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Short Communication

Primary hyperparathyroidism in a child with abdominal pain and hematuria

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Introduction

Primary hyperparathyroidism (PHPT) is an endocrine disease characterized by chronically elevated serum calcium and abnormally high PTH levels (1). Disease complications vary considerably, with urolithiasis, fractures, osteoporosis, and hypercalcemia being the most common (1). The symptoms of PHPT in children are non-specific. PHPT is a relatively common disease in the adult population. However, it is rare among children and adolescents. The accurate diagnosis of PHPT in pediatric patients is difficult, often leading to delayed treatment (2). There are few case reports and limited information available on Japanese children with PHPT (3, 4). Here, we described a Japanese child with PHPT who presented with abdominal pain and hematuria.

Case Report

A 12-yr-old girl was referred to our hospital with recurrent abdominal pain and gross hematuria. The patient had no medical or family history of endocrine disorders, including hypercalcemia and endocrine neoplasia. Her abdominal pain was acute, colicky, and felt in the flank. There were no abnormal signs on physical examination. The bilateral flank pain was intermittent, and costovertebral angle tenderness was negative. Computed tomography (CT) revealed bilateral kidney stones. Laboratory evaluation revealed markedly elevated serum calcium (13.7 mg/dl, normal range: 8.8–10.1 mg/dl) and PTH (321 pg/ml, normal range: 10–65 pg/ml) levels, and low phosphorus (2.8 mg/dl, normal range: 2.6–4.6 mg/dl). The urinary calcium-creatinine ratio was 0.36 g/g・Cr (normal: < 0.30). The results of stone analysis showed that calcium phosphate and calcium oxalate accounted for 60% and 40% of kidney stones, respectively. Cervical ultrasonography revealed hyperplasia of the right parathyroid gland (**Fig. 1a**). Methoxy-2-isobutyl isonitrile (MIBI) scintigraphy showed a focus with MIBI accumulation in the same region (**Fig. 1b**). Dual-energy X-ray absorptiometry (DEXA) revealed low bone mineral density at the L2–4 vertebrae (Z score: −2.7 SD). Based on these findings, the patient was diagnosed with PHPT. To exclude multiple endocrine neoplasia syndromes (MEN), we evaluated the trunk CT scan and head magnetic resonance imaging and conducted various hormonal tests. No abnormalities were detected. Serum calcitonin and catecholamine levels were within normal limits (**Table 1**). Accordingly, we diagnosed that the patient's parathyroid pathology involved a simple parathyroid adenoma and not MEN. Single-gland parathyroidectomy was performed without complications. An enlarged parathyroid gland was located in the lower right portion of the thyroid gland. The weight of the resected tumor was 1,860 mg and measured 25 mm × 24 mm × 13 mm (**Fig. 1c**). Histological findings revealed a parathyroid adenoma (**Fig. 1d**). Immediately after surgery, the serum intact PTH level dropped to 10 pg/ml. The patient was provided with calcium supplementation in fluid, and her serum calcium level was 9.3 mg/dl. There were no episodes of hypocalcemia after surgery. The calcium dose was gradually reduced and discontinued after 1 wk. The

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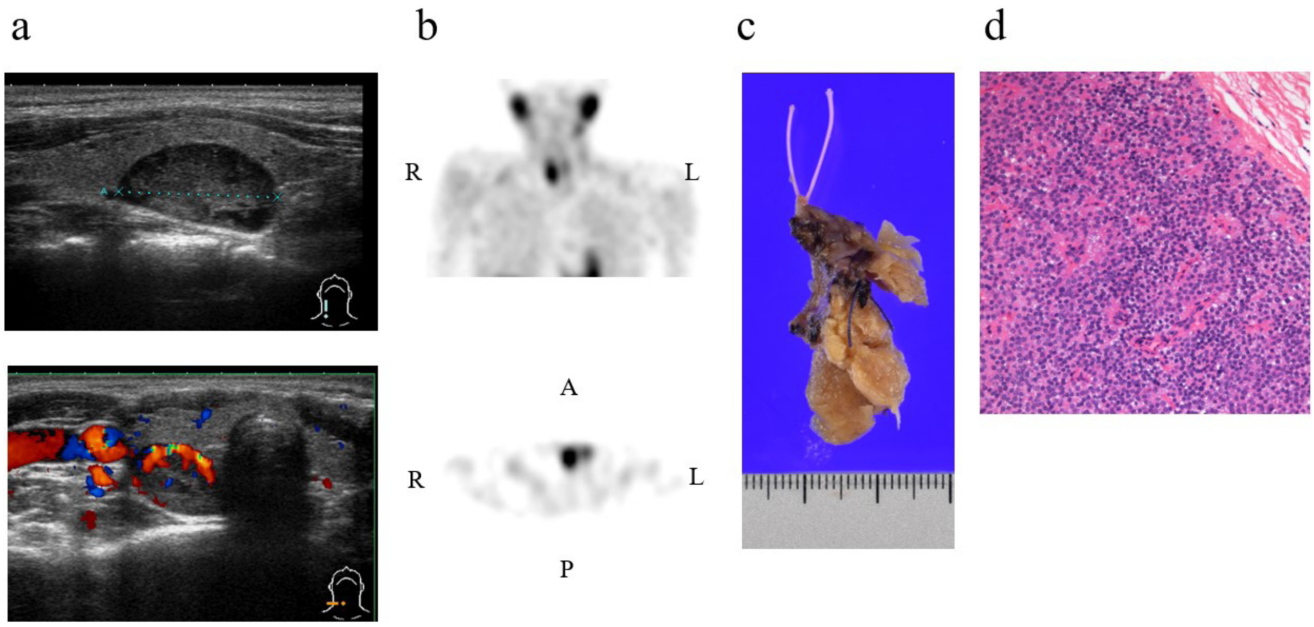

