

POST THYROIDECTOMY HYPOCALCEMIA PREVENTION AND OPTIMIZED MANAGEMENT

Sasan Fazeli MD¹, Mark Zafereo MD², Jennifer R. Wang MD², Jeena Varghese MD³

¹Department of Endocrinology and Diabetes City of Hope Cancer Center, ²Depratement of H&N Surgery MD Anderson Cancer Center, ³Dertment of Endocrine Neoplasia and Hormonal disorders MD Anderson Cancer Center

Introduction

- Hypoparathyroidism is a common complication after total thyroidectomy.
- Patients who develop hypocalcemia have longer hospital stays and more post discharge complications.
- Postop serum calcium and parathyroid Hormone (PTH) levels have been used as predictors of hypocalcemia.
- An optimized management guideline is not available.
- Questions:
 - Can we predict hypocalcemia?
 - Can we prevent hypocalcemia?
 - How should we manage these patients?

Objective

- To assess predictors and design an algorithm for optimized management of hypoparathyroidism/hypocalcemia after total thyroidectomy.

Methods

- Study design: retrospective / prospective chart review.

- Population: all adult patients underwent total thyroidectomy at the MD Anderson Cancer Center (1/2019 – 1/2020), with hypoparathyroidism.
- Hypoparathyroidism, defined as intact PTH (iPTH) level below normal reference range (15-65 pg/mL).
- All patients had iPTH and serum Ca levels 2-4 hours postop and every 6 - 8 hours, as an implemented protocol.
- Patients detailed data over time including, all labs, parathyroid gland status from operative report, timing of hypocalcemia, detailed treatment, medication doses, and follow up status were assessed.

Results

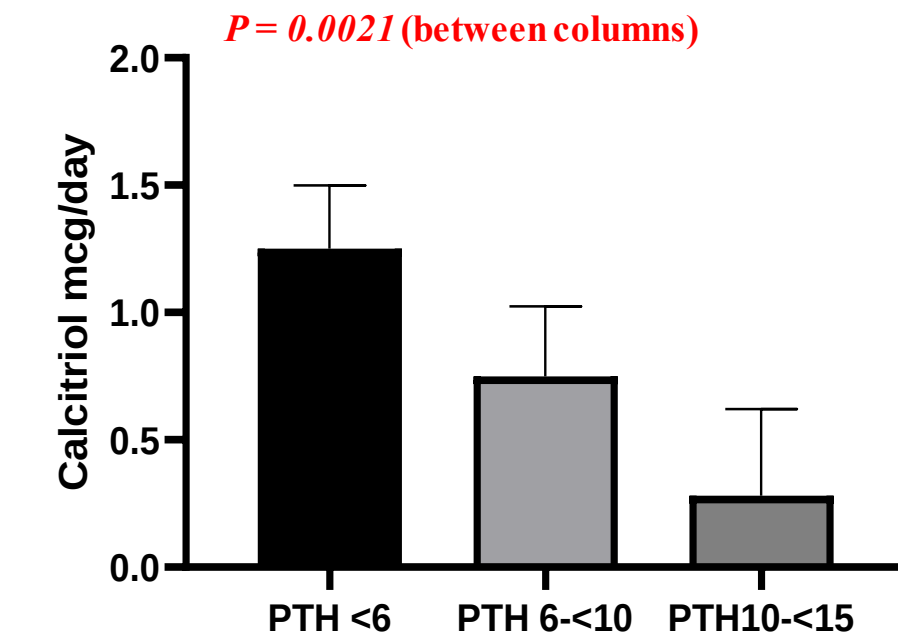
Patients baseline characteristics	n=17
Age, median (SD)	45 (15)
Female, n (%)	9 (53%)
Ca Issues POST OP	17 (100%)
Ca Issues after discharge (readmission, hypocalcemia, symptoms), n(%)	10 (59%)
Readmission for hypocalcemia, n (%)	4 (23%)
Surgical missing one gland, n (%)	12 (71%)
Surgical transplanted one gland, n (%)	14 (82%)
Surgical missing plus transplant, n (%)	16 (94%)
Nadir PTH, mean (SD)	3 (2)
Days to normal PTH, mean (SD)	16 (12)

