



E-ISSN: 2616-3470  
P-ISSN: 2616-3462  
© Surgery Science  
www.surgeryscience.com  
2022; 6(1): 83-86  
Received: 15-10-2021  
Accepted: 20-12-2021

**Dr. Srinivas Rao Mandalapu**  
Associate Professor: Department of  
Surgery, SVS Medical College,  
Mahabubnagar: Telangana, India

## Hypocalcemia in patients undergoing bilateral thyroid surgery: A clinical study

**Dr. Srinivas Rao Mandalapu**

**DOI:** <https://doi.org/10.33545/surgery.2022.v6.i1b.825>

### Abstract

**Background:** Hypocalcemia after thyroid surgery is a common complication that can cause severe short- and long-term morbidity. The goal of this study was to see how often post-thyroidectomy hypocalcaemia (defined as a corrected calcium of less than 2.1 mmol/l) was and what factors could predict it in a tertiary surgical center.

**Aims:** The aim of present study was to assess the incidence of post thyroidectomy hypocalcemia and factors which might play a role in its occurrence.

**Materials and Methods:** The present prospective study was conducted in department of general surgery in 40 patients who had their thyroids removed bilaterally were studied. The research was conducted from March 2017 to February 2019. Serum calcium estimation was used to determine the incidence of hypocalcemia in the immediate post-operative period, 4 hours, and 24 hours following surgery, and on the 5th post-operative day. Pre-operative and post-operative serum calcium levels, clinical manifestations, and disease type all patients were examined.

**Results:** Mean age of the patients was  $48.2 \pm 14.90$  years with a range of 21-70 years. Maximum number of patients had colloid goitre on FNAC i.e., 18 (45%) followed by atypical cells s/o malignancy in 9 (22.5%) patients. In 32 (80%) patients, total thyroidectomy was performed and in 8 (20 %) patients subtotal thyroidectomy was performed. Mean serum calcium preoperatively was  $9.0 \pm 0.2$  and when it was compared with serum calcium level in immediate postoperative, 4 hours after surgery, 24 hours after surgery and 5 days after surgery, it showed a significant difference ( $p < 0.001$ ). The maximum level of hypocalcemia was noted. Total incidence of hypocalcemia as 65% that means 26 patients out of 40 developed hypocalcemia. Out of these 26 patients, 12 patients are of colloid goitre, 7 each in papillary carcinoma and multinodular goitre. Incidence of hypocalcemia is high in carcinoma.

**Conclusions:** The incidence of post-thyroidectomy hypocalcaemia was underestimated by 6% when only POD1 measurements were considered. The timing of measurement on POD1 has an impact on the incidence of post-thyroidectomy hypocalcaemia.

**Keywords:** Thyroid surgery, hypocalcaemia, post-thyroidectomy

### Introduction

Hypocalcemia after thyroid surgery is a major early consequence. According to estimates, temporary hypocalcemia occurs 9.2% of the time and persistent hypocalcemia occurs 0.5 percent of the time. Surgical trauma, devascularization, inadvertent removal of parathyroid glands, and reoperation can all cause hypocalcemia. Some transient parathyroid dysfunction may occur even after meticulously executed treatments. Surgery extension has been identified as a risk factor, as there is a danger of blood supply disruption following complete thyroidectomy due to bilateral surgical manipulation. Other considerations, on the other hand, are related to the surgical approach chosen and its impact on devascularization or unintentional parathyroid gland removal. The parathyroid glands and their blood supply should be meticulously dissected and preserved as part of the surgical plan. Identifying the parathyroid glands correctly is the best method to avoid unintentional excision<sup>[1, 2]</sup>.

