

Severe Hungry Bone Syndrome After Incidental Parathyroidectomy in Hypophosphatemic Rickets

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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.

Thyroid nodule	Thyroid Cytology	Surgery	Histology
<p>Thyroid palpation: elastic nodule with ± 2 cm on right lobe</p> <p>Ultrasonography: hypoechogetic, heterogeneous nodule with 1.7 cm</p>	<p>1st cytology: follicular lesion of undetermined significance</p> <p>▼▼▼</p> <p>2nd cytology: Follicular Tumour</p>	<p>Thyroid completion without intraoperative complications</p>	<p>Thyroid nodular hyperplasia</p> <p>Parathyroid Adenoma</p>

Postoperative Period

Severe symptomatic hypocalcaemia

Blood Tests		
Analyte [§]	Result	Normal Range
Albumin-corrected calcium	5.5	8.8-10.6 mg/dL
PTH	<2.5*	9-72 pg/mL
25-OH vitamin D	6.5	>30 ng/mL
Magnesium	1.1	1.9-2.5 mg/dL
Phosphorus	3.5	2.5-4.5 mg/dL
ALP	959	30-120 U/L
ALT	11	<34 U/L
AST	16	<31 U/L
GGT	26	<38 U/L
Urinary calcium (24h)	108	<250 mg/24h
Urinary phosphorus (24h)	1,032	400-1,300 mg/24h

Blood Tests		
Analyte [§]	Result	Normal Range
Hemoglobin	10.3	12-15 g/dL
Glucose	90	60-99 mg/dL
Creatinine	0.59	0.55-1.02 mg/dL
BUN	3.1	7.9-20.9 mg/dL
Na ⁺	146	135-145 mmol/L
K ⁺	3.8	3.5-5.0 mmol/L
Cl ⁻	109	101-109 mmol/L
LDH	295	< 247 U/L
CK	232	< 145 U/L
TSH	3.6	0.4-4.0 uIU/dL
fT4	1.3	0.8-1.9 ng/dL

[§] Analytes were measured in the serum if not stated otherwise.

* Preoperative value of 2,436 pg/mL

[§] Analytes were measured in the serum if not stated otherwise.

Salt and Pepper Sign



Osteitis Fibrosa Cystica



Based on clinical and biochemistry data she was diagnosed in childhood with **X-linked hypophosphatemic rickets**

No PHEX mutation identified

Inpatient Care

Calcium replenishment	Vitamin D	Calcitriol (p.o.) 1-3.5 µg/24h
- Calcium gluconate (i.v.): 970-23,280 mg/24h	Phosphorus	Phosphorus (p.o.) 1,000-2,000 mg/24h
- Calcium carbonate (p.o.): 1,750-50,000 mg/24h	Magnesium	Mg ²⁺ sulfate (i.v.): 4,000-6,000 mg/24h Mg ²⁺ Aspartate (p.o.): 2,459-13,526 mg/24h
- Calcium citrate (p.o.): 2,850-68,400 mg/24h	PTH analogue	Teriparatide (sc.) 20-60 µg/24h

Treatment Challenges

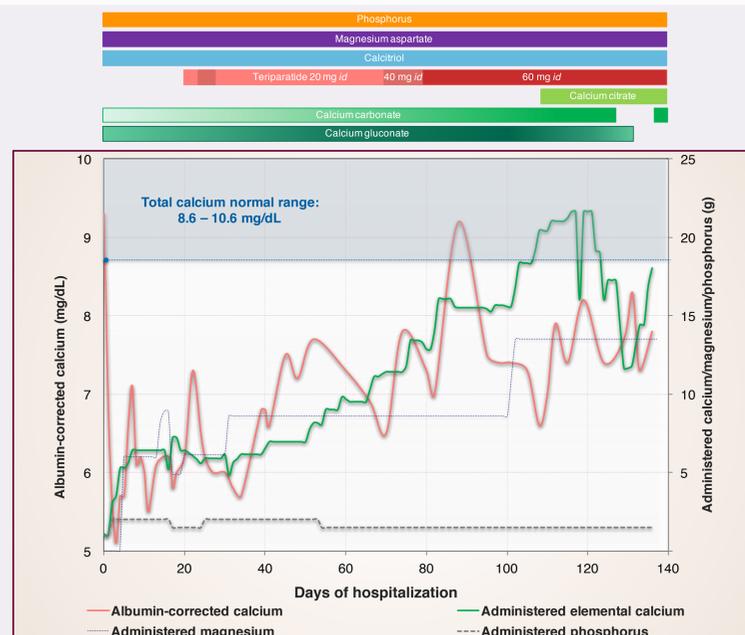
Calcium formulations malabsorption	Frequent phlebitis	Bacteraemia and/or pneumonia from long-term central and peripheral venous catheter

Follow-up

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

Current treatment (total daily doses):

- Calcium carbonate 15,000 mg; calcium citrate 15,200 mg; magnesium aspartate 9,837 mg; phosphorus 1,500 mg; calcitriol 1.5 µg
- Levothyroxine 150 µg



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.