Evaluation of Incidental Thyroid Nodules Detected on Imaging Studies

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Learning Objectives

- Review current guidelines on the evaluation and management of thyroid nodules
- Describe recent advancements in thyroid imaging
- Illustrate differences in the management of incidental nodules through case presentation
Agenda

- ATA Guidelines
- TIRADS
- Case 1
- Case 2
- Case 3
- Case 4
- Wrap-Up
2015 American Thyroid Association Guidelines

FIG. 1. Algorithm for evaluation and management of patients with thyroid nodules based on US pattern and FNA cytology. R, recommendation in text.
2015 American Thyroid Association Guidelines
Sonographic Patterns

FIG. 2. ATA nodule sonographic patterns and risk of malignancy.
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ACR Thyroid Imaging, Reporting and Data System (TI-RADS): White Paper of the ACR TI-RADS Committee

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## ACR TI-RADS

**Composition (Choose 1)**
- Cystic or almost completely cystic: 0 points
- Spongiform: 0 points
- Mixed cystic and solid: 1 point
- Solid or almost completely solid: 2 points

**Echogenicity (Choose 1)**
- Anecic: 0 points
- Hypoechoic or isoechoic: 1 point
- Hypoechoic: 2 points
- Very hypoechoic: 3 points

**Shape (Choose 1)**
- Widely-ran-tall: 0 points
- Tall-er-than-wide: 3 points

**Margin (Choose 1)**
- Smooth: 0 points
- Ill-defined: 2 points
- Lobulated or irregular: 3 points
- Extrathyroidal extension: 3 points

**Echogenic Foci (Choose All That Apply)**
- None or large comet-tail artifacts: 0 points
- Macronodules: 1 point
- Peripheral (cm): 2 points
- Calcifications: 3 points
- Punctate echogenic foci: 3 points

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**TR1**  Benign  No FNA

**TR2**  Not Suspicious  No FNA

**TR3**  Mildly Suspicious
- FNA if > 2.5 cm
- Follow if ≥ 1.5 cm

**TR4**  Moderately Suspicious
- FNA if > 1 cm
- Follow if ≥ 0.5 cm

**TR5**  Highly Suspicious
- FNA if > 1 cm
- Follow if ≥ 0.5 cm

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**Composition**
- Spongiform: Composed predominantly (≥50%) of small cystic spaces. Do not add further points for other categories.
- Mixed cystic and solid: Assign points for predominant solid component.
- Assign 2 points if composition cannot be determined because of calcification.

**Echogenicity**
- Anecic: Applies to cystic or almost completely cystic nodules.
- Hypoechoic/isoechoic/hypoechoic: Compared to adjacent parenchyma.
- Very hypoechoic: More hypoechoic than strap muscles. Assign 1 point if echogenicity cannot be determined.

**Shape**
- Taller-than-wide: Should be assessed on a transverse image with measurements parallel to sound beam for height and perpendicular to sound beam for width.
- This can usually be assessed by visual inspection.

**Margin**
- Lobulated: Protrusions into adjacent tissue.
- Irregular: Jagged, spiculated, or sharp angles.
- Extrathyroidal extension: Obvious invasion = malignancy. Assign 0 points if margin cannot be determined.

**Echogenic Foci**
- Large comet-tail artifacts: V-shaped, > 1 mm, in cystic components.
- Macronodules: Cause acoustic shadowing.
- Peripheral: Complete or incomplete along margin.
- Punctate echogenic foci: May have small comet-tail artifacts.

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# 2015 American Thyroid Association Guidelines

## Bethesda System

**TABLE 8. THE BETHESDA SYSTEM FOR REPORTING THYROID CYTOPATHOLOGY: DIAGNOSTIC CATEGORIES AND RISK OF MALIGNANCY**

<table>
<thead>
<tr>
<th>Diagnostic category</th>
<th>Estimated/predicted risk of malignancy by the Bethesda system, %&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Actual risk of malignancy in nodules surgically excised, % median (range)&lt;sup&gt;b&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nondiagnostic or unsatisfactory</td>
<td>1–4</td>
<td>20 (9–32)</td>
</tr>
<tr>
<td>Benign</td>
<td>0–3</td>
<td>2.5 (1–10)</td>
</tr>
<tr>
<td>Atypia of undetermined significance or follicular lesion of undetermined significance</td>
<td>5–15</td>
<td>14 (6–48)</td>
</tr>
<tr>
<td>Follicular neoplasm or suspicious for a follicular neoplasm</td>
<td>15–30</td>
<td>25 (14–34)</td>
</tr>
<tr>
<td>Suspicious for malignancy</td>
<td>60–75</td>
<td>70 (53–97)</td>
</tr>
<tr>
<td>Malignant</td>
<td>97–99</td>
<td>99 (94–100)</td>
</tr>
</tbody>
</table>

<sup>a</sup>As reported in The Bethesda System by Cibas and Ali (1076).

