Severe Secondary Hyperparathyroidism in a Hemodialysis Patient: A Case Report from Mongolia

Saruultuvshin Adiya Khurtsbayar Damdinsuren Chuluuntsetseg Dorj

Nephrology Center, First Central Hospital of Mongolia, Ulaanbaatar, Mongolia

Keywords

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Abstract

Secondary hyperparathyroidism (SHPT) occurs in patients with chronic renal failure complicated with renal bone disease and soft tissue/vascular calcification. In dialysis patients with severe SHPT, medical treatment may fail and parathyroidectomy (PTX) is indicated for definitive treatment. Severe hypocalcemia from hungry bone disease or postoperative hypoparathyroidism may occur during the postoperative period. We report here a case of severe SHPT in a hemodialysis patient treated with phosphate binders, calcitriol, and calcimimetics but who still required PTX. Severe hypocalcemia with muscle cramps occurred postoperatively. Around 1 year after PTX, anemia and features of SHPT have improved but the patient still has intermittent hypocalcemia with suspected postoperative hypoparathyroidism. Regular comprehensive

assessment of calcium and phosphorus levels throughout all stages of chronic kidney disease is vital. The postoperative period of PTX in SHPT patients is critical, requiring monitoring to improve management.

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Introduction

Severe persistent secondary hyperparathyroidism (SHPT) is an indication for parathyroidectomy (PTX) in patients requiring renal replacement therapy [1]. In hemodialysis (HD) patients, PTX is associated with considerable improvement in both biochemical and clinical features of SHPT, with resultant decreased risk of cardiovascular morbidity and mortality as well as all-cause mor-

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Table 1. Laboratory findings during follow-up on MHD, before PTX in 2015

Laboratory findings	Year						Reference range
	2009	2010	2011	2012	2013	2014	
Calcium, mmol/L	2.13	2.34	2.38	2.7	2.6	2.51	2.15–2.55
Phosphorus, mmol/L	3.7	2.9	3.31	3.2	3.1	2.84	0.87–1.45
PTH, pg/mL	–	–	520	910	1,824	2,458	15–65
Hemoglobin, g/dL	10.8	13.2	11	9.0	9.9	9.1	11.5–16.5

PTH, parathyroid hormone.

Fig. 1. Imaging findings during medical therapy and 6 months before PTX. X-ray shows soft tissue calcification around the left hip joint.

tality [2]. Here, we report a case of severe SHPT and subsequent PTX in a HD patient with severe postoperative hypocalcemia and discuss the lessons learned from the case.

Case Report

A 39-year-old Mongolian man with an 11-year history of renal insufficiency secondary to chronic glomerulonephritis presented in 2016 with a history of muscle cramps and periorbital paresthesia for about 1 year during tapering-off of his maintenance oral calcium carbonate dose after PTX. He had no history of smoking or alcohol consumption, with no known allergies and no family history of note. On physical examination, he appeared stable, blood pressure was 130/90 mm Hg, and heart rate was 84 bpm. Body mass index was 24.3 and interdialytic weight gain was 3 kg. There was no pitting edema.

In April 2006, at the age of 28, he was first diagnosed with renal insufficiency. He commenced hemodialysis at our hospital in 2008 (8 h weekly for 1 year) and has been on maintenance HD (MHD;

12 h weekly) to date. In 2011, he developed pain in both legs, muscle weakness, pruritus, and weight loss lasting the next 5 years. He took oral calcium acetate 700 mg twice daily with meals and calcitriol 1 µg daily until 2013. Calcium acetate was then switched to the phosphate binder sevelamer (800 mg daily) to control hypercalcemia. Since 2012 he had been anemic despite receiving erythropoietin (EPO), possibly due to EPO resistance, and later in 2015 he developed severe anemia from bleeding gastric ulcer, requiring multiple blood transfusions. Laboratory investigations from 2009 to 2014 revealed mild hypercalcemia, elevated serum phosphorus, and extremely high parathyroid hormone (PTH) levels (Table 1).

In February 2015, he developed painful palpable masses near the left hip joint and both shoulders. Radiography of the left hip joint showed soft tissue calcification on plain X-ray (Fig. 1). Concurrent ultrasound examination showed 2 parathyroid glands measuring 0.6×0.7 cm and 0.6×0.3 cm on the right side. He commenced cinacalcet for 3 months based on soft tissue calcification, and PTH was markedly reduced (2456 pg/mL to 918 pg/mL). However, cinacalcet was discontinued due to non-availability in Mongolia.

