

CASE REPORT

A Case of Primary Hyperparathyroidism with Urinary Tract Stones as the Initial Symptom

Gangfeng Li, Qian Wang, Ningping Shan

Department of Clinical Laboratory Center, Shaoxing People's Hospital, Shaoxing, P.R. China

SUMMARY

Background: Primary hyperparathyroidism (PHPT) is a disease caused by excessive secretion of parathyroid hormone (PTH) due to parathyroid gland lesions, resulting in high serum calcium and low phosphorus, leading to symptoms such as digestive ulcers and urinary tract stones.

Methods: We report a case of multiple urinary tract stones with high serum calcium and low serum phosphorus. Upon investigation, it was found that the cause was primary hyperparathyroidism.

Results: The serum PTH level of the patient was detected to be significantly elevated. At the same time, neck ultrasound showed the presence of a parathyroid adenoma. Therefore, it is believed that the patient has PHPT causing high serum calcium and low serum phosphorus, leading to multiple urinary tract stones.

Conclusions: When patients with urinary tract stones have high serum calcium levels and low serum phosphorus levels, laboratory personnel should consider the possibility of PHPT. Simultaneously measuring PTH levels and promptly reminding clinical doctors to perform parathyroid ultrasound and other examinations on patients to reduce the possibility of a missed PHPT diagnosis.

(Clin. Lab. 2025;71:xx-xx. DOI: 10.7754/Clin.Lab.2024.240838)

Correspondence:

Ningping Shan
Department of Clinical Laboratory Center
Shaoxing People's Hospital
Shaoxing 312000
P.R. China
Phone: +86 13957558155
Email: 553897163@qq.com

KEYWORDS

primary hyperparathyroidism, parathyroid hormone, urinary tract stones

INTRODUCTION

PHPT is a disease caused by excessive secretion of parathyroid hormone due to diseases such as parathyroid adenoma, leading to systemic metabolic disorders, mainly manifested as recurrent urinary tract stones, peptic ulcers, and extensive bone damage [1,2]. Because the incidence rate of PHPT is low, the clinical manifestations are complex and diverse and lack specificity. Clinicians do not know enough about the disease, which often leads to delay in diagnosis and treatment. We report a case of PHPT with multiple urinary tract stones as the initial symptom. The specific situation is as follows:

Table 1. The results of serum biochemistry.

Test items	Results	Reference value
C-reactive protein (CRP)	66.44 ↑	0 - 6 mg/L
Total protein (TP)	63.4	65 - 85.00 g/L
Albumin (ALB)	37.9	40 - 55 g/L
Alanine Aminotransferase (ALT)	20.3	9 - 50 U/L
Aspartate Aminotransferase (AST)	28	15 - 40 U/L
Alkaline Phosphatase (ALP)	113	45 - 125 U/L
Lactate Dehydrogenase (LDH)	183	120 - 250 U/L
Urea (BUN)	8.55↑	2.86 - 8.20 mmol/L
Creatinine (Cr)	214.8↑	59 - 104 μmol/L
Serum calcium (Ca)	3.13↑	2.08 - 2.60 mmol/L
Serum phosphorus (P)	0.22↓	0.85 - 1.51 mmol/L

Table 2. Changes in serum calcium, serum phosphorus, and PTH levels in the patient after surgery.

	Serum calcium	Serum phosphorus	Parathyroid hormone
August 18, 2024	2.8↑	0.55↓	
August 20, 2024	2.70↑	0.69↓	3↓
August 22, 2024	2.4	0.91	
Reference ranges	2.08 - 2.60 mmol/L	0.85 - 1.51 mmol/L	12 - 65 ng/L

CASE PRESENTATION

A 68-year-old male patient was admitted to the urology department of the hospital for surgical treatment due to multiple urinary tract stones on August 9, 2024. Admission auxiliary examination: CT scan shows bilateral kidney stones, lower right ureteral stones, and multiple bladder stones. Biochemical test results showed that CRP (66.44 mg/L), serum calcium (3.13 mmol/L), and serum creatinine (214.8 μmol/L) were significantly increased, while serum phosphorus (0.22 mmol/L) was significantly decreased (Table 1).

Laboratory personnel found that the patient had moderate hypercalcemia and severe hypophosphatemia, which were not consistent with the clinical symptoms of mild renal insufficiency. Tracing the patient's medical history, it was found that the patient was admitted for treatment on March 4, 2024, due to coronary heart disease. At that time, the electrolyte results showed a slight increase in serum calcium (2.68 mmol/L) and a significant decrease in serum phosphorus (0.63 mmol/L). Abdominal ultrasound shows kidney stones. At the same time, the patient had a history of urethral stone surgery in 2021. Considering the patient's long-term high blood calcium and low blood phosphorus, multiple urinary tract stones, and no evidence of malignant tumors

found, laboratory personnel suspect that the patient's high calcium and low phosphorus levels may be caused by PHPT. So, PTH testing was added to the patient's serum sample, and it was found that PTH levels significantly increased, reaching 267 ng/L (reference value: 12 - 65 ng/L). We contacted clinical doctors and suggested performing ultrasound or CT examination on the patient's parathyroid gland. B-ultrasound examination showed a parathyroid adenoma measuring 2.39 cm x 1.19 cm in size on the patient's neck. On August 18, 2024, the patient underwent parathyroid tumor resection surgery. Parathyroid hormone decreased significantly on the second day after operation, and serum calcium and phosphorus also returned to normal on the fourth day after operation (Table 2). Therefore, we believe that PHPT causes high serum calcium and low serum phosphorus, and leads to long-term urinary tract stones.

