

A Case of Parathyroid Adenoma with Recurrent Renal Calculi and Hypercalcemia

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Abstract

Parathyroid adenoma is a common and rare benign tumor, which is often dominated by elevated blood calcium. Parathyroid adenoma with kidney stones is rare. Therefore, it is particularly easy to miss diagnosis or misdiagnosis in clinical work. We report a case of repeated kidney stones caused by parathyroid adenoma, which eventually led to severe renal atrophy.

Keywords

Hypercalcemia; Renal Calculus; Renal Atrophy; Decreased Bone Mineral Density; Primary Hyperparathyroidism; Parathyroid Adenoma.

1. Introduction

Primary hyperparathyroidism (primary hyperparathyroidism, PHPT), referred to as primary hyperparathyroidism, is a bone metabolic disease caused by increased secretion of parathyroid hormone (PTH) caused by parathyroid adenoma hyperplasia or cancerization [1], resulting in a series of clinical symptoms, including kidney stones, osteoporosis or non-pathological fractures, decreased neurocognitive function, gastrointestinal symptoms, musculoskeletal pain and potential cardiovascular mortality. The onset of the disease is often hidden, the development is slow, and it is easy to be missed and misdiagnosed without typical clinical manifestations in the early stage [2,3]. Recurrent hypercalcemia with renal stones is rare. This paper reports a case of idiopathic PHPT caused by thyroid adenoma with repeated hypercalcemia with double renal stones leading to renal atrophy and renal insufficiency.

2. Presentation of case

The patient, a 56-year-old male, was hospitalized for "repeated elevated serum calcium and double kidney stones for more than 8 years". During the physical examination 8 years ago, the patient found an increase in blood calcium (the specific results are unknown), accompanied by multiple stones in both kidneys, no obvious malignant vomiting, low back pain, gross hematuria, frequent urination, urgent urination pain, and no fear of cold and fever. no nausea, vomiting, bone pain and other special discomfort. It has not been paid attention to and has not been dealt with. During the reexamination of electrolytes, serum calcium still increased, per calcium >3.0mmol/L (specific results are unknown), not treated. Two years ago, there was pain in the right lumbar region, showing intermittent dull pain. Right ureteroscopic lithotripsy was performed in the outer hospital, and the right ureteroscope could be recovered after operation,

but there was still sore distension in the right lumbar region. For further treatment, he went to the urology department of our hospital on December 9, 2019 and was diagnosed as "1. Hydronephrosis in the right kidney 2. Right ureteral calculi 3. Right ureteral stricture 4. Left kidney stone 5. Multiple cysts of the left kidney" (See Figure 1).



Figure 1. Severe hydronephrosis in the right kidney, Multiple stones in the left kidney

The electrolyte: calcium:3.07mmol/L during hospitalization, right ureteroscopy and right nephrostomy was performed under general anesthesia on December 11, 2019. The postoperative condition was good. At the same time, retrograde pyelography suggested multiple stones in the left kidney (See Figure 2) and was discharged on December 17, 2019.



Figure 2. Retrograde pyelography: multiple left kidney stones

After discharge, the patients had recurrent low back pain, low back distension, no gross hematuria and other discomfort, and further solved ureteral stricture. They were admitted to the Department of Urology of our hospital again on January 06, 2020, and there was no electrolyte abnormality during hospitalization. Laparoscopic resection and end-to-end anastomosis of right ureteral stricture and atresia segment plus end-to-end anastomosis of right ureteral stricture and atresia was performed under general anesthesia on January 9, 2020. The patient recovered after operation, and there was no exudation after removal of drainage tube and nephrostomy, unobstructed urination after removal of catheter, no lumbar and abdominal pain and other discomfort, and was discharged from hospital on January 22, 2020.

