www.jmscr.igmpublication.org
Impact Factor (SJIF): 6.379
Index Copernicus Value: 71.58
ISSN (e)-2347-176x ISSN (p) 2455-0450
crossrefDOI: https://dx.doi.org/10.18535/jmscr/v6i7.142

IGM Publication
Journal Of Medical Science And Clinical Research
An Official Publication Of IGM Publication

Original Article

Study of Incidence of Hypocalcemia in Total Thyroidectomy Patients Using Serum Calcium Level as an Indicator

Authors
Dr Manoj.V.V.[1], Dr Ramlal.R.V.[2*]
[1]Assistant Professor in Surgery, Govt.TD Medical College, Alappuzha, India
Mob 9495211540, Email: *manojvvdr@gmail.com*
[2]Associate Professor in Surgery, Govt.TD Medical College, Alappuzha, India
*Corresponding Author
Dr Ramlal .R.V.
Mob: 9447037787, Email: *ramlal_rv@yahoo.com*

Abstract
Background: *Total thyroidectomy is a commonly performed surgery in our part of the country. Injury to parathyroids or total loss of the parathyroid glands is an important complication of total thyroidectomy which leads to transient or persistent hypocalcemia.*
Aims: *To find out the incidence of post thyroidectomy hypocalcemia in patients undergoing total thyroidectomy and to evaluate the risk of hypocalcemia following total thyroidectomy by early serial postoperative serum calcium level estimation.*
Materials and Methods: *After ethical committee approval and informed consent from patients a crosssectional study was performed in 60 patients undergoing total thyroidectomy within a period of 6 months. Postoperative serial calcium estimation in 12, 24, 72 hours and after 7 days was performed and results were analysed by entering in Microsoft excel.*
Results: *By analysing the data using appropriate software, three groups of patients showing positive trend, negative trend and doubtful trend in serum calcium status were obtained. In patients showing a positive trend in early serum calcium estimation showed no incidence of persistent hypocalcemia where as those with negative trend showed a considerable incidence of hypocalcemia.*
Conclusion: *In our study estimation of early serum calcium levels after total thyroidectomy helped to identify patients with risk of developing persistent hypocalcemia and patients who can be discharged early without much hypocalcemic complications.*
Keywords: *Total thyroidectomy, hypocalcemia, serum calcium estimation, positive trend, negative trend.*

Introduction

Total thyroidectomyis a commonly performed surgery in our part of the country[1,2] as the incidence of thyroid malignancy, controlled toxic goitre, multi-nodular goitre and thyroiditis are high[3,5].

Total thyroidectomy causes a potential risk of injury to parathyroids or total loss of parathyroid glands which leads to transient or permanent *hypocalcemia*[4]. Post operative hypocalcemia is one of the main complications of total thyroidectomy with a reported incidence of around 25% transient hypocalcemia and 1 to 2 % of permanent hypocalcemia[7]. For this reason

patients undergoing total thyroidectomy requires close observation and frequent laboratory investigations for a considerable period of time. Oedema and congestion of the glands following thyroidectomy causes low serum calcium levels between 24 and 72 hours postoperatively[6]. When the oedema and congestion resolves, the parathyroid gland regains its function and serum calcium level gradually comes to normal (transient hypocalcemia).

Inadvertent removal, irrevocable damage or ischemia of all the parathyroid tissue causes permanent hypocalcemia. Ischemic necrosis is the most common cause of permanent hypocalcemia following total thyrodectomy.

The decline in calcium level and onset of symptoms do not usually occur before 24 hours following thyrodectomy.

A reliable criteria which can identify patients who are at risk of developing hypocalcemia may help to find out patients who are suitable for early discharge[8].

Aims and Objectives

Aim of the study is to find the incidence of post thyroidectomy hypocalcemia in patients undergoing total thyroidectomy.

The objective of the present study is to evaluate the risk of hypocalcemia following total thyroidectomy by early serial postoperative serum calcium level estimation. This can be used to develop an algorithm to identify patients who have less chance to develop permanent hypocalcemia and can be discharged after 72 hours of surgery.