Results

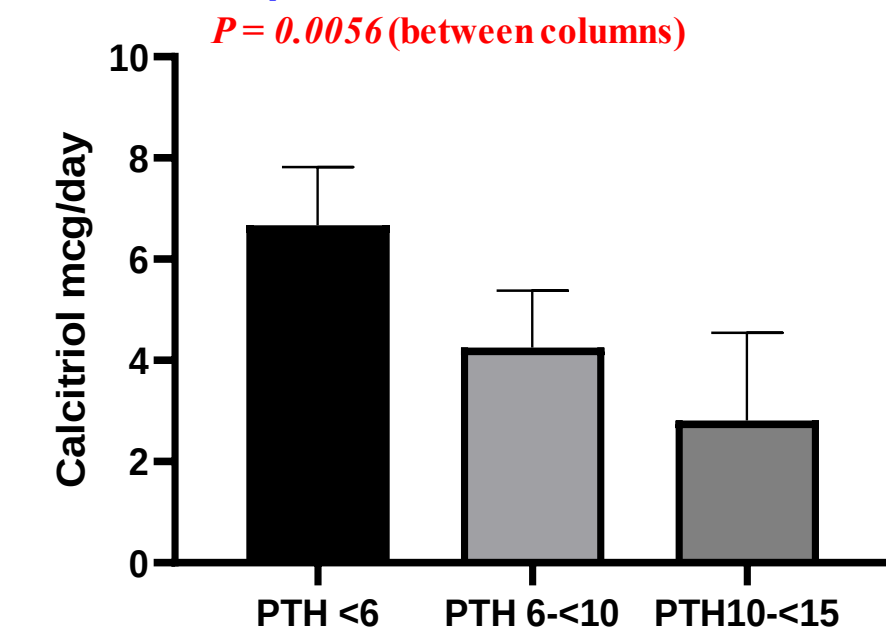
Patient characteristics in different PTH-2H groups	10 - <15 N=8	6 - <10 N=6	<6 N=3	P value *
PTH-2H, mean	13.3	7.3	4.8	<0.0001
Ca-2H level, mean	8.6	8.3	8.5	0.439
Ca issue (readmission, post dc issue, long LOS) n (%)	7 (87%)	4 (66.6)	3 (100%)	0.394
Nadir PTH, pg/mL	7.4	5.4	3.9	0.0136
Time to normal PTH (days), mean	8	29	15	0.01**
Number gland (missing + transplant), mean (SD)	1.7	2.2	2.7	0.161

* Fisher exact and Mann Whitney U test, ** Significant difference only in the PTH-2H 10-15 with other 2 groups