Depending upon the extent of parathyroid damage, postoperative hypocalcemia may be transient, resolving within a few months, or permanent, requiring lifelong oral or intravenous calcium supplementation. A 3 to 32% incidence of hypocalcemia has been reported after thyroid surgery and it generally present on second to fifth postoperative day<sup>[3, 4]</sup>. The clinical feature includes circumoral paraesthesia, carpopedal spasm and in severe cases it may lead to tetany. This study aims to prospectively study and analyze the incidence and possible causes of hypocalcemia following thyroid surgery.

**Corresponding Author:**  
**Dr. Srinivas Rao Mandalapu**  
Associate Professor: Department of  
Surgery, SVS Medical College,  
Mahabubnagar: Telangana, India

**Materials and Methods**

The present prospective study was conducted in department of general surgery in 40 patients who had their thyroids removed bilaterally were studied. The research was conducted from March 2017 to February 2019.

Data will be collected from the patients undergoing total thyroidectomies by meticulous history taking, careful clinical examination, appropriate radiological, haematological investigations including serum calcium and serum albumin, operative findings and follow-up of the cases will be done after surgery for post-operative hypocalcemia.

**Inclusion Criteria:** Patient aged more than 12 yrs including both gender with clinically and pathologically diagnosed thyroid swellings undergoing thyroidectomy surgery

**Exclusion Criteria:** Patients undergoing hemithyroidectomy / lobectomy, Primary parathyroid pathologies, previous irradiation to neck and patient already on calcium supplementation.

An informed consent was taken from all patients/guardians for inclusion in study. Data was collected from the patients undergoing thyroid surgery by meticulous history taking, careful clinical examination, appropriate radiological, hematological investigations including serum calcium and serum albumin. The outcome studied was post-thyroidectomy hypocalcaemia in the immediate postoperative period and at six months following surgery. The STH operating theatre electronic database was used to identify patients. The postoperative serum calcium was determined by two consecutive measurements in the morning and afternoon at approximately 9am and 3pm respectively. There was no standard protocol on measuring serum calcium after POD1 in normocalcaemic patients.

Patient characteristics preoperative diagnosis, treatment details, peri-operative biochemistry. were collected. Serial monitoring of serum calcium levels in immediate and early post-operative period i.e., immediately after the surgery, 4 hours after surgery and 24 hours after surgery and on 5th post-operative day was done. All these findings were entered into predesigned patient proforma and results were analysed. All operations were performed or supervised by Senior surgeon.

Data were collected from hospital electronic records and case notes. A data collection form was developed, piloted for data entry using five medical records and revised accordingly. The statistical significant level was set at 0.05.

**Results**

In this study, authors followed 40 patients who underwent thyroid surgery for various indications. Mean age of the patients was 48.2±14.90 years with a range of 21-70 years.

**Table 1:** Demographic details in study

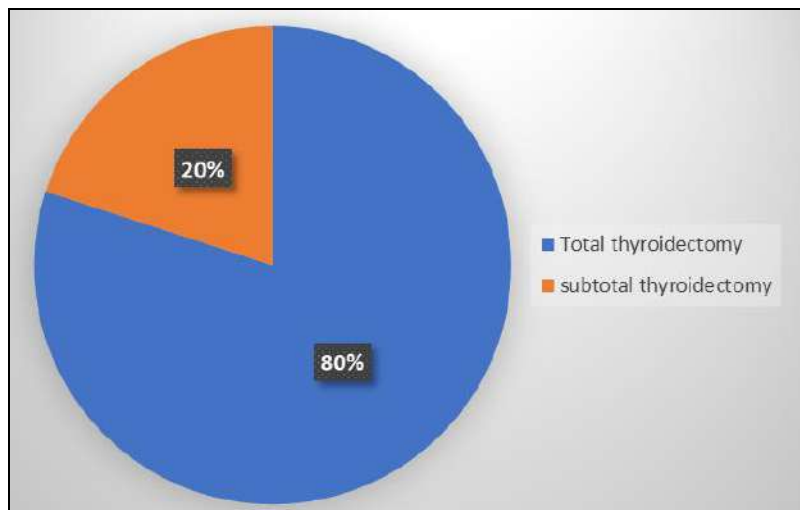
Gender	Number of cases	Percentages
Males	10	25
Females	30	75
Preoperative diagnosis		
cancer	16	40
Hyperthyroidism	18	45
Others	6	15

Sex distribution of the patients showed that female patients outnumbered male patients by a significant margin. There were 30 (75%) females and 10 (25%) males. A clinical diagnosis was established in all patients after local examination of thyroid with cancer and hyperthyroidism.

