

The Study of Hypocalcemia in Total Thyroidectomy Patients - A Prospective Study

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Date of Submission: 26-06-2020

Date of Acceptance: 15-07-2020

I. Introduction

NEED FOR STUDY :

Thyroid disorders and their varied clinical presentation and their management strategy are increasing in today's clinical practice. Total thyroidectomy is one of the commonly done surgeries, which is done mostly in case of toxic Multinodular goitre and Thyroid malignancies. Postoperative complications after thyroid surgery are varied and reported more with Total Thyroidectomy.

Hypocalcemia after Total surgical resection of the thyroid is a potential complication. Incidence of transient hypocalcemia are reported in the literature from 9.2% to 25% and of permanent hypocalcemia ranges from 0.5% to 2% (1)

Even after meticulously performed surgery, the incidence of early transient post thyroidectomy hypocalcemia is quite significant, and some studies show up to 59% (2).

Careful dissection to identify and spare atleast two parathyroid glands under direct vision is mandatory to avoid postoperative reduced calcium levels and its complications. Studies have shown that postoperative hypocalcemia is more frequent following bilateral resection of lobes than unilateral 9% and 1.9% respectively (3).

Early detection and prompt initial treatment of hypocalcemia following total thyroidectomy are vital for the best outcome in the postoperative period. Because of the availability and cost factor of the test (serum calcium measurement) even in small scale hospitals estimation of serum calcium has become an ideal tool for early diagnosis and treatment of postoperative hypocalcemia.

There are many predictors which are under evaluation to establish an effective protocol to be followed in the postoperative period to manage postoperative hypocalcemia efficiently.

Hypocalcemia following thyroid surgery is one of the significant factors that determine the length of hospital stay. So, this study prospectively evaluates the validity of consecutive measurements of serum calcium levels to predict the clinically relevant post-operative hypocalcemia at an early stage.

In our study, we analyse the effect of total thyroidectomy on postoperative hypocalcemia.

AIM

To study hypocalcemia in total thyroidectomy patients during the first post-operative week.

OBJECTIVES

- Incidence of Hypocalcemia
- Male or Female preponderance
- Age group in which Hypocalcemia is common
- On which Postoperative day Hypocalcemia is common
- Incidence of Asymptomatic and Symptomatic Hypocalcemia

II. Review Of Literature

Thomas Wharton coined the term *thyroid gland* in 1656 (*glandulaethyroidae*). Advancement in thyroid surgery came from **Theodore Kocher**, who recognized the need to preserve the parathyroids. He reported more than 5000 successful thyroidectomies by 1912. He is called "Father of thyroid surgery. Hypocalcaemia was significantly associated with 11.4% of toxic goitre, 12% of malignant goitre and 3.6% of simple multinodular goitre. When preservation of parathyroid glands and their blood supply is achieved during thyroidectomy, the incidence of postoperative hypocalcaemia and permanent hypoparathyroidism can be reduced consistently. Thyroidectomy with bilateral neck dissection is one of the most potent independent risk factors of postoperative hypocalcemia resulted in an incidence of 23.4%. Patients aged 45 years to 75 years were less likely to have postoperative hypocalcemia compared with their younger and older counterparts.

Additional factors autonomously associated with postoperative hypocalcemia included female gender, peripheral smallscale hospitals, and malignant neoplasms of the thyroid gland(3)

In a study done by Sakoutiet al. (4) regarding the incidence of transient and permanent hypocalcemia after total thyroidectomy for thyroid cancer reveals a higher incidence of hypocalcemia after total thyroidectomy in malignant diseases of the thyroid and its incidence increases more with surgeries combined with radical neck dissection

Routine supplementation therapy with oral calcium or vitamin D effectively prevents symptomatic hypocalcemia following total thyroidectomy, and this may allow for a safe early discharge. The combination of oral calcium and vitamin D may further reduce the rate of postoperative hypocalcemia, without inhibiting parathyroid hormone secretion(5)

Inpatients receiving calcium and vitamin D supplements, the decrease in serum calcium was slighter, and symptoms of hypocalcemia are minimized, and no patient experienced a hypocalcemic crisis. By contrast, hypocalcemic symptoms are more severe in patients who had undergone CND but did not receive supplements(6)

Oral administration of 1 µg of calcitriol twice a day and 500 mg of calcium salts three times a day after total thyroidectomy significantly decreases the risk of severe postoperative hypocalcemia(7)

III. Materials And Methods

Source of data:

- A prospective observational study.
- Cases for the present clinical study are sourced from the patients aged >18years admitted to the general surgical wards of Sri Venkateshwara Medical College &Hospital, Tirupati during the period from March 2018 to April 2019 and undergoing total thyroidectomy procedure.

