

What Endocrine surgeons need to know about Endocrinology!

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Hyperthyroidism:

- Pre-operative preparation
 - Emergent
 - Corticosteroids
 - Potassium Iodide [KI]
 - Iopanoic acid [Contrast agent- not available in the USA]
 - Non-Emergent
 - Anti-thyroid therapy to 'cool off' the thyrotoxic state
 - MMI or PTU
 - Beta- blocker therapy
 - Atenolol or Propranolol or Metoprolol
 - Potassium Iodide [KI] to reduce vascularity of the gland.
 - 150 to 300 mg of Inorganic iodine per day [1 to 2 drops of saturated iodine tid or 7-8 drops Lugol's iodine tid]
 - "Iodine escape"

Hypothyroidism

- Risk of surgery in Hypothyroid patients
 - Clinically/biochemically euthyroid on replacement- no additional risk
 - Post-operatively will not require replacement unless NPO for >5 days.
 - If NPO for more than 5 days use IV levothyroxine q 24hrs at 50-80% of daily oral dose.
 - Clinically/biochemically hypothyroid or myxedema
 - Emergent surgery- surgery takes precedence followed by PO or IV levothyroxine replacement.
 - Non-Emergent surgery- ideally replace levothyroxine, normalize thyroid function before surgery.
- What is the peri-operative risk of hypothyroidism
 - Hypothyroid patients have a higher incidence of peri- & post-operative ileus, hyponatremia, hypotension, hypercapnia
 - More sensitive to opiate medication and altered mental status, decreased fever response to sepsis

Hypothyroidism - treatment

- Pre-morbid adequate replacement [normal TSH]
 - If NPO for 3-4 days – No replacement is required. Resume home dose when appropriate
 - If NPO for > 5 days – start on IV levothyroxine at 50-80% of daily PO dose
- Pre-morbid Hypothyroid or newly diagnosed Hypothyroidism/Myxedema
 - Start with 50 mcg of IV levothyroxine q 24hrs
 - In high risk patients [Elderly or known CAD]- use 25mcg IV levothyroxine q 24hrs

Thyroid Cancer

- Pre-operative
 - Lateral Neck imaging for lymph node
- Post-operative adjuvant therapy
 - Radio-iodine ablation
 - Withdrawal of T4 for 4-6 weeks v. T3 for 4 weeks post-op, withdraw for 10 days v. rhTSH stimulated

Risk of MTC development in MEN-2 depends on the mutated RET codon Timing of Thyroidectomy

Clinical monitoring for medullary thyroid cancer and timing of thyroidectomy in carriers of a mutation in the RET gene

Risk	RET codon mutation	Recommended age to begin annual screening for MCT*	Recommended timing of prophylactic thyroidectomy [†]
Highest	918	Not applicable	In the first months to year of life
High	834, 883	Three years	At or before age five years
Moderate	833, 859, 811, 618, 870, 870, 658, 769, 790, 804, 891, 912	Five years	Childhood or young adulthood

Risk of MTC development in MEN2 depends on mutated RET codon.

MEN2: multiple endocrine neoplasia type 2; MTC: medullary thyroid cancer.

* Annual physical examination, neck ultrasound, and measurement of serum calcitonin.

† Patients with MEN2 and a diagnosis of MTC (regardless of age) must have pheochromocytoma excluded prior to thyroidectomy.

Data from: Wells SA Jr, Asa SL, Drake H, et al. Revised American Thyroid Association Guidelines for the Management of Medullary Thyroid Carcinoma. The American Thyroid Association Guidelines Task Force on Medullary Thyroid Carcinoma. *Thyroid* 2015; 25:567.

