**Prevention of hypocalcaemia after total thyroidectomy in children and adolescents**

**SUMMARY**

**Background**

Hypocalcaemia is the most common complication of total thyroidectomy in 30-40% of children after a total thyroidectomy.

**How to manage** *(also refer to summary pathway)*

**1. Preoperative management**

* Check serum 25-hydroxyvitamin D level at least 1 month preoperatively.
* Give stoss dose cholecalciferol 150,000 IU if serum 25-hydroxyvitamin D is <50 nmol/L.
* If <12 months old, refer to RCH vitamin D guideline for treatment: (<https://www.rch.org.au/clinicalguide/guideline_index/Vitamin_D_deficiency/>)
* Surgical team to inform inpatient endocrinology team on the day of surgery

**2. Postoperative management**

Inpatient endocrinology team will assess and manage patients regarding hypocalcaemia.

a. Determine if high risk or low risk patient.

* High risk patients are those who meets criteria for one of the following:
* Parathyroidectomy
* Parathyroid tissue damage or devascularisation/reimplantation
* Lymph node or central dissection
* Hyperthyroidism
* Young age (≤ 6 years of age).

b. Check serum calcium and PTH 6 hours postop

*(refer to page 4 for interpretation of PTH)*

* *For all patients*, start prophylactic calcium orally once patient is able to tolerate oral intake within 12 hours postoperatively.
* Please also chart a PRN calcium and calcitriol dose dose for symptomatic hypocalcaemia as per the weight/age guidelines below.

Suggested oral calcium doses:

1. If weight < 30 kg, give elemental calcium 600 mg BID
2. If weight 30-49 kg, give elemental calcium 1200 mg BID
3. If weight > 50 kg, give elemental calcium 1200 mg TDS

* If *high risk patient* or if patient develops *hypocalcaemia* (total calcium < 2.0 mmol/L or ionised calcium < 0.9 mmol/L), add calcitriol treatment:

Suggested starting Calcitriol doses:

1. Age 1-5 years: Calcitriol 0.25 mcg BID
2. Age 6-10 years: Calcitriol 0.5 mcg BID
3. Age > 10 years and adults: Calcitriol 1 mcg BID

* If patient develops *symptoms of hypocalcaemia* (mild: muscle spasms or cramps, numbness or tingling periorally or in the extremities, fatigue; severe: tetany, seizures, laryngospasm, arrhythmia (prolonged QRS or QT):
  + Check serum calcium and magnesium levels immediately.
  + Start oral calcium and calcitriol as per high risk patient or give PRN calcium/calcitriol as per charted PRN dose.
  + If patient already on calcium and calcitriol, doses may be increased:
    - Elemental calcium up to 150 mg/kg/day
    - Calcitriol up to 100 ng/kg/day
  + Only consider IV calcium replacement if oral is not possible due to risk of cutaneous necrosis with extravasation.

Suggested IV calcium doses:

1. IV bolus: 10% calcium gluconate solution 0.5 mL/kg (0.11 mmol/kg of calcium ions), give diluted solution slowly over 20-60 minutes.
2. IV infusion: 10% calcium gluconate solution 4.5 mL/kg/day (1 mmol/kg/day of calcium ions), continuous infusion using an infusion pump.

c. Check serum calcium 12 hours postop

* Patients who developed clinical or biochemical hypocalcaemia:
  + Consider discharge once symptoms of hypocalcaemia resolved and total serum calcium levels are ≥ 2.0 mmol/L on 3 consecutive checks.
  + If the patient develops hypocalcaemia and/or requires calcium and/or calcitriol doses beyond the above suggested guides, ongoing discharge planning should be individualised as per the inpatient endocrinology team.
* High risk patients without hypocalcaemia:
  + Consider discharge if serum calcium ≥ 2.0 mmol/L and surgically cleared.
  + Recheck calcium 2-3 days after discharge
  + Check serum calcium levels 2-3 days after discharge. If normal, check serum calcium levels weekly. If calcium remains within normal ranges, halve the Calcitriol or Calcium dose weekly until the patient is off both medications.
* Low risk patients without hypocalcaemia:
  + Consider discharge if serum calcium ≥ 2.0 mmol/L and surgically cleared.
  + Check serum calcium levels weekly. If calcium remains within normal ranges, halve the calcium dose weekly until they reach calcium carbonate 600 mg daily, then cease calcium if serum calcium level is normal 1 week after.

**Summary pathway for the management of post-thyroidectomy patients**



**Notes:**

1. PTH testing with a timely turnover is not available in many centres and is therefore not likely to guide immediate treatment. However, once available, it can guide future management. A PTH of > 2.1 pmol/L in a normocalcaemic patient is reassuring. PTH of < 1.6 pmol/L is associated with higher risk of hypoparathyroidism and requires more intensive monitoring and slower wean of supplements. Clinical discretion should be used for PTH levels between 1.6 to 2.1 pmol/L in a normocalcaemic patient.
2. High risk patients: Parathyroidectomy, parathyroid tissue damage or devascularisation/reimplantation, lymph node or central dissection, hyperthyroidism, young age (≤ 6 years of age).
3. Calcium dose is elemental calcium 50-150 mg/kg/day in 2 divided doses, up to an adult dose of elemental calcium 1.2g TDS orally. As a guide:

If weight < 30 kg, give elemental calcium 600 mg BID

If weight 30 - 49 kg, give elemental calcium 1200 mg BID

If weight > 50 kg, give elemental calcium 1200 mg TDS

1. Calcitriol (up to 100 ng/kg/day should be started postoperatively for high risk patients or hypocalcaemic patients as soon as possible *in addition* to oral calcium carbonate as detailed above. As a guide:

Age 1-5 years: Calcitriol 0.25 mcg BID

Age 6-10 years: Calcitriol 0.5 mcg BID

Age > 10 years and adults: Calcitriol 1 mcg BID

If patient is hypocalcaemic and unable to tolerate oral treatment, IV calcium correction should be considered.

1. Symptoms of hypocalcaemia includes muscle spasms or cramps, numbness or tingling periorally or in the extremities, fatigue, tetany, seizures, laryngospasm, arrhythmia (prolonged QRS or QT).

Ca Calcium

PTH Parathyroid hormone