Do We Do Too Many Parathyroidectomies in Dialysis?

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Objectives

- To review the rationale and recent trends for surgical parathyroidectomy in dialysis patients
- To discuss risks from surgical parathyroidectomy in dialysis patients
- To explain indications for surgical parathyroidectomy in dialysis patients

Case presentation

- 67 years
- ESRD on peritoneal dialysis
- Diabetes mellitus, hypertension, coronary artery disease, atrial fibrillation (on warfarin), temporal arteritis (on prednisone)

Case presentation

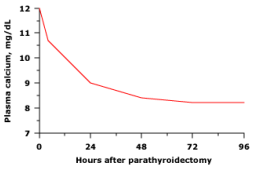
- Patient was diagnosed with calciphylaxis
- Mineral bone metabolism parameters
  - Serum calcium (corrected for calcium) 8.7 mg/dL
  - Serum phosphate- 4.8 mg/dL
  - Serum parathyroid hormone level- 287 pg/mL
  - Serum alkaline phosphatase- 345 U/L
  - Serum 25-hydroxyvitamin D- 26 ng/mL
- Subtotal surgical parathyroidectomy performed

Case presentation

- Day 1- Post-parathyroidectomy patient reports twitching
- Laboratory data
  - Serum calcium (corrected for albumin)- 6.4mg/dL
  - Serum phosphate- 1 mg/dL
  - Serum parathyroid hormone- 4 ng/mL
  - Hypomagnesaemia and hyperkalemia
- What is the diagnosis?
- What is the treatment?
- What are the implications for this patient?

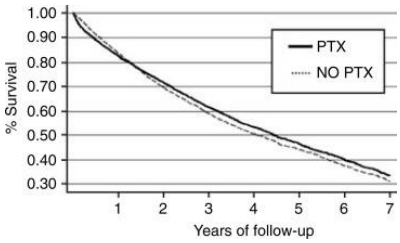
Hungry bone syndrome

- Severe, prolonged post-parathyroidectomy despite normal or elevated PTH
- Other features
  - Hypophosphatemia
  - Hypomagnesaemia
  - Hyperkalemia
- Treatment
  - Calcium
  - Calcitriol
  - Phosphate repletion
  - Dialysis



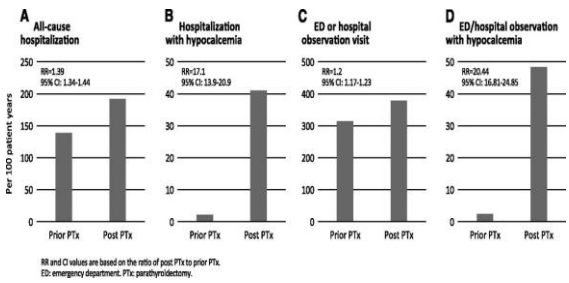
Am J Med 1988; 84:654
UpToDate

Survival following parathyroidectomy among United States dialysis patients

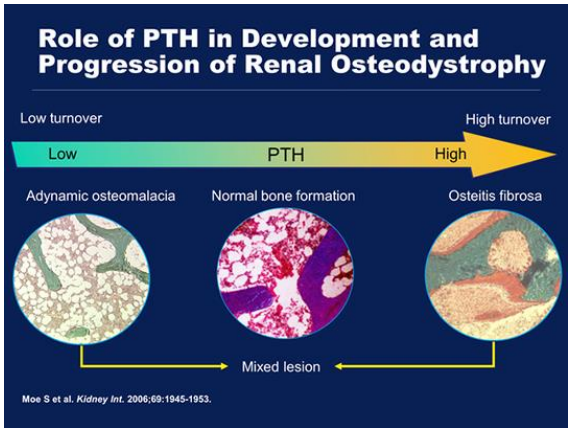


Kidney International
Volume 66, Issue 5, Pages 2010-2016

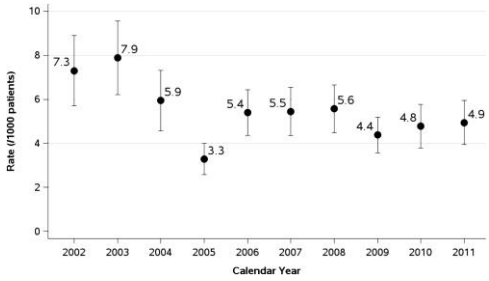
Event rates in the 1 year before and 1 year after parathyroidectomy



CJASN 2015;10:90-97

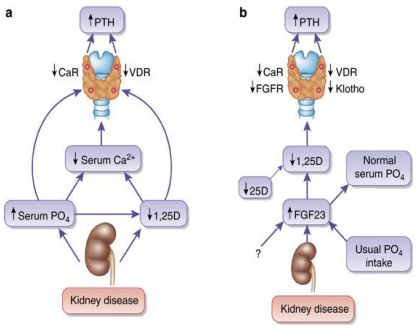


Temporal trends in parathyroidectomy rates and 95% confidence intervals for secondary hyperparathyroidism.



