## **Vesalius SCALpel**<sup>TM</sup>: Thyroid (see also: head and neck folios)

#### **Anatomic**

lingual thyroid

most common ectopic location normal thyroid tissue

patients may have no thyroid in neck

manifest as teenager, may enlarge

70% of pts with lingual thyroid are hypothyroid

Rx w synthroid, may shrink

10% incidence of cretinism if not recognized

Dx by scan

in 70% of patients with lingual thyroid, it is the only thyroid tissue

no need to remove asymptomatic

substernal thyroid/goiter

CT scan to diagnose inferior extension

US inadequate for Dx

growth, airway obstruction, SVC syndrome

85% anterior

primary substernal thyroid blood supply from thoracic, v secondary from neck

posterior type danger recurrent nerve injury

most from inferior extension of goiter

almost always accessible from neck, source of blood supply

goiter

Grave's, solitary nodule, multinodular, Hashimoto's, subacute thyroiditis (DeQuervain's), Reidel's

may be asymptomatic, hyperthyroid, or cause compression, hoarseness, stridor, dyspnea

### **Thyroid function**

thyrotropin releasing hormone from hypothalamus stimulates pituitary to release thyroid stimulating hormone (TSH)

TSH stimulates thyroid to release iodinated thyroglobulin stored in cells

thyroglobulin hydrolyzed to T3 and T4 which are released into the circulation

most (80%) of circulating thyroid hormone is T4

T3 is also generated by peripheral conversion of T4

T3 is more metabolically active than T4

thyroglobulin is not normally released into circulation except in pathological conditions, cancer

#### Benign

### Grave's

autoimmune

Graves and Hashimotos: antithyroglobulin and antimicrosomal antibodies T3 X 10d should decrease TSH 50%

in Graves, toxic nodule, TSH is already suppressed

Dx: clinical, decreased TSH, antimicrosomal & antithyroglobulin antibodies

medical Rx mild: PTU, tapazol 4-6w to improvement

10% incidence rash, nausea, headache, fever, agranulocytosis, aplastic anemia,

thrombocytopenia, hepatic toxicity

methimizole passes through placenta

beta block for tachycardia, hypertension

steroids for eye manifestations

50% remission 6-24mo

radioactive iodine (RAI)

failed drug treatment

recurrence, pts > 55, non-operative candidates

contraindicated in pregnancy, lactation

RAI passes placenta and into breast milk

20-70% become hypothyroid

5-20% recurrence, repeat in 6mo

incidence of recurrence of Graves equal with subtotal and RAI

no RAI in child or woman of childbearing age

### surgery

indications: failed drug therapy, rapid need (pregnancy), large goiter, noncompliance, woman of childbearing age, severe eye manifestations

lugols soln. 8 drops/d starting 10d pre-op

near total thryroidectomy

#### thyroid storm

fever, tachycardia, confusion, coma, congestive heart failure, nausea, vomiting, diarrhea

10-20% mortality from high output CHF

most common cause non-compliance with meds

start treating before lab results or multiorgan failure

Rx: PTU, beta block, steroids/IV hydrocortisone (prevent peripheral conversion of

T4 to T3), treat underlying cause

propranalol 1mg/m to 10mg max dose for tachycardia

PTU 200mg

KI 5-10 drops decreases T3 and T4 release

hydrocortisone 200mg IV initial, then 100mg Q8h to decrease thyroid

hormone release

IV with glucose (thyroxin increases glucose metabolism)

no ASA (displaces T4 from thyroglobulin, worsens storm)

iodine to inhibit sodium pump and slow release of T3,4 from gland

O<sub>2</sub>, Tylenol for fever, ice packs PRN

#### solitary toxic adenoma (Plummer's)

RAI failure, > 3cm do surgical lobectomy 1/1000 risk of Ca

### Hashimoto's thyroiditis

### subacute thyroiditis (DeQuervain's)

self-limiting inflammatory thyroiditis young to middle age women fatigue, headache, muscle ache, fever minimal to moderate enlargement, tenderness salicylates, NSAIDS, steroids

## Reidel's thyroiditis

rare, fibrous thyroiditis
middle aged women
progressive hard woody enlargement, rock-hard gland
bx to differentiate from anaplastic carcinoma
isthmusectomy to maintain airway, often need permanent tracheostomy
steroids, TAM main Rx, goal to stabilize

### **Thyroid cancer**

most common endocrine cancer thyroid nodule

solitary in child rare, associated with radiation, more malignant (40% in child < 14) than adult MEN2a and b risk in child, young FNA 6% false negative; if positive to OR, no scan needed full US to assess other lobe and lymph nodes

high index suspicion child despite negative tests

cancer risk: solitary non-functioning nodule (12-15% malignant), > 4cm (26% cancer risk), age < 20, > 40, firm, fixed, rapid growth, lymphadenopathy, radiation exposure (after 20y)

