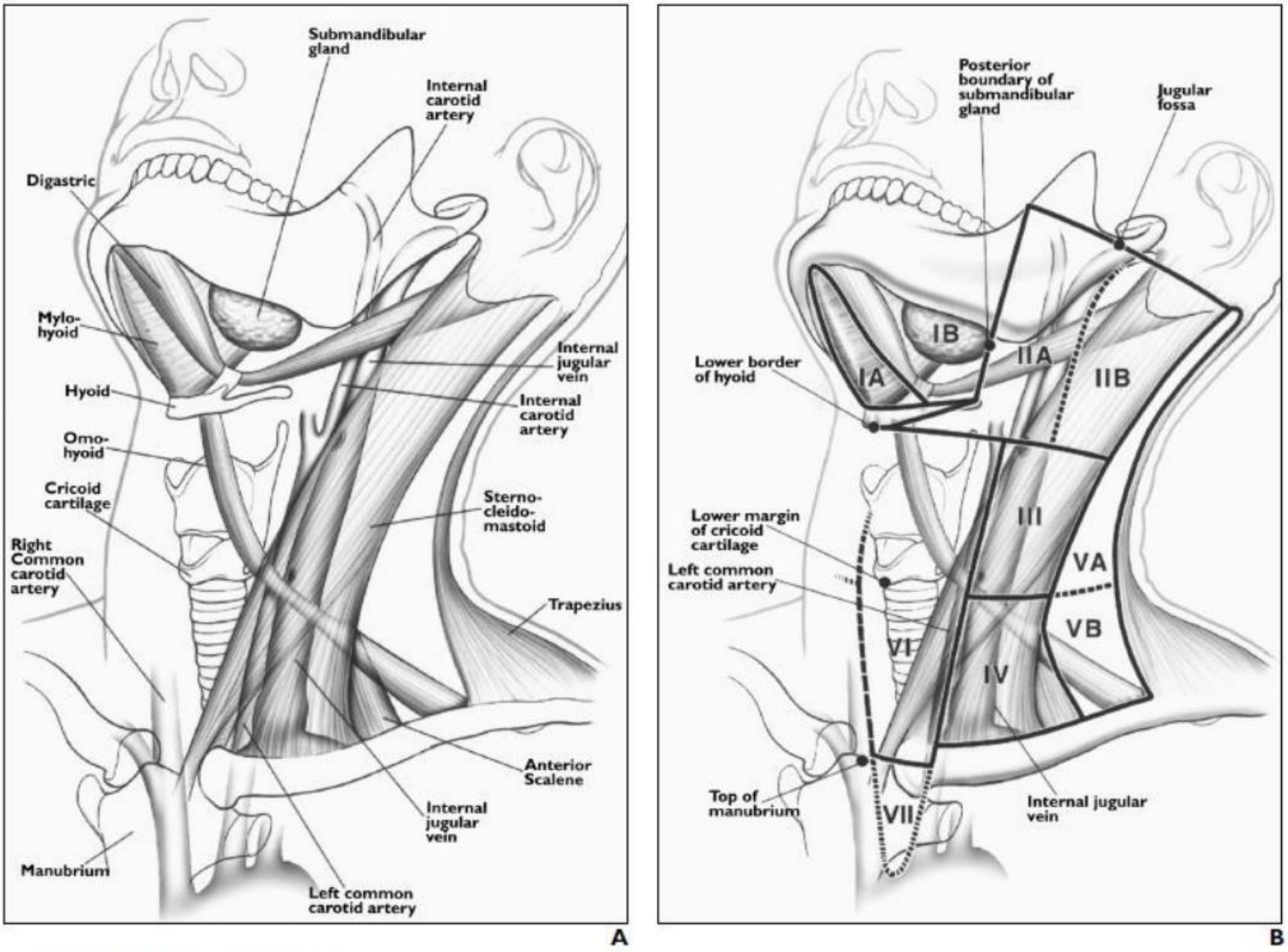
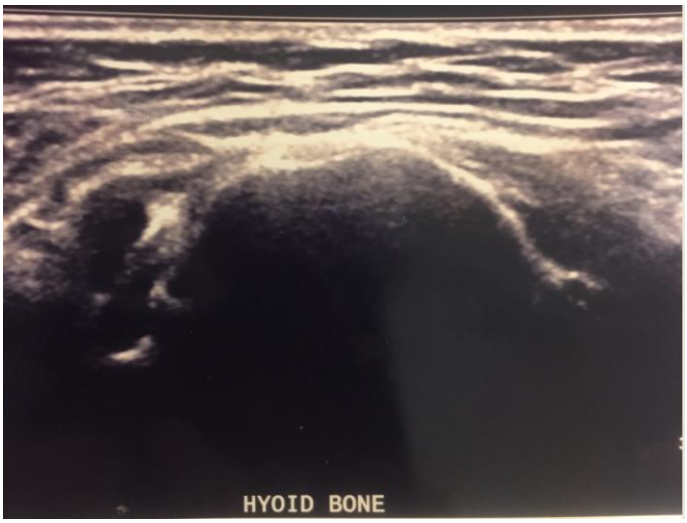
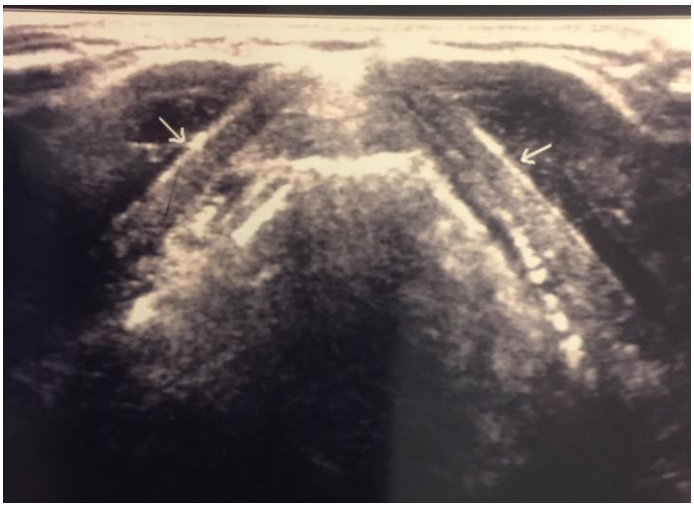
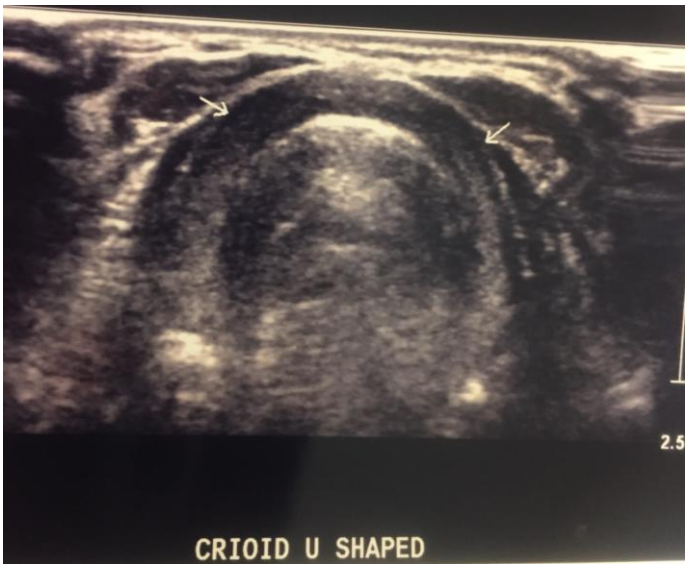


