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Postoperative Elevated Serum Levels of Intact Parathyroid Hormone after Surgery for Parathyroid Adenoma: Sign of Bone Remineralization and Decreased Calcium Absorption

Johan Westerdahl, M.D., Ph.D.,[1] Stig Valdemarsson, M.D., Ph.D.,[2] Pia Lindblom, M.D.,[1]
Anders Bergenfelz, M.D., Ph.D.[1]

[1]Department of Surgery, Lund University Hospital, S-221 85 Lund, Sweden
[2]Department of Internal Medicine, Lund University Hospital, S-221 85 Lund, Sweden

Abstract. Increased levels of intact parathyroid hormone (PTH) have been documented after surgery for primary hyperparathyroidism (pHPT) despite normocalcemia. The pathogenesis remains to be elucidated. Seventeen consecutive patients operated on for solitary parathyroid adenoma were investigated before and at 8 weeks and 1 year after surgery with serum levels of intact PTH, biochemical variables known to reflect PTH activity, and bone mineral content (BMC). In addition, an oral calcium loading test was performed 8 weeks after the operation. All patients had low or normal serum calcium levels during follow-up. Eight weeks after operation six patients (35%) had an increased serum PTH level. These patients (group I) preoperatively had higher serum levels of PTH and alkaline phosphatase than patients with normal PTH levels (group II). They also had lower BMC and larger parathyroid adenomas. They did not differ in renal function. At 8 weeks after operation group I showed higher mean serum levels of osteocalcin and propeptide of type I procollagen but lower urinary calcium excretion. In contrast to patients in group II, they also showed a lower calciuric response and a trend to a lower calcemic response during the oral calcium load. The two groups showed similar parathyroid sensitivity for calcium. Patients in group I demonstrated a significant increase in BMC the first year after the operation. Increased serum PTH 8 weeks after surgery for sporadic parathyroid adenoma was not due to persistent pHPT or impaired renal function. Instead, the results imply there is diminished calcium absorption and increased bone turnover with cortical bone remineralization.

Increased levels of intact parathyroid hormone (PTH) have been documented after successful surgery for primary hyperparathyroidism (pHPT) [1–7]. In most cases it seems to be a transient phenomenon [4, 6]. However, an unexpectedly high incidence of patients operated on for pHPT have been found to have high serum levels of PTH after a mean of 15 years of follow-up [8].

The phenomenon has been mainly described in older patients with evidence of advanced pHPT [3, 4, 6]. Furthermore, previous investigations have shown that effects of pHPT can remain for a long time after surgical cure [3, 4]. Although a number of hypotheses have been proposed, the pathogenesis for persistent elevated PTH after surgery for solitary parathyroid adenoma is still unclear. In the present study we investigated some possible mechanisms behind this phenomenon.

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Correspondence to: J. Westerdahl, M.D., Ph.D., e-mail: johan.westerdahl@kir.lu.se

Materials and Methods

Patients

A total of 17 consecutive patients (7 men, 10 women) with the clinical and biochemical diagnosis of pHPT, and subsequently operated on for solitary parathyroid adenoma at the Department of Surgery, Lund University Hospital, were included. The mean (± SD) age of the patients was 64 ± 15 years (range 26–80 years), and the mean (± SD) serum calcium level was 2.80 ± 0.24 mmol/L. The median weight of the excised parathyroid adenoma was 0.74 g (range 0.07–5.25 g). One patient had an increased serum level of creatinine preoperatively (226 μmol/L).

The medical conditions associated with pHPT in the patients included hypertension in five (29%) patients, cardiovascular disease in six (35%), diabetes mellitus in one (6%), psychiatric disorder in one (6%), peptic ulcer in three (18%), nephrolithiasis in five (29%), fragility fracture in four (23%), and gout in three (18%). Eleven patients (65%) had neuromuscular symptoms, two (12%) had a history of constipation, five (29%) had polyuria, and one (6%) had pruritus. Two (12%) patients had no symptoms, and three (18%) had hypercalcemic crisis. Biochemical variables known to reflect PTH activity and bone mineral content (BMC) were investigated before and at 8 weeks and 1 year after surgery. In addition, an oral calcium loading test was performed 8 weeks after the operation. Informed consent was obtained in all cases.

