The Thyroid (patho-phys review)
-Anterior neck, bi-lobed structure with an isthmus
-Usually mobile and non-tender
-Produces T3 and T4 (aka thyroid hormones)
  -T3 Active Form- regulates metabolism, growth and development
  -Hormone production regulated by the hypothalamus, pituitary, and thyroid gland axis
    -Negative Feedback System
      -T3 and T4 are produced-> Negative feedback on hypothalamus and pituitary gland -> Less thyroid releasing hormone (TRH) and thyroid stimulating hormone (TSH) released -> Less T3 and T4 produced

History
-Personal or family history of thyroid issues? Malignancy?
-Enlarged thyroid gland?
-Hypothyroid Symptoms- everything is LOW- “slowed down”
  -Fatigue
  -Hair loss
  -Dry Skin
  -Constipation
  -Weight Gain

-Hyperthyroid Symptoms- everything is HIGH- “ramped up”
  -Palpitations
  -Heat intolerance
  -Anxiety
  -Sweating
  -Diarrhea

PEARL: Not all patients will have all these symptoms- presentations can be very subtle

Hypothyroid
-Primary hypothyroidism- failure to produce thyroid hormone
  -Hashimoto’s thyroiditis, prescriptions meds, iodine deficiency
-Secondary Hypothyroidism- not enough TRH or TSH produced due to issue with hypothalamus or pituitary gland

-Secondary hypothyroidism is much more rare- masses, ischemic events (Sheehan’s syndrome from post-partum hemorrhage)

Myxedema Coma- Hypothyroid problem
-Many causes- drugs, infections, medication non-compliance, CHF, trauma, bleeding, electrolyte imbalances- anything that can cause stress

Symptoms- everything is DOWN
  -Hypoxia, decreased respiratory rate
  -Hypothermia
  -Bradycardia, heart blocks, abnormal EKG intervals
  -Decreased mental status

“So classic case” is an elderly female “found down”

Myxedema management
-Careful attention to ABCs
  -IV fluids, oxygen, cardiac monitoring.

-Labs
  -CBC, CMP, TSH
  -TSH will be HIGH

-Look for possible causes
  -Medication changes? Infection/sepsis?

-T3 vs. T4
  -T3 associated with more arrhythmias
  -Most clinicians use T4- 200-500 mcg IV over 1 hour
    -Lower doses for patients with cardiac disease

-Steroids
  -Dexamethasone 2-4mg IV every 6 hours OR
  -Hydrocortisone 100mg every 8 hours

-Disposition
  -Most go to ICU for close monitoring
**Thyrotoxicosis** - Hyperthyroid problem

**-Causes** - Grave’s disease, multinodular goiter, subacute thyroiditis, OD on thyroid medication
- Also anything that causes stress - surgery, infection, drugs, pregnancy

**-Symptoms** - everything is UP
- Tachycardia
- Nausea/vomiting/diarrhea
- Hyperthermia
- Confusion/agitation (not apathetic like myxedema coma)

**-Labs**
- Same labs as myxedema - TSH will be LOW

**Thyroid Storm management**
- More complicated than myxedema coma

**-Goals:**
1) Provide supportive care and block the effects of thyroid hormone
2) Decrease production of thyroid hormone
3) Block release of thyroid hormone into peripheral circulation
4) Block peripheral conversion of thyroid hormone to active form
5) Find and treat precipitating cause if present

**-Supportive care** - IV fluids, oxygen, treat arrhythmias

**-Propanolol** - blocks effects of thyroid hormone and peripheral conversion of thyroid hormone
- 1-2mg slow IV bolus every 10-15 minutes

**-PTU or methimazole** - decreases thyroid production
- PTU - 600-1,000mg PO initially, then 200-250mg PO every 4 hours
- Methimazole - 40mg PO initially, then 25mg every 4 hours
  - Don’t use methimazole in pregnant patients in the first trimester

**-Potassium Iodide or Lugol’s solution** - blocks release of thyroid hormone
- Potassium Iodide - 5 drops PO every 6 hours
- Lugol’s solution - 8-10 drops PO every 6 hours

**-Steroids** - blocks peripheral conversion
- Hydrocortisone 100mg IV every 8 hours
- Dexamethasone 2mg IV every 6 hours

**-Find and treat underlying causes**
- Sepsis? Trauma? Medication OD?

**Disposition** - ICU for monitoring and continued treatment

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