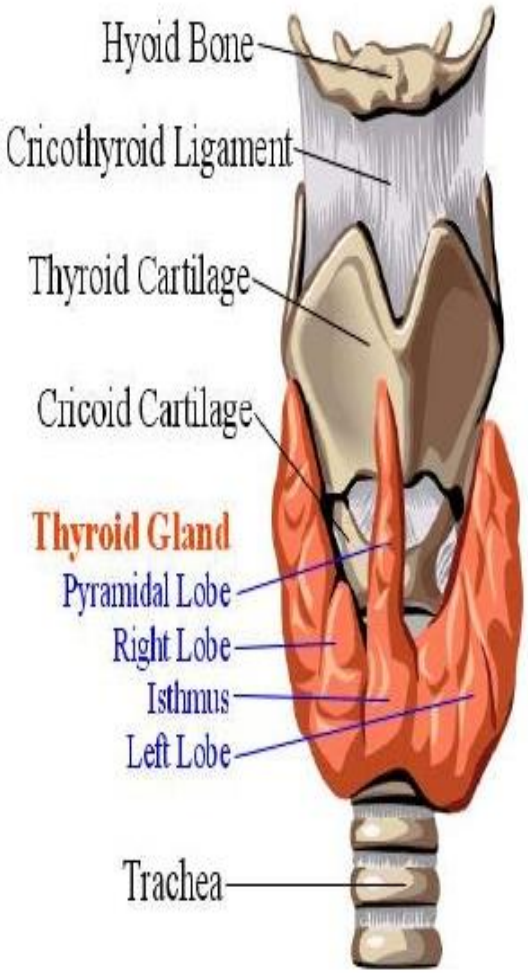
Fig. 1.—Neck as seen from left anterior view.
A, Drawing shows anatomy pertinent to nodal classification.
B, Drawing shows specific margins of anatomy seen in **A** that relate to definitions of classification levels. Note that line of separation between levels I and II is posterior margin of submandibular gland. Separation between levels II and III and level V is posterior edge of sternocleidomastoid muscle. Line of separation between levels IV and V is oblique line extending from posterior edge of sternocleidomastoid muscle to posterior edge of anterior scalene muscle. Posterior edge of internal jugular vein separates level IIA and IIB nodes. Carotid arteries separate levels III and IV from level VI. Top of manubrium separates levels VI and VII. (Reprinted with permission from [16])