Material and Methods

Study design

Cross sectional study

Study Population

Patients admitted in the general surgery wards for total thyroidectomyin Government TD Medical College Hospital, Alappuzha, Kerala.

Sample Settings

60 patients undergoing total thyroidectomyin a period of six months duration from April 2017 to September 2017

Inclusion criteria

1. Patients above 13 years of age and below 70 years
2. All patients admitted in Govt. TDMCH Surgery ward 9 and 10posted for total thyroidectomy.
3. Patients with no previous history of parathyroid disease

Exclusion criteria

1. Patients with abnormal serum total protein and albumin levels
2. Patients with abnormal serum calcium level preoperatively
3. Patients with medical renal disease
4. Patients taking any oral calcium

Method

Each case was individually seen and patient's name, age, sex, occupation and address were noted. Detailed history was elicited and thorough general, local and systemic examination was done. Data collected according to the prepared proforma after obtaining informed consent for total thyroidectomy as well as participation in the study.

All routine preoperative investigations including thyroid function test, FNAC Thyroid, Ultra sound scan of the neck and CT/MRI scan of the neck (in selected patients) along with ENT examinations were done.

Total thyroidectomy was performed in all the selected patients under general anaesthesia. The patients were observed for a period of 7 days Post-operatively and Serum Calcium levels were estimated serially at 12, 24, 72 hrs and after one week post-operatively in the same laboratory for all the patients.

Patients showing serial elevation in the serum calcium levelsat12, 24 and 72 hours post operatively were grouped as those showing "**Positive Trend**". Patients showing serial decrease in the serum calcium levels at 12, 24, 48and 72 hours post operatively were grouped as

those showing "**Negative Trend**". And the patients showing no changes or fluctuating values at 12, 24, 48and 72hours were grouped as showing "**Doubtful Trend**".

All patients were observed for a period of 7 days postoperatively, during which the presence or absence of signs and symptoms suggestive of hypocalcemia in each "trend" were observed and analysed.

Each patient was followed at 2 weeks for wound inspection and serum parathormone assay was done in patients at 2 months who had postoperative hypocalcemia and to find out patients with persistent hypocalcemia.

Statistical Methods

After collecting the data, it will be entered to Microsoft excel. The observations and data collected were coded and analyzed using SPSS Version 19 with the assistance of a statistician.

Ethical Consideration

Study was conducted after getting approval from institutional ethical Committee

Observation and Results

Sixty patients admitted for total thyroidectomy in Govt T.D. Medical College Alappuzha were included in this study from April 2017 to September 2017.

Among the 60 patients subjected to total thyroidectomy 52 patients (86.7%) were females and 8 patients (13.3%) were males.

Out of the 60 patients studied, 32 patients (53.3%) were ≤ 40 years and 28 patients (46.7%) were above 40 years.

In this study 76.7% patients were euthyroid at presentation, 16.7% hypothyroid and 6.7% patients were hyperthyroid.

Out of the 46 euthyroid patients at presentation 37 patients (80.4%) were having normocalcemia, and 5 patients (10.9%) showed transient hypocalcemia and 4 patients (8.7%) developed permanent hypocalcemia postoperatively. Of the 10 patients who were hypothyroid at presentation 9 patients (90%) were normocalcemic and 1 patient (10%) showed transient hypocalcemia. Out of the 4 patients who were having symptoms of hyperthyroidism preoperatively 3 patients (75%) were having normocalcemia and 1 patient developed persistent hypocalcemia.

Among the 60 total thyroidectomy specimens examined histopathologically, 33 cases (55.0%) were proved as nodular colloid goitre, whereas 13 cases (21.7%) were chronic lymphoyticthyroditis and 11 cases (18.3%) were papillary carcinoma thyroid, 3 cases (5%) proved to be follicular neoplasm in which 2 cases were follicular adenoma and 1 case was follicular carcinoma.