After discharge, the patient had no low back pain, low back distension, no gross hematuria and other discomfort. Re-examination found that the right kidney atrophy, creatinine slightly increased, blood calcium was still high, so he was admitted to hospital. There was a history of hypertension for more than 10 years, and the highest systolic blood pressure was 160mmHg. Taking "Allisartan Isoproxil 1 tablet QD", the blood pressure was controlled at 140/90 mmHg. Admission physical examination: body temperature: 37.0°C, pulse: 85 beats/min, respiration: 20 beats/min, blood pressure: 118/81mmHg. The height is 1.6m and the weight is 51 kg, BMI 19.9 kg/m². Clear mind, no special face, no purple lines, negative hand tremor, negative exophthalmos, unpalpable thyroid enlargement, unpalpable nodules, tremor, no murmur. Cardiopulmonary physical examination was normal, and old surgical scars could be seen in the right abdomen. No obvious abnormality was found in physical examination. Specialist examination: there was no local eminence in double kidney region, no mass in double kidney region, percussion pain in right kidney region, and no vascular murmur. There was no tenderness in the bilateral ureteral process area, no localized eminence in the suprapubic region of the bladder, no filling and tenderness in the bladder area. External genitals are normal. Laboratory examination: blood routine, urine routine, stool routine, liver function, blood coagulation function, glycosylated hemoglobin, calcitonin, serum growth hormone, male hormone, thyroid function, multiple tumor markers and four items before blood transfusion were normal. Renal function: creatinine 128 (umol/L), uric acid 797 (umol/L), EGFR 53.54; electrolyte: calcium 3.10 (mmol/L), phosphorus 0.52 (mmol/L); blood lipids: triglyceride 1.74 (mmol/L); parathyroid gland 258.1 (pg/ml); k light chain and λ light chain ; immunoglobulin κ light chain 4.05(g/L). Urine K light chain 27.62 (mg/L); Bone metabolism test: parathyroid hormone 174.3 (pg/ml); plasma methoxyepinephrine: 3-methoxycaseamine <0.08nmol/L; methoxy suprarenal gland < 0.08nmol/L; methoxy norepinephrine 0.32nmol/L. Insulin-like growth factor (IGF-1): IGF-1 146.9ng/ml, plasma catecholamine: dopamine 104.5pmol/L, adrenal <55.5pmol/L, norepinephrine 933.8pmol/L.

Auxiliary examination: bone imaging: pelvic degeneration; lumbar sacralization; lumbar degeneration; thoracic degeneration. Bone mineral density measurement: the bone mass of spine and hip joint decreased. Cervical color ultrasound: the volume of thyroid is slightly smaller; the hypoechoic nodule on the middle dorsal side of the left lobe of thyroid considers the origin of parathyroid gland (See Figure 3).

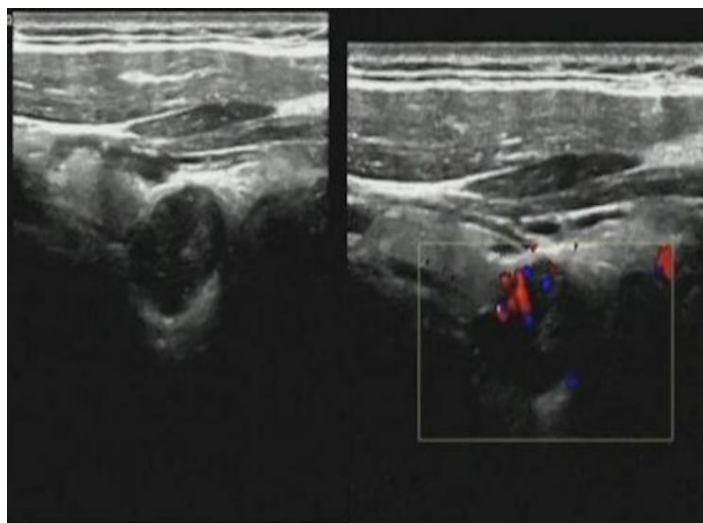


Figure 3. Color Doppler ultrasonography: a hypoechoic nodule was found outside the dorsal capsule of the middle part of the left lobe of the thyroid, with clear boundary, irregular shape, less than 1 aspect ratio, uneven internal echo, and strong echo like dots, with a size of about 15x11mm. Examination Parathyroid source.

Urinary system enhanced CT: 1. Atrophy of the right kidney; dilatation of the right renal pelvis and ureter was alleviated; 2. High density focus in the upper segment of the right ureter, considering small calculi or ureteral wall calcification; 3. Multiple cysts of both kidneys are the same as before; 4. There were more stones in the left kidney than before (See Figure 4). Parathyroid imaging: MIBI imaging of the dorsal pole of the left lobe of thyroid is positive. Considering the possibility of parathyroid adenoma, further examination is recommended if necessary (See Figure 5). No obvious abnormality was found in chest CT, cardiac color ultrasound, Sella turcica and pituitary MRI scan and enhancement.

