

THYROID NODULES WHICH ONES MATTER?

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Disclosures

- Honoraria/Ad board: Sanofi-Aventis, Janssen, Merck Frosst, Eli-Lilly, Astra Zeneca, Boehringer-Ingelheim

Objectives

- By the end of the presentation, participants will be able to:
 1. Choose the appropriate imaging test/s when thyroid nodules are suspected
 2. List 3 criteria that would prompt one to consider FNA biopsy of a thyroid nodule or at least that would prompt referral for consideration to do so
 3. Recognize the limitations of FNA biopsy results

Case of TC

- 38 F
- Referred for decreasing Levothyroxine requirements and left thyroid nodules
- PMHx
 - Notable for R hemithyroidectomy remotely for benign thyroid nodules
- Meds:
 - Levothyroxine 50mcg daily

Case #2 SN

- 34 F
- Pregnant
- Incidentally noted thyroid nodules on routine examination

THYROID NODULES EPIDEMIOLOGY

- Palpable thyroid nodules prevalence:
 - 5% women
 - 1% men
- US detected nodules
 - Depending on study, anywhere from 19-68% -- with highest rates in women and the elderly

Why do we care about thyroid nodules?

- Malignancy
- Only 7-15% of thyroid nodules are malignant
- >90% of all thyroid malignancies are differentiated thyroid cancers
 - Generally good prognosis cancers with slow progression and low mortality rates
- Interestingly, although we are detecting and removing more differentiated thyroid cancers over time
 - Mortality rates which have always been low, remain low.
 - This is despite a tripling in the yearly incidence rates in the U.S. from 1975 to 2009 (4.9 per 100,000 patients to 14.3 per 100,000)

Patient factors that increase Thyroid cancer risk

- History of head/neck radiation exposure
 - Eg. Childhood malignancies, living in Chernobyl fallout area
- One or more first degree family members with thyroid cancer
 - Whether screening is warranted depends on the type of thyroid cancer and number of family members affected
 - Insufficient evidence to evaluate whether screening helpful in patients with a history of differentiated thyroid carcinoma (unlike those with medullary thyroid carcinoma)

Physical Findings/Symptoms worrisome for Thyroid Malignancy

- Rapid nodule growth (although keep in mind that benign cystic lesions can rapidly change).
- Voice changes/vocal cord paralysis
- Fixation of the nodule to surrounding tissues
- Cervical adenopathy

APPROACH To Suspected THYROID NODULE

- 1. GET a TSH
 - Hyperfunctioning nodules are rarely cancerous
- 2. IF TSH is decreased
 - First test should be a thyroid scan to determine if the suspected nodule is hyperfunctioning
- 3. IF TSH is normal or high
 - First test should be a thyroid ultrasound

RETURN TO CASE #1 TC

Case of TC

- 38 F
- Referred for decreasing Levothyroxine requirements and left thyroid nodules
- PMHx
 - Notable for R hemithyroidectomy remotely for benign thyroid nodules
- Meds:
 - Levothyroxine 50mcg daily

Case of TC Questions?

- What test would you like next?

CASE OF TC cont'd

- Thyroid US report – R lobe absent. L lobe notable for 4 nodules: largest in the mid-lower region was 3.8cm in maximal diameter with cystic/solid components; next largest 1.7cm and the other 2 nodules ≤ 7 mm in maximal diameter
- TSH 0.026 mIU/L (normal range 0.35-5 mIU/L)
- Free T₄ 13.9 pmol/L (normal range 9-19)
- Free T₃ 4.5 pmol/L (normal range 2.6-5.7)

Follow-up with TC

- Interestingly already had thyroid scintigraphy previously (before starting Levothyroxine)
 - L lower lobe notable area of focal hyperintensity c/w large heterogeneous nodule seen on US with rest of L lobe activity suppressed
- Off Levothyroxine completely for 3 months
 - TSH 1.216
- After several years of slowly growing toxic nodules, she started to develop mildly compressive symptoms
 - She opted for I-131 ablation which was successful

What Nodules NEED A BIOPSY?

- 1. Focal thyroid nodules on FDG-PET scan more than 1cm (30% are malignant)
- 2. Hypoechoic solid nodules above 1 cm or complex nodules with a hypoechoic solid component that fit into an intermediate to high risk of malignancy category based on sonographic features
- 3. Most other thyroid nodules greater than 1.5cm in maximal diameter

High risk features on THYROID US

- Irregular margins (infiltrative, microlobulated)
- Microcalcifications
- Taller than wide shape (on transverse view)
- Rim calcifications with small extrusive soft tissue component
- Evidence of extra-thyroidal extension

What does not need a biopsy?