Fig. 1. Images of the enlarged right parathyroid gland. a: Cervical ultrasonography revealed hyperplasia of the right parathyroid measuring 22.3 mm and presenting as a low echoic lesion in the posterior part of the right thyroid gland. b: Methoxy-2-isobutyl isonitrile (MIBI) scintigraphy showed a focus with MIBI accumulation in the right parathyroid gland. c: Extracted right parathyroid gland weighing 1,860 mg. (d): Hematoxylin and eosin staining showed the typical architecture of an adenoma.

Table 1. Laboratory data of the patient

Biochemical data	
Ca (mg/dl)	13.7
IP (mg/dl)	2.8
Intact PTH (pg/ml)	321
IGF-1 (ng/ml)	227
Free T3 (pg/dl)	3.36
Free T4 (ng/dl)	1.38
TSH (μIU/ml)	2.22
PRL (ng/ml)	10.47
ACTH (pg/ml)	11.6
Cortisol (μg/ml)	7.5
LH (mIU/ml)	9.6
FSH (mIU/ml)	4.8
Estradiol (pg/ml)	48.4
1.25OHVD (pg/ml)	94.3
Calcitonin (pg/ml)	1.55
Adrenaline (pg/ml)	26
Noradrenaline (pg/ml)	440
Dopamine (pg/ml)	< 5
Urinary data	
Urinary RBC (/ul)	5303
β2 microglobulin (ng/ml)	155
Ca/Cre ratio (g/g・Cr)	0.36
FECa (%)	1.57

Ca, calcium; IP, phosphorus; TSH, thyroid stimulating hormone; 1.25OHVD, 1,25-dihydroxyvitamin D; RBC, red blood cell; FECa, fractional excretion of calcium.

patient's abdominal pain or hematuria resolved after surgery. DEXA scan of the bone density in the lumbar spine improved to –1.9 SD after 6 mo and normalized to –1.2 SD after 10 mo.

Discussion

We report a case of PHPT in a Japanese child who presented with urolithiasis. PHPT in children is rare, and limited information is available regarding hyperparathyroidism in children in Japan (3, 4). Children with PHPT have more varied and less specific clinical symptoms than adults with PHPT (2). The characteristic feature of PHPT in children is a delayed presentation. Most adult cases of PHPT are diagnosed by incidental detection of hypercalcemia during routine investigations in asymptomatic patients (1). In contrast, approximately 80% of children with PHPT are symptomatic (5). This delay in diagnosis leads to organ damage, and children with PHPT are usually seriously ill (6).

Among children with PHPT, 45% and 17% of patients develop urolithiasis and abdominal pain, respectively (7). Urolithiasis is generally less common in children than in adults and is related to underlying diseases such as genetic diseases, congenital urinary malformations, and endocrinological diseases. The main components of uroliths are calcium phosphate or calcium oxalate in 60% and 40% of stones, respectively (8). Most uroliths in children are composed of calcium oxalate (40–60%) (8). Approximately 3% of adult patients with urolithiasis have PHPT, and 10% of adult patients with PHPT present with recurrent urolithiasis. There is

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limited information available regarding the association between PHPT and urolithiasis in children. Therefore, PHPT should be included in the differential diagnosis of urolithiasis in children.

Genetic syndromes that are associated with multiple abnormal parathyroid glands may account for 5–15% of all cases of PHPT and are more common in patients younger than 40 yr of age than in older patients (9). MEN is the most common cause of inherited PHPT and a syndrome with increased mortality. Early genetic diagnosis and regular follow-up are needed for the timely detection of MEN (10). Clinicians must be aware of the possibility of MEN. In this case, no abnormal findings were detected in the thyroid gland, adrenal gland, or pancreas. Although we did not perform MEN gene testing, long-term follow-up assessments are needed to determine the prognosis. We will perform MEN gene testing if the patient presents with another episode of endocrine neoplasia. In conclusion, we reported a case of PHPT in a Japanese child who presented with urolithiasis. PHPT should be considered in children with urolithiasis, and regular follow-ups are needed because PHPT is the earliest indicator of MEN.

Conflict of interests: The authors declare no conflict of interest.

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