Thyroid Cartilage

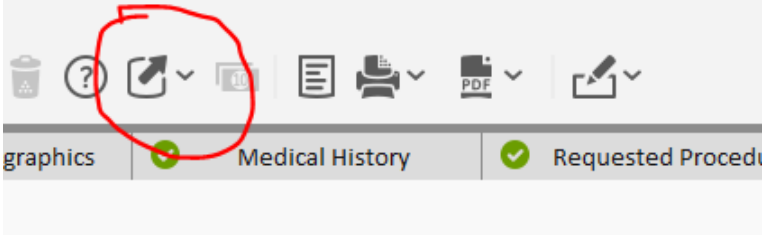




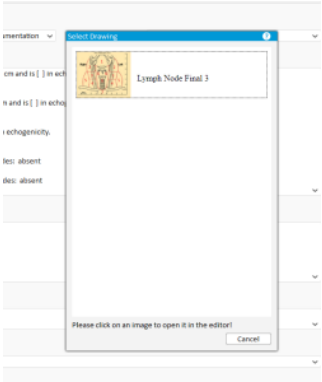
ATTACHING A VIEWPOINT DRAWING -

Used to illustrate any abnormal lymph nodes in pre and post thyroidectomy patients. Illustrate locations of nodes on neck level image and attach the illustration to the **VIEWPOINT** exam. If no abnormal lymph nodes are seen, this is not needed. Saving the illustration will attach it to to the images in the VIEWPOINT study, and the illustration will be sent to GE PACS with the other images. To create a VIEWPOINT drawing -

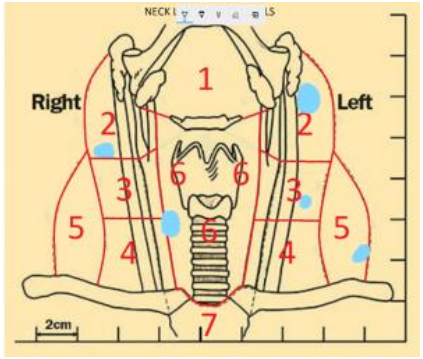
1- Within the Head and Neck VIEWPOINT templates, Select the Extensions icon, then Drawing Import.