Among the 33 cases of nodular colloid goitre, 25 patients (75.8%) had no features of hypocalcemia, whereas 8 patients had features of hypocalcemia in which 4 cases (12.1%) were transient and 4 cases (12.1%) had persistent symptoms or signs of hypocalcemia confirmed by decreased PTH levels at 2 months following total thyroidectomy.

Among the 13 patients diagnosed as lymphocytic thyroiditis, 2 patients (15.4%) had transient hypocalcemia and 1 patient (7.7%) developed persistent hypocalcemia. Among the 11 cases diagnosed as papillary carcinoma none of them developed hypocalcemia. All the 3 patients diagnosed as follicular neoplasm had normocalcemia postoperatively

.

Table Incidence of post thyroidectomy hypocalcemia in patients and selected variables

		Normocalcemia		Transient hypocalcemia		Persistent hypocalcemia	
		Count	Percent	Count	Percent	Count	Percent
Sex	Male	6	75.0	1	12.5	1	12.5
	Female	43	82.7	5	9.6	4	7.7
Age	<=40	25	78.1	3	9.4	4	12.5
	>40	24	85.7	3	10.7	1	3.6
Pre OP Thyroid status	Euthyroid	37	80.4	5	10.9	4	8.7
	Hypothyroid	9	90.0	1	10.0	0	0.0
	Hyperthyroid	3	75.0	0	0.0	1	25.0

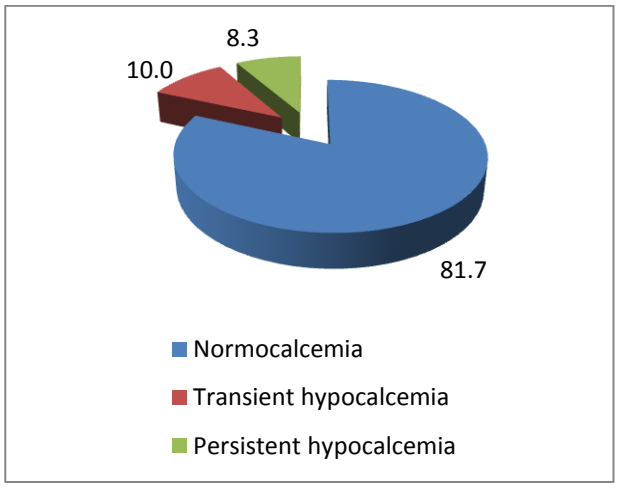
Histopathological diagnosis	Nod colloid goiter	25	75.8	4	12.1	4	12.1
	Thyroiditis	10	76.9	2	15.4	1	7.7
	Papillary CA	11	100.0	0	0.0	0	0.0
	Follicular adenoma	2	100.0	0	0.0	0	0.0
	Follicular CA	1	100.0	0	0.0	0	0.0

Incidence of post thyroidectomy hypocalcemia in patients undergoing total thyroidectomy

Table: Percentage distribution of the sample according to Post Op calcium status

Post Op calcium status	Count	Percent
Normocalcemia	49	81.7
Transient hypocalcemia	6	10.0
Persistent hypocalcemia	5	8.3

Among the sixty patients subjected to total thyroidectomy, 11 patients (18.3%) had features of hypocalcemia in which 6 cases were transient (10%) and 5 patients (8.3%) had persistent symptoms confirmed by a low PTH value at 2 months following total thyroidectomy. 49 patients (81.7%) had no features of hypocalcemia following total thyroidectomy.



Percentage distribution of the sample according the trend

Table: Percentage distribution of the sample according to the trend

Serum calcium status	Count	Percent
Positive trend	40	66.7
Negative trend	13	21.7
Doubtful trend	7	11.7

66.7% of patients showed a positive trend in serum calcium status postoperatively while 21.7% of patients had a negative trend in serum calcium status and 11.7% patients showed a doubtful trend.

