

# A Study of Post-operative Hypocalcemia in Thyroidectomy Patients: Prospective Observational Study

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## Abstract

**Introduction:** The most common metabolic complication that lengthens hospital stay is hypocalcemia after thyroidectomy. The acute and most anticipated complication after thyroidectomy is hypocalcemia. Post-operative hypocalcemia can be acute or irreversible in lifetime supplements, depending on the degree of parathyroid injury.

**Aim:** This study aimed to analyze the post-operative hypocalcemia in thyroidectomy patients.

**Materials and Methods:** This prospective study was performed in Dindigul Headquarters Hospital (Tamil Nadu), Department of General Surgery. The study included all patients who underwent thyroidectomy. The data from the patients were obtained after the procedure for the treatment of post-operative hypocalcemia in patients undergoing a detailed thyroidectomy history, careful clinical review, effective radiological, and hematological investigations, including serum calcium and serum albumin and surgical findings.

**Results:** Out of 75 patients, 68 were female, and 7 were male. Twenty-four patients were in the age group between 12 and 30 years, 23 were in between 31 and 40 years, 18 were between 41 and 50 years, and 10 patients had greater than 50 years. Based on post-operative HPE report 27 patients had Hashimoto's thyroiditis, 14 patients had thyroid adenomas, 13 patients had a nodular goiter, 7 patients had thyroid malignancy, 6 had a toxic multinodular goiter, 4 patients had lymphocytic thyroiditis, and 4 patients had graves diseases. Twenty-six patients had post-thyroidectomy hypocalcemia.

**Conclusion:** To concluded, from this data that the risk factor for hypocalcemia production is multifactor. The suggested operational technique for preventing permanent hypocalcemia is a thorough dissection and preservation of at least 1 parathyroid gland and its blood supply.

**Key words:** Hypocalcemia, Incidence, Post-operative complications, Thyroidectomy

## INTRODUCTION

A popular treatment performed in the world is a complete thyroidectomy. In patients with thyroid cancer, Graves' disease, and toxic multi-dose goiter, complete thyroidectomy is recommended. In recent years, total thyroidectomy has become an option, particularly in endemic iodine-deficient areas, to treat patients with multinodular goiter. Complete

thyroidectomy is usually done when the diagnosis of thyroid lobectomy or lobectomy is performed in the case of a presumed benign condition, such as symptomatic multinodular goiter.<sup>[1]</sup>

This approach is still associated with hypocalcemia, although safe in experienced hands. Chronic hypoparathyroidism is an extreme and potentially weakening condition caused by several factors. It very frequently happens as a thyroid surgery complication. Certain studies have concluded that the prevalence of intermittent hyperparathyroidism ranges from 6.9% to 46%, whereas hyperparathyroidism rates range from 0.4% to 33%.<sup>[2-5]</sup>

The risk factors for the risk of predisposing to hypocalcemia after thyroid treatment are giant goiters, complete

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thyroidectomy, chronic goiters, carcinoma, and surgeons' experience, which may lead to devascularization or accidental removal of the parathyroid glands.<sup>[4,6,7]</sup> Hypocalcemia can occur secondary to surgical trauma, devascularization, and unintended extraction of the glands. The length of stay after thyroidectomy often depends primarily on the development of hypocalcemia. In most cases, hypocalcemia post-thyroidectomy is reversible, although it can take several months.

A small number of cases (0–12%) remain during this time and are assumed to be permanent, even though the gap between temporary and permanent hypocalcemia ranges from 6 months to 1 year.<sup>[8]</sup> However, the patient is committed to lifelong symptomatic care with calcium or vitamin D if the interval is permanent. The surgeon needs to make every effort to maintain one or more sustainable parathyroid, especially in the case of total thyroidectomy or subtotal thyroidectomy to avoid this complication.<sup>[9]</sup>

Careful dissection and protection of parathyroid glands and their blood supply are recommended as an organizational strategy.<sup>[5]</sup> Parathyroid glands must be correctly identified to help prevent accidental excision. Where less than three glands are found during the procedure, the probability of complication is higher.<sup>[4]</sup>

Factors that can reliably predict the development of post-thyroidectomy hypocalcemia can help start calcium supplements early and adequately and predict patients' protection from early release.<sup>[10]</sup> In several studies, the occurrence of post-thyroidectomy hypocalcemia was correctly predicted by post-operative parathyroid hormone (PTH), which was lower than the value intraoperatively, or on the same day of the surgery, between 8 and 15 Pg/mL.

### Aim

This study aimed to analyze the post-operative hypocalcemia in thyroidectomy patients.

