

# Quantification of Indocyanine green fluorescence of parathyroid gland post thyroidectomy for predicting hypocalcemia

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## Introduction

- Post thyroidectomy hypoparathyroidism is associated with prolonged hospitalization
- Prompt identification aids in safe and early discharge
- No tools are available for objective identification of parathyroid gland perfusion (PGP) using indocyanine green dye (ICG)
- **Aim:**  
To study the correlation between intraoperative quantitative assessment of PGP using ICG with post-thyroidectomy hypocalcemia

## Material and Methods

- Prospective interventional study of 86 patients undergoing total thyroidectomy from 1<sup>st</sup> January 2023 to 30<sup>th</sup> June 2024
- Patients with known allergy to iodine containing dyes excluded
- Two ml (2.5mg/mL) ICG injected intravenously post thyroidectomy
- QP score of internal jugular vein set at baseline value of 100%
- PGP objectively assessed using QP software of Stryker Spyphi machine and compared to the baseline

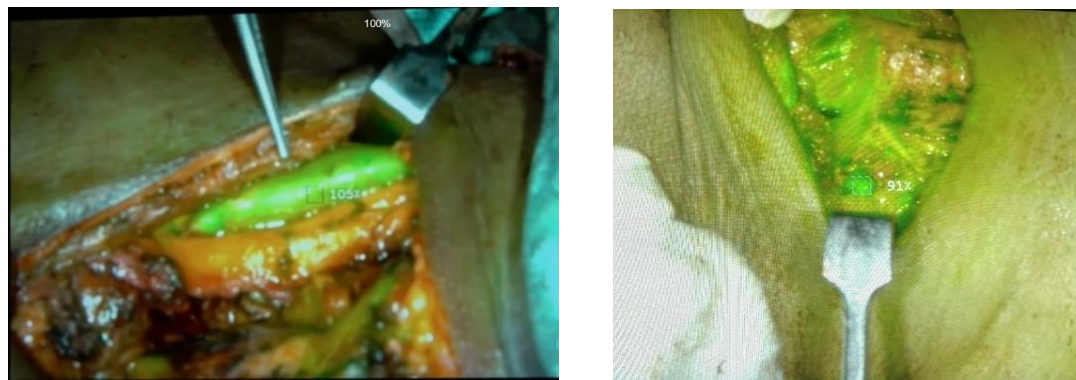


Figure 1: Baseline QP score and PGP assessment

## Results

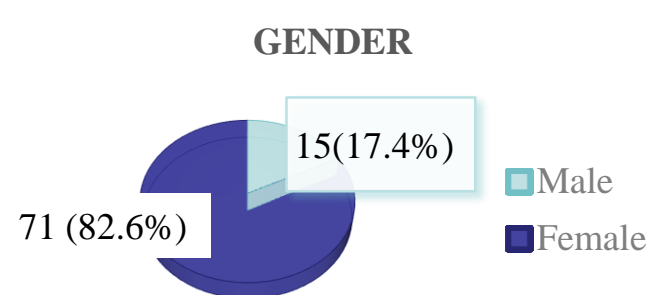


Figure 2: Sex distribution, n = 86

Surgical Procedure	n = 86 (%)
Total thyroidectomy	76 (88.3)
Total thyroidectomy with CCLND	4 (4.7)
Total thyroidectomy with CCLND with MRND	4 (4.7)
Completion thyroidectomy	2 (2.3)

Table 1: Distribution according to surgical procedure

QP Value	Correlation	p-Value
PTH POD 0	0.187	0.176
PTH POD 1	<b>0.273</b>	<b>0.018</b>
Post-op Calcium	<b>0.239</b>	<b>0.045</b>
Vitamin D3	0.011	0.929

Table 2: Association between QP value, Post op Day 0/1 PTH, post op calcium and Vitamin D3 levels using Pearson correlation

	PTH <18.1 (n=34)	PTH ≥18.1 (n=45)	p-Value
QP Value	55.264 ± 16.68	68.82 ± 15.31	<b>&lt;0.001</b>

Table 3: Association between QP value and Post op Day 1 PTH for cut-off value <18.1 and ≥18.1 pg/ml, PTH cut-off value as per departmental study (1)