- Most nodules under 1cm in maximal diameter
- Pure cystic lesions
- Most toxic nodules (rarely malignant)
 - In addition, biopsy can result in falsely suspicious results in those cases

Table 7. The Bethesda system for reporting thyroid cytopathology: Diagnostic categories and risk of malignancy¹

Diagnostic category	Estimated/predicted risk of malignancy by the Bethesda system (%)¹	Actual risk of malignancy in nodules surgically excised (% , median (range))²
Nondiagnostic or Unsatisfactory	1-4	20 (9-32)
Benign	0-3	2.5 (1-10)
Atypia of Undetermined Significance or Follicular Lesion of Undetermined Significance (AUS/FLUS)	5-15	14 (6-48)
Follicular Neoplasm or Suspicious for a Follicular Neoplasm (FN/SFN)	15-30	25 (14-34)
Suspicious for Malignancy (SUSP)	60-75	70 (53-97)
Malignant	97-99	99 (94-100)

¹As reported in The Bethesda System by Ali & Cibas, 2009 (1076)

²Based on the meta-analysis of 8 studies reported by Bongiovanni et al. (103). The risk was calculated based on the portion of nodules in each diagnostic category that underwent surgical excision and likely is not representative of the entire population, particularly of non-diagnostic and benign diagnostic categories.

RETURN TO CASE#2

SN

Case #2 SN

- 34 F
- Pregnant
- Incidentally noted thyroid nodules on examination

Questions for Case#2 SN

- What two additional tests would you like to order?

Case#2 SN continued

- Initial US: multiple nodules on the R lobe with largest 4cm in maximal diameter –inhomogeneous solid. Directly below it a cystic/solid nodule 1.7cm in maximal diameter and an additional nodule near the isthmus on the R measuring 1.2cm in maximal diameter. No significant nodular disease on the left
- TSH normal

Conclusion to Case#2 SN

- US guided FNA of largest (4cm) nodule
 - Follicular lesion of undetermined significance
- Had repeat imaging post-partum
 - US findings minimally changed compared to previous
 - Had repeat biopsy of same nodule
 - Benign
- Patient proceeded to R hemithyroidectomy/isthmusectomy for diagnosis
 - Confirmed multifocal follicular variant papillary thyroid carcinoma

Key Points

- GET A TSH
 - If normal or high – ultrasound is first imaging test
 - If low – thyroid scintigraphy is first test– hot nodules generally do not require biopsy
- Size matters
 - Most nodules under 1 cm do not require biopsy
- Imaging characteristics matter:
 - Pure cysts do not require biopsy
 - Recommendations mainly depend on size and imaging characteristics

ANY QUESTIONS?

Table 6. Sonographic patterns, estimated risk of malignancy and FNA guidance for thyroid nodules.

Sonographic Pattern	US features	Estimated risk of malignancy	Consider biopsy/FNA size cutoff (largest dimension)
High suspicion	Solid hypoechoic nodule or solid hypoechoic component of a partially cystic nodule with one or more of the following features: irregular margins (infiltrative, microlobulated), microcalcifications, taller than wide shape, rim calcifications with small extrusive soft tissue component, evidence of extrathyroidal extension	>70-90%*	Recommend FNA at > 1 cm
Intermediate suspicion	Hypoechoic solid nodule with smooth margins without microcalcifications, extrathyroidal extension, or taller than wide shape	10-20%	Recommend FNA at > 1 cm

From table 6 in 2015 ATA management guidelines for adult patients with thyroid nodules and differentiated thyroid cancer.

Low suspicion	Isoechoic or hyperechoic solid nodule, or partially cystic nodule with eccentric solid areas, without microcalcification, irregular margin or extrathyroidal extension, or taller than wide shape.	5-10%	Recommend FNA at > 1.5 cm
Very low suspicion	Spongiform or partially cystic nodules without any of the sonographic features described in low, intermediate or high suspicion patterns	< 3%	Consider FNA at > 2 cm Observation without FNA is also a reasonable option

From table 6 in 2015 ATA management guidelines for adult patients with thyroid nodules and differentiated thyroid cancer.