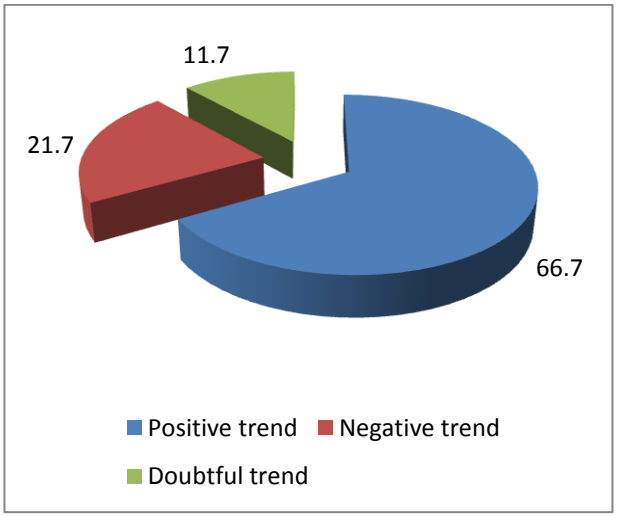


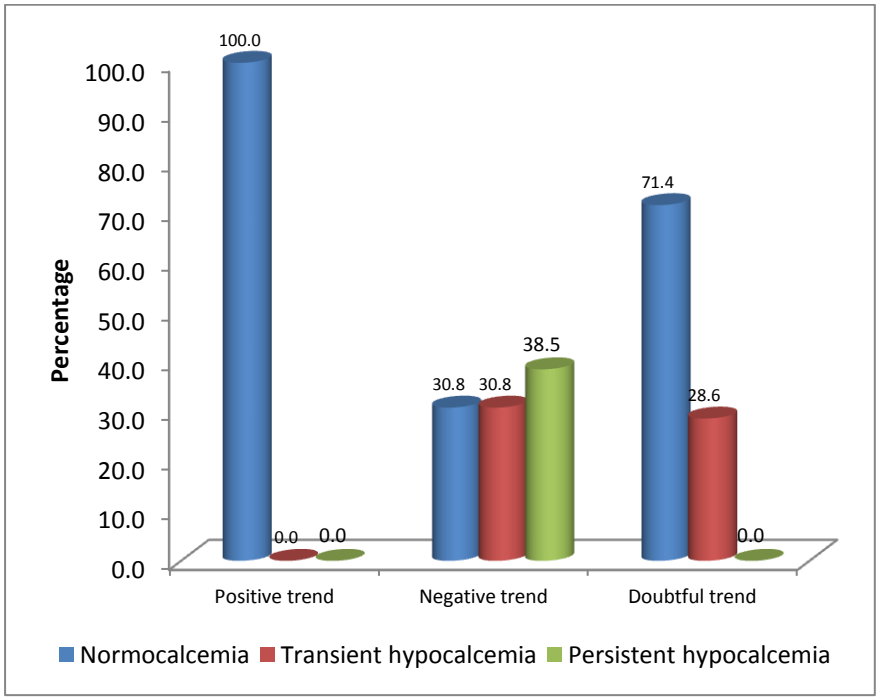
Table : Comparison of calcium status in different trends

Serum calcium status	Normocalcemia		Transient hypocalcemia		Persistent hypocalcemia		χ^2#	p
	Count	Percent	Count	Percent	Count	Percent		
Positive trend	40	100.0	0	0.0	0	0.0	21.55**	0.000
Negative trend	4	30.8	4	30.8	5	38.5		
Doubtful trend	5	71.4	2	28.6	0	0.0		

Kruskalwallis test **: - Significant at 0.01 level

All the patients who showed a positive trend in S. Calcium status were normocalcemic postoperatively. Among the patients who showed a negative trend, 30.8% were having normocalcemia, 30.8% developed transient hypocalcemia and 38.5% developed persistent hypocalcemia. Among the patients who showed a doubtful trend in S. Calcium status 71.4% were having normocalcemia postoperatively and 28.6% developed transient hypocalcemia.

Fig. Comparison of calcium status in different trends



Discussion

This study was conducted in 60 patients in the department of general surgery in Government T.D. Medical College Alappuzha who underwent total thyroidectomy in a period of 6 months from April 2017 to September 2017.

Out of the 60 patients selected for the study 11 patients (18.3%) developed hypocalcemia in which 6 patients (10%) had transient hypocalcemia and 5 patients (8.3%) developed persistent hypocalcemia after surgery.