Surgery

All patients underwent neck exploration with the unilateral approach [9]. Postoperatively, serum calcium levels were monitored daily during the first 4 days postoperatively. Oral calcium was given intermittently to five patients because of minor symptoms.

Adenoma Diagnosis

Parathyroid adenoma was diagnosed by finding one enlarged gland with histologic features of adenoma (i.e., a rim of normal parathyroid tissue, chief cells with nuclear pleomorphism, decreased cytoplasmic fat content) and signs of suppression in one normal-sized gland (chief cells with increased cytoplasmic fat) [10]. Furthermore, the decline in the serum level of intact PTH was determined intraoperatively when feasible ($n = 13$). In all patients the decline at 15 minutes after parathyroid gland removal was 60% or more below baseline, highly suggestive of solitary parathyroid adenoma [11, 12], with a mean decline of 83 ± 10%.

Bone Densitometry

Bone mass was evaluated by single-photon absorption [13] and determined as BMC (i.e., bone mass divided by the one-dimensional length of the bone measured). The source was 241Am (Americium), and measurements were made on both forearms one-fourth of the distance from styloid process to the olecranon. Correction for adipose tissue was made [13]. The technique has a precision of 0.6% (coefficient of variation) on a skeleton and 1% to 2% in patients. BMC is expressed as grams per centimeter.

Oral Calcium Loading

The oral calcium loading test was performed 8 weeks after the operation. After an overnight fast, one indwelling catheter for blood sampling was inserted into an antecubital vein. After baseline blood samples were obtained, an oral load of 1.5 g of calcium (Calcium-Sandoz effervescent tablet 0.5 g; Novartis, Basel, Switzerland) dissolved in 100 ml water was given. This oral calcium dose has previously been demonstrated to increase the ionized calcium level by approximately 0.09 mmol/L [14]. During the 4-hour study blood samples for serum ionized calcium and intact PTH were obtained at 0, 30, 60, 90, 120, 180, and 240 minutes. Urine was collected at 0, 120, and 240 minutes for measurement of calcium. All individuals were hydrated with a glass of water hourly but otherwise their fast continued during the test.

Biochemical Analyses

All blood samples were obtained after an overnight fast. Preoperative data were obtained from blood samples drawn the day before surgery. Serum levels of intact PTH were measured using the N-tact PTH-assay (Incstar, Stillwater, MN, USA). The sensitivity of this assay is 0.13 pmol/L.

Serum concentrations of osteocalcin (bone gla protein) were measured with the commercially available Incstar Osteocalcin 125/RIA kit. Serum concentrations of propeptide of type I procollagen (PICP) and type I collagen telopeptide (ICTP), respectively, were determined with commercially available radioimmunoassay kits (Orion Diagnostica, Espoo, Finland). 25-Hydroxyvitamin D_3, [$25(OH)D_3$] was measured with high-performance liquid chromatography (HPLC). 1,25-Dihydroxyvitamin D_3, [$1,25(OH)_2D_3$] was assessed with a radioreceptor assay (Incstar). Serum ionized calcium concentrations were analyzed with an ion-selective electrode (Radiometer, Copenhagen, Denmark).

Glomerular filtration rate (GFR) was evaluated by a technique for measuring renal clearance of the contrast agent iohexol [15]. Using this method, the average value for young, healthy subjects is 127 ml/min with an expected reduction in subjects older than 55 years. Calcium, albumin, total alkaline phosphatase, and blood urea and creatinine were assayed in a routine autoanalyzer (Kodak Ektachem 700xR-C).

Statistics

The results were expressed as the mean (±SD) if not stated otherwise. For statistical evaluation of differences between groups, the Wilcoxon signed rank test and the Mann-Whitney U-test was used. In addition, for categorical data statistical significance was analyzed by the chi-squared test (χ^2), and by Fisher's exact test when expected frequencies were less than five. Correlation among variables was evaluated by the least-squares linear regression. A p value < 0.05 was considered significant.

The degree of change for the variables studied during the oral calcium load test was estimated from the area under the curve (AUC) in each patient. The value for the AUC was calculated from the product of the concentration of the variable studied (f) against time (t) according to the formula:

$$T(AUC) = t\,(\text{minutes between sampling}) \times [0.5f_1 + f_2 + \ldots + f_{n-1} + 0.5f_n]$$

The *calcuric response* was estimated by the ratio of the AUC for urine calcium to GFR (AUC u-Ca/GFR). *Relative PTH suppressibility* was calculated from the ratio of the AUC for percentage of baseline value of PTH to AUC for ionized serum calcium (AUC PTH%/AUC s-Ca^{2+}).

