Management of patients with thyroid cancer scheduled for thyroidectomy at RCHSD

Pre-Operative labs – To be drawn when Thyroidectomy for the management of thyroid cancer is first considered

- Vitamin D-25 OH
- CMP (in order to check calcium and alkaline phosphatase along with electrolytes)
- TSH, Total T4 or Free T4
- Anti TPO-Ab and Anti-Thyroglobulin antibodies

Pre-Operative supplementation with Vitamin D3

- VD-25OH = 20-29 ng/ml: Start with 1000 IU of Vitamin D3 daily if normal weight
  2000 IU of Vitamin D3 daily if obese
- VD-25 OH <20 ng/ml: Start with 2000 IU of Vitamin D3 daily if normal weight
  4000 IU of Vitamin D3 daily if obese
- VD-25 OH <10 ng/ml: Start with 5000 IU of Vitamin D3 daily if normal weight
  10,000 IU of Vitamin D3 daily if obese
  Add celiac panel with next blood draw
- Consider calcium supplementation if Vitamin D < 20 ng/ml

Post-Operative management for Total or Completion Thyroidectomy

General measures

- All patients should be on telemetry overnight after thyroidectomy
- ENT physician should page Endocrine on call at the completion of the surgery in order to relay information as to the extent of the resection and the status of the parathyroid glands.
- iPTH intact and calcium level should be drawn in the PACU to be run STAT.
- Endocrine on call should be notified if iPTH level is < 10 pg/ml or calcium level is <8 mg/dL
### Risk Stratification for post-operative hypocalcemia

<table>
<thead>
<tr>
<th>Low Risk patient</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Total thyroidectomy or uncomplicated completion thyroidectomy without central neck dissection &amp; • Parathyroid glands visualized and left intact and well vascularized at the end of the procedure</td>
<td></td>
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<td>• Thyroidectomy with central neck dissection • Complicated or prolonged re-operative cases • Cases with parathyroid re-implantation • Cases in which parathyroid glands were removed or were not visualized well • <strong>Hyperthyroid patients</strong></td>
<td></td>
</tr>
</tbody>
</table>
I. Low risk patient flowchart

STAT iPTH and serum calcium level in the PACU

Asymptomatic

iPTH >10 pg/ml & 2 calcium levels q 6 hrs ≥8.8 mg/dl

No further action is required. Discontinue calcium checks

iPTH >10 pg/ml & Calcium < 8.8 mg/dl

Repeat calcium with Albumin and Mg

If calcium < 8.8 mg/dl start calcium carbonate oral 1000 mg TID

Check calcium q4 hrs

Discontinue calcium checks if 2 calcium levels ≥ 8.8 mg/dl

If calcium level > 9.5 mg/dl hold calcium carbonate recheck calcium in 6 hrs

If calcium < 8 mg/dl

Refer to High Risk patient flow chart and notify endocrine

iPTH ≤10 pg/ml

Anticipate calcium decrease

Refer to High Risk patient flow chart
II. High risk patient flowchart

STAT iPTH, Calcium and Mg level in the PACU

Magnesium < 1.6 mg/dl (Regardless of calcium levels)
- Magnesium < 1.8 mg/dl & Calcium < 8 mg/dl
  - Administer IV MgSO4
- Magnesium ≥ 1.8 mg/dl
  - Repeat Mg level in 12 hrs

Repeat Mg levels along with Calcium checks

Asymptomatic

iPTH < 5 pg/ml
  - Anticipate rapid decrease of serum calcium level
  - Start Calcitriol & Calcium carbonate (q4 hrs dosing)
  - Check Calcium q 4hrs

iPTH ≤ 10 pg/ml
  - Anticipate rapid decrease of serum calcium level
  - Start Calcitriol & Calcium carbonate (q6 hrs dosing)
  - Check Calcium q 4hrs

iPTH > 10 pg/ml
  - Start Calcium carbonate and add albumin to next lab draw.

iPTH > 10 pg/ml & 2 calcium levels q 6 hrs ≥ 8.8 mg/dl
  - No further action is required. Discontinue calcium checks

If calcium < 7.5 mg/dl give one time dose of Forteo
  - Increase calcium per endocrine
  - Get EKG
  - Check Calcium q 4 hrs

If calcium level > 9.5 mg/dl hold calcium carbonate and notify Endocrine

If Calcium 8.8 mg/dl start calcium carbonate q 6 hrs
  - Check Calcium q 6hrs

If Calcium < 8 mg/dl add calcitriol and increase calcium carbonate to q 4 hrs
  - Check Calcium q 4 hrs

If Calcium < 7.5 mg/dl add Forteo q 12 hrs SQ
  - Get EKG
  - Check Calcium q 4 hrs*

* If symptomatic Hypocalcemia refer to step III (Symptomatic Hypocalcemia or Calcium ≤ 7 mg/dl)
III. Symptomatic Hypocalcemia or Calcium <7 mg/dl (In addition to the High risk patient flowchart)

- Notify ENT and Endocrine on call and consider PICU admission
- Obtain an EKG to evaluate QTc and cardiac rhythm
- Secure a central line or a good antecubital vein for administration of IV calcium
- Order IV calcium infusion given as Calcium (total) Gluconate 10% at 100-200 mg/kg over 5-10 minutes for tetany
- Order SQ Forteo q 12 hrs
- Transfer patient to the PICU if Calcium <7mg/dl or QTc >470 msec, for closer cardiac monitoring
- Make sure Calcitriol based on High risk patient flowchart has been ordered