## MATERIALS AND METHODS

This prospective study was performed in Dindigul Headquarters Hospital (Tamil Nadu), Department of General Surgery. The study included all patients who underwent thyroidectomy. The data from the thyroidomes were obtained after the procedure for the treatment of post-operative hypocalcemia in patients undergoing a detailed thyroidectomy history, careful clinical review, effective radiological, and hematological investigations, including serum calcium and serum albumin and surgical findings. The primary pathology of parathyroid patients undergoing hemi-thyroidectomy/lobectomy. To prevent

previously altered parathyroid functions, we excluded patients with altered pre-operative levels of calcium and excluded patients with prior radiation history, including those with a calcium supplement already excluded. We have followed all patients who meet our serum calcium requirements after operating on day 1, day 2, and day 4. We have also reported a history of various post-operative hypocalcemia presentations such as perioral stunning, carpopedal spasm, trousseau sign, Chvostek's signs, ECG changes in hypocalcemia, and other neurological symptoms.

## RESULTS

Out of 75 patients, 7 patients were male, and 68 patients were female [Figure 1].

Based on the age group, 24 patients were in the age group between 12 and 30 years, 23 were between 31 and 40 years, 18 were between 41 and 50 years, and 10 patients had greater than 50 years [Figure 2].

Based on the pre-operative indication for total thyroidectomy, 12 patients had malignancy, 19 patients had toxic features, and 44 patients had swelling/goiter [Figure 3].

Based on the surgery's nature, 72 patients had a total thyroidectomy and 3 patients had re-surgery/complete thyroidectomy [Figure 4].

Based on post-operative HPE report, 27 patients had Hashimoto's thyroiditis, 14 patients had thyroid adenomas, 13 patients had a nodular goiter, 7 patients had thyroid malignancy, 6 had a toxic multinodular goiter, 4 patients had lymphocytic thyroiditis, and 4 patients had graves diseases [Figure 5].

Based on post-operative hypocalcemia, 26 patients had hypocalcemia and 49 patients had no hypocalcemia [Figure 6].

Out of 26 patients had post-operative hypocalcemia, 4 were male and 2 were female. Six patients had an age between 12 and 30 years, 9 patients had an age between 31 and 40 years, 4 patients had an age between 41 and 50 years, and 7 patients had age greater than 50 years. Nine patients had malignancy, 9 patients had toxic features, and 8 had swelling/goiter. Twenty-three patients had a total thyroidectomy and 3 patients had re-surgery/completion thyroidectomy. Based on post-operative HPE report, 6 patients had Hashimoto's thyroiditis, 3 patients had thyroid adenomas, 4 patients had a nodular goiter, 7 patients had thyroid malignancy, 3 had toxic multinodular goiter, and 3 patients had graves diseases [Table 1].

**DISCUSSION**

The most common issue after TT is hypocalcemia which may be temporary or permanent.<sup>[11]</sup> Temporary hypocalcemia may be either biochemically (BH) or symptomatically (SH), usually 24–48 h post-thyroidectomy.<sup>[12]</sup> Hence, patients

must be monitored for this time before discharge to avoid the development of clinically relevant hypocalcemia. The poor rural health care system is especially significant in India. Production of hypocalcemia after complete thyroidectomy (TT) depends on different factors. One of them was serum calcium levels postoperatively.<sup>[13]</sup>

