Parathyroidectomy management in patients with secondary hyperparathyroidism (2015)

Indications for parathyroidectomy

The indications for parathyroidectomy in patients with ESKD are intractable secondary hyperparathyroidism despite optimal medical management. This includes, but is not limited to, cases of hypercalcaemia despite cessation of calcium based phosphate binders and vitamin D analogues.

Surgical procedure involves resection of all four parathyroid glands with autotransplantation of a small amount of glandular tissue in the deltoid muscle.

Post parathyroidectomy hypocalcaemia

Hypocalcaemia post-parathyroidectomy ("hungry bone syndrome") is almost universal in patients with ESKD. It is frequently associated with hypophosphataemia and hypomagnesaemia. Large doses of calcitriol (2-4ug per day) and elemental calcium (6-12g per day) in addition to a calcium infusion may be required.

Although studies have not been consistent, several
risk factors for severe hypocalcaemia have been reported:

- Preoperative hypercalcaemia
- Marked elevations of parathyroid hormone
- Elevated alkaline phosphatase
- Hypomagnesaemia
- Hypoalbuminaemia
- 25-OH-vitamin D deficiency

Pre-operative management

1. Check serum magnesium, calcium, phosphate and 25-OH vitamin D pre-operatively and correct hypomagnesaemia, hypophosphataemia and 25-OH-vitamin D deficiency.
2. Assess the patient's vascular access. A calcium infusion requires a large vein to reduce the risk of extravasation injury. A peripherally inserted central catheter (PICC) or central venous catheter (CVC) may be required if reliable peripheral venous access is not available.
3. Oral calcitriol should be commenced 48 hours prior to surgery at 0.75ug TDS.
4. Cinacalcet and phosphate binders should be ceased the day prior to surgery.

Post-operative management

1. Oral calcium should be commenced as soon as possible after surgery at a dose of 1.8g TDS, away from meals (Caltrate 3 tablets TDS).
2. Serum calcium should be checked 2 hours after surgery and the patient assessed for symptoms of hypocalcaemia (see below).
3. Calcium testing should then occur every 4-6 hours
4. A calcium infusion (see below) is indicated in either of the following situations:
    a. Corrected calcium has declined by more than 10% from the pre-operative value
    b. Corrected calcium is less than 2.0mmol/L (ionised calcium < 1.0mmol/L)
5. The target corrected calcium is 2.0-2.4mmol/L (ionised calcium 1.0-1.25mmol/L)
6. Testing may reduce to twice daily once patients have achieved a stable serum calcium within the target range *and* infusions has been weaned and ceased.
7. Magnesium and phosphate should be checked at least daily. Hypomagnesaemia (of any degree) and severe hypophosphataemia (<0.4mmol/L) should be treated with IV or oral preparations. Magnesium should not be given with food if patients are hypophosphataemic.
8. If intravenous magnesium or phosphate is required use:
    Magnesium - 10mmol $MgSO_4$ in 100mL 0.9% saline over 2 hours
    Phosphate - 10mmol KH_2PO_4 in 100mL 0.9% saline over 4 hours
9. Patients should not be discharged until calcium, phosphate and magnesium values are considered stable with oral medications only.

Assessment of hypocalcemia

Symptoms:

- Paraesthesias of lips, fingers and toes
- Confusion
- Muscle spasm and tetany
- Laryngospasm
- Seizures.

Signs:

- Chvostek's sign: facial muscle spasm with tapping of the facial nerve.
- Hyperactive deep tendon reflexes.
- Prolonged QTc.

Urgent treatment of hypocalcaemia

- **For severe symptoms (eg. laryngospasm, seizure or tetany) use 10mL calcium gluconate 10% over 2 minutes.**

- For less severe symptoms use 10mL 10% calcium gluconate over 10-20mins.

Calcium infusion

1. Intravenous calcium requires a large reliable vein to reduce the risk of extravasation injury.
2. Combine 100mL 10% calcium gluconate with 150mL 5% dextrose.
   This produces 250mL solution containing 3.6mg elemental calcium per 1mL.
3. Suggested starting rate is 25mL/hr (90mg/hr).
4. Repeat calcium should be obtained at 4 hours and infusion titrated to attain target range. Subsequent testing should be 4-6 hourly.
5. Rate adjustments should be made in consultation with the Renal registrar or MOIC. Suggested adjustments are 25-50% of the current rate, depending on the speed and magnitude of calcium fluctuations, but are at the discretion of the treating medical officer.

Patients receiving a calcium infusion should have continuous ECG monitoring under the following circumstances:

1. Severe hypocalcaemia at any point (Corrected calcium < 1.5mmol/L, ionised calcium < 0.7mmol/L)
2. Concurrent digoxin
3. Any new cardiac arrhythmia
4. History of serious cardiac arrhythmia or other predisposing factor as determined by the medical officer.

References

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