## Introduction

Hypophosphatemic rickets is characterized by phosphate renal loss associated with a primary defect of osteoblasts and metabolism of vitamin D. These patients are at high risk for developing hungry bone syndrome due to marked bone turnover caused by high levels of parathyroid hormone (PTH). Furthermore, in the presence of autonomous PTH production, long-term suppression of residual non-pathological parathyroid glands further aggravates post-surgical hypoparathyroidism. Hypocalcaemia probably results from increased bone usage of calcium through inhibition of bone resorption and continued stimulation of bone formation. The treatment is aimed at replenishing calcium deficit and at restoring normal bone turnover.

## Case Report

A 34-years old woman with a past medical history of Lynch syndrome and hypophosphatemic rickets associated with hyperparathyroidism and brown tumours. She had multinodular goitre and ten years ago she underwent left hemithyroidectomy, isthmectomy, and subtotal right hemithyroidectomy, without immediate complications, but hypothyroidism subsequently developed. Goitre relapsed and cytological assessment revealed a follicular tumour which lead to completion thyroidectomy.

Her current daily medications are: 88 µg of levothyroxine, 120 mg of cinacalcet, 4,500 mg of phosphorus and 1 µg of calcitriol.

### Histology

- Thyroid nodular hyperplasia
  - Parathyroid Adenoma

### Postoperative Period

#### Severe symptomatic hypocalcaemia

<table>
<thead>
<tr>
<th>Analyte</th>
<th>Result</th>
<th>Normal Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Albumin-corrected calcium</td>
<td>5.0</td>
<td>8.8-10.5 mg/dL</td>
</tr>
<tr>
<td>PTH</td>
<td>&gt;2.5 µg/L</td>
<td>9.7-32 pg/mL</td>
</tr>
<tr>
<td>25-OH vitamin D</td>
<td>6.5</td>
<td>&gt;30 ng/mL</td>
</tr>
<tr>
<td>Magnesium</td>
<td>1.1</td>
<td>1.0-2.3 mg/dL</td>
</tr>
<tr>
<td>Phosphorus</td>
<td>3.5</td>
<td>2.0-4.5 mg/dL</td>
</tr>
<tr>
<td>ALP</td>
<td>939</td>
<td>30-120 U/L</td>
</tr>
<tr>
<td>ALT</td>
<td>11</td>
<td>&lt;45 U/L</td>
</tr>
<tr>
<td>AST</td>
<td>16</td>
<td>&lt;55 U/L</td>
</tr>
<tr>
<td>GOT</td>
<td>26</td>
<td>&lt;55 U/L</td>
</tr>
<tr>
<td>Urinary calcium (24h)</td>
<td>108</td>
<td>&lt;200 mg/dL</td>
</tr>
<tr>
<td>Urinary phosphorus (24h)</td>
<td>1,032</td>
<td>100-2,000 mg/dL</td>
</tr>
</tbody>
</table>

1. Analyses were measured in the serum if not stated otherwise.
2. Phosphorus value of 2.436 mg/dL.

### Blood Tests

- Hemoglobin: 10.3 g/dL (12.1-15 g/dL)
- Glucose: 90 mg/dL (60-99 mg/dL)
- Creatinine: 0.59 mg/dL (0.55-1.0 mg/dL)
- BUN: 232 mg/dL (7.9-20.9 mg/dL)
- Creatinine: 0.59 mg/dL (0.55-1.0 mg/dL)
- Mg2+: Aspartate (p.o.): 9,837 mg; phosphorus 1,500 mg; calcitriol 1.5 µg
- Calcium carbonate 15,000 mg; calcium citrate 15,200 mg; magnesium aspartate 9,837 mg

### Treatment Challenges

- Calcium formulations malabsorption
- Frequent phlebitis
- Bacteraemia and/or pneumonia from long-term central and peripheral venous catheter

### Inpatient Care

- **Calcium replenishment**
  - Calcium gluconate (i.v.) 970-25,230 mg/24h
  - Calcium carbonate (p.o.) 1,750-50,000 mg/24h
  - Calcium citrate (p.o.) 2,850-66,400 mg/24h

- **Vitamin D**
  - Calcitriol (p.o.) 1-3.5 µg/24h

- **Phosphorus**
  - Phosphorus (p.o.) 1,000-2,000 mg/24h

- **Magnesium**
  - Mg2+ aspartate (i.v.) 4,000-8,000 mg/24h
  - Mg2+ aspartate (p.o.) 2,459-13,526 mg/24h

### Follow-up

- **Albumin-corrected calcium** 9.3 mg/dL

### Conclusion

- Hungry bone syndrome is a rare complication of parathyroidectomy, particularly in the setting of tertiary hyperparathyroidism.
- The treatment of hungry bone syndrome should be directed to the reestablishment of calcium deficit and restoration of bone turnover, which may take several months.
- The absence of guidelines and the different pharmacokinetics of calcium formulations pose a particular challenge in the management of these patients.