**Table 2:** Distribution of patients according to FNAC report

FNAC findings	Number of patients	Percentages
Colloid goitre	18	45
Papillary carcinoma	8	20
Atypical cells s/o malignancy	9	22.5
Benign follicular cells	3	7.5
Carcinomatous changes	2	5

Maximum number of patients had colloid goitre on FNAC i.e., 18 (45%) followed by atypical cells s/o malignancy in 9 (22.5%) patients. Only 2 (5%) patient had carcinomatous changes which ultimately turned out to be a case of anaplastic carcinoma. Eight patients were diagnosed as papillary carcinoma on FNAC findings.



**Fig 1:** Type of surgery performed in study

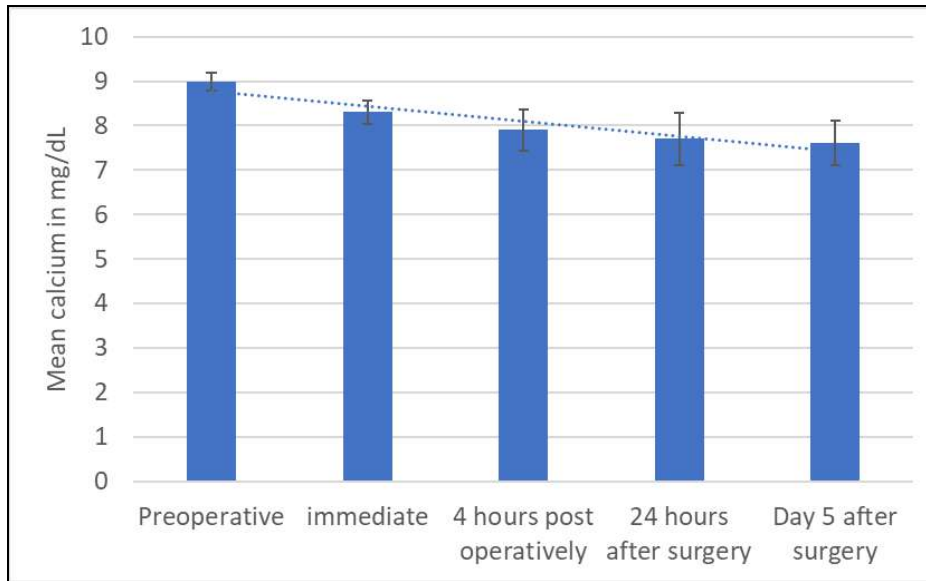
After making tissue diagnosis by FNAC and having a complete workup, all patient was subjected to surgical intervention. Subtotal thyroidectomy was carried out only in those patients

where there was no evidence of malignancy on FNAC. In 32 (80%) patients, total thyroidectomy was performed and in 8 (20%) patients subtotal thyroidectomy was performed.

**Table 3:** Postoperative evaluation of hypocalcemia

	Number of patients	Percentages
Chovestek s sign	15	37.5
Parasthesia	14	35
Trousseau's sign	11	27.5

Postoperative progress of the patients showed that paresthesia was observed in 15 (37.5%) patients, Chvostek's sign in 14 (35%) and Trousseau's sign in 11 (27.5%) patients.



**Fig 2:** Preoperative and postoperative serum calcium levels

Mean serum calcium preoperatively was  $9.0 \pm 0.2$  and when it was compared with serum calcium level in immediate postoperative, 4 hours after surgery, 24 hours after surgery and 5 days after surgery, it showed a significant difference ( $p < 0.001$ ). The maximum level of hypocalcemia was noted at 24 hours after surgery.