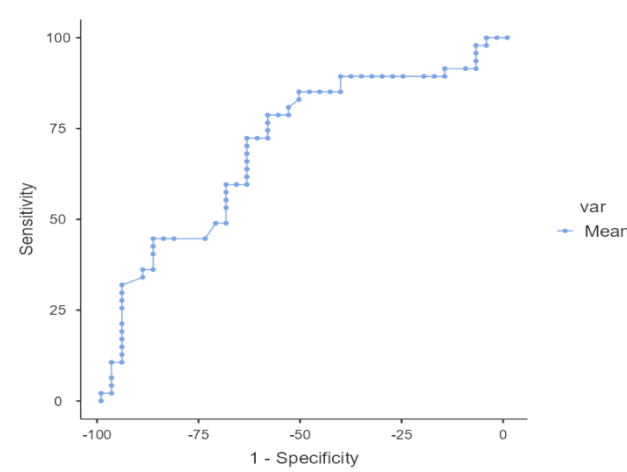


Figure 3: ROC analysis for QP (mean) score to detect PTH levels ≥ 18.1 pg/ml  
Sensitivity 80.85%, specificity 55.85% for AUC 0.703 for QP (mean) value of 55.75%

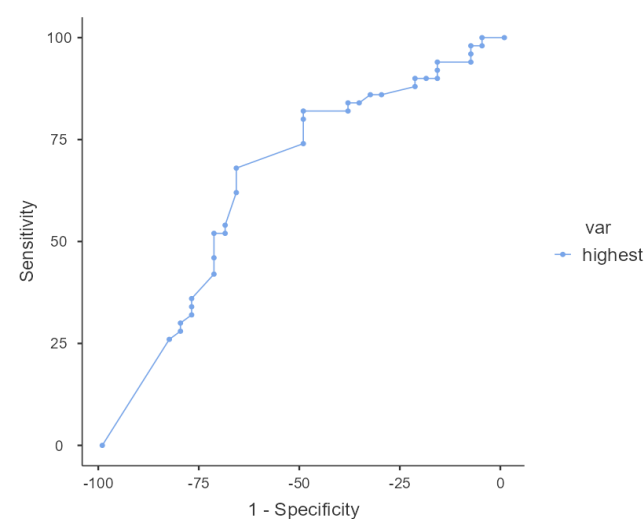


Figure 4: ROC analysis for QP (highest) score to detect PTH ≥ 18.1 pg/ml  
Sensitivity 80%, Specificity 50% for AUC 0.654 for QP (highest) value of 75%

	HC	NC	Total
QP (mean) < 55.75% & QP (highest) < 75%	16	7	23
QP (mean) > 55.75% & QP (highest) > 75%	11	38	49

Table 4: Sensitivity and Specificity for predicting hypocalcemia (HC) in patients with QP (mean) score <55.75% and QP (highest) score of <75%.  
Sensitivity = 59.25% specificity = 84.4%  
NC - Normocalcemia

## Discussion and Conclusion

- **First study on quantitative assessment of PGP using QP score of Stryker spyphi machine**
- Studies have subjectively evaluated PGP using black and white scoring system (0-2 score) (2)
- Lang et al. compared greatest fluorescent intensity with anterior tracheal wall fluorescent intensity (>150%) (3)
- QP score is a reliable tool for identification of PGP but does not replace identification and meticulous dissection of parathyroid gland
- **Mean QP score of >55.75% or highest QP score >75% in at least 1 gland reliably predicts normocalcemia**
- **Mean QP score >55.75% along with highest QP score >75% has a high specificity for ruling out hypocalcemia**

## References

1. Garg S et al. PTH Gradient as a Predictor of Post Thyroidectomy Hypocalcemia. Indian J Endocrinol Metab. 2021 Jul-Aug;25(4):332-336.
2. Vidal Fortuny et al. Intra-Operative Indocyanine Green Angiography of the Parathyroid Gland. World J Surg. 2016;40(10):2378-81.
3. Lang BHH et al. Indocyanine green fluorescence angiography for quantitative evaluation of in situ parathyroid gland perfusion and function after total thyroidectomy. Surgery. 2017 Jan;161(1):87-95.