Method of collection of data:

Consecutive cases undergoing total thyroidectomy in Sri Venkateshwara Medical College &Hospital, Tirupati are selected for the study.

- a) Direct interview with the patient and obtaining a detailed history regarding age, sex, symptoms and thorough clinical examination.
- b) Preoperative investigations: Serum calcium, Thyroid profile, FNAC, USG of the neck.
- c) Post operative investigations including serum calcium, at day 1, day two and day 3, day 5 and day 7 post-op &Histopathological examination of the specimen.
- e) Following parameters considered for statistical analysis: Age, Gender, Final diagnosis, HPE (benign or malignant), Principal procedure, Presence and absence of symptoms of hypocalcemia and incidence of biochemical hypocalcemia are analysed.
- f) All the cases were followed upto 6months after discharge.
- g) Hypocalcaemia diagnosed when serum ionised calcium level dropped below 8.5mg/dL.

Inclusion criteria:

- Patients aged more than 18years of age, including both genders admitted and positively diagnosed as having thyroid swelling and requiring total thyroidectomy and willing for surgery.

Exclusion criteria:

- Concomitant parathyroid diseases.
- Patients undergoing lobectomy, isthmectomy and hemithyroidectomy, subtotal thyroidectomy.
- Patients with liver/renal diseases
- Patients already on calcium supplementation
- Previous thyroid surgery or irradiation.

IV. Results And Discussion

In this study, we followed 64 patients who were undergone totalthyroidectomies on various indications.

These patients are selected from, patients undergoing total thyroidectomies in SVRRGGH Tirupati from the period of March 2018 to April 2019, after meticulous history taking and fulfilling the inclusion and exclusion criteria mentioned in this study proposal.

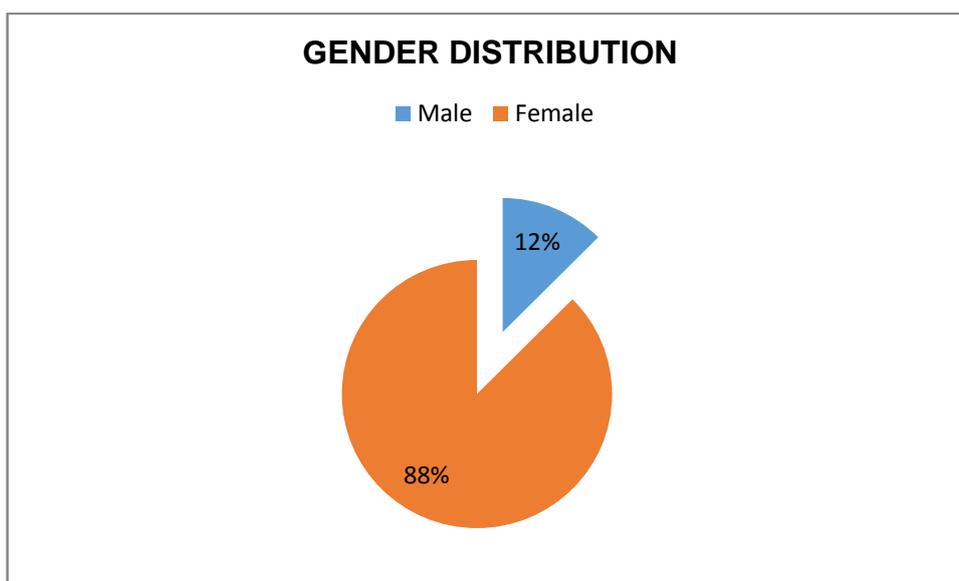
After thorough history taking, we excluded patients undergoing surgeries other than total thyroidectomies like hemithyroidectomy near-total and subtotal thyroidectomies, in the age group of above 18 years.