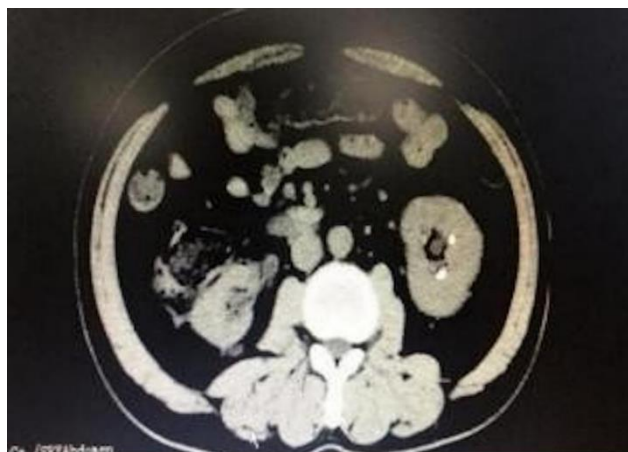


Figure 4. CT of urinary system: right renal contraction; multiple stones in left kidney increased compared with that of the former

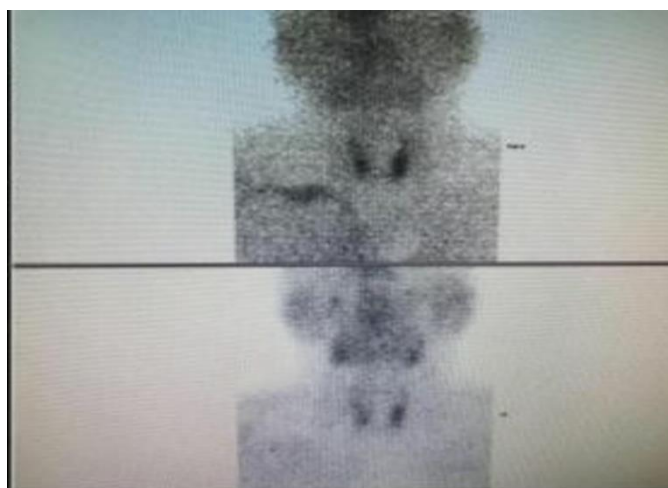


Figure 5. SPECT imaging of parathyroid gland: SPECT / CT fusion imaging (1 hour imaging): a solid nodule, about 16.1x10.1x9.4mm in size, was seen on the dorsal side of the middle pole of the left lobe of thyroid gland.

The uptake of ^{99m}Tc MIBI in the nodule was increased locally. MIBI imaging was positive in the middle pole dorsal side of the left lobe of the thyroid gland, which suggested that parathyroid adenoma might be considered.

After admission, patients were given symptomatic support treatment such as salmon calcitonin, kidney protection, hydration and diuresis, and the blood calcium decreased to normal in the first 3 days after admission. The serum calcium of the patients increased again on the 4th day after admission, and zoledronic acid was added to reduce calcium. At the same time, parathyroid imaging suggests that parathyroid adenoma is possible, and mastoid surgery and

urology consultation are invited. After multidisciplinary consultation, it is recommended to transfer to mastoidectomy.

The patient was transferred to mastonail surgery on the 8th day after admission and was followed by general anesthesia and endotracheal intubation. 1. Left superior parathyroidectomy 2. Left partial thyroidectomy 3. Exploration of left recurrent laryngeal nerve and parathyroid gland 4. Fascia tissue flap plasty 5. Tattooing cosmetic suture, send rapid pathology: A. (left superior parathyroid) parathyroid adenoma, B. (left goiter) nodular goiter. The results of pathological general resection in the later stage were as follows: A. (left superior parathyroid) parathyroid adenoma with cholesterol crystals and giant cell reaction of foreign bodies could be seen around the parathyroid adenoma, B. (left goiter) nodular goiter (See Figure 6).



Figure 6. Pathological diagnosis: A: (left upper parathyroid) parathyroid adenoma, cholesterol crystals and foreign body giant cell reaction were found around. B: (left thyroid mass) nodular goiter

No obvious abnormality of electrolyte was found on the third day after operation, and he was discharged smoothly on the third day. One month after operation, the patient was followed up by telephone, and the patient reported to the local hospital that the electrolyte was normal.

3. Discussion

The most important organ in the regulation of plasma calcium balance is parathyroid gland [4]. When the parathyroid gland itself has pathological changes, such as excessive hyperplasia, tumorigenesis or even canceration, or due to the existence of other diseases in the body, such as long-term vitamin D deficiency, it may lead to hyperparathyroidism. Single parathyroid adenoma in primary hyperparathyroidism is the main cause of hypercalcemia patients with elevated parathyroid hormone [5,6].