CJASN 2016;11:1260-1267

Chronic kidney disease is associated with characteristic mineral metabolism abnormalities

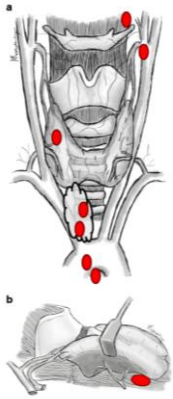


Kidney International 78, 947-949

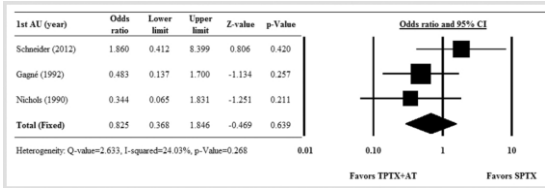
Causes of refractory hyperparathyroidism (persistent, progressive elevation of PTH)

- Persistent stimuli for PTH secretion
- Inadequate medical therapy
- Parathyroid gland hyperplasia or adenoma

Localization of the resected ectopic parathyroid gland in patients with refractory hyperparathyroidism



Comparison between total vs. subtotal parathyroidectomy

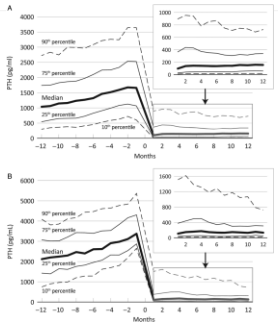


1st AU (year)	Odds ratio	Lower limit	Upper limit	Z-value	p-Value
Schneider (2012)	1.860	0.412	8.399	0.806	0.420
Gagné (1992)	0.483	0.137	1.700	-1.134	0.257
Nichols (1990)	0.344	0.065	1.831	-1.251	0.211
Total (Fixed)	0.825	0.368	1.846	-0.469	0.639

Heterogeneity: Q-value=2.633, I-squared=24.03%, p-Value=0.268

Horm Metab Res. 2015 Aug;47(9):643-51

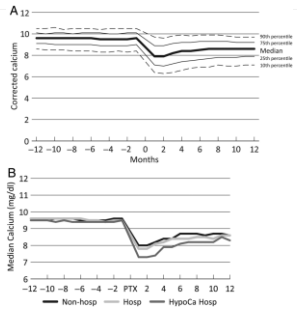
Changes in secondary hyperparathyroidism-related biochemical parameters and medication use following parathyroidectomy



PTH levels in the 12 months before and after PTX overall (A) and for the highest quartile (B). PTH, parathyroid hormone; PTX, parathyroidectomy.

Nephrol Dial Transplant. 2015;31(1):103-111

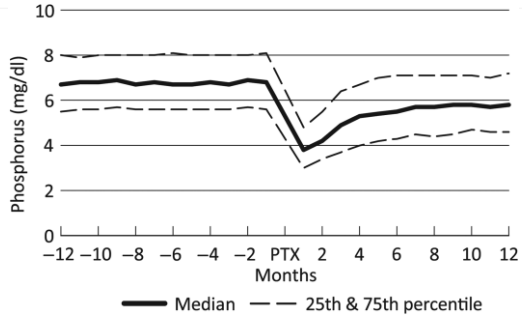
Changes in secondary hyperparathyroidism-related biochemical parameters and medication use following parathyroidectomy



Corrected calcium levels in the 12 months before and after PTX overall (A) and for patients hospitalized for hypocalcemia within 90 days post-PTX (B). PTX, parathyroidectomy.

Nephrol Dial Transplant. 2015;31(1):103-111

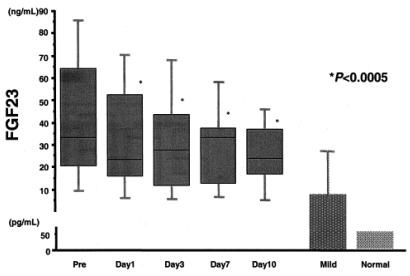
Changes in secondary hyperparathyroidism-related biochemical parameters and medication use following parathyroidectomy



Phosphorus levels in the 12 months before and after PTX. PTX, parathyroidectomy.