Calcitriol requirment in different PTH-2H groups

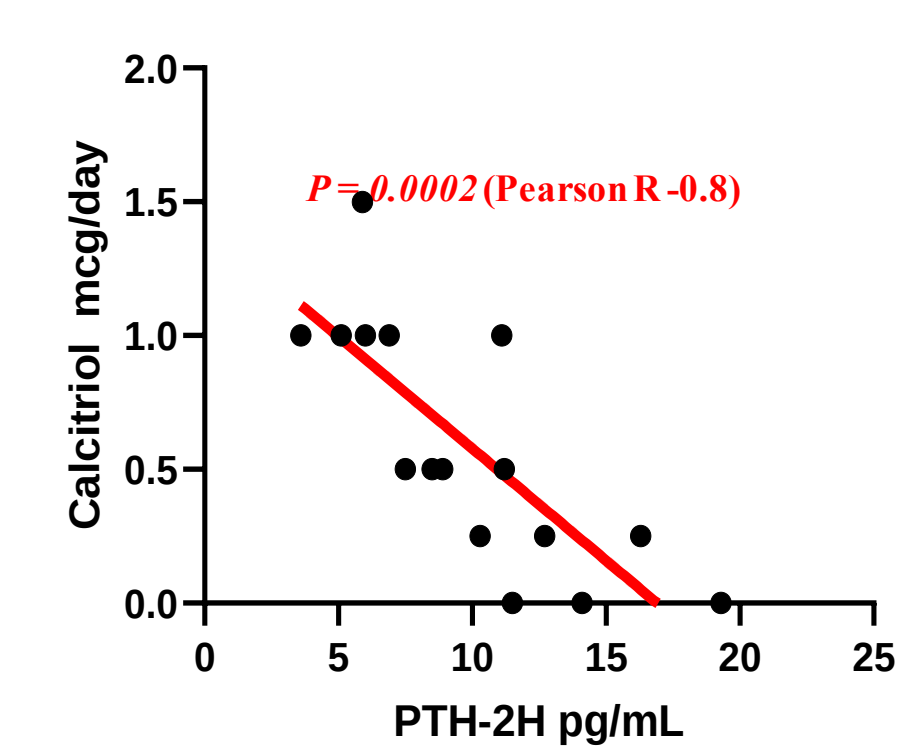


Calcium requirment in different PTH-2H groups

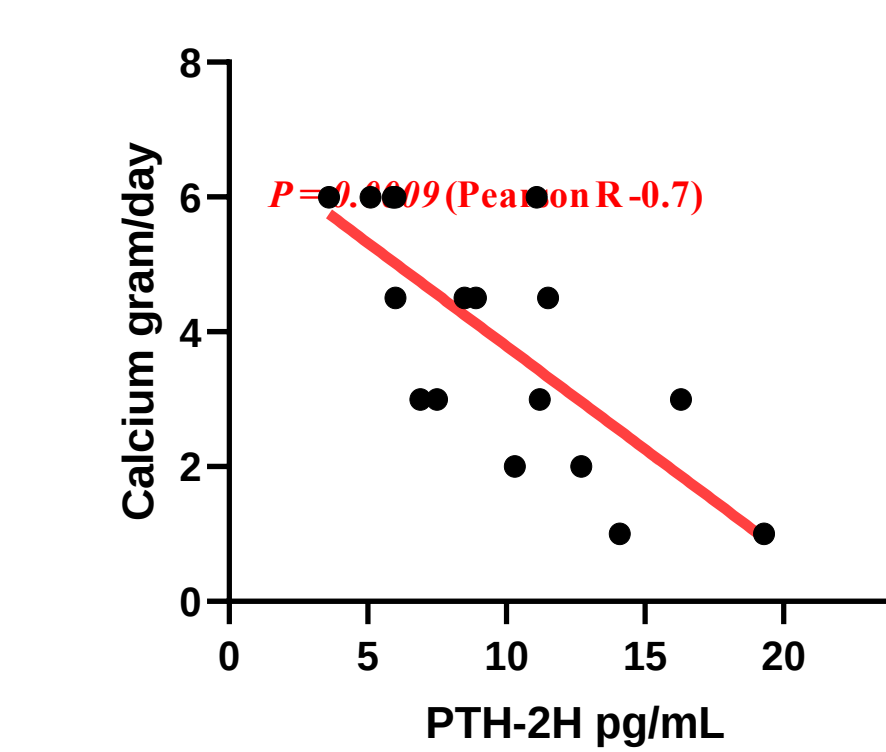


- The required dose of the calcium and Calcitriol had significant correlation with the PTH levels post operation.
- Number of missing glands or transplanted did not differ significantly.
- Average time to normal PTH was from 8 to 29 days, with shorter duration in patients with PTH of 10-15 pg/mL.

