

# Intraoperative Parathyroid Hormone Monitoring During Parathyroidectomy for Renal Hyperparathyroidism: Comparison of Various Criteria

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## Introduction

Intraoperative parathyroid hormone monitoring (IPM) provides real-time assessment of parathyroid function. The result of focused exploration guided by IPM has been excellent for primary hyperparathyroidism. The role of IPM during surgery for renal hyperparathyroidism, which involves completely removal of all affected parathyroid tissue, is not established (Table 1 for various criteria). This study aims to identify the optimal criteria for IPM in order to determine the success of total parathyroidectomy for renal hyperparathyroidism.

## Materials and methods

This is a prospective observational study. We enroll dialysis patients who require parathyroidectomy (PTX) into the inclusion criteria, as well as the patients who need redo-PTX. We collect 1-84 PTH level, which its half-life does not exceed 4 minutes in the blood stream. The surgery is total PTX with forearm autotransplantation. The timing we collect 1-84 PTH level includes before surgery, pre-excision, 0-, 10-, 15-minute post-excision, and post-operative day 1. The assay we chose is Liaison 1-84 PTH, the 3rd generation assay. Post-operative PTH level > 300ng/ml at any measurement between day 1 to day 30 is regarded as a failure. The IPM Criteria being assessed includes >50% drop from pre-excision to 10-minute post-excision, >90% drop from pre-excision to 10-minute post-excision, and >90% drop from pre-excision to 15-minutes after excision.

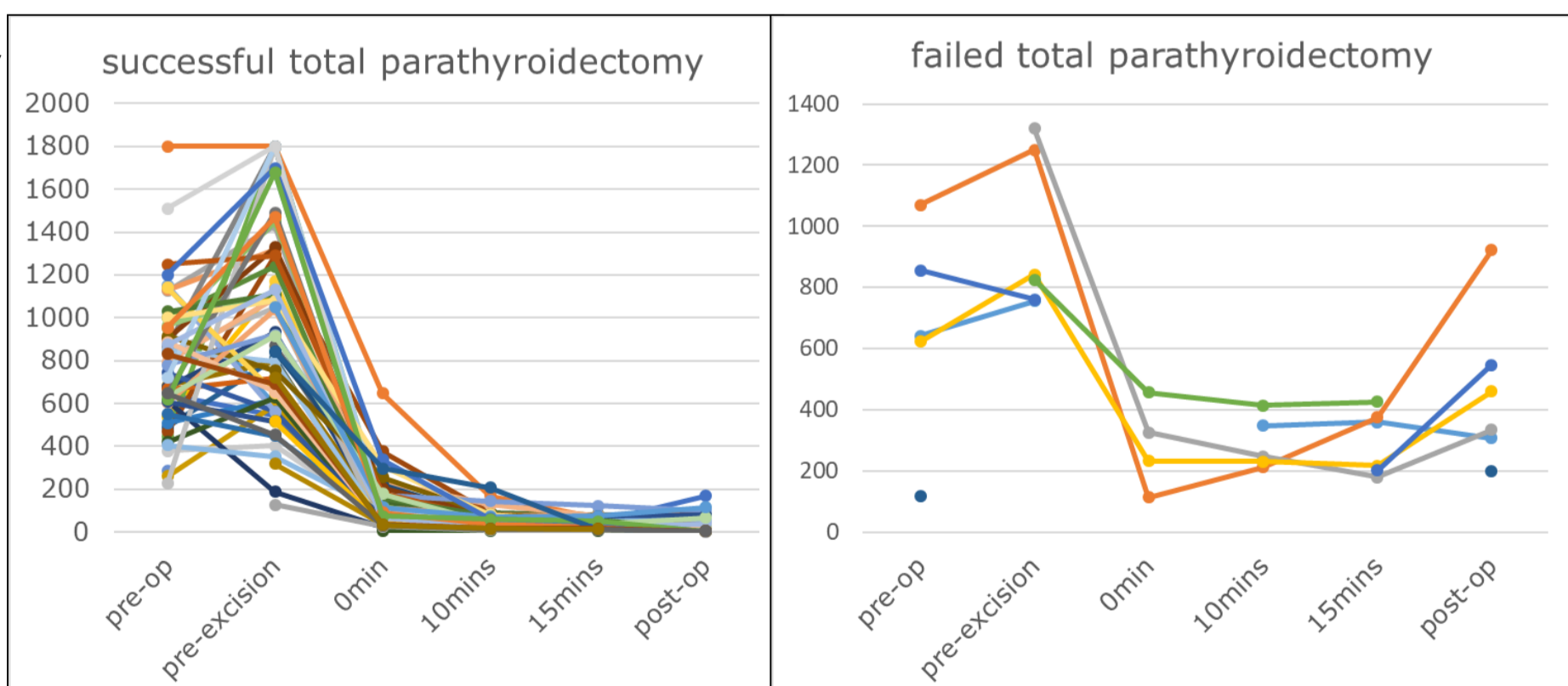
Year	Author	n	Baseline	Time post excision	% of drop
2000	Chou <i>et al.</i>	24	Incision	10 30	60 85
2005	Barczyński <i>et al.</i>	102	Incision	10 20	60 80
2007	Matsuoka <i>et al.</i>	44	Incision	10	90
2010	Kara <i>et al.</i>	42	Incision	15	90
2012	Conzo <i>et al.</i>	35	Incision	20	80
2016	Zhang <i>et al.</i>	501	Incision	20	88.9
2021	Chávez <i>et al.</i>	30	Incision	15	90
2022	Hiramitsu <i>et al.</i>	344	Incision	10	70

## Results

From September, 2022 to July, 2024, we enrolled 71 patients including 64 of which who underwent total parathyroidectomy, and the other 7 underwent redo-parathyroidectomy. 64 of whom revealed successful removal of all affected glands which the removed glands were confirmed by pathology. But 7 cases declared failed removal of all affected glands, including one of which showed

15-minute post-excision PTH level drop <90%, and 5 revealed post-operative PTH level >300ng/ml.

**The sensitivity, specificity and accuracy of our criteria showed that >90% drop from pre-incision to 15-minute post-excision are all 100%, but not 0 or 10-minute post-excision.**



## Discussion/ Conclusion

Our study comes to a similar conclusion with two of the various criteria, including Kara's and Chávez's, with expecting a >90% drop of 15-minute post-excision PTH level, which accurately predicts the success of surgery in patients with renal hyperparathyroidism. For those who is not achieved, reexploration and a post-operative PTH level are suggested to accurately predict success. We believe that this stricter criteria may be helpful to identify supernumerary hyperfunctioning parathyroid tissue, those with fewer than 4 parathyroid glands, and ectopic parathyroid glands, during the surgery.