Nephrol Dial Transplant. 2015;31(1):103-111

Time course of circulating FGF-23 levels before and after (day 1, day 3, day 7, day 10) parathyroidectomy



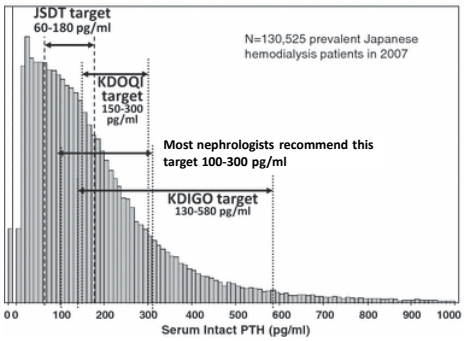
American Journal of Kidney Diseases, Volume 44, Issue 3, 2004, 481–487

KDIGO guidelines, 2009 for CKD patients

- Maintain normal serum calcium
- Maintain normal serum phosphorous
- Evaluate calcium and phosphorous levels separately rather than as a product
- Measure intact serum PTH levels
- Treatment should be based upon trends rather than single laboratory values
- Calcium and phosphate levels should be measured every 1 to 3 months and PTH levels every 3 to 6 months

KDIGO guidelines, 2009 for ESRD patients

- Maintain normal serum calcium
- Lower serum phosphorous levels towards the normal range
- Evaluate calcium and phosphorous levels separately rather than as a product
- Measure intact serum PTH levels and maintain between 2 to 9 times of the upper limit of normal
- Treatment should be based upon trends rather than single laboratory values



Kalantar-Zadeh. *Seminars in Dialysis. Volume 24, Issue 1 pages 29-33, 2011*

Monitoring of CKD-MBD: Biochemical Abnormalities

- Monitoring serum levels of calcium, phosphorus, PTH, and alkaline phosphatase activity beginning in CKD Stage 3. In children, such monitoring beginning in CKD Stage 2.
- In patients with CKD Stages 3-5D, to base the frequency of monitoring serum calcium, phosphorus, and PTH on the presence and magnitude of abnormalities, and the rate of progression of CKD.

Monitoring of CKD-MBD: Biochemical Abnormalities

Reasonable monitoring intervals would be:

- In CKD stage 3: for serum calcium and phosphorus, every 6-12 months; and for PTH, based on baseline level and CKD progression.
- In CKD stage 4: for serum calcium and phosphorus, every 3-6 months; and for PTH, every 6-12 months.
- In CKD stages 5, including 5D: for serum calcium and phosphorus, every 1-3 months; and for PTH, every 3-6 months.

Monitoring of CKD-MBD: Biochemical Abnormalities

Reasonable monitoring intervals would be:

- In CKD stages 4-5D: for alkaline phosphatase activity, every 12 months, or more frequently in the presence of elevated PTH.
- In CKD patients receiving treatments for CKD-MBD, or in whom biochemical abnormalities are identified, reasonable to increase the measurements frequency to monitor for trends and treatment efficacy and side-effects.

Monitoring of CKD-MBD: Biochemical Abnormalities

- In patients with CKD stages 3–5D, 25(OH)D levels might be measured, and repeated testing determined by baseline values and therapeutic interventions.
- Vitamin D deficiency and insufficiency be corrected using treatment strategies recommended for the general population.
- In patients with CKD stages 3–5D, therapeutic decisions be based on trends rather than on a single laboratory value, taking into account all available CKD–MBD assessments.

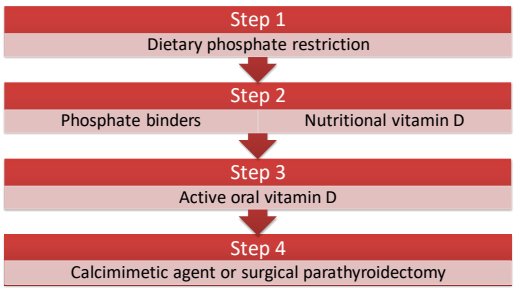
Monitoring of CKD-MBD: Biochemical Abnormalities

- In patients with CKD stages 3–5D, individual values of serum calcium and phosphorus, evaluated together, be used to guide clinical practice rather than the mathematical construct of calcium-phosphorus product.
- In reports of laboratory tests for patients with CKD stages 3–5D, clinical laboratories inform clinicians of the actual assay method in use and report any change in methods, sample source (plasma or serum), and handling specifications to facilitate the appropriate interpretation of biochemistry data.

Assumptions while treating secondary hyperparathyroidism in CKD patients

- Positive phosphate balance
- Low vitamin D status
- Increased PTH prior to demonstrable hyperphosphatemia or hypocalcemia

Algorithm to manage CKD-MBD: General guidelines



Indications for surgical parathyroidectomy

- Symptomatic patients
  - PTH > 800 pg/mL and
  - Severe hypercalcemia
  - Progressive and debilitating hyperparathyroid bone disease
  - Refractory pruritus
  - Progressive extraskeletal calcification or calciphylaxis
  - Otherwise unexplained myopathy
- Asymptomatic patients
  - PTH > 1,000 pg/mL
- Renal transplant recipients
  - PTH > 800 pg/mL
- Patients awaiting transplantation
  - PTH > 800 pg/mL

UpToDate

Summary

- Incidence of surgical parathyroidectomy has remained relatively stable
- Concerns for adverse effects and overall no significant improvement in survival in dialysis patients after surgical parathyroidectomy

Questions