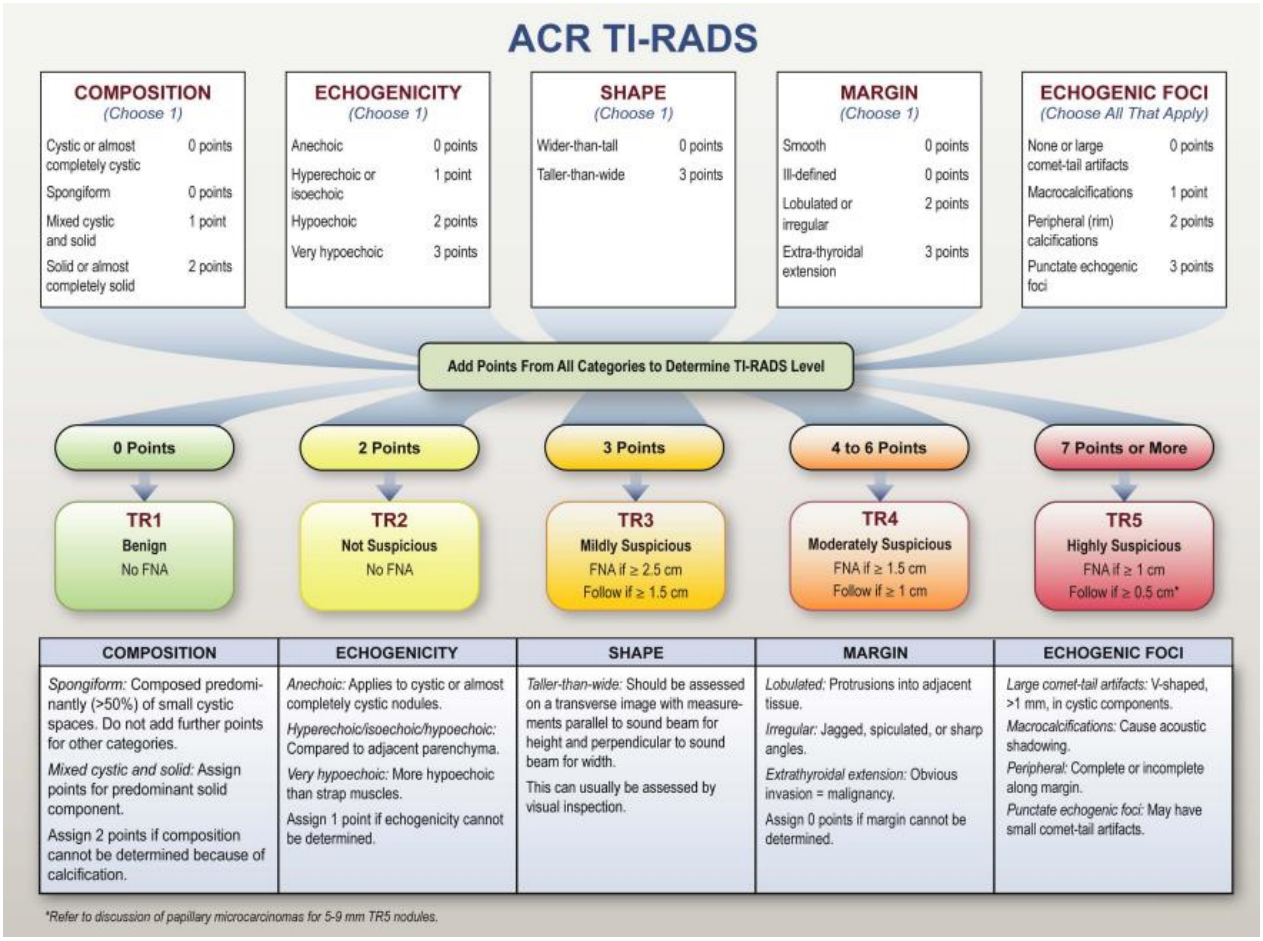


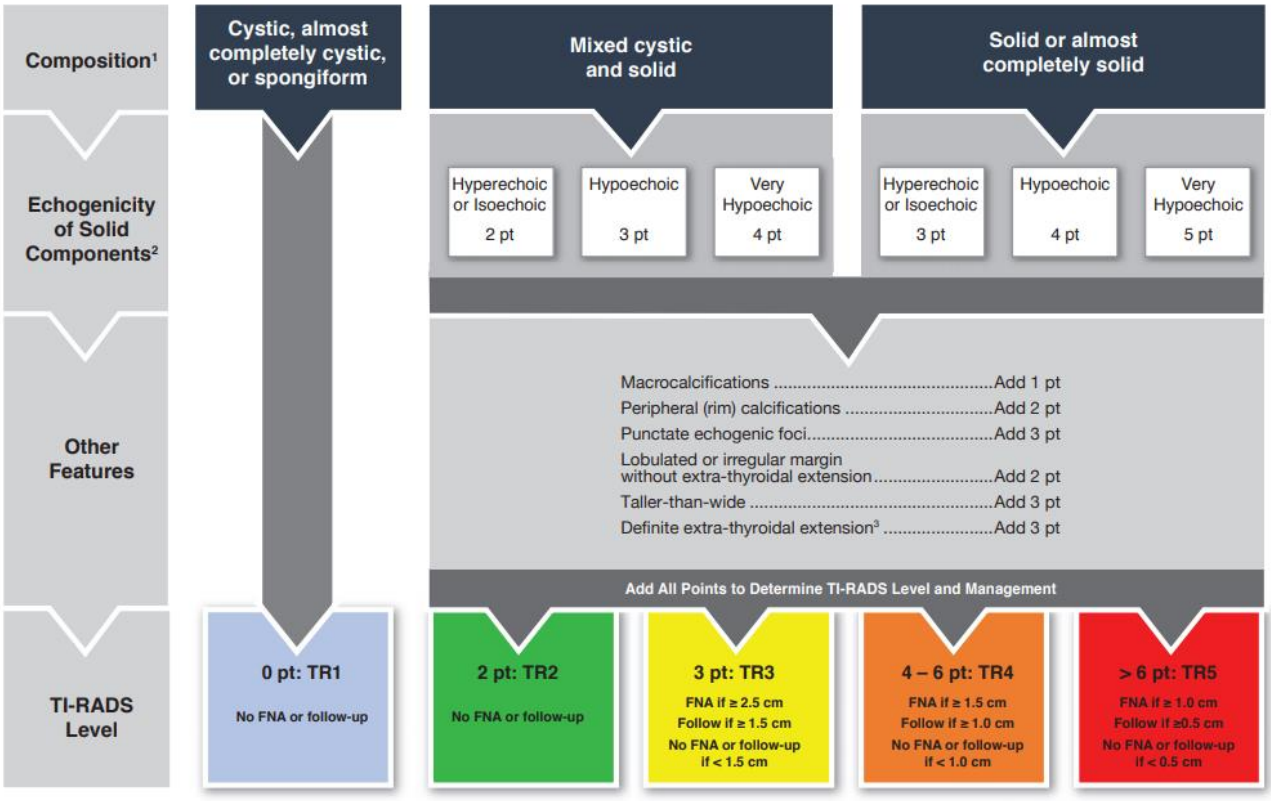
2 - The Select Drawing pop up window will show the Neck illustration. Double click on this and the file will open as a Microsoft Paint file.



3 - Use the paint program to draw on the picture to map the location of abnormal lymph nodes. When you are done, save image using the disk icon at top of window and close the file. This will add the drawing to the ultrasound images on Viewpoint.







[1] *Classify nodule as solid if composition cannot be determined*
[2] *Classify nodule as isoechoic if echogenicity cannot be determined*
[3] *Nodules with definite extra-thyroidal extension should be considered malignant until proven otherwise*

	Date	Changes made	By whom
Updated	3/28/18		Becky Marion
Updated	3/24/22	-Viewpoint drawing updates for new version of EPIC -Color doppler image requirements -Dual screen use for nodules	Protocol Meeting 3/24 Attendees
Added	4/12/2022	-Pre thyroidectomy section added -Post thyroidectomy – measure most suspicious 3 on each side only'' -For >1cm and otherwise nrml nodes – list largest only	Renee Betit Fitz