Non Thyroid Surgery in Thyroid Disease

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Produced

T3

T4
General

- Thyroid disease common
- > in females
- Many have surgeries
- Many ill patients $\rightarrow$ abnormal thyroid tests
  - Not always clinically relevant ie. NTI
- No screening unless clinical suspicion
Thyroid Function in Ill/Inpatients

- Can be difficult to interpret
- Low FT3, FT4, TSH
  - Non Thyroidal Illness (NTI)
    - Acquired transient central hypothyroidism
    - No evidence to Tx
      - May be harmful in fact
- Only test if high clinical suspicion
Thyroid Function in NTI

Graph showing changes in thyroid hormone levels from 'Sick', 'Sicker', to 'Sickest'.
- rT3: Red line increasing
- Free T4 index: Orange line decreasing
- TSH: Green line decreasing
- T4: Yellow line decreasing
- T3: Black line decreasing
Hypothyroidism & Surgery

- Hypometabolism
  - Dec CO, HR, contractility
- Hypoventilation
  - Respiratory muscle weakness
  - < respiratory response to hypoxia/hypercarbia
- Dec gut motility
- Hyponatremia
- Inc creat
- Dec drug clearance
- Dec Vit K dep clotting factors
- Dec RBM mass → normocytic anemia
Surgical Outcomes

- No RCT's
- Case control studies
  - Dec BP
  - CV collapse
  - Inc sensitivity to narcs, seds, anesthesia
Study # 1

- n=120
- Normal vs hypothyroid
- No difference
  - OR duration
  - CV outcomes
  - Time to extubation/post op ventilation
  - Bleeding
  - Fluid/lytes
  - Sepsis
  - Time to d/c

Outcome of anesthesia and surgery in hypothyroid patients. Weinberg AD; Brennan MD; Gorman CA; Marsh HM; O'Fallon WM Arch Intern Med 1983 May; 143(5): 893-7.
Study # 2

- n=40 hypothyroid & n=80 control
- Hypothyroid
  - > hypotension, CHF
  - > GI, neuropsychiatric abnormalities
  - < fever with infection
  - No diff
    - Blood loss, duration of hospital stay
    - Arrhythmia
    - Hypothermia
    - Hyponatremia
    - Wound healing
    - Resp Cx
    - death

Severe Hypothyroidism

- Myxedema coma risk
  - High mortality
- Hypotension
- Hypothermia
- Hypoventilation
- Bradycardia
- Dec LOC
- hypoNa, hypoglycemia
- CHF, pericardial effusion
- Very low FT4
Definitions

- Poorly defined, inconsistent
- Severe more easily defined
- All others, mild/moderate hypothyroid
What to do?

- Mild-Moderate
  - OR ok if urgent/emergent
  - If elective, delay OR
    - L-thyroxine outpatient dosing
      - 1.6mcg/kg if young, healthy
      - 25mcg/d if old/CV disease
  - If chronic l-T4, iv if can’t take po x 5-7days
    - iv dose 80% of po dose
Severe Hypothyroidism

- No good data of what to do
- Only emergency surgery since high risk
- L-T4 200-300mcg → 50mcg od
- L-T3 5-20mcg → 2.5-10mcg q8h x 2 days or till alert
- If suspicion adrenal insufficiency & no time to test
  - Stress dose glucocorticoids

Monitor
- Hemodynamics
- Fluid/lytes
- Ileus
- Neuro-psych
- Infection w/o fever
CV Surgery & Hypothyroidism

- Special case
- L-T4 can increase angina
  - but w/o it can increase CHF
- Studies:
  - no difference if mild-mod w/o Tx in outcomes
- Angina may improve or worsen
- Start slowly & increase slowly with l-T4
Hyperthyroidism

- Inc CO, O2 requirements, contractility, HR, PP
- Dec PVR
- A. Fib 10-20%
- Inc SOB
- Dec weight/malnutrition
- Inc risk thyroid storm
  - Life threatening
- No elective OR till control (3-8 weeks)
Cardiac Physiology

- Thyroid-hormone-mediated thermogenesis (peripheral tissues)
- Release metabolic endproducts
- Local vasodilation
- Increased cardiac output
- Cardiac chronotropy (and inotropy)
- Decreased diastolic blood pressure
- Elevated blood volume
- T3
- Decreased systemic vascular resistance
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<tr>
<th>Organ system</th>
<th>Symptoms</th>
<th>Signs</th>
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<td>Neuropsychiatric/Neuromuscular</td>
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<td>Muscle wasting</td>
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<td>Anxiety</td>
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<td>Confusion</td>
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<td>Decreased libido</td>
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<td>Ophthalmologic</td>
<td>Diplopia</td>
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<td>Eye irritation</td>
<td>Ophthalmoplegia</td>
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<td>Conjunctival injection</td>
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Thyroid Storm

- Hyperthermia
- Mental Status changes
  - Confusion/delirium
  - Agitation & psychosis
  - Coma
- CVS
  - Tachycardia
  - CHF
  - Hypotension
Surgical Outcomes & Tx

- No good studies
- Assess cardio-resp status and optimize
Beta-Blockade

- Propranalol
  - iv 1-3mg q3h or
  - po 60-120mg q4-6h

- Esmolol
  - iv 0.25-0.5mg/kg --> 0.05-0.1mg/kg/min

- Diltiazem (Bronchospasm Hx)
  - po 60-90mg q6-8h
  - iv as usual
Thionamides

“Anti-thyroid Drugs”

- PTU (Propylthiouracil)
  - po/ng 1000mg --> 150-300mg q6h
  - pr 400mg q6h
  - iv/pr formulation can be made
    - contact pharmacy
- Methimazole
  - po/ng 20mg q4-8h
  - pr 60mg q24h
Iodinated Radiocontrast Agents

- 1 hour post-Thionamides
  - po/ng SSKI 5 drops q8-12h
  - po/ng Lugol’s 10 drops q8h
  - iv NaIodide 1g over 24h
  - po/iv Iopanic Acid/Iodate(Telepaque) 0.5-1g q12h over 12h
Others

- **Glucocorticoids x 1-2d**
  - iv Dexamethasone 2mg q6h
  - iv Hydrocortisone 300mg --> 100mg q8h
    - decrease T4 --> T3
    - decrease hormone release
Others

- Lithium
  - If serious reaction to ATD’s
  - 300mg q6h
  - aim level 1mEq/L
- Phenobarbital
- Cholestyramine
  - po 20-30g/d
- Dialysis
- Plasmapheresis
Definitive Tx

- 1-131 Ablative Tx
- Thyroidectomy
Peri-op Concerns

- CV status
  - Arrhythmias
  - Ischemia
  - CHF
  - Prolonged intubation
Thank you