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Parathyroid Hormone is Normal in Renal Stone Patients with Idiopathic Hypercalciuria and High Fasting Urinary Calcium*

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Summary. In a group of patients with idiopathic hypercalciuria and an increased fasting urinary calcium excretion we re-examined the question: does secondary hyperparathyroididsm exist? Eight out of 51 patients with calcium renal stones had a high calcium excretion in both fasting and in 24 h urines. The carboxyl-terminal immunoreactive PTH (iPTH) values in these patients were 16 ± 5 ngeq/ml (M ± SD), no higher than the iPTH values in the other groups, e.g. normocalciuric patients had an iPTH of 23 ± 8 ngeq/ml. The existence of secondary hyperparathyroidism in a subgroup of stone patients with increased fasting urinary calcium excretion is questionable.

Key words: Parathyroid hormone, Calcium stone, Idiopathic hypercalciuria.

Introduction

There is no agreement whether or not secondary hyperparathyroidism exists in the renal form of idiopathic hypercalciuria (IH). Groups which show secondary hyperparathyroidism include high immunoreactive parathyroid hormone (iPTH) and/or urinary cAMP into their definition [1, 3, 9]. Others question the existence of secondary hyperparathyroidism [2, 8]. It is possible that both absorptive and renal IH have increased serum 1.25 $(OH)_2D$ and intestinal calcium absorption, the first because of the supposed underlying defect that is a phosphate deficiency inducing a high serum 1.25 $(OH)_2D_3$ [4], the latter under the assumption of secondary hyperparathyroidism as a reason for an increased synthesis of 1.25 $(OH)_2D_3$. Therefore, these parameters cannot be used to differentiate these groups. From a proposed basic idea of the defect, i.e. a disturbed tubular calcium reabsorption, the fasting urinary calcium excretion appears to be the most reasonable parameter to identify individuals with a renal IH. In a group of patients with a high fasting urinary calcium excretion we re-examined the question of whether secondary hyperparathyroidism is involved in the disturbed calcium metabolism in these patients.

Material and Methods

We studied 51 patients (30 male, 21 female age range 15–76 years) with calcium containing kidney stones who underwent inpatient investigation. All subsequent patients who had a calcium containing kidney stone according to the X-ray examination were included in this study. These patients received a diet containing 850 mg of calcium. The following laboratory studies were performed after at least one week under this diet: serum and urinary calcium and magnesium (using atomic absorption spectrophotometry), phosphorus and creatinine concentrations (measured by an Auto-Analyser), and parathyroid hormone, measured in a carboxyl-terminal reactive assay system employing the antiserum S476 IV, bovine bPTH (1–84) as labelled hormone and a mixture of human carboxyl-terminal fragments as standard [6]. The results of this assay are presented as ngeq/ml serum.

Fasting urinary calcium was determined in a 2 h urine sample collected between 7–9 a.m. after an overnight fast. The creatinine concentration in these samples was determined and the calcium related to the creatinine. We also studied 20 hospital personel as controls under the same dietary conditions for the fasting urinary calcium excretion (7 males, 13 females, age range 20–52 years).

In order to establish the ability of the PTH assay used to separate patients with elevated PTH in the serum we studied iPTH in the serum of 21 patients with primary hyperparathyroidism and seven with secondary hyperparathyroidism due to vitamin D deficiency and normal renal function.

Results

The results are presented in Table 1. The patients were divided into four groups according to the 24 h urinary calcium excretion (elevated > 7.5 nmol) and the calcium excretion in the fasting sample (elevated: > 0.11 mg Ca/mg creatinine [10]). This latter value, used to discriminate elevated

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Table 1. Parameters of calcium metabolism in 51 patients with calcium stones

Group number	*n*	Urinary calcium		iPTH	Serum calcium	Serum magnesium	Serum phosphate	Serum creatinine
		fasting as ng/mg creatinine	24 h as mmol	ngeq/ml	mval/l	mval/l	mg/100 ml	mg/100 ml
I	25	0.053[a] ± 0.026	3.8 ± 1.6	23 ± 8	4.8 ± 0.16	1.67 ± 0.18	3.0 ± 0.6	0.81 ± 0.32
II	8	0.154 ± 0.044	4.7 ± 1.9	20 ± 3	4.83 ± 0.09	1.57 ± 0.32	3.3 ± 0.6	0.81 ± 0.27
III	10	0.056 ± 0.025	10.9 ± 4.4	22 ± 11	4.7 ± 0.3	1.85 ± 0.37	2.85 ± 0.44	0.82 ± 0.13
IV	8	0.141 ± 0.036	12.4 ± 4.8	16 ± 5	4.9 ± 0.2	1.43 ± 0.28	3.26 ± 0.70	0.87 ± 0.18
normal range		< 0.11	< 7.5	7–27	4.5–5.2	1.2–2.2	2.5–4.0	0.3–1.1

[a] Mean ± SD

fasting urinary calcium from normal, was taken from the literature [10] and included all individual values of the control group (0.04 ± 0.01, M ± SD). Thus we believe that it identifies a group with definitly elevated fasting urinary calcium excretion.

Patients with primary hyperparathyroidism had an iPTH of 99 ± 66 ngeq/ml (M ± SD) ranging from 30–210 ngeq/ml (normal range: < 7–21 ngeq/ml [6]). Individuals with vitamin D deficiency and secondary hyperparathyroidism had an iPTH of 57 ± 23 ngeq/ml (M± SD). These patients had a 25 OH vitamin D_3 serum concentration below 10 ng/ml (normal range: 10–23 ng/ml), measured according to Haddad et al. [5, 7]. These data show that the PTH assay used is able to identify patients with increased parathyroid secretion.

Three patients of group I (see Table 1) and two of group III had an iPTH definitly above normal. Repeated serum calcium determinations constantly gave normal results. There were no indications of primary hyperparathyroidism by the following parameters: alkaline phosphatase, urinary phosphate excretion, iliac crest biopsy, X-ray of the hand. Therefore it could not be proven that these patients have primary hyperparathyroidism and they were therefore included in the study.

Discussion

According to the data presented here, patients with high fasting urinary calcium do not have iPTH in the serum higher than those with normal fasting urinary calcium. This is true irrespective of whether the 24 h calcium excretion is normal or increased. Our observation that patients with nephrolithiasis and hypercalciuria have normal iPTH values in the serum is in accordance with published data [2, 8]. By dividing patients according to the fasting urinary calcium excretion it was not possible to identify a subgroup with high iPTH.

In studies of renal and absorptive hypercalciuria published by others [1, 10], patients with renal hypercalciuria represent a small group. Because of the relatively high calcium content in the diet of our patients – when compared to these studies [1, 10] – it is possible that we included in this group some patients with absorptive hypercalciuria in whom the fasting over-night period was not long enough to decrease the urinary calcium excretion.

However, from the data published suggesting secondary hyperparathyroidism it should be excepted to find at least a tendency for higher iPTH, if some of the patients in this group had secondary hyperparathyroidism. In fact there was no individual patient with an iPTH value above normal and as a group these patients had the lowest iPTH.

The evidence against the existence of secondary hyperparathyroidism in a subgroup of idiopathic hypercalciuric patients in our study and in others [2, 8], questions the meaning of the high PTH observed in some patients with IH.

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