PTH-2H and Calcitriol dose



PTH-2H and Calcium dose



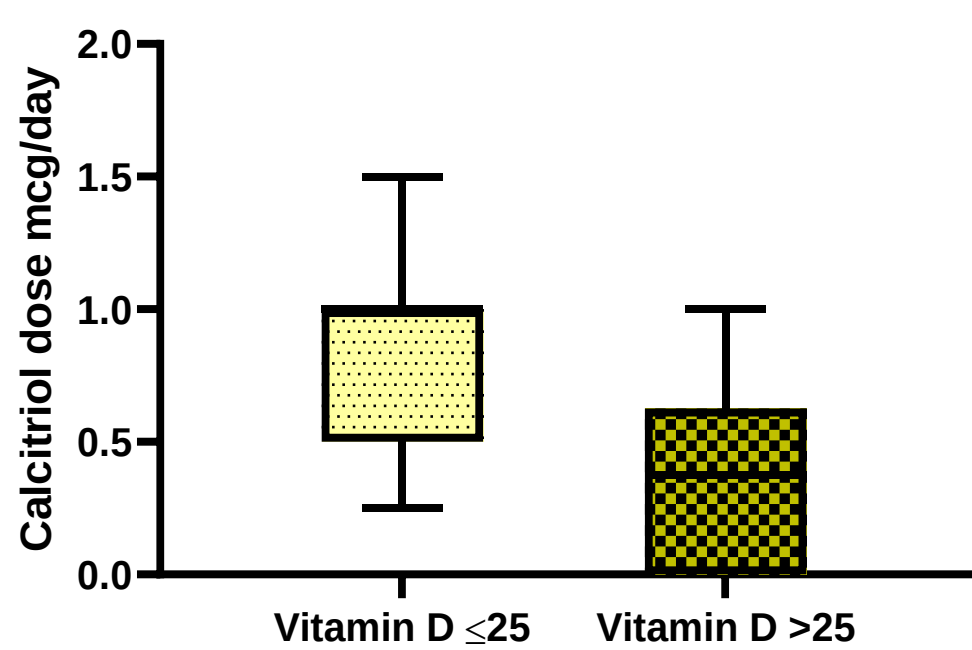
- Both Calcitriol and Calcium had significant correlation with PTH-2H in a linear fashion.

PTH next am had similar result with PTH-2H in correlation with Calcitriol dose.