We excluded patients with preoperative altered calcium levels in order to avoid previous altered parathyroid functions and excluded patients already on calciumsupplementation.

We followed all patients who have met our study criteria with serial estimation of serum calcium levels post operatively by day 1, day 2, day 3, day 5 and day 7 and also recorded history about various presentations of postoperative hypocalcaemia like perioral numbness, carpopedal spasm, trousseau's sign, chovestek's sign, ECG changes of hypocalcaemia and other neurological symptoms.

Table 1: Gender distribution

Gender	Number of patients	Percentage(%)
Male	8	12.5
Female	56	87.5
Total	64	100



Among the total 64 patients, 8 are males constituting to 12.5%, and 56 were females(87.5%)The male and female ratio was 1:7

Table 2: Age-wise Distribution

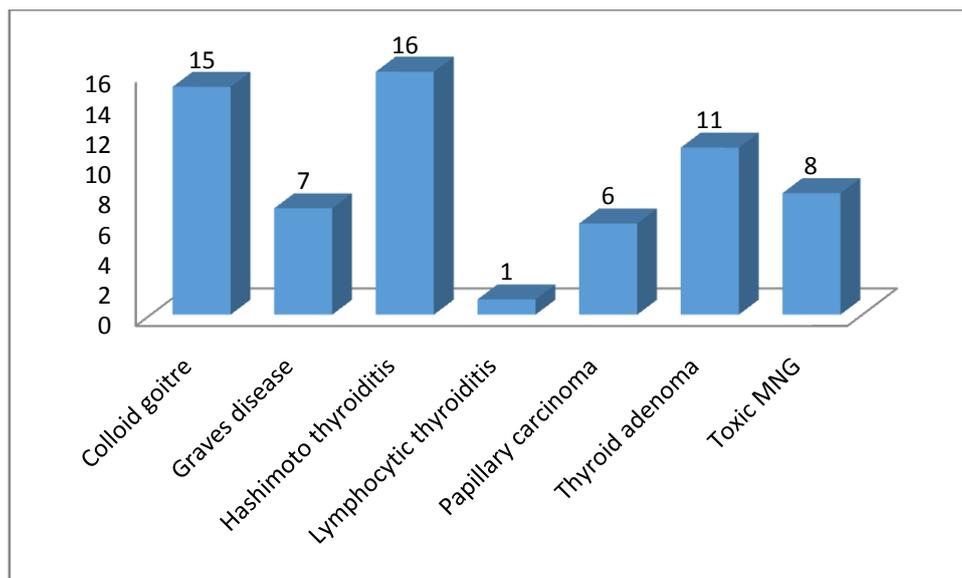
Age	Number of patients
<30yrs	18
30-39yrs	21
>39yrs	25

TABLE 3: Preoperative indication of total thyroidectomy in the study population

Preoperative diagnosis	number of patients
malignancy	8
Toxic features	19
goitre	37
Total	64

TABLE 4: Postoperative HPE based diagnosis of the study population

Colloid goitre	15	23.4
Graves disease	7	10.9
Hashimoto thyroiditis	16	25.0
Lymphocytic thyroiditis	1	1.6
Papillary carcinoma	6	9.4
Thyroid adenoma	11	17.2
Toxic MNG	8	12.5
Total	64	100



