THYROID PATHOLOGY

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DEFINITIONS
• GOITER: enlarged thyroid
• EUTHYROID: normal thyroid function
• NONTOXIC: thyroid not hyperfunctional
• TOXIC: hyperfunctional thyroid

GRAVES’ DISEASE
DIFFUSE TOXIC GOITER
MOST COMMON CAUSE OF HYPERTHYROIDISM

GROSS:
• DIFFUSELY ENLARGED
• UP TO 3-4X NORMAL (normal 10-35gm)
• SURGERY RARE
GRAVES’ DISEASE

MICROSCOPIC:

Hyperplasia of follicular lining cells
- New follicles formed: tall, columnar cells
- Scalloping of colloid
- Lymphoid cell infiltrates
  - Source of abnormal autoantibodies

HASHIMOTO’S THYROIDITIS

- May be found
  - Incidentally
  - Visible neck mass
  - Compressing trachea or esophagus
- GROSS:
  - Usually enlarged up to 2-3X
  - Usually symmetrical, diffuse & firm
    - If nodular, suspect neoplasm
  - Light tan or gray
  - L-thyroxine therapy may shrink gland

HASHIMOTO’S THYROIDITIS

Lymphocytic thyroiditis with oxyphilia

MICROSCOPIC:

- LYMPHOCYTES & plasma cells
- HURTHLE CELLS = Oxyphilic cells
  - Abundant pink cytoplasm
  - Pink = acidophilic = eosinophilic
  - Electron Microscopy
    - Numerous mitochondria
NONTOXIC NODULAR GOITER “NTNG”

- **Common:**
  - 4-7% adults in US have palpable nodular goiter
  - usually asymptomatic but may cause compression
  - most are MULTINODULAR
  - may have only one palpable nodule
    - clinical concern to rule out neoplasm
    - do ultrasound to detect other nodules
    - do needle aspirate or core bx to diagnose NTNG

NONTOXIC NODULAR GOITER “NTNG”

- **GROSS:**
  >1 round, well demarcated, tan glistening nodules of variable sizes within normal red-brown thyroid tissue.

NONTOXIC NODULAR GOITER “NTNG”

- **MICROSCOPIC:**
  - Follicles
    - VARYING SIZES, usually large
    - filled with COLLOID
    - lined by cuboidal cells
  - Zones of FIBROSIS & HEMORRHAGE
THYROID NEOPLASMS

• BENIGN: ADENOMA

• GROSS:
  – Nodule
    • well encapsulated
    • solid
    • deep-tan

THYROID NEOPLASMS

• How to distinguish Follicular ADENOMA from CARCINOMA?
  – Search for invasion of capsule or blood vessels
  – Examine entire nodule, especially capsule
THYROID CARCINOMA

1. PAPILLARY: 70-80%
2. FOLLICULAR: 10-20%
3. MEDULLARY: 5%
4. ANAPLASTIC: 1-3%

PAPILLARY CARCINOMA

- 70-80% of thyroid carcinomas
- **GROSS:** most often solitary
  - **BUT........
- **MICRO:** most often multifocal
  - if opposite lobe is serially sectioned, another focus will be found in 50-75% of cases

PAPILLARY CARCINOMA

**GROSS:**

- GRANULAR or FIRM WHITE LESION
- IRREGULAR BORDERS

PAPILLARY CA

**MICRO:**

- PAPILLARY FRONDS
- CUBOIDAL LINING CELLS
- MOST LESIONS ALSO HAVE FOLLICULAR AREAS
- SAME BIOLOGIC BEHAVIOR REGARDLESS OF % PAP VS. FOLL
PAPILLARY CA

NUCLEAR FEATURES:
- GROUND GLASS
- OPTICALLY CLEAR
- ORPHAN ANNIE-EYE

PSAMMOMA BODIES=
- SMALL CONCENTRIC CONCRETIONS
PAPILLARY CA

RELIABLY DIAGNOSED BY:
1. FINE NEEDLE ASPIRATION (FNA)
2. CORE NEEDLE BIOPSY
3. FROZEN SECTION DIAGNOSIS

PAPILLARY CA

METASTATIC SPREAD:
• LYMPHATIC TO PARYTHYROIDAL LNs
• MULTICENTRIC FOCI IN THYROID
  – ? MULTIPLE PRIMARIES
  – ? MET FOCI VIA LYMPHATIC SPREAD
• CLINICAL OR SUBCLINICAL