Results

All patients had low or normal serum calcium levels during follow-up. The mean serum levels of ionized calcium at 8 weeks and 1 year after surgery were 1.23 ± 0.05 and 1.21 ± 0.03 mmol/L, respectively.

Eight weeks after operation six patients (35%) had an increased level of intact PTH with a mean of 7.2 ± 1.6 pmol/L (group I). At this point these patients did not differ in terms of serum levels of ionized calcium from patients with normal PTH (group II) [1.21 ± 0.06 vs. 1.23 ± 0.04 mmol/L ($p = 0.36$)]. Patients in group I showed higher levels of serum osteocalcin and propeptide of type I procollagen but lower urinary calcium excretion (Table 1).

There was no significant correlation between the serum level of intact PTH 8 weeks after surgery and the GFR ($r = -0.42$, $p = 0.14$). If the patient with a preoperatively moderate increase in serum creatinine (226 μmol/L) was omitted from the analysis, the correlation coefficient declined to −0.1 ($p = 0.75$).

The preoperative data for both groups are summarized in Table 2. Patients in group I had preoperatively higher serum levels of intact PTH and alkaline phosphatase than did patients in group II (Table 2). They also had larger adenomas and lower BMC. The GFR was not significantly different between the two groups, nor did the two groups vary in symptoms or signs (data not shown).

There was no difference in the intraoperative decline of PTH for the two groups of patients after adenoma excision or in serum calcium levels during the early postoperative period (data not shown). One patient in group I and four patients in group II

Table 1. Biochemical data in patients with increased (group I) and normal (group II) serum levels of intact PTH 8 weeks after surgery for solitary parathyroid adenoma.

Variable	Group I ($n = 6$)	Group II ($n = 11$)	Significance between groups (p)	Reference values
Total s-Ca (mmol/L)	2.23 ± 0.12	2.33 ± 0.11	0.11	2.20–2.60
Ionized s-Ca (mmol/L)	1.21 ± 0.06	1.23 ± 0.04	0.36	1.15–1.35
Intact s-PTH (pmol/L)	7.2 ± 1.6	3.5 ± 1.0	<0.01	1.0–5.0
s-Phosphate (mmol/L)	1.02 ± 0.15	1.03 ± 0.12	0.55	0.70–1.60
s-Creatinine (μmol/L)	89 ± 42	75 ± 16	0.69	55–116
s-Osteocalcin (μg/L)	37 ± 16	21 ± 8	<0.05	10–37
s-25(OH)D_3 (nmol/L)	56 ± 10	63 ± 16	0.46	20–100
s-1.25(OH)2D_3 (pmol/L)	83 ± 33	72 ± 23	0.36	24–120
s-Propeptide of type I procollagen (μg/L)	126 ± 20	89 ± 21	<0.05	72–259
s-Type I collagen telopeptide (μg/L)	7.7 ± 4.0	4.7 ± 2.2	0.17	1.9–6.7
s-Albumin (g/L)	40 ± 2	43 ± 4	0.06	36–51
u-Calcium (mmol/L)	0.6 ± 0.4	2.3 ± 1.1	<0.01	2.5–8.0

PTH: parathyroid hormone; s: serum; u: urine; 25(OH)D_3, 1.25(OH)2D_3: forms of hydroxyvitamin D_3.

Table 2. Preoperative clinical and biochemical data, BMC, and GFR in patients with increased (group I) and normal (group II) serum levels of intact PTH 8 weeks after surgery for solitary parathyroid adenoma.

Variable	Group I ($n = 6$)	Group II ($n = 11$)	Significance between groups (p)	Reference values
Age	67 ± 14	63 ± 16	0.37	
Male/Female (no.)	2/4	5/6	0.99	
Glandular weight (g)	2.51 ± 2.19	1.07 ± 1.37	<0.05	
Total s-Ca (mmol/L)	2.89 ± 0.31	2.75 ± 0.19	0.37	2.20–2.60
Ionised s-Ca (mmol/L)	1.56 ± 0.12	1.47 ± 0.08	0.07	1.15–1.35
Intact s-PTH (pmol/L)	16.5 ± 6.5	6.3 ± 1.5	<0.01	1.0–5.0
s-Phosphate (mmol/L)	0.81 ± 0.21	0.86 ± 0.17	0.55	0.70–1.60
s-Creatinine (μmol/L)	98 ± 64	77 ± 16	0.87	55–116
s-Urea (mmol/L)	6.3 ± 4.3	5.6 ± 1.9	0.67	2.0–9.0
s-Osteocalcin (μg/L)	72 ± 44	32 ± 15	0.11	10–37
s-Alkaline phosphatase (μkat/L)	3.3 ± 0.8	2.3 ± 0.6	<0.05	0.8–4.6
s-25(OH)D_3 (nmol/L)	48 ± 20	61 ± 17	0.30	20–100
s-1.25(OH)2D_3 (pmol/L)	83 ± 16	96 ± 23	0.40	24–120
s-Propeptide of type I procollagen (μg/L)	118 ± 34	109 ± 28	0.46	72–206
s-Type I collagen telopeptide (μg/L)	5.3 ± 2.8	4.2 ± 2.7	0.36	1.9–6.7
s-Albumin (g/L)	41 ± 3	44 ± 5	0.22	36–51
u-Calcium (mmol/L)	3.7 ± 2.0	4.7 ± 1.9	0.63	2.5–8.0
BMC (g/cm)	2.59 ± 1.07	3.73 ± 0.81	<0.05	
GFR (ml/min/1.73 m^2)	65 ± 32[a]	80 ± 9	0.62	50–125[b]

BMC: bone mineral content; GFR: glomerular filtration rate.

[a]If the patient with preoperative increase in serum creatinine (226 μmol/L) was omitted from the analysis, the GFR was 76 ± 25 ml/min/1.73 m^2 ($p = 0.89$) between group I and group II.

[b]Age-dependent: age 20–50 years, 80–125 ml/min/1.73 m^2; age 51–65 years, 60–110 ml/min/1.73 m^2; age 66–80 years, 50–90 ml/min/1.73 m^2.

suffered from early postoperative (≤ 4 days after surgery) symptomatic hypocalcemia.

Table 3 shows changes in the biochemical variables studied during the oral calcium loading test 8 weeks after surgery for a solitary parathyroid adenoma. As can be seen, the maximal absolute and relative (%) increase for serum levels of ionized calcium did not differ between the two groups. However, the calculation of AUC for ionized calcium suggested a lower calcemic response among patients in group I ($p = 0.1$). Furthermore, when displayed graphically, the increase in ionized calcium seems somewhat different between the two groups (Fig. 1).

The AUC for intact PTH was higher in patients in group I then in those in group II ($p < 0.01$). The percent decline in PTH and the relative PTH suppressibility by calcium showed no difference between the groups (Table 3). Furthermore, the graphically displayed PTH response after oral calcium administration suggested no difference in parathyroid sensitivity for calcium (Fig. 2). This is more clearly seen in Figure 3, where the PTH is plotted in terms of the percent of baseline value.

After calcium ingestion, patients in group I had a lower urinary calcium excretion, estimated by both absolute urinary calcium increase and the AUC for urinary calcium, than patients in group II (Table 3). Furthermore, the calciuric response was lower.

There was a trend to a negative correlation between serum levels of 1,25$(OH)_2D_3$ at 8 weeks and the calciuric response ($r = -0.51$, $p = 0.07$). In addition, in group I the serum level of 1,25$(OH)_2D_3$ 8 weeks after operation was unchanged compared to that preoperatively. In contrast, in group II the serum level of 1,25$(OH)_2D_3$ significantly decreased to 72 ± 23 pmol/L ($p < 0.01$).

Table 3. Changes in biochemical variables studied during the oral calcium loading test 8 weeks after surgery for solitary parathyroid adenoma.

Variable	Group[a] (n = 6)	Group II[b] (n = 11)	p
Ionized s-Ca maximum increase (mmol/L)	0.09 ± 0.02	0.10 ± 0.04	0.51
Ionized s-Ca maximum increase (%)	7.2 ± 1.9	8.7 ± 3.6	0.55
Intact s-PTH maximum decline (pmol/L)	3.7 ± 1.7	2.1 ± 1.2	0.06
Intact s-PTH maximum decline (%)	56 ± 23	58 ± 17	0.84
u-Ca maximum increase (mmol/L)	0.6 ± 0.6	2.0 ± 1.4	<0.05
u-Ca maximum increase (%)	86 ± 52	98 ± 80	0.84
AUC for ionized s-Ca (mmol × min/L)	295 ± 19	308 ± 8	0.10
AUC for intact s-PTH (pmol × min/L)	908 ± 397	455 ± 199	<0.01
AUC for u-Ca (mmol × min/L)	240 ± 182	782 ± 433	<0.01
Calciuric response[c]	4.4 ± 2.2	10.1 ± 5.4	<0.05
Relative PTH suppressibility[d]	48.5 ± 25.0	44.1 ± 14.1	0.99

AUC: area under the curve; PTH: parathormone.
[a]Patients with increased intact PTH 8 weeks after surgery.
[b]Patients with normal levels of intact PTH 8 weeks after surgery.
[c]AUC for u-Ca (mmol × min/L)/GFR (ml/min/1.73 m^2).
[d]Ratio of AUC for percent of baseline value of PTH (% × min)/AUC for ionized s-Ca (mmol × min/L).

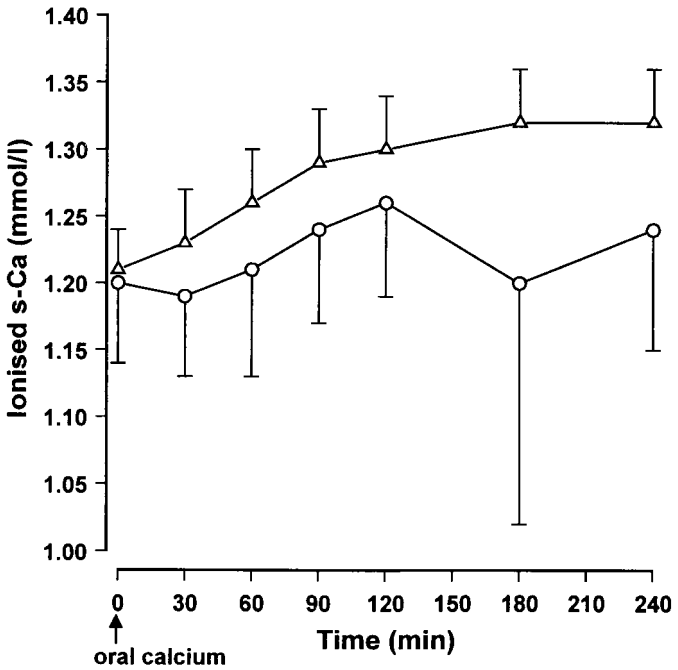

Fig. 1. Serum ionized calcium (s-Ca) levels in patients with elevated parathormone (PTH) (circles) and normal PTH (triangles) 8 weeks after surgery for parathyroid adenoma during the oral calcium load test. Means ± SD are shown.

At 1 year after operation three patients in group I had normalized serum levels of intact PTH. The PTH value was missing for one patient. Thus the mean serum PTH level in group I had decreased to 5.0 ± 0.6 pmol/L (p = 0.08 vs. that at 8 weeks), but the mean serum level of ionized calcium was unchanged. In group II the serum levels of PTH and ionized calcium were not altered at the 1-year follow-up. No patients required oral calcium substitution or received treatment with vitamin D analogs.

In both groups the GFR at the 1-year follow-up was unchanged compared with that preoperatively. One year after operation the BMC in group I had increased to 3.11 ± 1.05 g/cm ($p < 0.05$ vs. that preoperatively). The BMC in group II was unaltered and was no different from that in group I: 3.01 ± 1.46 g/cm (p = 0.94 vs. that preoperatively).

Discussion

In the present series of pHPT patients we found that a significant number had elevated levels of intact PTH 8 weeks after surgery for parathyroid adenoma. However, even though the phenomenon has been documented before [1–7], the pathogenesis remains unclear.

Persistent HPT/Parathyroid Function

Microscopic hyperplasia was previously demonstrated in the remaining parathyroid glands after surgery for a single adenoma [16]. Thus the possibility of persistent HPT as a cause of the elevated postoperative PTH levels must be considered.