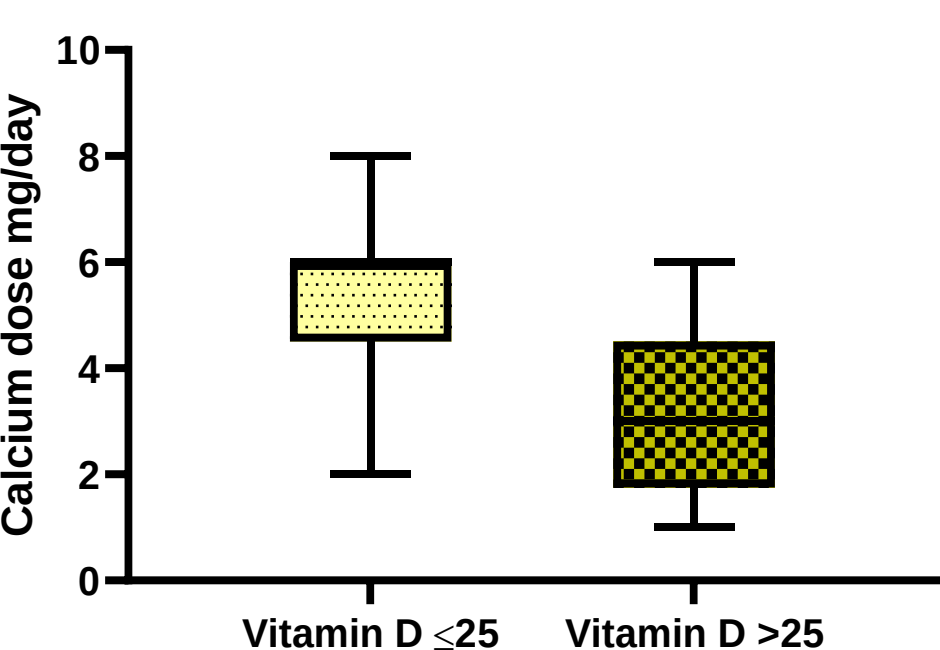
Results

Pre- Operation Vitamin D correlation with Calcium and Calcitriol dose

Vitamin D level and Calcitriol Dose Required

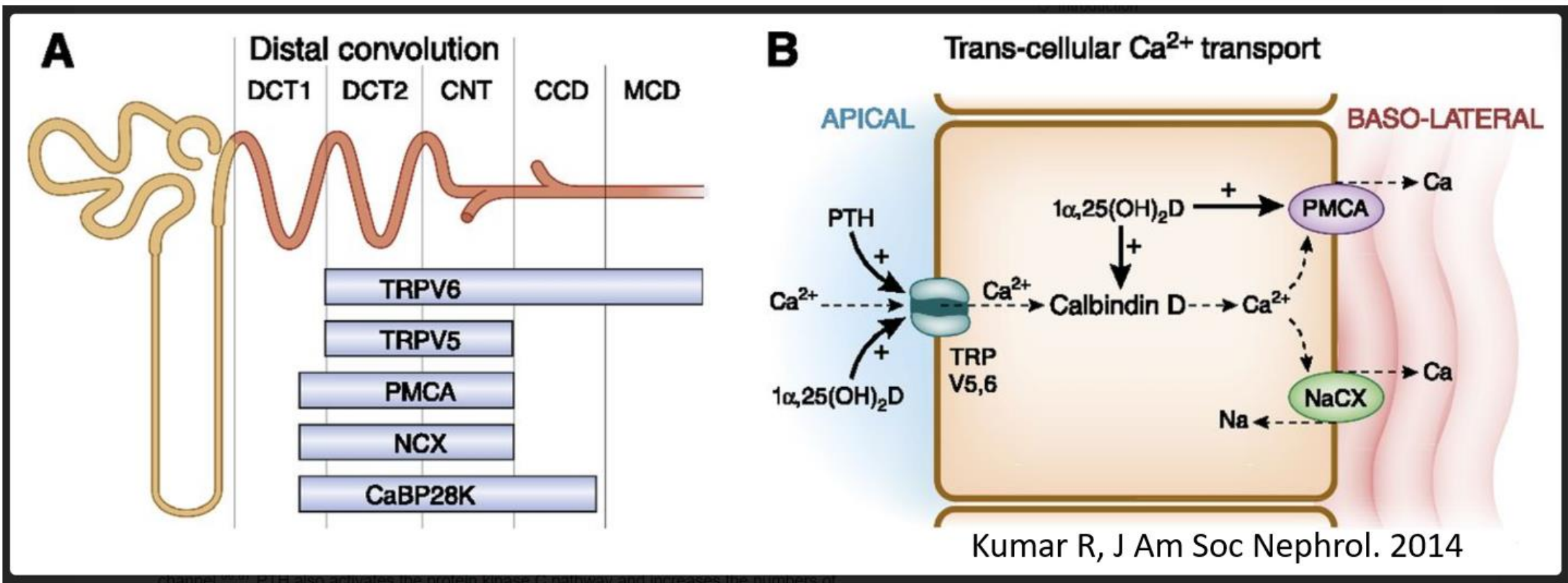


Vitamin D level and Calcium Dose Required



- Vitamin D level less < 25 in patients with low PTH, had significant effect on the calcium and Calcitriol requirement.
- Low preop vitamin D level placed patients in high risk of hypocalcemia.