In our study, none of the patients who showed a positive trend in serum calcium status developed either transient or persistent hypocalcemia. Among the patients who showed a negative trend 38.5% developed persistent hypocalcemia and 30.8% developed transient symptoms. Among the patients who showed a doubtful trend in S. Calcium status 28.6% showed only a transient hypocalcemia and the rest were having normocalcemia. In a similar study conducted byNahas ZS et al[9] in 2006, all patients with a positive slope (50/50) did not develop significant hypocalcemia in contrast to only 59 of 85 patients (69.4%) with a nonpositive slope.

In a similar study conducted by Leahu A et al[10] in 206 Patients, 81 patients showed a positive trend is Serum calcium estimation postoperatively, out of which only 3 patients (3.7%) had hypocalcemia and 78 patients (96.3%) were normocalcemic. Among the 64 patients who had a negative trend in serial serum calcium estimation, 33 patients (51.6%) had hypocalcemia and 31 patients (48.4%) were normocalcemic. Only 4 patients (6.5%) out of 61 patients who showed a doubtful trend developed hypocalcemia.

Out of the 46 patients who were euthyroid, 37 patients (80.4%) were normocalcemic whereas 5 patients(10.9%) developed transient hypocalcemia and 4 patients (8.7%) developed persistent hypocalcemia postoperatively. In a study conducted by MazhaiIqbal et al[11] 16 out of 70 euthyroid patients (22.5%) had transient hypocalcemia and none of the patients had persistent hypocalcemia.

Out of the 10 patients who had features of hypothoridism preoperatively, only 1 patient (10%) developed transient hypocalcemia.Out to the 4 patients who were hyperthyroid 1 patient (25%) developed persistent hypocalcemia. This is comparable to a study by Kim Y. S et al[12] in which 4 out of 21 cases (19%) had hypocalcemia after total thyroidectony. In a study conducted by MazharIqbal et al[11] none of the 4 patients who

were hyperthyroid had hypocalcemia.

In this study of 60 patients, 33 patients were histopathologically proved as beningn nodular colloid goitre. Among this 4 patients (12.1%) had transient hypocalcemia and 4 patients had persistent hypocalcemia. This is comparable to a study done by Leahu A et al in which out of 100 beningn nodular goitre cases who had undergone thyroidectomy, 20 cases (20%) developed hypocalcemia. In another study done by P.E Muller et al[13] out of 324 patients with beningn nodular goitre 92 patients (28.4%) had hypocalcemia. Pisanu A etal [14] studied 32 patients with beningn nodular goitre, out of which 6 patients (18.75%) had hypocalcemia.

Among the 13 patients with the diagnosis at thyroditis in this study, 2 patients (15.4%) had transient hypocalcemia and 1 patient (7.7%) had permanent hypocalcemia. Leahu A etal [10] studied 81 patients with thyroiditis, out of which 16 cases (19.75%) had hypocalcemia. In studies done by Kim Y.S etal[12] and Pisanu A et al[13] the incidence of hypocalcemia in thyroditis patients were 13.1% and 25% respectively.

Among the 11 patients who were diagnosed as papillary CA, none of them had hypocalcemia. The only one case diagnosed as follicular CA was normocalcemic.

Among the 2 cases of follicular adenoma in this study, none of them developed hypocalcemia.

Conclusion

In our study estimation of early serum calcium levels after total thyroidectomy helped to identify patients with risk of developing persistent hypocalcemia and patients who can be discharged early without much hypocalcemic complications.

8.3% of patients developed persistent hypocalcemia and 10% of patients developed transient hypocalcemia postoperatively.

None of the patients who showed a positive trend in serum calcium status developed hypocalcemia postoperatively. Among the patients who showed a negative trend, 38.5% developed persistent hypocalcemia and 30.8% developed transient hypocalcemia. 28.6% of patients with a doubtful trend developed transient hypocalcemia.

From this study it is evident that patients showing positive trend in early serum calcium estimation postoperatively can be discharged early and safely.