PAPILLARY CA

SPREAD:
• RARELY DIE OF PAPILLARY CA
• IF DIE, USUALLY
  – PULMONARY OR CEREBRAL METS
  – INVASION OF JUGULAR, CAROTID OR AIRWAY
  – ANAPLASTIC DIFFERENTIATION

FOLLICULAR CA

• 10-20% OF THYROID CARCINOMAS
• USUALLY
  – SOLITARY
  – COLD
  – LOW RAI UPTAKE

FOLLICULAR CA

GROSS:
• SOLITARY
• MAY HAVE CAPSULE
  – INVASION DISTINGUISHES CA FROM ADENOMA
• MAY INVADE
  – ADJACENT THYROID
  – OUTSIDE THYROID & CAUSE ADHESIONS TO ADJACENT STRUCTURES
FOLLICULAR CA

MICRO:
• SOLITARY IN ONE LOBE
• METASTATIC SPREAD:
  – INVADES AND METS VIA VEINS
  – COMMON SITES OF METS:
    • LUNGS AND BONES

Treatment:
• Total thyroidectomy (1 or 2 stages)
• If metastatic to lung or bone, treat with hi dose $^{131}$I to ablate
• 10 year survival: 50-70%

CHORNOBYL PROJECT
$I^{131}$ Radioisotope scan of 24 year old man with thyroid cancer and lung metastases
THYROID NEOPLASMS

- How to distinguish Follicular ADENOMA from CARCINOMA?
  - Search for invasion of capsule or blood vessels
  - Examine entire nodule, especially capsule

FOLLICULAR CA

- VERY DIFFICULT TO DIAGNOSE BY FROZEN SECTION
  - Bland tumor cells
  - Subtle invasion
  - EASY TO DIAGNOSE ANY CA WITH GROSS INVASION &/OR ANAPLASIA AND MITOSES

MEDULLARY CA

- 5% OF THYROID CARCINOMAS
- ARISE from PARAFOLLICULAR CELLS ("C" CELLS)
  - ARISE FROM NEURAL CREST
- FAMILIAL 25% (MEN)
- ASSOCIATED WITH RET PROTO-ONCOGENE

MEDULLARY CA

- "C" CELLS PRODUCE MAINLY CALCITONIN
  - & OTHER PP HORMONES ie SERATONIN, ACTH
- PRE-OP SERUM CALCITONIN FOR DIAGNOSIS
- POST-OP SERUM CALCITONIN TO DETECT RESIDUAL OR RECURRENT TUMOR
- TOTAL THYROIDECTOMY
- LN DISSECTION IF ENLARGED OR SUSPICIOUS NODES

MEDULLARY CA

GROSS:
- YELLOW-TAN
- ILL-DEFINED BORDERS
- INFILTRATES ADJACENT TISSUES
MEDULLARY CA

MICROSCOPIC:

- SOLID NESTS
- ROUND TO SPINDLY CELLS
- AMYLOID-LIKE STROMA
  - CONGO RED, POLARIZED:
    APPLE GREEN BIREFRINGENCE
**MEDULLARY CA**

**SPREAD:**
- LYMPHATIC
- VENOUS
- METS TO LUNG AND BONES
- MULTIFOCAL

**ANAPLASTIC CA**

**1-3% OF THYROID CARCINOMAS**

**VERY POOR PROGNOSIS**

(<5% SURVIVE 5 YEARS)

**LESS FREQUENT than 40 years ago**

**ANAPLASTIC CA**

**CLINICAL:**
- Patients >50 years old
- Old nodule begins to grow rapidly
  - ? arose in pre-existing nodule
- ? Lower incidence due to more resected nodules

**ANAPLASTIC CA**

**CLINICAL:**
- Rapid growth
- Invasion of adjacent structures
- Tracheostomy frequently necessary
- Usually unresectable
- Chemo / Radiation not useful in most

**ANAPLASTIC CA**

**MICRO:**
- HIGHLY UNDIFFERENTIATED!!!!
  - small cells
  - giant cells
  - spindle cells
- May need immunostains to distinguish from lymphoma & sarcoma
MALIGNANT LYMPHOMA OF THYROID

• USUALLY ARISES IN HASHIMOTO’S THYROIDITIS

• RARELY PRIMARY IN THYROID

THYROGLOSSAL DUCT CYST

• PERSISTENT THYROID ALONG EMBRYONAL MIGRATION PATH IN MIDLINE NECK, ANTERIOR TO LARYNX & HYOID BONE

• RESECTED WHEN RESIDUAL TRACT / CYST PERSISTS OR RECURS

• MICRO:
  – LINED BY CILIATED RESPIRATORY EPITHELIUM, SQUAMOUS, OR BOTH