Hyperparathyroidism

- Pre-operative
 - Localization of lesion -adenoma v. hyperplasia
 - 'Locate' the surgeon
- Operative
 - Intra-operative PTH monitoring- 50% reduction in PTH level
 - Intra-operative Indo-cyanine green fluorescence
- Post-operative
 - "Hungry bone syndrome"
 - Treat with PO Calcium carbonate and Calcitriol
 - IV Calcium carbonate infusion 50mg/hr [Use CaCO₃ solution concentration 50mg/mL]
 - Correct Magnesium deficiency
 - Correction of Phosphate deficiency can be hazardous unless patient has concomitant CHF or muscle paralysis

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Management of adults with hypocalcemia after thyroid surgery

Postoperative day	Serum tests	Therapy
Night of surgery	Calcium in the evening (approximately 8 PM)	Ca <7.5 mg/dL: Calcitriol 0.5 mcg three times daily x three days and calcium gluconate 3 g/L D5 1/2 normal saline IV at 100 mL/hour
Day 1	Calcium and phosphorus in the morning (approximately 8 AM); if Ca <7.5 mg/dL, add magnesium	<p>Ca <7.5 mg/dL: Calcitriol 0.5 mcg twice daily x three days and adjust depending upon calcium response and calcium gluconate 3 g/L D5 1/2 normal saline IV at 100 mL/hour and calcium carbonate (2 to 4 g elemental calcium) by mouth daily in divided doses depending upon calcium response</p> <p>Ca 7.5 to 8.0 mg/dL: Calcitriol 0.5 mcg twice daily x three days and adjust depending upon calcium response and calcium carbonate (1 to 4 g elemental calcium) by mouth daily in divided doses depending upon calcium response</p> <p>Ca >8.0 mg/dL: Calcium carbonate (1 g elemental calcium) by mouth twice daily</p> <p>Mg <2 mg/dL: Magnesium sulfate 4 g in 100 mL normal saline IV at 10 mL/hour and magnesium oxide 400 mg by mouth twice daily x one month</p>
Day 2 to 4	If day 2 Ca <8.0 mg/dL, total calcium and phosphorus	<p>Ca <7.5 mg/dL and asymptomatic: Calcitriol 0.25 mcg three times daily and calcium gluconate 3 g/L D5 1/2 normal saline IV at 100 mL/hour and calcium carbonate (1 to 4 g elemental calcium) by mouth daily in divided doses and modify based upon calcium response</p> <p>Ca <7.5 mg/dL and asymptomatic: Calcitriol 0.25 mcg three times daily and calcium carbonate (2 to 4 g elemental calcium) by mouth daily in divided doses and modify based upon calcium response</p> <p>Ca 7.5 to 8.4 mg/dL or P <2.45 mg/dL: Calcitriol 0.25 mcg daily and calcium carbonate (2 to 4 g elemental calcium) by mouth daily in divided doses and modify based upon calcium response</p> <p>Ca 8.5 to 9.4 mg/dL and P <2.45 mg/dL: Calcium carbonate (1 to 4 g elemental calcium) by mouth daily in divided doses and modify based upon calcium response</p> <p>Ca 9.5 mg/dL: No therapy</p>

To convert serum calcium to mmol/L, divide by 4. To convert serum phosphorus to mmol/L, divide by 3.1.

Ca: calcium; IV: intravenous; Mg: magnesium.

Hypo-parathyroidism [chronic]

- Calcium Carbonate [1-2 gms elemental calcium] TID or Calcium Citrate TID (in Elderly, on PPI or Achlorohydia) along with
- Calcitriol 0.25mcg PO TID [to be given along with Ca]
- Monitor serum and 24hr urine calcium [Avoid hypercalcuria >250mg]
- When 24hr Ur Calcium is >250 mg use thiazides to reduce Ur Ca
 - HCTZ 12.5 - 50 mg/day +/- dietary Sodium restriction
- Maintain Serum Calcium level in the lower end of the normal range.

Hypo-parathyroidism [chronic]

- rhPTH 1-84 (Natpara)
 - To be used in conjunction with Calcium and Calcitriol
 - Starting dose 50mcg SQ daily. Reduce Calcitriol dose by 50% on starting Natpara. Maintain Calcium dose as is, until Ur calcium excretion is >300mg