**Table 4:** Histological findings in study

Histological findings	Number of patients	Percentages
Colloid goitre	18	45
Papillary carcinoma	8	20
Multinodular goitre	4	35

**Table 5:** Incidence of hypocalcemia in different thyroid conditions.

Histological findings	Number of patients	Post thyroidectomy hypocalcaemia	Percentages
Colloid goitre	18	12	66.7
Papillary carcinoma	8	7	87.5
Multinodular goitre	7		50

Total incidence of hypocalcemia as 65% that means 26 patients out of 40 developed hypocalcemia. Out of these 26 patients, 12 patients are of colloid goitre, 7 each in papillary carcinoma and multinodular goitre. Incidence of hypocalcemia is high in carcinoma

**Discussion**

In our study, results show that thyroid diseases that may need thyroid surgeries with mean age  $48.2 \pm 14.90$  years. A study conducted by Erbil Y *et al* named the impact of age, vit D level and incidental parathyroidectomy on postoperative

hypocalcemia after total or near total thyroidectomy reveals that in advancing ages the level of vit D fall postoperatively increases tremendously. So the incidence 25 times greater for the patients of more than 50 years of age [5].

Thyroid diseases are more common in females, as in many literature. Our study population also reflects the same male 25% and female contributes 75% of thyroid disorders [6]. Morganti *et al* in their study concluded that aging has been proposed to represent a trigger for the development of autoimmune phenomena resulting in the production of both organ and non-organ-specific antibodies [7]. They reported that studies on the relationship between sex and thyroid autoimmunity in elderly subjects have shown that the age-related prevalence of antithyroid autoantibodies is greater in women >60 years of age. Maximum number of patients had colloid goitre on FNAC i.e., 18 (45%) followed by atypical cells s/o malignancy in 9 (22.5%) patients. Only 2 (5%) patient had carcinomatous changes which ultimately turned out to be a case of anaplastic carcinoma. Eight patients were diagnosed as papillary carcinoma on FNAC findings.

Paresthesia's was the most commonly seen clinical symptom after hypocalcemia in this study. In the present study, Postoperative progress of the patients showed that paresthesia was observed in 15 (37.5%) patients, Chvostek's sign in 14 (35%) and Trousseau's sign in 11 (27.5%) patients. It was comparable to the results of the study of Eismontas *et al.* who in their study reported paresthesia in 22.6% patients, Chvostek's sign in 5.4% patients and Trousseau's sign in 3.6% patients [8].

Total incidence of hypocalcemia as 65% that means 26 patients out of 40 developed hypocalcemia. Out of these 26 patients, 12 patients are of colloid goitre, 7 each in papillary carcinoma and multinodular goitre. Incidence of hypocalcemia is high in carcinoma. The results are comparable to the results of the study

done by various other authors reported in the literature. The higher incidence of hypocalcemia in malignant condition is because of excessive dissection required for resection of thyroid and clearance of lymph nodes. This can lead to compromise of vascular supply of parathyroid gland despite their safe preservation.

There is a wide range of reported hypocalcemia rates after thyroidectomy, according to the literature (0.33 percent - 83 percent )<sup>[9-12]</sup> The incidence of hypocalcemia was higher in this study than in others, most likely because there were more cancer patients in this study than in others. 9,10 Because the surgical oncology unit of the study institute is part of the general surgery department, there are more cases of malignant goitre in this study. Another reason for the increased frequency of hypocalcemia in this study is that the authors included complete and subtotal thyroidectomy cases, whereas previous studies included lobectomy and hemithyroidectomy procedures as well. Benign diseases shows less incidence of post thyroidectomy hypocalcaemia than the malignant diseases, this attribute to the extensive surgical dissection performed in malignant disorders in order to obtain tumour clearance. In a study conducted by sokouti M *et al*, regarding the incidence of transient and permanent hypocalcemia after total thyroidectomy for thyroid cancer reveals higher incidence of hypocalcemia after total thyroidectomy<sup>[13]</sup>.

