Update on Thyroid Nodules and Differentiated Thyroid Cancer

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Thyroid Carcinoma
Histologic Classification

1. Papillary including follicular variant (80%)

2. Follicular including Hurthle cell variant (15%) *FNA
   & frozen section will be non diagnostic in follicular and
   Hurthle cell neoplasms

   ★ Well differentiated thyroid CA = papillary & follicular

3. Medullary (5%)

4. Anaplastic, Lymphoma, Metastatic (<1%)
Investigation of Thyroid Nodules

✦ 10% of thyroid nodules are malignant (radiation exposure increases risk up to 50%)

✦ Work up of nodule regardless of how it is found (symptoms, routine exam, incidentaloma on carotid doppler, CT/MRI chest/neck, PET, etc.)

✦ PET nodules more aggressive

  • PET nodules on FNA, 60% malig., 30% benign, 10% indeterminate
Investigation of Thyroid Nodules

1. TSH
   - Low TSH (hyperthyroid) lower risk of CA, obtain nuclear scan and compare US → HOT nodule
   - High TSH (hypothyroid) higher risk of CA → COLD nodule

2. Diagnostic US
   - size (10 mm), solid/cystic, calcifications, vascularity, shape, hypoechogenic, irregular edges, elastonography (hardness)

3. US guided FNA (no FNA on purely cystic nodules)
   - FNA is most accurate, low risk, & cost-effective eval. of nodule
   - Observation has risk of delay in diagnosis
   - Thyroidectomy (surgical biopsy) has risks of anesthesia and surgery
US guided FNA

- Mostly recommended on nodules that are > 10mm
- FNA > 5mm for high risk

1. High risk US - microcalcifications, hypoechoic, increased vascularity, infiltrative margins, taller than wide
2. High risk history - family history, radiation exposure, FDG avid on PET, prior hemithyroidectomy with CA

- FNA any nodule size in presence of abnormal lymph nodes

> 5mm

≥ 10mm

Any nodule size
Classification FNA Cytology
(Bethesda System for Reporting Thyroid Cytopathology)

I. Non-diagnostic (1-4% risk of malignancy) —> repeat FNA

II. Benign (0-3% risk) —> serial US follow up

III. AUS/FLUS Atypia/follicular lesion of undetermined significance (5-15% risk) —> repeat FNA or 2nd opinion on FNA

IV. SFN suspicious for follicular neoplasm - follicular or Hurthle cell neoplasm, indeterminate (15-30% risk) —> thyroid lobectomy but risk of 2nd surgery if malignant on permanent

V. Supicious for malignancy (60-75% risk) —> total thyroidectomy

VI. Malignant (97-99% risk) —> total thyroidectomy

Benign Thyroid Nodules

• If FNA is benign, → recommend repeat US in 6-18 months, and then every 3-5 years if stable (I repeat US in 6 months then repeat yearly for 2 years)

• If nodule increases in size, → repeat FNA (20% increase in at least 2 dimensions or 50% increase in volume regarding the solid portion)

• Routine suppression therapy with benign thyroid nodules is not recommended
Surgery on Benign Nodules

• Symptomatic or cosmetic concerns

• Patient preference (several nodules, dislike of multiple FNAs, fear of missing cancer, “just be done with it”), trouble regulating thyroid function,

• Consider surgery even with benign FNA: nodules > 3cm (false negative rate 5% for < 3cm and 12% for nodules > 3cm; false negatives were mainly follicular variant of papillary or follicular CA)

• High risk (radiation exposure, posterior nodules)

Indications for Surgery

• Surgery recommended for Bethesda V and VI (diagnostic or suspicious for CA)

• Follicular and Hurthle cell neoplasms need definitive biopsy (surgery)

• Nondiagnostic FNA need surgery (or very close observation)
The Future: Indeterminate FNA

• Proto-Oncogene analysis on FNA may help avoid surgery in indeterminate cytology in the future

- PTC (papillary thyroid cancer) - BRAF, Ras, RET/PTC, NTRK1

- FTC (follicular thyroid cancer) - PAX8, PPAR-gamma-1, HRAS, NRAS, KRAS
TNM Classification for Differentiated Thyroid Carcinoma

- **T1** tumor diameter $\leq 2$cm
- **T2** tumor diameter $>2$ to 4cm
- **T3** $>4$cm with minimal extrathyroidal extension
- **T4_a** extends beyond capsule to invade subQ tissues of larynx, trachea, esophagus, or nerve
- **T4_b** invades prevertebral fascia or encases carotid artery or mediastinal vessels
TNM Classification for Differentiated Thyroid Carcinoma

- **N0** no metastatic nodes
- **N1\textsubscript{a}** mets to level VI nodes
- **N1\textsubscript{b}** mets to ipsi/contra/bilateral cervical nodes or superior mediastinal nodes
- **NX** nodes not assessed at surgery
- **M0** no distant mets
- **M1** distant mets
- **MX** distant mets not assessed
## TNM Classification for Differentiated Thyroid Carcinoma

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<th>Stage</th>
<th>&lt; 45 years old</th>
<th>≥ 45 years old</th>
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<td>I</td>
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Take Home Points

• Work up includes TSH & ultrasound

• US guided FNA for nodules $\geq$ 10mm

• If benign, repeat US in 6 months

  ✓ and refer if nodule increases in size

  ✓ Refer for surgery if FNA inconclusive or CA

  ✓ Refer for symptomatic goiter
That’s all folks!