References

1. Incidence of Post-Operative Hypocalcaemia after Thyroidectomy: A Case Control Study Viswanathan KV1, Jithunath MR2 , Manjusha Viswanathan3
2. Study of Complications of Thyroidectomy with Special Reference to Recurrent Laryngeal Nerve Injury. Sreejayan M. P.1, Arun S.2 , Rashmi Ravindran3 , Rafeek Ahmed4 1 Additional Professor, Department of General Surgery, Government Medical College, Kozhikode. 2 Assistant Professor, Department of General Surgery, Government Medical College Manjeri, Kerala, India. 3 Assistant Professor, Department of Anaesthesia, Government Medical College, Kozhikode, Kerala, India.
3. Delbridge L, Guinea AI, Reeve TS. Total thyroidectomy for bilateral benign multinodulargoiter: effect of changing practice. *Arch Surg* 1999; 134: 1389-93.
4. Clinical Study of Hypocalcemia following Thyroid Surgery Muthukumaraswamy, P (2008) *Clinical Study of Hypocalcemia following Thyroid Surgery*. Masters thesis, Tirunelveli Medical College, Tirunelveli
5. Bron LP, O'Brien CJ. Total thyroidectomy for clinically benign disease of the thyroid gland. *Br J Surg* 2004; 91: 569-74.
6. American association of clinical endocrinologists and american college of endocrinology disease state clinical review: postoperative hypoparathyroidism - definitions and managementbrendan c. Stack, jr., md, facs, face[1]; david n. Bimston, md, facs, fsso[2]; donald l. Bodenner, md, phd[3]; elise m. Brett, md,

face, cnsc, ecnu[4]; henning dralle, frcs, facs, febs[5]; lisa a. Orloff, md, facs[6]; Johanna pallota, md, facp, face[7]; samuel k. Snyder, md,facs[8]; richardj. Wong, md[9]; g regory w. Randolph, md, facs, face, chair for the aace endocrine surgery scientific committee[10]

7. Hypocalcaemia following total thyroidectomy: An analysis of 806 patientsC Gopalakrishnan Nair[1], Misha J. C. Babu[2], Riju Menon[2], Pradeep Jacob[2]
8. Monitoring of Hypocalcaemia & Hyperglycemia predictive consequences of Thyroidectomy Syed Wasif Gillani1*, Diana Laila Rahmatillah2 , YellyOktavia Sari1, Mirza R Baig3 and Syed Azhar Syed Sulaiman4
9. Nahas ZS, Farrag TY, Lin FR, Belin RM, Tufano R. A safe and cost-effective short hospital stayprotocol to identify patients at low risk for the development of significant hypocalcemia aftertotal thyroidectomy. *Laryngoscope.*2006; 116(6): 906-910.
10. AncuţaLeahu, Vanessa Carroni, G. Biliotti. Calcium level, A predictive factor of hypocalcemia following total thyroide-ctomy. *Jurnalul de Chirurgie, Iaşi,* 2009, Vol. 5, Nr. 2 [ISSN 1584 – 9341].
11. Iqbal M, Subhan A, Baig M.S, Shah M.S. Frequency of hypocalcemia in total thyroidectomy. *Journal of Surgery Pakistan (International)* 15 (2) April - June 2010 p87-91.
12. Kim Y.S. Impact of preserving the parathyroid glands on hypocalcemia after total thyroidectomy with neck dissection. *J Korean Surg Soc*. 2012 august 83(2): 75-82.
13. Muller P.E, Kabbus S, Robens E, Spelsberg F. Indications,Risks, and Acceptance of Total Thyroidectomy for Multinodular benign goiter. *Surg Today*. Nov 2001, vol. 31, issue 11, p 958-62.
14. Pisanu A, Saba A, Coghe F, Ucchedu A et al. Early prediction of hypocalcemia following total thyroidectomy using combined i-PTH and serum calcium measurement. *Langenbecks Arch Surg*. Oct 2012. Springer -Verlag Berlin Heidelberg 2012.