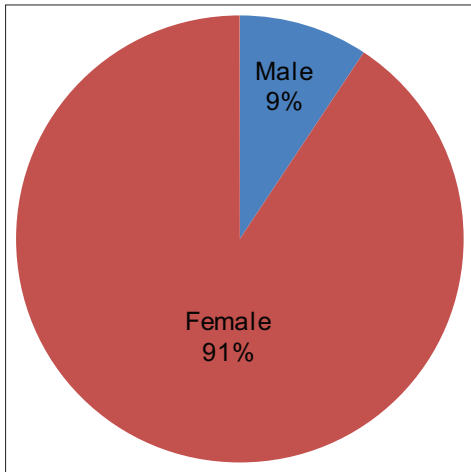


Figure 1: Gender distribution

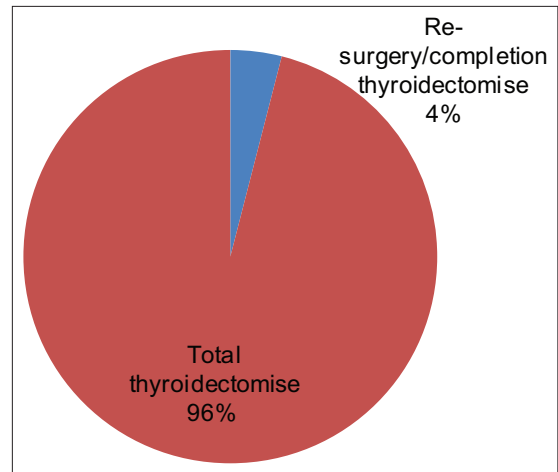


Figure 4: Distribution of nature of surgery

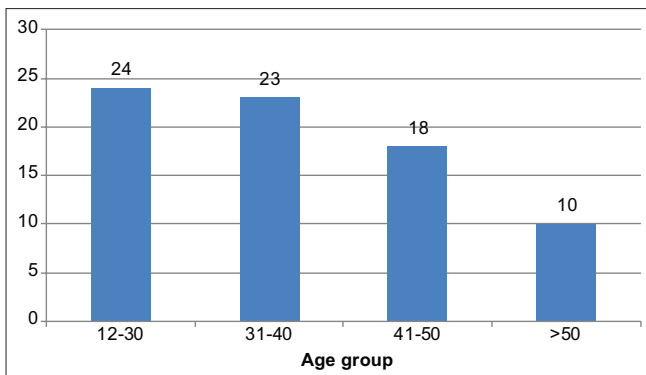


Figure 2: Age distribution

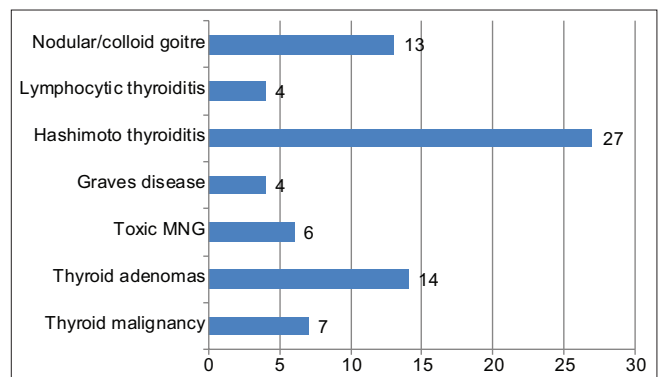


Figure 5: Post-operative final diagnosis based on HPE report

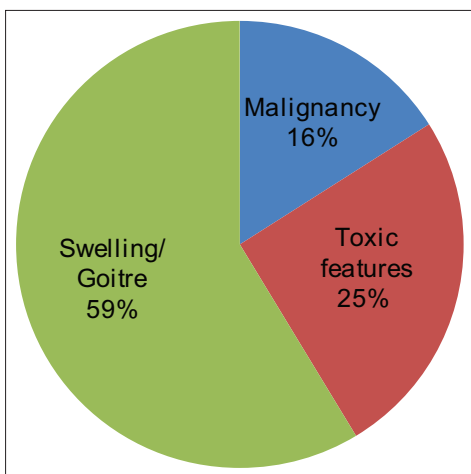


Figure 3: Indication for total thyroidectomy

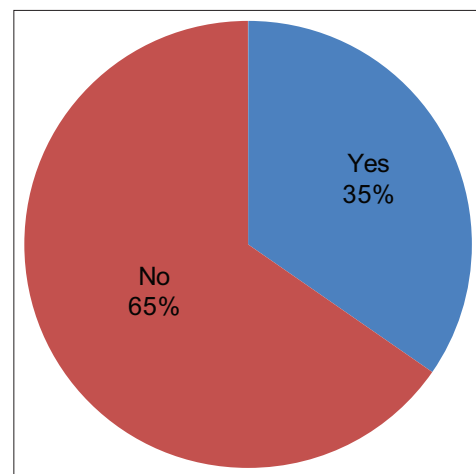


Figure 6: Post-operative hypocalcemia

**Table 1: Distribution of post-operative hypocalcemia**

Variables	Post-thyroidectomy hypocalcemia
Gender	
Male	4
Female	22
12–30	6
Age group	
31–40	9
41–50	4
>50	7
Indications	
Malignancy	9
Toxic features	9
Swelling/goiter	8
Nature of surgery	
Re-surgery/completion thyroidectomy	3
Total thyroidectomy	23
Diagnosis	
Thyroid malignancy	7
Thyroid adenomas	3
Toxic MNG	3
Graves' disease	3
Hashimoto thyroiditis	6
Nodular/colloid goiter	4

A prospective study by Sperlongano *et al.* observed hypocalcemia in 27 out of 180 patients following thyroidectomy in total with 40.7%, 22.2%, 29.6%, 3.7%, and 3.7% -, 2nd-, 4th-, and 5<sup>th</sup>-day, hypocalcemia in all cases.<sup>[14]</sup>

In another prospective study of 102 Pasque *et al.* patients, 18 patients experienced hypocalcemia, 38.8% on the 1<sup>st</sup> day after surgery, 22.2% on the 2<sup>nd</sup> day after surgery, and 33.3% on the third day off and 5.5% on the 4<sup>th</sup> day after the surgery.<sup>[15]</sup>

Tredici *et al.* recorded a 50% hypocalcemia incidence for patients with total thyroidectomy on the 1<sup>st</sup> post-operative day, 46% on the second day, 22% on the third day, and the remaining patient's hypocalcemia on the 4<sup>th</sup> and 5<sup>th</sup> post-operative days.<sup>[16]</sup>

Asari *et al.* performed a study to determine whether serum calcium measurements would forecast hypoparathyroidism on 1–4 post-operative days. They observed that the assessment of serum calcium on a second, (62.8%) and fourth, and (32.6%) post-operative days was of the highest hypoparathyroidism sensitivity (72.1%), as opposed to the first (18.6%).<sup>[17]</sup>

## CONCLUSION

We inferred from this analysis that the risk factor for hypocalcemia production is multifactor. The suggested

operational technique for preventing permanent hypocalcemia is a thorough dissection and preservation of at least one parathyroid gland and its blood supply.

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