>4cm: higher false negative FNA rate, do minimum of lobectomy favorable prognosis pap/follic: women < 50, men < 40, tumor < 5cm

poor prognosis: lymphatic invasion FNA 98-100% accurate for papillary

### papillary

numerous histologic variants, some with poorer clinical outcomes

tall cell and columnar cell variants of papillary more aggressive

RET (tyrosine kinase) oncogene: papillary, MENIIA, B, familial MTC

80% of thyroid cancer

papillary and follicular = well differentiated thyroid cancers

papillary Ca most common, best prognosis

tall cell variant worse prognosis

FNA Dx papillary confirmed 98-100% on final path

painless mass, euthyroid, microscopically multicentric common, no markers

15% of well differentiated thyroid cancers have hx of goiter

history of neck radiation, most node positive

Gardner's, Crohn's and FAP associated with thyroid Ca

patients with FAP have a 2% chance of getting papillary thyroid cancer

nodes

risk: age < 20, > 70, local tumor invasion, blood vessel invasion, hi nuclear grade

child more common LN mets, most after RT

closest nodes central and carotid sheath, 50% micromets

central node dissection with palpable nodes

lateral compartment modified neck dissection (not cherry picking)

elective node dissection without palpable nodes does not influence survival

20% subsequent palpable mets, dissect with same survival

LN mets correlates with local recurrence

positive nodes do not change prognosis

female to male pap and folic 3:1, males worse prognosis, 2X mortality ablative I131 post total thyroidectomy decreased recurrence rate thyroid hormone post-op to suppress TSH

#### follicular

15% of thyroid cancer

20% met to lung and bone

ablative I131 post total thyroidectomy decreased recurrence rate

thyroid hormone post-op to suppress TSH

follicular: multicentricity increases with size, 4cm do total

#### Hurthle cell/oncocytic

older pts (>60)

variant of follicular, < 5% of differentiated thyroid cancers

Hurthle cell same prognosis, but more recurrence

positive nodes in Hurthle worse prognosis (v no change prognosis in other well differentiated thyr cancers)

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surgery
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rationale for near total: 80% multicentric, 15% local recurrence, with routine neck dissection up to 80% positive nodes, ability to monitor thyroglobulin, use RAI, no difference distant mets or survival

80% get near total complications

1% bleeding

15% transient hypocalcemia

monitor Q 8h X 3, if Ca++ > 8 no further monitor or Rx

1-2% hypopara > 6mo

5% transient recurrent laryngeal N injury

recovery 3-6mo

1% permanent injury

thyroglobulin: produced by most papillary and follicular cancers, tumor marker for recurrence

### medullary (MCT)

5-10% of thyroid malignancies

neuroendocrine parafollicular C cells release calcitonin

calcitonin release normally in response to elevated calcium

inhibits osteoclast activity, minor role in calcium balance

elevated basal or stimulated calcitonin indicates medullary cancer already present

FNA spindles

25% genetic

RET protooncogene mutation, chromosome 10, autosomal dominants

RET (codes for tyrosine kinase receptor) mutation stimulates cell growth DNA test on peripheral lymphocytes

also mutation tumor suppressor gene on chromosome 11 responsible for protein menin

3 phenotypes

MEN-IIA: MCT, pheo (50%), hyperpara (20%)

bilateral/multifocal MCT, C-cell hyperplasia

(MEN-2A:MEN-2B 3:1)

MEN-IIB: MCT, Marfanoid, mucosal neuroma, ganglioneuroma

phenotype: marfanoid, prognathism, puffy lips, bumpy tongue, hyperflexible adrenal surgery preceeds MCT

familial MCT (FMCT): MCT alone

for familial/genetic prophylactic total thyroidectomy as young as 6

screening and surveillance not appropriate

Ca/parathormone, 24h urine VMA, total and fractionated metanephrine to r/o MEN2 65% sporadic, 35% MEN2

sporadic usually unilateral without family hx

80% of pts. positive central neck nodes, 80% ipsilateral, 50% contralateral surgery only effective Rx, multicentric, total thyroidectomy, central neck dissection palpable nodes 75% positive f/u: calcitonin, CEA (some produced)

# anaplastic

long hx goiter or differentiated thyroid cancer, rare, 1% older, rapid growth, local, nodal, hematogenous spread 3-6mo survival < 5cm, limited to thyroid do total, XRT, taxol, rare palliative in most, maintain airway