THYROID ULTRASOUND EXAMINATION

[Thyroid ultrasound will be performed with an order from a physician or other qualified clinical practitioner. The examination will be supervised and interpreted by a radiologist or other licensed practitioner who is qualified by reason of training to understand the normal anatomy, pathophysiology of the abdomen, and integration of ultrasound with other imaging techniques to optimize the probability of detecting disease.]

INDICATIONS: Thyroid ultrasound indications include:
• palpable neck masses in the region of the thyroid gland
• abnormalities of the thyroid detected by other imaging techniques
• laboratory evidence of thyroid disease
• known thyroid nodules to evaluate change or stability
• patients at high risk to for occult malignancy

Note: In the setting of thyroid cancer (pre-operative or post-operative), Detailed Neck Ultrasound Examination protocol is more appropriate.

Parathyroid evaluation may be included upon request of the referring provider. Indications may include:
• suspected primary or secondary hyperparathyroidism
• previous parathyroid surgery with recurrent signs/symptoms of hyperparathyroidism

PATIENT PREPARATION: No special preparation required.

PROCEDURE: The thyroid should be imaged in its entirety and include the adjacent soft tissue structures of the neck. The neck should be imaged in hyperextension (pillow behind the shoulders), but to limit discomfort, the patient may be bent at the waist with the head of the bed elevated. The examination should be performed using a linear transducer at the highest frequency that still allows adequate tissue penetration. The order of organ imaging will be (minimal number of images in parenthesis):

• Right Thyroid (8 images and 2 cines)
• Isthmus (2 images)
• Left Thyroid (8 images and 2 cines)

Long axis views must include the superior and inferior pole of each lobe (additional images may be necessary). Measurement of the long axis of each lobe should include sufficient surrounding soft tissue to clearly identify the margins of the gland. If the lobe does not fit into a single frame, then a trapezoid (Virtual Convex) or panoramic (Logiqview) view should be obtained to measure the entire length. Short axis views of each lobe should be obtained orthogonal to the long axis, with measurements at the widest diameter. The greatest anteroposterior and transverse diameters should be recorded in a single image. The short axis view of the isthmus should include its thickest segment.

Note: Anteroposterior measurements may be obtained in long axis when it is impractical to do so in the short axis view (e.g. gland is located inferiorly under the clavicles, resulting in a less horizontal orientation).
Minimal stored images (image label in **bold**):

- **Right Thyroid**
  - *Long Rt Thyroid Lat*
    - one long view of the lateral right lobe
  - *Long Rt Thyroid Mid*
    - one long view of the right lobe, with the maximum length measured*
  - *Long Rt Thyroid Med*
    - one long view of the medial right lobe
  - *Long Rt Thyroid Lat-Med*
    - one long axis lateral to medial cine sweep of the right lobe
  - *Trans Rt Thyroid Sup*
    - one transverse view of the superior right lobe
  - *Trans Rt Thyroid Mid*
    - one transverse view with the maximum width and anteroposterior dimensions of the right lobe measured*
  - *Trans Rt Thyroid Inf*
    - one transverse view of the inferior right lobe
  - *Trans Rt Thyroid Sup-Inf*
    - one short axis superior to inferior cine sweep of the right lobe

- **Midline Thyroid (Isthmus)**
  - *Trans Thyroid*
    - one transverse midline view of the isthmus, perpendicular to the trachea, with the maximum thickness measured*

- **Left Thyroid**
  - *Long Lt Thyroid Lat*
    - one long view of the lateral left lobe
  - *Long Lt Thyroid Mid*
    - one long view of the left lobe, with the maximum length measured*
  - *Long Lt Thyroid Med*
    - one long view of the medial left lobe
  - *Long Lt Thyroid Lat-Med*
    - one long axis lateral to medial cine sweep of the left lobe
  - *Trans Lt Thyroid Sup*
    - one transverse view of the superior left lobe
  - *Trans Lt Thyroid Mid*
    - one transverse view with the maximum width and anteroposterior dimensions of the left lobe measured*
  - *Trans Lt Thyroid Inf*
    - one transverse view of the inferior left lobe
  - *Trans Lt Thyroid Sup-Inf*
    - one short axis superior to inferior cine sweep of the left lobe

*For every image with measurements, there must be an identical image without measurements.
**See Pathologic Conditions for additional image requirements in the presence of thyroid nodules.
PATHOLOGIC CONDITIONS: When pathologic processes are detected during the course of the examination, additional images are necessary to characterize the abnormalities. The following is a description of abnormalities that may be encountered during the examination. The list is not intended to be comprehensive, and sonographers are expected to apply their knowledge to provide clear images of the disease processes they encounter.