Most of the calcium absorption in the kidney is in the proximal renal tubules [7], while the effect of PTH on calcium reabsorption is limited to the distal nephron [4]. When the calcium filtered from the glomerulus increases, resulting in an increase in urinary calcium excretion. PTH can also inhibit the reabsorption of phosphorus in proximal and distal tubules, resulting in increased urinary calcium excretion. Calcium accumulates in the kidneys and leads to the formation of kidney stones, which may lead to kidney damage if left untreated. However, up to one third of PHPT patients have calcium within the reference range [8]. In addition, high levels of PTH can lead to overstimulation of osteoclasts and decrease of osteoblast activity, resulting in osteopenia/ osteoporosis. Hyperparathyroidism also overstimulates calcium-sensitive receptors and accelerates the conversion of vitamin D into its active form (1,25-(OH) 2 vitamin

D). Therefore, compared with the normal population, PHPT patients have a higher risk of vitamin D deficiency [9,10].

At the beginning of the 20th century, the level of plasma calcium in Chinese patients with PHPT was often higher than that in patients of western countries, where PHPT often showed asymptomatic hypercalcemia [11], but in developing countries, PHPT was still dominated by symptomatic diseases such as kidney stones and fractures, and 60% of the patients had radiological changes. In recent years, the asymptomatic PHPT has been increasing in China [12-14]. Eight years ago, our patient found bilateral kidney stones with hypercalcemia, and there were no obvious symptoms such as low back pain, nausea, vomiting and fractures, so there was no systematic further diagnosis and treatment, such as improving the basic thyroid ultrasound examination. In recent years, the patient was admitted to the urology department of our hospital many times because of kidney stones, in which the electrolyte showed hypercalcemia during the first hospitalization, and the blood calcium was normal for the second time, so only the relevant treatment was done for the kidney stones, and no further primary disease was found. resulting in multiple recurrence of kidney stones.

The examination related to the admission of the patient: increased parathyroid hormone; cervical color ultrasound: hypoechoic nodules on the middle dorsal side of the left lobe of the thyroid gland; parathyroid imaging: positive MIBI imaging on the dorsal side of the left lobe of the thyroid gland, considering the possibility of parathyroid adenoma. After parathyroidectomy under general anesthesia, the pathological results showed that (left superior parathyroid) parathyroid adenoma, so hypercalcemia caused by parathyroid adenoma was considered.

In addition, hypercalcemia occurs in patients with granulomatous diseases such as sarcoidosis or tuberculosis and tumors due to the activity and excessive formation of ectopic 25 (OH) Dmuri 1-hydroxylase (CYP27B1) expressed in macrophages or tumor cells [15]. In the course of onset, our patients had no general manifestations such as fever, cough, expectoration, fatigue, anorexia, arthritis, muscle soreness, uveitis, arrhythmia and other clinical manifestations, and the lymph nodes were not touched by physical examination. However, in order to make a more comprehensive diagnosis, we also synchronously improved multiple tumor markers, k light chain and λ light chain, and the results of chest CT, showed no obvious abnormalities, so malignant tumors, pulmonary tuberculosis, multiple myeloma and sarcoidosis were not likely [16,17].

At present, surgery is still the first choice for the treatment of PHPT [18]. In areas where the medical environment is underdeveloped, it is generally recommended that after the diagnosis of PHPT, all symptomatic patients and most asymptomatic patients should consider parathyroidectomy [19-21], which can not only relieve the symptoms of hypercalcemia, but also improve the health of bones and kidneys [22,23].

Our patients were given drug calcium-lowering support treatment after admission, and their serum calcium increased again after returning to normal level in the course of treatment. Therefore, after consultation with the relevant departments, they were transferred to surgical treatment. He was successfully discharged from the hospital after operation, and the electrolyte was normal in the follow-up one month after discharge.

4. Conclusion

Urolithiasis is one of the common surgical diseases. In the process of diagnosis and treatment, clinicians are required to have a better clinical thinking for patients with recurrent calculi, especially for patients with high calcium. It is suggested that the relevant causes should be identified early and the primary lesion should be found as soon as possible to ensure timely diagnosis and proper treatment to prevent the occurrence of poor prognosis. In addition, our case also emphasizes that surgery is the best choice for PHPT, with or without clinical

symptoms. The deficiency of our case is that there is no long-term follow-up of serum calcium, bone density and recurrence of renal stones.

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