**Doses for medications used in the protocol**

**Calcitriol PO:**
- If < 30 kg 0.25 mcg BID
- If 30-50 kg 0.5 mcg BID
- If > 50 kg 1 mcg BID

If unable to take oral calcitriol use IV calcijex at the above dosages

**Calcium Carbonate:**
- If < 30 kg 500 mg Q 4 hrs
- If 30-50 kg 750 mg Q 4 hrs
- If > 50 kg 1000 mg Q 4 hrs

(Total calcium)
- If < 30 kg 500 mg Q 6 hrs
- If 30-50 kg 750 mg Q6 hrs
- If > 50 kg 1000 mg Q 6 hrs

If unable to take oral calcium use IV calcium (total) gluconate 100 mg/kg over one hour q 6hrs

**Forteo SQ:**
- If < 30 kg 10 mcg
- If 30-50 kg 15 mcg
- If > 50 kg 20 mcg

**Magnesium Sulfate IV:** 25 mg/kg (Max 1 gram) over 4 hrs

**Goals for Discharge**

- Off IV calcium for at least 12 hrs prior to discharge
- Stable calcium levels >7.8 mg/dl (at least in 2 consecutive blood draws) over a 12 hr period
- If the patient is discharged home on supplements (calcitriol or PO calcium or SQ Forteo), repeat calcium and magnesium levels 2-3 days after discharge
- If the patient is high risk and is discharged home without calcium supplementation repeat
calcium levels with thyroid levels in 2 weeks.

- Patients and caregivers must receive adequate education in recognizing signs and symptoms of hypocalcemia prior to discharge

**Clinical manifestations of hypocalcemia – Mild to Moderate Hypocalcemia**

- Paresthesias and numbness of the fingertips and perioral area
- Spontaneous muscle cramps
- Muscle stiffness and myalgia
- **Chvostek's sign**: Twitching of the ipsilateral facial musculature (perioral, nasal, and eye muscles) by tapping over cranial nerve VII at the ear.
  It is neither sensitive nor specific for hypocalcemia: it is absent in 30% of patients with hypocalcemia and is present in roughly 10-15% of normocalcemic patients
- **Trousseau's sign of latent tetany**: Carpopedal spasm induced by inflation of the blood pressure cuff around the arm.
  More sensitive and specific than Chvostek's sign: present in 94% of hypocalcemic patients and only observed in 1% of normocalcemic patients.
- Prolongation of QTc in the EKG
- Asthma not controlled with routine bronchodilators

**Clinical manifestations of hypocalcemia – Severe Hypocalcemia**

- Stridor and/or dyspnea induced by prolonged contraction of the respiratory and laryngeal muscles
- Anxiety or agitation
- Mental status changes
- Seizures
- Prolongation of QTc in the EKG
- Arrhythmia on EKG
APPENDIX

Adapted flowchart if iPTH is not available in house

I. Low risk patient flowchart

STAT serum Calcium in the PACU and then q 6 hrs

- Initial calcium <8.8 or Last calcium level is lower than prior level?
  - Asymptomatic
    - NO
      - 2 calcium levels q 6 hrs ≥8.8 mg/dl
        - No further action is required. Discontinue calcium checks
    - Asymptomatic
      - YES
        - Calcium level <8.8 mg/dl
          - Start PO calcium carbonate 1000 mg TID
            - Check calcium q4 hrs
    - YES
      - Calcium level <8 mg/dl
        - Refer to High Risk patient flow chart
  - If calcium level >9.5 mg/dl hold calcium carbonate recheck calcium in 6 hrs
  - Discontinue calcium checks if 2 calcium levels ≥ 8.8 mg/dl
  - If calcium < 8 mg/dl Refer to High Risk patient flow chart and notify endocrine
II. High risk patient flowchart

STAT serum Calcium and Mg level in the PACU and then q 4 hrs

- Magnesium < 1.6 mg/dl (Regardless of calcium levels)
  - Administer IV MgSO4
- Magnesium < 1.8 mg/dl & Calcium < 8 mg/dl
  - Administer IV MgSO4
- Magnesium ≥ 1.8 mg/dl
  - Repeat Mg level in 12 hrs

Asymptomatic

- Calcium level 8-8.8 mg/dl
  - Start PO calcium carbonate (q6 hrs dosing) Check Calcium q 6hrs
- Calcium level <8 mg/dl
  - Start PO Calcitriol & Calcium carbonate (q4 hrs dosing) Check Calcium q 4hrs
  - If calcium <7.5 mg/dl give one time dose of Forteo Increase calcium per endocrine Get EKG Check Calcium q 4 hrs
- Calcium level <7.5 mg/dl
  - Start PO Calcitriol & Calcium carbonate (q4 hrs dosing) Add Forteo q 12 hrs SQ
  - Get EKG Check serum Calcium q 4 hrs

Initial calcium <8.8 or Last calcium level is lower than prior level?

- 2 calcium levels q 6 hrs ≥8.8 mg/dl
  - No further action is required. Discontinue calcium checks

Magnesium < 1.8 mg/dl & Calcium < 8 mg/dl

* If symptomatic Hypocalcemia refer to step III (Symptomatic Hypocalcemia or Calcium <7 mg/dl)