- **Thyroid Nodules**: Ultrasound is frequently employed to monitor thyroid nodules by periodic examination. It is important that the prior images are reviewed by the sonographer before initiating the current examination in order to identify and reproduce the same nodule(s) and maintain consistent labeling.
  - **TI-RADS**: Nodules will be assessed by the interpreting radiologist, using ACR TI-RADS. This system grades thyroid nodules using ultrasound features and makes management recommendations based on this grading and nodule size. Sufficient images should be provided to demonstrate the tissue characteristics of every thyroid nodule:
    1. **Composition**: cystic; spongiform; mixed cystic/solid; solid (or almost completely solid)
    2. **Echogenicity**: hyperechoic/isoechoic; hypoechoic; very hypoechoic (more hypoechoic than overlying strap muscles)
    3. **Shape**: taller than wide (assessed in a transverse view of the thyroid)
    4. **Margin**: smooth; poorly defined; lobulated/irregular; extra-thyroidal extension
    5. **Echogenic Foci**: macrocalcifications (shadowing); peripheral/rim calcifications; **punctate** echogenic foci* (may have small comet tail artifacts)

- **Documentation**: In each lobe, up to x5 discrete nodules >1cm should be documented*.
  - labeled “A”, “B”, “C”, etc.
  - labels should be consistent on follow up exams
  - annotated with the position of the nodule (e.g. "sup", "mid/post", "inf/med")
  - drawn/labeled on the online form
  - one dual screen image demonstrating b-mode characteristics, with measurements
    - one long axis measurement – maximum length
    - two short axis measurements – maximum length and orthogonal to that
  - one image optimized for color Doppler vascularity
  - one cine in either plane

Additionally, the largest x3 documented nodules should be measured in three orthogonal dimensions.

*Nodules >5mm that demonstrate any of the more worrisome features (e.g.: very hypoechoic, taller than wide, punctate echogenic foci) should be documented as well.

- **Lymph Node Screening**: In the presence of documented nodules, lymph nodes should be evaluated for abnormal features, bilaterally. The region of the anterior neck,
lateral to the thyroid gland should be evaluated from the clavicle to the level of the common carotid artery bifurcation.

All nodes ≥8mm and any nodes with abnormal features should be imaged and measured in a dual screen (see Abnormal Lymph Nodes below for a list of abnormal features).

If no abnormal nodes are identified, then a single representative dual screen image should be captured, bilaterally (labeled Long and Trans Rt Neck, as appropriate).

Parathyroid Masses: Ultrasound examination for parathyroid masses should focus on the area immediately posterior to the thyroid gland. Ectopic parathyroid glands may reside in the thyroid (intrathyroidal parathyroid) or inferior neck/mediastinum. Normal parathyroid glands are not usually visible. Enlarged parathyroid glands should be imaged in two planes (long and short axis), and measured in three orthogonal planes. The location of the enlarged gland(s) must be labeled on the image (e.g. Long Rt Sup Parathyroid).

Abnormal Lymph Nodes: Normal lymph nodes are commonly identified in the neck, and do not require documentation. They are oblong, small (<8 mm short axis diameter), symmetric and have an echogenic sinus. The echogenic sinus in many normal cervical lymph nodes may not be visible. Color Doppler may be used to differentiate lymph nodes from vascular structures.

Incidentally encountered abnormal lymph nodes should be imaged in two planes (long and short axis) and measured in three orthogonal dimensions. The image should be sufficiently magnified, and a cine should be obtained.

A lymph node is considered abnormal if it demonstrates any of the following features:

- micro-calcifications
- cystic space(s)
- focal hyperechoic cortex
- nodular contour or asymmetric cortical thickening

References: