Pattern of calcium and parathyroid hormone normalization at 12-months follow-up after parathyroid operation

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Background. *At 12 months after a parathyroid operation, we expect cured patients to have biochemical profiles similar to those of healthy individuals. The aim of the current study was to compare the biochemical characteristics patients at 12 months after parathyroidectomy for primary sporadic hyperparathyroidism with those of healthy controls.*

Methods. *A total of 547 patients who underwent parathyroid neck operation for primary sporadic hyperparathyroidism from 2000–2014 were analyzed. A control group consisted of 74 healthy subjects. Calcium and parathyroid hormone were collected perioperatively. Graphic plots of the relationship between calcium versus parathyroid hormone (95% confidence intervals) were used to compare the biochemical profiles of patients after parathyroid operation and controls.*

Results. *Preoperatively, patients with primary sporadic hyperparathyroidism had a calcium level of 10.9 ± 0.5 mg/dL and parathyroid hormone level of 124.4 ± 68.5 pg/dL vs controls' values of 9.2 ± 0.3 mg/dL and 34.4 ± 13.4 pg/dL, respectively. Before operation, all primary sporadic hyperparathyroidism patients had calcium versus parathyroid hormone values outside the normal zone. At 12 months after operation, 335 (69%) patients showed normalization of the chemical profile; 13 (2.7%) had absolute elevation of calcium and parathyroid hormone, reflecting persistent disease; 2 (0.4%) patients had hypoparathyroidism after subtotal parathyroidectomy; and 149 (31%) had calcium and parathyroid hormone values outside the normal zone, not fitting into the above categories. There were no marked differences between patients with simple adenoma those with multiple-gland disease.*

Conclusion. *Longer follow-up might be needed for patients after parathyroid operation to confirm stabilization of biochemical profiles. (Surgery 2016;■:■-■.)*

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Parathyroid surgery has been accepted as the gold standard of care for primary sporadic hyperparathyroidism (1°HP), which is caused by either single parathyroid adenoma (75%) or multiple-gland disease (25%).[1,2] The definition of parathyroid surgery success has been widely accepted as a permanent eucalcemic state after 6 months postoperatively, the point at which at least 95% of operated patients showed calcium and parathyroid hormone (PTH) normalization.[1,3] Thus, most patients should be followed for at least 6 months postoperatively to determine if they have risk for recurrence or persistent disease.[4]

Postoperative calcium or PTH increase raises the suspicion of failed treatment, whereas variability of postoperative hormonal fluctuations raises the debate about the frequency of clinical follow-up after operative intervention to accurately identify recurrence.[5] Existing literature on parathyroidectomy outcomes is limited due to a short period of follow-up, a large number of operated patients lost to follow-up, and isolated evaluation of calcium or PTH when determining disease relapse.

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Table I. Preoperative characteristics of patients undergoing neck exploration for sporadic primary hyperparathyroidism

Variable	*Parathyroid disease* (n = *547*)	*Control* (n = *74*)	P *value*
Age, years	56 ± 20.1	48.1 ± 13.1	.0001
Sex, males	116 (21.2%)	45 (60.8%)	.0001
BMI, kg/m^2	27.3 ± 9.4	n/a	
Preoperative calcium, mg/dL	10.9 ± 0.5	9.2 ± 0.4	.0001
Preoperative PTH, pg/dL	98.1 ± 76.8	33.1 ± 15	.0001
Pathology		n/a	n/a
Single adenoma	370 (68%)		
Double adenoma	78 (14.3%)		
Hyperplasia	98 (18%)		
Preoperative vitamin-D 25-OH, mg/dL	24.9 ± 13.5	20.5 ± 15.5	.06
Preoperative vitamin-D 1,25-OH, mg/dL	52.3 ± 15.8	n/a	
Preoperative creatinine	0.8 ± 0.2	n/a	

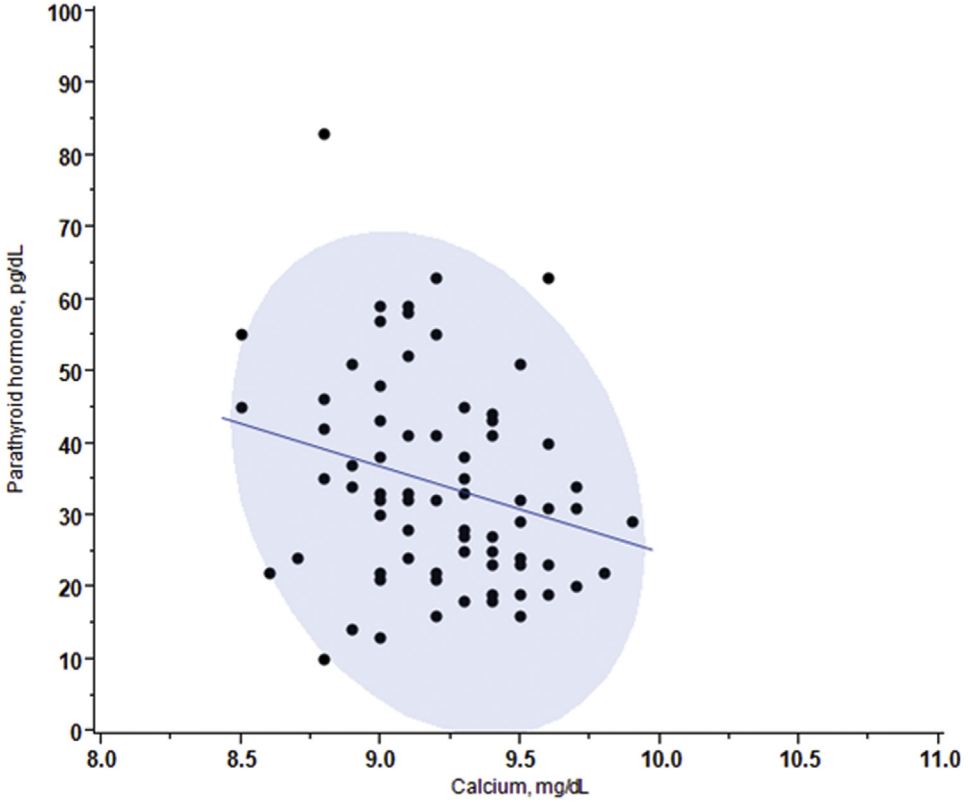

Fig 1. Scatter plot of 95% CI of PTH versus calcium among healthy subjects (n = 74). The *blue line* represents the correlation between calcium and PTH.

We strongly believe that estimation of the calcium and PTH relationship is more predictive of and critical to distinguish between recurrence and physiologic fluctuations compared with separate parameter values. Furthermore, the biochemical criteria used to define persistence or recurrence of the disease should be the same as that for the initial 1°HP diagnosis. Additionally, recent reports have shown increased recognition of more subtle 1°HP presentations, in which PTH levels may be within the reference range or minimally elevated, which complicates the documentation of biochemical cure.

At 6 months—and moreover, at 12 months—after parathyroid operation, we expect cured patients to