Neonatal hypocalcaemia

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Case 1

A 14-day-old male neonate, born at 30+2 weeks gestation, birth weight 1.1 kg, currently in NICU,

new-onset jitteriness and intermittent apnea. He was on CPAP for 48 hours, now on room air.

Enteral feeds were started on day 3 and gradually advanced. He is currently on fortified expressed breast milk (EBM) and gaining weight slowly.

On examination:

HR: 158/min, RR: 52/min, Temp: 36.7°C

Jittery movements noted during handling

Mild abdominal distension, active bowel sounds

CNS: Alert, no focal deficits

No dysmorphism, no hepatosplenomegaly

Serum calcium – 6.8mg/dl

What clinical features suggest hypocalcemia?

Neurological – jitteriness, seizures, irritability, hypotonia, apnea

Cardiorespiratory – Tachycardia, prolonged QT interval on ECG, Stridor

What are the risk factors for late-onset hypocalcemia in preterm neonates?

Late onset of hypocalcemia – occurring beyond 72 hours of life : Risk factors

Prematurity

- Immature parathyroid response

- Reduced calcium stores due to shortened third trimester

Associated hypomagnesemia

Vitamin D deficiency

Use of diuretics (e.g., furosemide)

Increases renal calcium loss

High phosphate intake

From cow’s milk–based formula or TPN

Leads to calcium-phosphate precipitation and suppression of serum calcium levels

List essential biochemical tests.

Serum calcium – age wise cut-off

Ionized calcium - <1.1 mmol/L confirms true hypocalcemia

Serum phosphate - 4.5–6.5 mg/dL

Serum magnesium - 1.5–2.5 mg/dL

If persistent or recurrent

Parathyroid hormone (PTH)

25-hydroxyvitamin D

Investigations – Index child

Serum calcium - 6.8 mg/dL ↓(8.5–10.5 mg/dL)

Ionized calcium - 0.9 mmol/L ↓(1.1–1.3 mmol/L)

Phosphate - 8.5 mg/dL ↑ (4.5–6.5 mg/dL)

Magnesium - 1.3 mg/dL ↓ (1.5–2.5 mg/dL)

PTH - Low normal (Age-appropriate range)

25(OH)D - 12ng/mL ↓

Glucose - 82 mg/Dl

ECG: QTc 490 ms ↑ (upto 440 ms)

Diagnosis

Late-onset hypocalcemia, likely nutritional and iatrogenic, exacerbated by high phosphate load from fortifier and low magnesium/Vitamin D.

Acute and chronic management

Acute Management (Symptomatic or Ca < 7.5 mg/dL)

- IV Calcium Gluconate - 10% solution, **1–2 mL/kg** over 10–20 minutes under **cardiac monitoring,** Preferably via central line; if peripheral, ensure secure access to avoid **extravasation**
- Monitoring: Continuous ECG for **bradycardia**, **arrhythmias**.

Chronic management (maintenance)

- Oral Calcium gluconate or carbonate: **50–75 mg/kg/day elemental calcium**, divided doses
- Vitamin D supplementation - 400–800 IU/day (adjust based on weight, feeding type, and maternal status)
- Feeding adjustments - Review fortifier composition; reduce phosphate load if elevated; maintain **Ca:P ratio ~1.5:1**

Role of Vitamin D

Why Preterm Neonates Are Vulnerable

Reduced transplacental transfer: Most maternal vitamin D transfer occurs in the third trimester – low stores.

Immature hepatic 25-hydroxylation: Limits conversion to active form

Adjustment of feeding and fortification

- Review fortifier composition - Check phosphate content—some bovine-based fortifiers have high phosphate loads
- Temporarily reduce fortifier volume or concentration - If serum phosphate is elevated (>7 mg/dL), Reduce fortifier by 50% for 48 – 72 hours
- **Switch to low-phosphate fortifier -** with better Ca:P ratios
- Aim for **Ca:P ≈ 1.5:1** to support bone mineralization and prevent hypocalcemia

THANK YOU