As previously shown, the association between the extracellular ionized calcium concentration and PTH secretion can be described by an inverse sigmoidal curve generated by a four-parameter equation: maximal secretion, minimal secretion, set point (i.e., the calcium concentration causing half-maximal inhibition), and parameter B (related to the slope of the mathematic function at the set point) [17]. Patients with pHPT are characterized by an increase in the set point (i.e., relative calcium insensitivity) [18].

In this investigation we found that patients with elevated PTH levels 8 weeks after operation did not differ in regard to the decline in PTH after adenoma excision or the serum calcium levels during the early postoperative period (≤ 4 days after surgery) compared to patients with normal PTH levels. Furthermore, the two groups did not differ in their serum calcium levels during follow-up or in relative PTH suppressibility during the oral calcium loading test. Thus it is highly unlikely that increased levels of PTH after operation are due to decreased calcium sensitivity. Therefore we found no evidence for persistent HPT. Because the absolute suppressibility of PTH was more pronounced among patients with elevated PTH levels, however, these patients have either an increase in maximal PTH secretion or a steeper inclination of the sigmoidal curve. Both factors are possible and therefore warrant further investigation. Still, the evidence presented

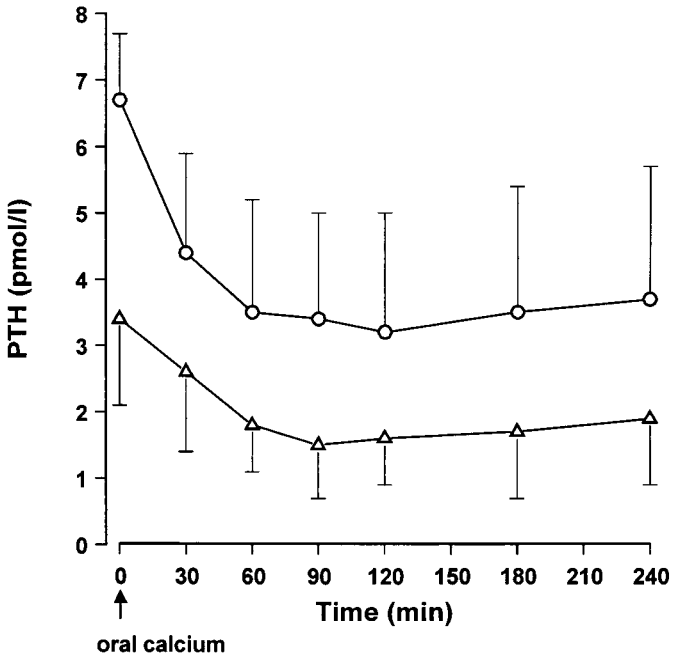

Fig. 2. Serum levels of intact PTH during the oral calcium load test in patients with elevated PTH (circles) and normal PTH (triangles) 8 weeks after surgery for parathyroid adenoma. Means ± SD are shown.

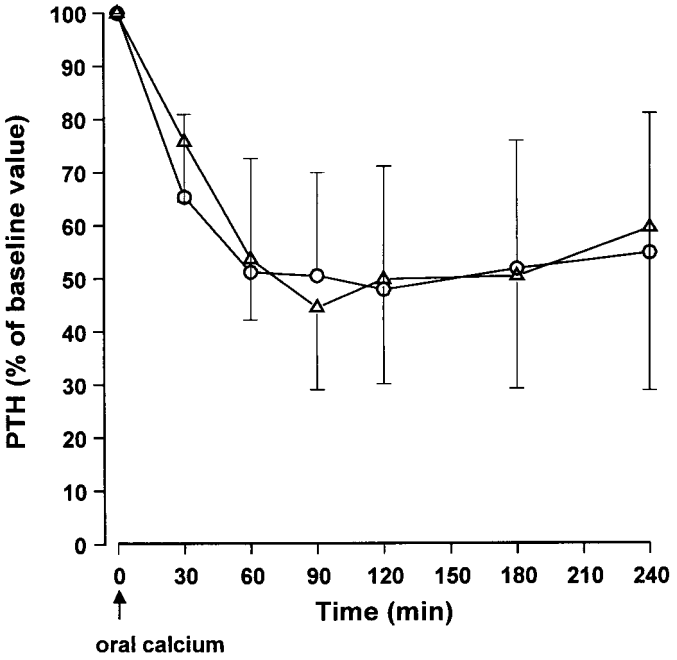

Fig. 3. Serum levels of intact PTH in patients with elevated PTH (circles) and normal PTH (triangles) 8 weeks after surgery for parathyroid adenoma during the oral calcium load test. Data are presented as percentage of baseline values and mean ± SD is shown. Baseline serum levels of intact PTH were 6.7 ± 1.0 pmol/L in patients with elevated PTH and 3.4 ± 1.3 pmol/L in patients with normal PTH.

below suggests that, regardless of which factor involved, the alteration in PTH secretion is likely a secondary phenomenon.