<sup>b</sup>Based on the meta-analysis of eight 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 nondiagnostic and benign diagnostic categories.
Agenda

- ATA Guidelines
- TIRADS
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- Case 2
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- Case 4
- Wrap-Up
Case 1: Thyroid Nodule Discovered on CT scan

- 33M s/p MVC who had pan-CT as trauma workup
- CT chest upper cuts show a 2 cm left thyroid nodule
- What’s next?

- Symptoms: Sticking sensation when swallowing saliva/dry food/pills
- PE: palpable left thyroid nodule, rises upon swallowing
Case 1: Thyroid Nodule Discovered on CT scan

- Thyroid ultrasound: 2.5 cm left hypoechoic complex thyroid nodule, smooth borders, no calcifications

- How do we counsel this patient?
Evaluation of Incidental Thyroid Nodules Detected on Imaging Studies
Case 1: Thyroid Nodule Discovered on CT scan

- Biopsy: Benign
- Discussion of severity of symptoms and surgical risks/benefits/alternatives
- Left hemithyroidectomy amenable to transoral approach
- Outcome: Resolution of symptoms
Transoral Thyroidectomy for Incidental Thyroid Nodules

Why Transoral?

- Transoral Endoscopic Thyroidectomy Vestibular Approach (Toetva)
- “First do no harm”
- Privacy, not vanity
- Other benefits
  - Less nerve traction, better voice outcomes
  - Better parathyroid visualization
Transoral Thyroidectomy for Incidental Thyroid Nodules

Patient Selection

- Benign or indeterminate nodules
- Up to 6 cm nodules
- Avoid: thyroiditis, previous radiation or surgery to the neck, mediastinal goiter
Transoral Thyroidectomy for Incidental Thyroid Nodules
Transoral Thyroidectomy for Incidental Thyroid Nodules
Case 2: Thyroid Nodule Discovered on PET Scan

- 24F with Stage II cervical cancer s/p treatment being followed with serial PET scans
- Also w/ history of Hashimoto’s thyroiditis on Synthroid
- Most recent scan shows an avid 1 cm lesion in the R thyroid
- What’s next?

- US: Bilateral nodules, 1.7 cm R nodule solid, hypoechoic and 1 cm left complex nodule
Case 2: Thyroid Nodule Discovered on PET Scan

- Biopsy: Bethesda 3, atypia of undetermined significance
- Molecular testing
- Thyroidectomy
  - How extensive?
- Total thyroidectomy
- Pathology: Benign
Case 3: Thyroid Nodule Discovered by OB/GYN

- 28F 16 weeks pregnant found to have a thyroid nodule on physical exam at OB appt
- Asymptomatic, benign exam
- Thyroid US: 3 cm right thyroid nodule solid, isoechoic, smooth borders, no concerning features

- Biopsy: Benign
- Plan?
Case 3: Thyroid Nodule Discovered by OB/GYN

- F/u appt 6 weeks after delivery, pt now symptomatic from nodule, desires surgery
- Nodule appears larger on exam
- Thyroid US: 4.5 cm solitary thyroid nodule no cervical adenopathy
- Repeat biopsy: Bethesda 3
- Discussion of surgery vs. molecular testing—pt desires total thyroidectomy
- Pathology: Benign
Case 4: Thyroid Nodule Discovered on CT Chest

- 64F with known lung nodules undergoing serial CT chest
- Thyroid nodules discovered on CT chest, US performed → surveillance
- Found to have mediastinal adenopathy and growing lung nodule
- Underwent VATS/mediastinoscopy
- Pathology: Adenocarcinoma of the lung, stage II, with mediastinal LN involvement
- Focus of papillary thyroid cancer in a single mediastinal LN
Case 4: Thyroid Nodule Discovered on CT Chest

- Thyroid US: 5.2 cm left thyroid cystic mass extending into left lateral neck with 1 cm calcification; extensive lateral neck adenopathy
- Biopsies: +PTC in left thyroid nodule, +PTC in left level II LN
- Underwent total thyroidectomy, central neck dissection, left modified radical neck dissection
Case 4: Thyroid Nodule Discovered on CT Chest

- Pathology: Classic and follicular variant PTC, multifocal, largest focus 0.8 cm
  - 3/7 positive central neck nodes
  - 4/41 positive lateral neck nodes (levels I-V)

- Plan: Chemotherapy followed by RAI
Take-Home Points

- Thyroid ultrasound is the best initial imaging modality to evaluate incidentally discovered thyroid nodules.
- The decision to biopsy should be based upon TIRADS and personal risk factors (radiation, FH).
- Management options include surveillance, hemithyroidectomy and total thyroidectomy and should include a discussion of risks and benefits of each option.
Selected References

Haugen, B, et al. 2015 American Thyroid Association Management Guidelines of Adult Patients with Thyroid Nodules and Differentiated Thyroid Cancer. Thyroid, Vol 26(1) 2016.

