

# Changes in PTH, Calcium, and Phosphorous Levels after Parathyroidectomy in Patients on Hemodialysis

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## Introduction

- ♦ Secondary hyperparathyroidism (SHPT) occurs commonly in patients receiving maintenance hemodialysis (HD).<sup>1</sup>
- ♦ Elevated parathyroid hormone (PTH) levels are associated with adverse outcomes.<sup>1-3</sup>
- ♦ Guidelines suggest that dialysis patients with severe SHPT who fail to respond to medical therapy should undergo parathyroidectomy (PTX).<sup>4</sup>
- ♦ However, the change in biochemical parameters (PTH, Ca, and P) following PTX has not been rigorously evaluated in a nationally representative group of patients undergoing PTX.

## References

1. Tentori F et al. *Am J Kidney Dis* 2008;52:519-30
2. Kalantar-Zadeh K et al. *J Bone Miner Res* 2010;25:2724-34
3. Streja E et al. *Bone* 2014;61:201-7
4. KDIGO Clinical Practice Guideline. *Kidney Int Suppl* 2009;S1-130.
5. Liu J et al. *Kidney Int* 2010;77:141-51

## Methods

- ♦ A cohort of prevalent adult HD patients who underwent PTX between 2007 and 2009 was identified from the linked database of the USRDS and a large dialysis organization (LDO).
- ♦ Patients were required to have Medicare as primary payer for both Parts A and B, and to have been receiving HD for > 1 year in a facility of a specific LDO.
- ♦ PTX was identified from Medicare inpatient claims using ICD-9-CM procedure codes 06.8x and 06.95; the date of PTX procedure was considered the index date.
- ♦ Comorbid conditions, assessed in the year before the index date, were defined by previously established USRDS methods.<sup>5</sup>
- ♦ Laboratory values (PTH, Ca, and P) and medication use were assessed in the 1-year periods before and after PTX.
- ♦ Descriptive statistics for continuous variables (median, 25th and 75th percentiles) and categorical variables (count [n], percentage [%]) were used to characterize the population and monthly lab values.

## Results

Table. Parathyroidectomy patients dialyzing in a large dialysis organization.

	N	%		N	%
Total	1402	100	Primary cause of ESRD		
Age at PTX, years			Diabetes	321	22.9
19-44	543	38.7	Hypertension	456	32.5
45-64	701	50.0	Glomerulonephritis	297	21.2
65-74	129	9.2	Other/unknown/missing	328	23.4
≥ 75	29	2.1	Years on dialysis		
Male sex	734	52.4	1- < 3	158	11.3
Race			3- < 5	301	21.5
African American	824	58.8	≥ 5	943	67.3
White	515	36.7	Comorbid conditions		
Other	63	4.5	Diabetes	575	41.0
Body mass index, kg/m <sup>2</sup>			ASHD	479	34.2
< 18	52	3.7	CHF	641	45.7
18- < 25	414	29.5	Other cardiac disease	515	36.7
25- < 30	335	23.9	CVA/TIA	159	11.3
30- < 35	219	15.6	PVD	458	32.7
35- < 40	152	10.8	Dysrhythmia	345	24.6
≥ 40	161	11.5			
Missing	69	4.9			

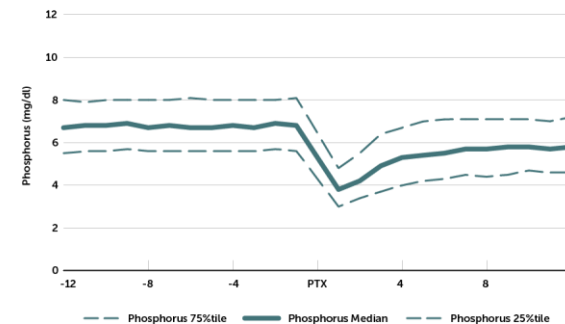


Figure 2. Changes in P levels before and after PTX

Median P level was 6.8 mg/dL before PTX, dropping to 3.8 mg/dL immediately after PTX. At 12 months, median P was 5.8 mg/dL, although 10% of patients still had levels ≥ 8.4 mg/dL.

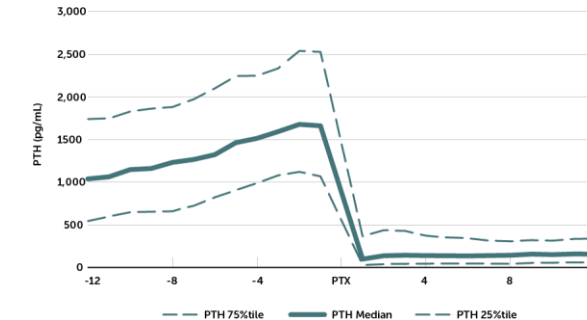


Figure 1. Changes in PTH levels before and after PTX

Median PTH increased from 1039 pg/mL 1 year before to 1661 pg/mL immediately before PTX, and decreased to 98 pg/mL immediately after. However, 10% of patients had values ≥ 897 pg/mL after PTX.

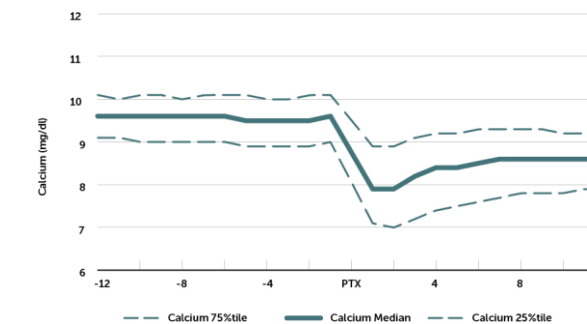


Figure 3. Changes in corrected Ca levels before and after PTX

Median Ca was typically 9.6 mg/dL in the year before PTX, and decreased to 7.9 mg/dL immediately thereafter; 10% of patients experienced levels < 6.5 mg/dL. At 12 months, levels for 10% were still ≤ 7.1 mg/dL.

## Discussion

- ♦ Generally, PTH rose substantially in the year before PTX.
- ♦ However, PTH levels appeared to be within recommended KDIGO targets at the time of PTX for many patients.
- ♦ PTH remained very high even after PTX in a substantial fraction of patients, a phenomenon deserving further study.
- ♦ Hypocalcemia occurred frequently after PTX; calcium levels remained very low in a quarter of patients even many months after PTX, suggesting long-term vigilance is required.
- ♦ P levels fell precipitously following PTX, suggesting that PTH-driven bone resorption contributes substantially to circulating P levels in SHPT.
- ♦ Limitations include the facts that we studied only patients who underwent PTX (and thus did not evaluate factors influencing provider decisions to recommend a PTX), and that we did not follow longitudinal laboratory data at the level of the individual patient.