

Acute Hypocalcaemia (for use in adult patients)

Introduction:

Acute hypocalcaemia can be life threatening, necessitating urgent treatment. In severe cases, intravenous calcium forms the mainstay of initial therapy but it is essential to ascertain the underlying cause and commence specific therapy as early as possible. This guideline aims to take the non-specialist through the initial phase of assessment and management.

Clinical presentations:

Symptoms of hypocalcaemia typically develop when adjusted serum calcium levels fall below ~ 1.9 mmol/L. However, this threshold varies greatly and is dependent on the rate of fall.

Symptoms and signs of hypocalcaemia include:

- Peri-oral and digital paraesthesiae
- Positive Trousseau's and Chvostek's signs
- Tetany and carpopedal spasm
- Laryngospasm
- ECG changes (prolonged QT interval) and arrhythmia
- Seizure

Potential causes:

The commonest cause of acute symptomatic hypocalcaemia in hospital practice is disruption of parathyroid gland function due to total thyroidectomy. Hypocalcaemia may be temporary or permanent.

Other causes include:

- Following selective parathyroidectomy (hypocalcaemia is usually transient and mild).
- Severe vitamin D deficiency.
- Mg²⁺ deficiency (consider PPI-associated hypomagnesaemia).
- Cytotoxic drug-induced hypocalcaemia.
- Pancreatitis, rhabdomyolysis, and large volume blood transfusions.

Investigations:

- Serum calcium (adjusted for albumin)
- Phosphate
- PTH
- U+E
- Vitamin D
- Magnesium

Management:

“Mild” hypocalcaemia (Asymptomatic, >1.9 mmol/L)

- Commence oral calcium supplements such as Sandocal™ 1000, 2 tablets BD (Alternatives include Adcal 3 tablets BD, Cacit 4 tablets BD, or Calcichew Forte 2 tablets BD).
- If post-thyroidectomy and patient asymptomatic, repeat calcium 24 hours later:
 - When adjusted calcium is > 2.1 mmol/L, patient may be discharged and recheck calcium within one week.
 - If serum calcium remains between 1.9 and 2.1 mmol/L increase Sandocal™ 1000 to three BD.
 - If patient remains in mild hypocalcaemic range beyond 72 hours post operatively despite calcium supplementation, start 1-alfacalcidol 0.25 mcg/day (calcitriol may also be used) with close monitoring (see long term follow-up, below).
- If vitamin D deficiency is the cause, commence vitamin D supplementation: Load with ~300,000 units of cole- or ergocalciferol over ~6-10 weeks.
- If hypomagnesaemia-related, stop any precipitating drug and administer IV Mg²⁺, 24 mmol/24 hours, made up as 6g of MgSO₄ (30 ml of 20%, 800 mmol/L, MgSO₄) in 500 ml Normal saline or 5% dextrose. Monitor serum Mg²⁺ and aim to achieve normal serum magnesium level.
- If other cause of hypocalcaemia, treat underlying condition.

Severe hypocalcaemia (<1.9 mmol/L and / or symptomatic at any level below reference range)

- This is a medical emergency.
- Administer IV calcium gluconate.
- Initially, give 10 – 20 ml 10% calcium gluconate in 50-100 ml of 5% Dextrose IV over 10 minutes with ECG monitoring. This can be repeated until the patient is asymptomatic. It should be followed up with a calcium gluconate infusion as follows.
 - Dilute 100mls of 10% calcium gluconate (ten vials) in 1 litre of Normal saline or 5% dextrose and infuse at 50 – 100 ml/hr. (Calcium chloride can be used as an alternative to calcium gluconate but it is more irritant to veins and should only be given via a central line).
 - Titrate the rate of infusion to achieve normocalcaemia and continue until treatment of the underlying cause has taken effect.
- Treat the underlying cause; in post operative hypocalcaemia and other cases of hypoparathyroidism, this consists of 1-alfacalcidol or calcitriol therapy. Starting doses should be approximately 0.25 – 0.5 mcg per day.
 - 1-alpha hydroxylated vitamin D metabolites are potent causes of hypercalcaemia. Frequent blood tests are required in stabilisation phase of treatment.
 - 1-alfacalcidol can be administered (at equivalent doses) intravenously if there are concerns about absorption or difficulties with oral drug administration.
 - NB: Large volume calcium infusions should not be used in patients with end stage renal failure or who are on dialysis. Guidance on management of hypocalcaemia in these patients is available in the NKF KDOQI guidelines (1).
- Vitamin D deficiency or hypomagnesaemia should be treated as described above.

Hazards of IV calcium administration:

Uncommon but include local thrombophlebitis, cardiotoxicity, hypotension, calcium taste, flushing, nausea, vomiting and sweating. Patients with cardiac arrhythmias or on digoxin therapy need continuous ECG monitoring during IV calcium replacement.

Long term follow up:

For patients commenced on 1-alfacalcidol or calcitriol, monitoring of adjusted serum calcium levels should initially be performed approximately one week post discharge, then if satisfactory at 1, 3 and then 6 months. Follow up by a specialist with an interest in calcium disorders is recommended.

References:

- (1) http://www.kidney.org/professionals/kdoqi/guidelines_bone/Guide14.htm

This information is provided by the Society for Endocrinology's Clinical Committee, February 2013, and will be reviewed annually.