

Emergency management of acute hypocalcaemia 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 presentation

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 most common 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
- Parathyroid hormone (PTH)
- Urea and electrolytes
- Vitamin D

- Magnesium

Management

'Mild' hypocalcaemia: asymptomatic; serum calcium >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 h later:

- When adjusted calcium is >2.1 mmol/L, patient may be discharged and recheck calcium within 1 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 h post-operatively despite calcium supplementation, start alfacalcidol 0.25 micrograms/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/week of cole- or ergocalciferol over ~6–10 weeks

If **hypomagnesaemia-related**, stop any precipitating drug and administer i.v. Mg²⁺, 24 mmol/24 h, made up as 6 g 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: serum calcium <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 i.v. over 10 min 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 100 mL of 10% calcium gluconate (10 vials) in 1 L of Normal saline or 5% dextrose and infuse at 50–100 mL/h. Titrate the rate of infusion to achieve normocalcaemia and continue until treatment of the underlying cause has taken effect. 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, with cardiac monitoring.

Treat the underlying cause; in post-operative hypocalcaemia and other cases of hypoparathyroidism, this consists of alfacalcidol or calcitriol therapy. Starting doses should be approximately 0.25–0.5 micrograms per day.

1-alpha hydroxylated vitamin D metabolites are potent causes of hypercalcaemia. Frequent blood tests are required in stabilisation phase of treatment. 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 (http://www2.kidney.org/professionals/KDOQI/guidelines_bone/Guide14.htm).

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 i.v. calcium replacement.

Long-term follow-up:

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

Trust Guidelines		
Guidance Title: Emergency management of acute hypocalcaemia in adult patients		
Issue Date		Version
September 2022		2
Accountabilities		
Author	Dr Kate Evans	
Reviewed by (Group)	Endocrinology consultants at UHPT; Society for Endocrinology committee	
Approved by (Lead)	Mrs Lizzy Moore	
Links to other documents		
Version History		
1	October 2019	Initial Document
2	September 2022	Document revised
Last Approval		Due for Review
August 2022		September 2025