Remineralization

Evidence of severe parathyroid disease with signs of osteitis fibrosa cystica is rare in contemporary patients with pHPT [19, 20]. However, with the help of single-photon densitometry several studies have reported decrements in cortical bone density among patients with pHPT [21–24].

In the present study the BMC was determined preoperatively and 1 year after surgery. In contrast to a previous study from our group [3], we found that patients with elevated PTH levels exhibited increased BMC, whereas patients with normal PTH levels did not. In addition, patients with postoperatively elevated levels of PTH showed higher serum levels of osteocalcin and propeptide of type I procollagen than did patients with normal PTH levels. These two proteins are known to reflect bone turnover and formation. Furthermore, the preoperative biochemical profile of patients with elevated PTH levels at 8 weeks after operation is strikingly similar to that of patients judged to have hungry bone syndrome [25]. Hence patients with postoperatively increased serum PTH levels show evidence of active remineralization, which may explain why they must increase their PTH secretion to maintain the extracellular concentration of ionized calcium.

Calcium Absorption

It is known that calcium is absorbed throughout the intestine via both an active vitamin D regulated transport process and a passive diffusional mechanism [26]. The active process accounts for most of the dietary calcium uptake when luminal calcium is low, whereas the passive mechanism predominates when calcium intake is high [26].

During the oral calcium load we found a lower calciuric response and a trend to a lower calcemic response in patients with increased postoperative levels of PTH. It was previously demonstrated that there is a strong positive correlation between the calciuric response to a calcium tolerance test and calcium absorption [27]. Therefore our results strongly imply diminished calcium absorption in this group of patients.

Vitamin D

Serum levels of 25-hydroxyvitamin D_3 is known to be reduced in pHPT [28], whereas $1,25(OH)_2D_3$ levels are augmented [29]. An increase in serum levels of 25-hydroxyvitamin D_3 and a decrease in serum levels of $1,25(OH)_2D_3$ have been observed following pHPT surgery [29]. In the present study, and in contrast to patients with normal PTH levels 8 weeks after surgery, $1,25(OH)_2D_3$ remained unchanged in patients with elevated PTH levels. Furthermore, contrary to what one could expect, there was a trend to a negative correlation between serum $1,25(OH)_2D_3$ levels at 8 weeks and the calciuric response. Consequently, the decreased calcium absorption found among patients with elevated PTH levels after operation cannot be explained by decreased active calcium absorption owing to *low* levels of vitamin D. This raises the question of whether this group of patients has a defect in their passive uptake mechanism of calcium, resistance in their active vitamin D-regulated uptake, or both. Clearly, this finding must be further investigated.

Renal Function

Parathyroid abnormalities increase with the degree of nephrosclerosis [30]. It is also known that patients without HPT but with mild to moderate renal failure have decreased PTH suppressibility when given oral calcium [31]. In addition, it has been demonstrated that serum levels of intact PTH positively correlate with serum creatinine levels [8]. Taken together these data suggest that even mild renal dysfunction influences parathyroid function. In the present study, however, renal function estimated by GFR and creatinine did not differ for patients with or without elevated PTH levels 8 weeks after surgery. Furthermore, there was no significant correlation between intact PTH 8 weeks postoperatively and GFR. These data strongly suggest that elevated PTH levels 8 weeks after surgery cannot be explained by impaired renal function. In addition, patients with increased PTH 8 weeks after operation did not display renal leakage of calcium.

PTH Receptor Resistance

Apart from the above-discussed mechanisms, a temporary PTH receptor resistance (e.g., down-regulation due to high preoperative pressure on these receptors) may play a role in the pathogenesis of postoperatively elevated PTH. This possibility was not investigated in the present study, but it must be considered and therefore warrants further investigation.