Because of failed medical intervention, severe SHPT, and extremely high levels of PTH (2,040 pg/mL), in August 2015 he underwent definitive treatment with total PTX involving autotransplantation of parathyroid tissue into the right sternocleidomastoid muscle. At surgery, the parathyroid glands were found to be hypertrophied; 2 of the resected glands measured about 2 cm and the other 2 about 1.5 cm in length. Twelve hours after PTX, the patient developed severe hypocalcemia with fatigue, dysphagia, myalgia, and paresthesia. He was admitted to the intensive care unit (ICU) and received intravenous (IV) calcium gluconate 20 g daily (elemental calcium 1.86 g daily) for 10 days with oral calcium carbonate 5 g daily and calcitriol 3 µg daily) for severe postoperative hypocalcemia. IV calcium replacement therapy was continued for 6 months because he was still quite symptomatic. Figure 2 shows pre- and immediate postoperative laboratory findings.

From around August 2015 to December 2016 during follow-up, bone pain and itching improved, the subcutaneous masses gradually disappeared, and the calcification resolved (Fig. 3). His general condition improved considerably and serum phosphorus (1.65 mmol/L) and PTH (22.3 pg/mL) were within normal reference ranges, and serum calcium (2.12 mmol/L) decreased slightly.

The latest follow-up was in January 2017, and his current medications are calcium carbonate 5 g and calcitriol 1 µg daily due to occasional episodes of hypocalcemia. He usually also receives IV calcium gluconate. Presently, he has no anemia (hemoglobin 15.5

Fig. 2. Laboratory findings before and immediately after PTX. Preop period, 22 weeks before PTX.

Fig. 3. X-ray at 17 months after PTX shows resolution of previous soft tissue calcification around the left hip joint (January 2017, latest follow-up).

g/dL) despite no longer receiving EPO therapy. Post-PTX laboratory investigations show alkaline phosphatase (ALP) has returned to normal (from 1386.1 to 208.8 U/L, reference range 64–306 U/L) (Fig. 4). Our final diagnosis is SHPT in an HD patient requiring surgical intervention with PTX after failed medical treatment.

Discussion

Disorders of calcium and phosphorus metabolism are common in patients with chronic renal failure (CRF), often presenting as hypocalcemia, hyperphosphatemia, and renal bone disease and vascular calcifications with associated increased risk of bone fracture and cardiovascular events, respectively. Several treatment modalities for SHPT exist. Control of hyperphosphatemia can be achieved by dietary phosphate restriction, use of phosphate binders, active vitamin D, and intensified dialysis. Calcium-containing phosphate binders and vitamin D sterols are widely recommended for treating SHPT but may cause hypercalcemia and hyperphosphatemia, further increasing the risk of soft tissue and vascular calcification. Non-calcium-containing phosphate binders, sevelamer, new vitamin D analogues, and calcimimetic agents provide safer and effective control of SHPT, with reduced risk of soft tissue and vascular calcification [3–5]. The calcimimetic cinacalcet HCl acts to increase sensitivity of the calcium-sensing receptor to calcium, thereby reducing PTH secretion [6].

Medical therapy is not always successful in the management of SHPT, and PTX is needed in a considerable number of patients on MHD or who are renal graft re-

cipients [7]. Following PTX, hypocalcemia may be induced by either postoperative hypoparathyroidism or hungry bone syndrome and each must be differentiated from the other. Postoperative hypoparathyroidism is caused by injury to the parathyroid glands or their blood supply and in advertent resection of parathyroid tissue. Hungry bone syndrome is a rare condition that induces rapid profound hypocalcaemia with hypophosphatemia and hypomagnesaemia, and is exacerbated by suppressed PTH in postoperative patients with severe SHPT and high preoperative bone turnover. Such cases require oral and IV calcium replacement and calcitriol [8, 9].

Contributory factors to developing SHPT in the present case include late diagnosis of the primary renal disorder. Appropriate treatment was delayed and the patient developed severe SHPT despite medical treatment with phosphate binders, calcitriol, and calcimimetics. Another factor is insufficient dialysis for 1 year after diagnosis. Calcium and calcitriol maintenance therapy may also have aggravated the soft tissue calcification. Cinacalcet was effective and reduced serum PTH but not to the target level, possibly due to late administration of calcimimetics in this patient with severe persistent SHPT. Moreover, long-term administration could not be maintained in this patient because the drug is currently unavailable in Mongolia.

The resected parathyroid glands were hypertrophied and the patient developed postoperative complications due to severe hypocalcemia, eventually requiring IV and oral calcium supplementation for 6 months. In the past 1 year however, the main complaints and soft tissue calcification have resolved and serum calcium, phosphorus, and PTH levels have decreased to normal values. However, the patient sometimes presents with episodic hypocalcemia, possibly due to postoperative hypoparathyroidism, and is currently taking calcium carbonate and calcitriol.

Regular comprehensive assessment of calcium and phosphorus levels throughout all stages of CKD is requisite. Medical management of SHPT is beneficial in HD patients. Failed medical treatment of SHPT necessitates surgical intervention with PTX, and the critical postoperative period following PTX requires close monitoring to improve management.

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Fig. 4. Timeline of the patient's outcome.

Statement of Ethics

The patient provided written informed consent for his case to be published.

Disclosure Statement

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