POSTOPERATIVE DIAGNOSIS OF STUDY POPULATION

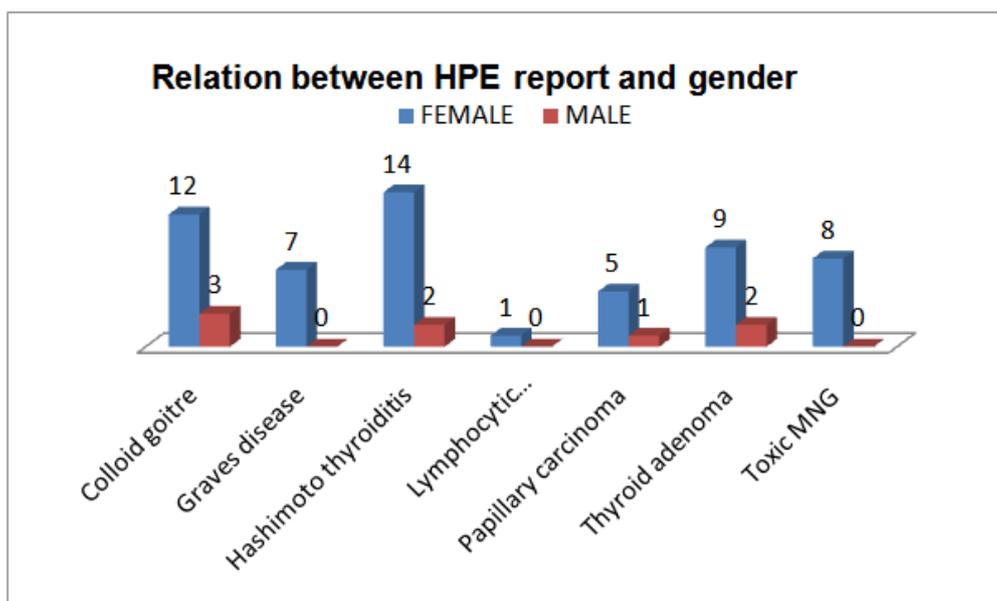


TABLE 5: Post thyroidectomy Hypocalcemia in the study population

In our study we documented 18 patients out of 64 patients of the study population had biochemical hypocalcemia in their post-operative period

Postoperative hypocalcemia	Number of patients	Percentage(%)
Yes	18	28
No	46	72

TABLE 6: Incidence of Post Thyroidectomy Hypocalcaemia in relation to sex in the study population

Sex distribution of the study population	Total number of patients	Number of patients developed hypocalcemia
Male	8	4
Female	56	14

Out of the 11 patients with thyroid adenoma showing histopathology report 1 patient developed postoperative hypocalcemia, 4 out of 15 patients with colloid goitre as histopathology report, 3 out of 8 patients with toxic

multinodular goitre, 2 out of 7 patients with graves disease and 2 out of 16 with Hashimoto's thyroiditis developed postoperative hypocalcemia. no patient with lymphocytic thyroiditis reported hypocalcemia. Out of 6 patients with histopathology report of papillary carcinoma, all the patients developed postoperative hypocalcemia.

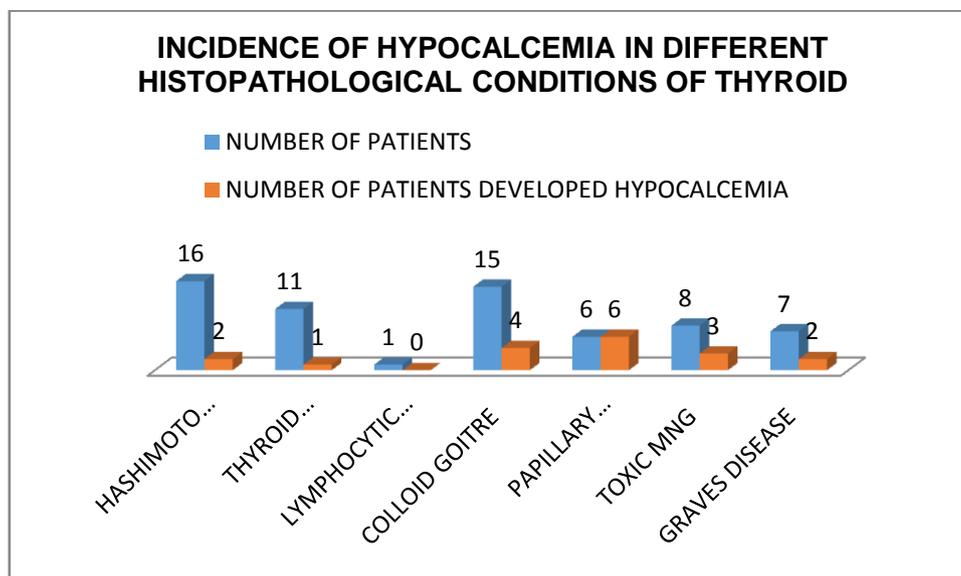


Table no 7: Time of presentation of post thyroidectomy hypocalcaemia in the study population

