Most thyroid nodules are benign

- Thyroid nodules occur in 77% of the world’s population
- Palpable thyroid nodules occur in about 5% of women and 1% of men in the US
- More common in women, advancing age, iodine deficiency, family history and radiation exposure
- High resolution ultrasound can detect nodules in 19-67%, with increasing rates in women and the elderly

(Tuttle and Lehoeuf, Endo Metab N Am) (ATA revised guidelines for Thyroid Nodules, Thyroid 2009)

Thyroid cancer is now the most rapidly increasing cancer in women

- Approximately 44,670 new cases of thyroid cancer were diagnosed in 2010
- Yearly incidence 3.6 per 100,000 in 1973 --> 8.7 per 100,000 in 2002
- Most of the change is attributed to increases in papillary thyroid cancer, which comprises 90% of all thyroid cancers
- Almost half of the rising incidence consisted of tumors <1cm
- 1,690 deaths from thyroid cancer predicted this year

(Gosnell and Clark, Management of thyroid nodules, in Cameron’s Current Surgical Therapy, 10th ed, 2010)
Thyroid nodules: History

- Symptoms of hypothyroid, hyperthyroidism
- Local symptoms in the neck
  - dysphagia, dyspnea, dysphonia
  - neck pain
- Family history of thyroid or other cancers
- Exposure to ionizing radiation to the head and neck

Physical exam

- Vitals
- Eye signs
  - stare, lid lag, exophthalmos
- Visible, palpable nodules
  - fixed mass, tenderness
- Deviation of midline structures
- Cervical lymphadenopathy
- Cardiac
- Extremities
  - pretibial myxedema
  - tremor
- Skin
  - rash, cutaneous lichen amyloidosis
  - Pemberton’s sign

Most thyroid cancers are biochemically “silent”

- TSH is the signal best test to assess for thyroid dysfunction
- T3, T4 as indicated
- Thyroglobulin
  - Suh et al., Serum thyroglobulin is a poor diagnostic biomarker of malignancy in follicular and Hurthle-cell neoplasms of the thyroid.
  - 366 pts with follicular/Hurthle cell lesions
  - Tg levels>500μg/L had positive predictive value of 0.75

(Suh et al., Am J Surg 2010 Jul;200:41)
Thyroid nodules: imaging

- Ultrasound
  - Better than palpation and scintigraphy for thyroid nodules and cervical lymph nodes
  - Inexpensive, non-invasive
  - Provides valuable characteristics of the nodule (calcifications, vascularity, borders)
  - Cannot distinguish between benign and malignant lesions

*Ultrasound for the Endocrine Surgeon, Surgery 2005, 138(6):1193*

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Value of preoperative ultrasound

Unsuspected disease was found by ultrasonography in 52 patients (34%) and altered the operative approach to include dissection of the central lymph nodes in 32 patients, ipsilateral nodes in 21 patients and contralateral nodes in 9 patients

(Kouvaraki et al, Surgery 134:946, 2003)

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Thyroid nodules: ultrasound guided FNA

(J Mechanick, Endocrine Surgery, 2004)

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FNA biopsy for thyroid nodules: when is it indicated??

- Most do not advocate biopsy of all thyroid nodules
  - >1cm, worrisome ultrasound findings, rapid enlargement, family history or radiation exposure


(Cooper et al. Revised ATA guidelines 2009)
Thyroid scintigraphy: Limited role!

- Historically, used to characterize thyroid nodules by their ability to take up isotope, as a way to distinguishing benign from malignant
  - up to 80% of thyroid nodules are “cold”, only 20% of these are malignant
- Now, useful in patients with biochemical hyperthyroidism
  - distinguish between Graves’ disease, toxic adenoma and Plummer’s disease (toxic MNG)

Other imaging modalities

- Useful to evaluate for retrosternal extension, tracheal deviation/compression, locally advanced disease
  - CT scan
    - avoid iodinated contrast in patients that may need RAI treatment
  - MRI

Retrosternal goiter
FNA biopsy for thyroid nodule

- **FNA biopsy**
  - Benign (70%)
  - Malignant (<10%)
  - Indeterminate/suspicious (5-10%)
  - Nondiagnostic (<10%)

- **> 90% accurate**
- **Total thyroidectomy (lobectomy)**
- **“Diagnostic” thyroidectomy**
- **10 – 50% risk of cancer**

Up to 25-30% of FNA indeterminate/nondiagnostic
Need for more accurate diagnostic tests than FNA cytology!

FNA: typical papillary thyroid cancer

- **“Orphan Annie eyes”**

Indeterminate FNA cytology

- Follicular cell lesion
- Hurthle cell lesion

Indications for thyroidectomy in patients with thyroid nodules

- FNA suspicious/malignant findings
- Worrisome nodules despite benign FNA findings
  - >4cm, growing
- Local compression
- Retrosternal extension
- Family history of thyroid cancer and exposure to ionizing radiation
- Selected cases of hyperthyroidism (toxic MNG, Graves’ disease)
- Cosmesis
The role of diagnostic surgery

- Indicated for follicular or Hurthle cell neoplasms
- Indicated for patients with worrisome clinical findings
  - growing nodules, risk factors for thyroid cancer
- Should be considered for nodules > 4cm

The role of intraoperative frozen section

- useful for nodules suspicious for papillary thyroid cancer (often FVPTC) (Livolsi, Surgical Pathology of the Thyroid, 2nd ed, 2007)
- useful for cervical lymph nodes, parathyroid glands
  - However frozen section can be inaccurate (Guerrero et al, Endocr Practice 2009;15(5):454). Consider PTH aspirate

What’s new?

- Molecular markers
  - Fillie et al, Diagnostic Cytopathology 2008;36(6):438
  - “Utilization of ancillary studies in thyroid fine needle aspirates: A synopsis of the National Cancer Institute Thyroid Fine Needle Aspiration State of the Science Conference”
- Prophylactic surgery for patients with mutations in the RET proto-oncogene
- New surgical approaches
  - “Minimally invasive”
  - Laparoscopic, robotic axillary approach
- Surgical adjuncts
  - Nerve monitoring, sentinel node mapping

Summary

- Thyroid nodules are common, and most are benign
- Streamlined work-up: TSH, ultrasound-guided FNA
- Pitfalls:
  - coincidental primary hyperparathyroidism
  - unrecognized retrosternal goitre
  - unrecognized familial syndrome
  - locally advanced cancers
Thank you