DISCUSSION

PHPT is a systemic disease mainly caused by abnormal parathyroid tissue leading to excessive secretion of PTH, which in turn causes disturbances in calcium, phosphorus, and bone metabolism [3]. The patient in this case was admitted for treatment with urinary tract

stones as the initial symptom. The causes of urinary tract stones are complex, with studies showing that 4.1% of patients with initial urinary tract stones and 12.6% of patients with recurrent urinary tract stones suffer from primary hyperparathyroidism [4]. In this case, laboratory personnel found that the patient had moderate hypercalcemia and severe hypophosphatemia, which were inconsistent with the clinical diagnosis of urinary tract stones and mild renal insufficiency. Based on the patient's medical history, it was found that the patient had long-term high serum calcium and low serum phosphorus and had repeated urinary tract stones. Therefore, laboratory personnel suspected that the patient had primary hyperparathyroidism, so they added PTH testing to the patient's blood sample and found that PTH was significantly elevated. The patient's neck ultrasound examination showed parathyroid adenoma and was ultimately diagnosed with PHPT. PHPT patients have excessive synthesis and secretion of PTH, leading to increased release of bone calcium into the bloodstream, as well as increased reabsorption of calcium by renal tubules, activating 1- α hydroxylase and increasing secretion of 1,25-dihydroxyvitamin D3 by the kidneys, resulting in increased intestinal calcium absorption and ultimately leading to hypercalcemia [5]. On the other hand, high concentrations of serum calcium cause an increase in calcium excretion in the kidneys, leading to hypercalciuria, which increases the incidence of calcium containing stones in the urinary tract [6]. After undergoing parathyroidectomy, the patient's serum calcium and parathyroid hormone levels decreased to normal levels, but the formed urinary system stones were difficult to disappear and had caused renal dysfunction.

PHPT patients mainly present with symptoms such as bone pain, multiple urinary tract stones, digestive ulcers, and emotional instability. The clinical manifestations are diverse and lack specificity. At the same time, clinical doctors have insufficient understanding of this disease, which makes PHPT prone to misdiagnosis and missed diagnosis. In order to avoid missed diagnosis, laboratory personnel should have a certain sensitivity to laboratory tests for high serum calcium and low serum phosphorus in patients with recurrent urinary tract stones, and if necessary, detect parathyroid hormone. At the same time, contact clinical doctors to conduct necessary imaging examinations of the patient's parathyroid gland, and make timely diagnosis and treatment of PHPT.

In summary, this case emphasizes that both laboratory personnel and clinical doctors should enhance their understanding of primary hyperparathyroidism and fully comprehend its pathophysiological mechanisms. For patients with multiple urinary tract stones, laboratory personnel should closely monitor their serum calcium, serum phosphorus levels, and parathyroid hormone levels, and promptly contact clinical doctors to avoid misdiagnosis or missed diagnosis of PHPT and reduce the recurrence rate of urinary tract stones.

Sources of Support:

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Declaration of Interest:

All authors declare that they have no competing interests.

References:

1. Kowalski GJ, Bula G, Zadło D, Gawrychowska A, Gawrychowski J. Primary hyperparathyroidism. *Endokrynol Pol* 2020; 71(3):260-70. (PMID: 32797471)
2. Insogna KL. Primary Hyperparathyroidism. *N Engl J Med* 2018 Sep 13;379(11):1050-9. (PMID: 30207907)
3. Muñoz-Torres M, García-Martín A. Primary hyperparathyroidism. *Med Clin (Barc)* 2018 Mar 23;150(6):226-32. (PMID: 28992983)
4. Tajima A, Fujii K, Ohta N, Ohmi Y, Suzuki K, Aso Y. [Primary hyperparathyroidism in cases of urinary stone]. *Hinyokika Kyo* 1984 Jul;30(7):975-9. (PMID: 6507215)
5. Motlaghzadeh Y, Bilezikian JP, Sellmeyer DE. Rare Causes of Hypercalcemia: 2021 Update. *J Clin Endocrinol Metab* 2021 Oct 21;106(11):3113-28. (PMID: 34240162)
6. Kohjimoto Y, Sasaki Y, Iguchi M, Matsumura N, Inagaki T, Hara I. Association of metabolic syndrome traits and severity of kidney stones: results from a nationwide survey on urolithiasis in Japan. *Am J Kidney Dis* 2013 Jun;61(6):923-9. (PMID: 23433467)