Day of presentation of hypocalcemia	No of patients	Percentage(%)
Postoperative day 1	13	72.2
Postoperative day 2	4	22.2
Postoperative day 3	1	5.6

Table no 8 :presence of symptoms of hypocalcemia in the post-operative period

Patients presenting with symptoms of hypocalcemia	Total number of patients	Percentage(%)
Yes	10	55.5
No	8	44.5

Table 9: Percentage of patients developed hypocalcemia

Study	Within 6 hours	1 st POD	2 nd POD	3 rd POD
CG Nair (n = 806)	21 (11.05%)	110 (57.88%)	46 (24.22%)	13 (6.84%)
Present study (n = 64)	---	13 (72.2%)	4 (22.2%)	1(5.6%)

Table 10: Comparison of studies

Study	% of hypocalcemia
Nair C.G et al	23.6%
Randall L Baldassarre et al	5.5%
Salem L Noureldine et al	29.9%
Sakouti M	28.7%
Present study	28.1%

V. Conclusion

- 1) Our study suggests that serum calcium level measurement is a significant marker in identifying post operative complication of Hypocalcemia and its secondary effects especially following total thyroidectomy for malignancy and multinodular goitre.
- 2) Hypocalcemia is more commonly seen females and its onset can be delayed upto 3rd post operative day.
- 3) If clinical signs and symptoms of hypocalcemia are not developed within 3 postoperative days and serial calcium monitoring doesnot show any hypocalcemia ,thenthesepatients can be considered safe and can be discharged early.

References

- [1]. Kim YS. Impact of preserving the parathyroid glands on hypocalcemia after total thyroidectomy with neck dissection. *J Korean Surg Soc.* 2012 Aug;83(2):75–82.
- [2]. Warren FM, Andersen PE, Wax MK, Cohen JI. Intraoperative parathyroid hormone levels in thyroid and parathyroid surgery. *The Laryngoscope.* 2002 Oct;112(10):1866–70.
- [3]. Baldassarre RL, Chang DC, Brumund KT, Bouvet M. Predictors of hypocalcemia after thyroidectomy: results from the nationwide inpatient sample. *ISRN Surg.* 2012;2012:838614.
- [4]. Sakouti M, Montazeri V, Golzari S. The incidence of transient and permanent hypocalcemia after total thyroidectomy for thyroid cancer. *Int J Endocrinal Metab* 2010;1;7-12
- [5]. Rocco Bellantone, Celestino Pio Lombardi, Marco Raffaelli, Mauro Boscherini, Pier Francesco Alesina, Carmela De Crea, Emanuela Traini and Pietro Princi. Is routine supplementation therapy (calcium and vitamin D) useful after total thyroidectomy?. *Surgery Italy*, Volume 132, Number 6
- [6]. Prevention of Postoperative Hypocalcemia With Routine Oral Calcium and Vitamin d Supplements in Patients With Differentiated Papillary Thyroid Carcinoma Undergoing Total Thyroidectomy Plus Central Neck Dissection
- [7]. Tartaglia F, Giuliani A, Sgueglia M, Biancari F, Juvonen T, Campana FP. Randomized study on oral administration of calcitriol to prevent symptomatic hypocalcemia after total thyroidectomy. *Am J Surg.* 2005 Sep;190(3):424–9.
- [8]. Gurleyik E, Gurleyik G, Dogan S, Cobek U, Cetin F, Onsal U. Pyramidal Lobe of the Thyroid Gland: Surgical Anatomy in Patients Undergoing Total Thyroidectomy
- [9]. Bliss RD, Gauger PG, Delbridge LW. Surgeon’s approach to the thyroid gland: surgical anatomy and the importance of technique. *World J Surg.* 2000 Aug;24(8):891–7.
- [10]. Gray SW, Skandalakis JE, *Embryology for surgeons* 1st ed Philadelphia: Saunders 1972

XXXXXXX, et. al. “The Study of Hypocalcemia in Total Thyroidectomy Patients - A Prospective Study.” *IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)*, 19(7), 2020, pp. 42-47.