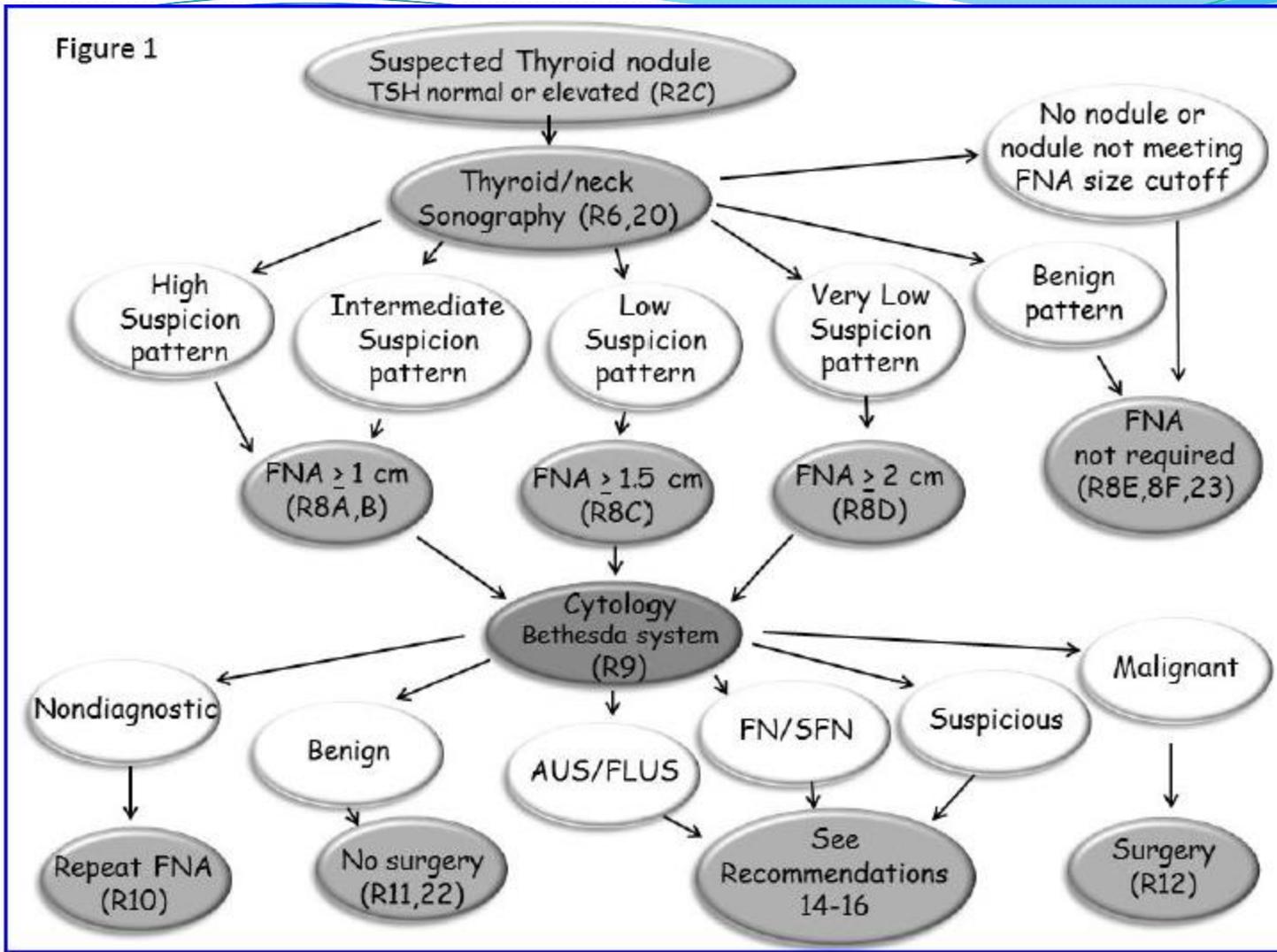


Figure 1. Algorithm for evaluation and management of patients with thyroid nodules based on US pattern and FNA cytology. R – Recommendation in text.

Reference

- 2015 American Thyroid Association guidelines for adult patients with thyroid nodules and differentiated thyroid cancer: The American Thyroid Association guidelines task force on thyroid nodules and differentiated thyroid cancer. Haugen, Alexander et al. *Thyroid*. Jan 2016, 26(1): 1-133