Conclusions

An increased serum PTH level 8 weeks after surgery for sporadic parathyroid adenoma was not due to persistent pHPT or to impaired renal function. Instead, the results imply there is diminished calcium absorption and increased bone turnover with cortical bone remineralization.

Résumé

On a décrit des taux élevés de parathormone intacte (PTH) en dépit d'une calcémie normale après chirurgie pour hyperparathyroïdie primitive (pHPT). La pathogénie en reste inconnue. On a dosé la PTH intacte, variable biochimique reconnue pour témoigner de l'activité de l'activité de la PTH et le contenu minéral de l'os (CNO), avant, 8 semaines et un an après opération pour adénome solitaire de la parathyroïde chez 17 patients consécutifs. De plus on a pratiqué un test de charge orale en calcium 8 semaines après l'opération. Tous les patients avaient un taux sérique de calcium bas ou normal pendant la période de suivi. Huit semaines après l'intervention, six patients (35%) avaient un taux sérique de PTH augmenté. Ces patients (groupe I) avaient un taux sérique de PTH et de phosphatase plus élevé en préopératoire comparé aux patients du groupe II qui avaient des taux sériques normaux. Ils (groupe I) avaient également un taux de CNO plus bas et les adénomes de la parathyroïde étaient plus volumineux. Il n'y avait aucune différence de fonction rénale entre les deux groupes. Huit semaines après l'intervention, les taux sériques moyens d'ostéocalcine et de propeptide du procollagène type I étaient plus élevés mais l'excrétion urinaire de calcium était plus basse dans les patients du groupe I. En contraste aux patients du groupe II, ces patients avaient une calciurie plus basse et avaient une tendance vers une réponse hypercalcémique après la charge orale en calcium. La sensibilité parathyroïdienne était similaire dans les deux groupes. On a trouvé une augmentation significative de la CNO un an après l'opération dans le groupe I. L'augmentation du taux sérique de PTH huit semaines après la chirurgie pour adénome sporadique de la parathyroïde n'est due ni à la persistance de la pHPT ni à une fonction rénale perturbée. Au contraire, ces résultats impliquent qu'elle est secondaire à une résorption de calcium diminuée et un renouvellement augmenté d'os avec une remineralisation de la corticale.

Resumen

Se sabe que tras cirugía por hiperparatiroidismo primario (pHPT), a pesar de que exista una hipocalcemia, aparecen niveles elevados de hormona paratiroidea intacta (PTH). La patogénesis de este hecho no es bien conocida. Se investigaron en 17 pacientes intervenidos por adenoma paratirodeo único, antes de la cirugía, a las 8 semanas y al año del postoperatorio, los niveles séricos de PTH intacta, variables bioquímicas conocidas por reflejar la actividad de la PTH y el contenido mineral óseo (BMC). Además, a las 8 semanas de la intervención se realizó un test de sobrecarga mediante la administración oral de calcio. Todos los pacientes, durante el periodo de seguimiento, presentaron niveles séricos normales o bajos de calcio. A las 8 semanas del postoperatorio seis pacientes (35%) mostraban niveles séricos elevados de PTH. Estos pacientes (grupo I) presentaron preoperatoriamente niveles séricos más altos de PTH y de fosfatasa alcalina que los pacientes del grupo II, en los que la PTH sérica era normal, encontrándose además adenomas paratiroideos más grandes y BMC más bajo. No hubo diferencia alguna por lo que a la función renal se refiere. A las 8 semanas de la intervención, los pacientes del grupo I mostraron valores séricos más altos de osteocalcina y del propectido de tipo I procolágena; sin embargo, la calciuria fue menor. Los pacientes del grupo II, también evolucionaron con calciuria baja y tendencia a responder, con una calcemia baja, a la sobrecarga oral de calcio. Ambos grupos mostraron una sensibilidad paratiroidea similar para el calcio. Al año de la operación, en los pacientes del grupo I se constató un incremento significativo de la BMC. El aumento de los niveles séricos de la PTH a las 8 semanas de la extirpación de un adenoma paratiroideo solitario no puede referirse ni a un pHPT persistente, ni a una función renal alterada. Al contrario, nuestros resultados implican una disminución de la absorción de calcio con incremento del recambio óseo y remineralización de la cortical ósea.

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