Discussion and Conclusion

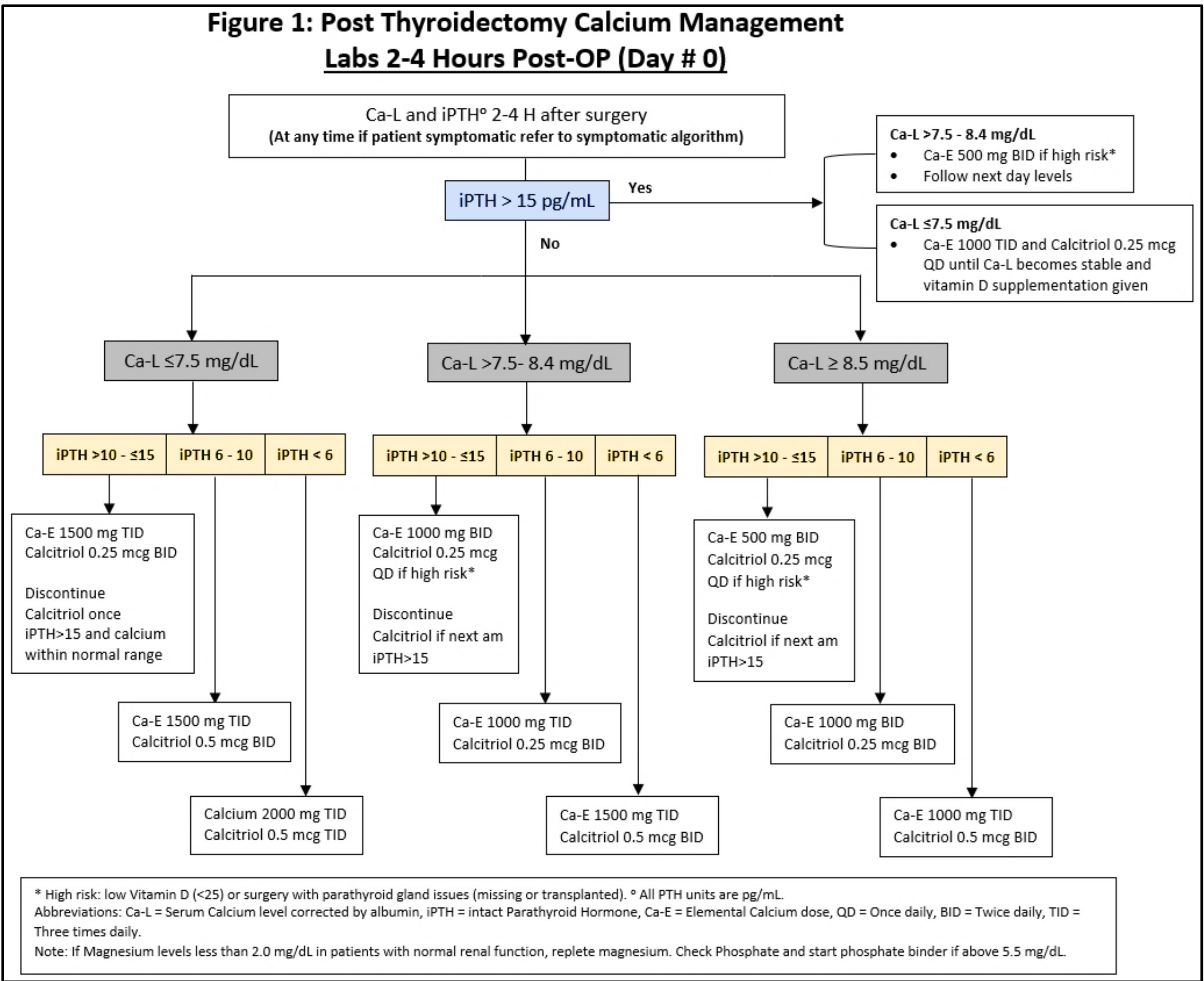


- Transient Receptor Potential Cation Channels, subfamily type 5 and 6 (TRPV5, TRPV6), mediate the Ca²⁺ uptake from the lumen into the cell.
- PTH increases the activity of TRPV5 channels also activate 1α,25(OH)₂D.
- 1α,25(OH)₂D enhances the expression of TRPV5 and TRPV6.

Formula and Algorithm

- Based on the inverse linear correlation between PTH and Calcitriol:
 - Calcitriol dose formula based on PTH2H (reference range 15 – 65)
 - Calcitriol dose = 15 – PTH2H/10**
 - Examples:
 - For PTH 5 ~ Calcitriol 1 mcg/day
 - For PTH 10 ~ Calcitriol 0.5 mcg/day

Algorithm



- Postop 2-hour PTH drop below reference range is a very sensitive marker indicating high possibility of hypoparathyroidism development, even in the absence of concurrent hypocalcemia.
- Postop 2-hour PTH below reference range is a good predicator for hypocalcemia presenting 2 to 3 days after surgery.
- PTH decline often precedes hypocalcemia.
- Hypoparathyroidism is usually transient.
- We suggest hypocalcemia prevention by utilizing an algorithm, using postop PTH 2-hour and calcium levels as the popper approach.

References

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