### Conclusion

From our study we concluded that post thyroidectomy transient hypocalcaemia is a frequent complication which can be prevented with preoperative preparation of patients with extreme caution and peroperative meticulous dissection, prompt identification of parathyroids and postoperative frequent monitoring of serum calcium and early treatment can prevent significant morbidity. For treating patients more than 45 years surgeon should careful in preventing hypocalcaemia. While doing surgeries for malignant and toxic lesions for thyroid, the surgeon should consider total thyroidectomy as not only a thyroid removing surgery but also a surgery done to preserve parathyroids. For small scale hospitals serial monitoring of serum calcium levels preoperatively and postoperatively combined with careful monitoring of signs. and symptoms of hypocalcemia is a efficient and cost effective tool to detect post thyroidectomy hypocalcemia.

### References

1. Fong J, Khan A. Hypocalcemia: updates in diagnosis and management for primary care. *Can Fam Physician*. 2012;58(2):158-162.
2. Kim YS. Impact of preserving the parathyroid glands on hypocalcemia after total thyroidectomy with neck dissection. *J Korean surg soc*. 2012;83:75-2
3. Tredici P, Grosso E, Gibelli B, Massaro MA, Arrigoni C, Tradati N. Identification of patients at high risk for hypocalcemia after total thyroidectomy. *Acta Otorhinolaryngol Ital*. 2011;31(3):144-148.
4. Dhiman B, Dalal S, Dalal N, Raman S. Study of the incidence of hypocalcemia in patients undergoing bilateral thyroid surgery. *Int Surg J*. 2020;7:2914-8.
5. Zendenius J, Wad storm C, Delbridge L, Routine autotransplantation of atleast one parathyroid gland during total thyroidectomy may reduce permanent hypoparathyroidism to zero. *Aust NZJ Surg* 1999;69:794-7.
6. Bailey and Love 26th edition, short practice of surgery
7. Morganti S, Ceda GOP, Saccani M, Milli B, Ucolotti D,

8. Premoolini R *et al*. Thyroid disease in the elderly: sex related differences in clinical expression. *J Endocrinol Invest*. 2005;28:101-4.
9. Eismontas V, Slepavicius A, Janusonis V, Zeromskas P, Beisa V, Stupas K, *et al*. Predictors of postoperative hypocalcemia occurring after a total thyroidectomy: results of prospective study. *BMC Surg*. 2018;18:55-67.
10. Thomusch O, Machens A, Sekulla C, Ukkat J, Brauckhoff M, Dralle H. The impact of surgical technique on postoperative hypoparathyroidism in bilateral thyroid surgery: a multivariate analysis of 5846 consecutive patients. *Surg*. 2003;133:180-5.
11. Rosato L, Avenia N, Bernante P, De Palma M, Gulino G, Nasi PG, *et al*. Complications of thyroid surgery: analysis of a multicentric study on 14,934 patients operated on in Italy over 5 years. *World J Surg*. 2004;28:271-6.
12. Wilson RB, Erskine C, Crowe PJ. Hypomagnesemia and hypocalcemia after thyroidectomy: a prospective study. *World J Surg*. 2000;24:722-6.
13. Demeester MN, Hooghe L, Aneertruvden VJ, DeMaertelaer V. Hypocalcemia after thyroidectomy. *Arch Surg*. 1992;127:854-8.
14. Sokouti, Mohsen, Montazeri V, Golzari EJ, Samad. The Incidence of Transient and Permanent Hypocalcaemia after Total Thyroidectomy for Thyroid Cancer. *Int J Endocrinol Metab*. 2010;2:271-276.