ORIGINAL ARTICLE

Hypocalcaemia in Postoperative Patients Following Total Thyroidectomy

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ABSTRACT

Introduction: Hypocalcaemia is one of the most common and severe complication seen in patients after total thyroidectomy. Reported incidence of hypocalcaemia is 20-30%. Multiple factors are enlisted causing post-operative hypocalcaemia. This study evaluated the occurrence of hypocalcaemia in patients after total thyroidectomy.

Objectives: To identify the frequency of hypocalcaemia and the factors leading to Hypocalcaemia in Patients undergoing total thyroidectomy

Study Design: Descriptive Case Series

Place & Duration: we conduct this study in surgical department of Sir Ganga Ram Hospital, Lahore From March, 2014 to February, 2016

Methodology: All Patients with total thyroidectomy and were above 15years were included in our study There routine investigation and serum calcium level were done pre operatively and postoperatively serum calcium level checked after 6,12,24,and 36hours .

Results: Out of 200 patients, Hypocalcaemia occurred in 102 patients. 62 (60.78%) patient developed hypocalcaemia after first 24 hours while by that time total 86 (84.31%) patient had developed hypocalcaemia.

Conclusion: Frequency of hypocalcaemia after total thyroidectomy was 51%, with most cases found to be hypocalcaemia after first 24 hours emphasizing the significance of Serum Calcium level during that period.

Keywords: Total thyroidectomy, Hypocalcaemia, Parathyroid hormone.

INTRODUCTION

Postoperative hypocalcaemia is one the most common severe complication seen after total thyroidectomy. Reported incidence of hypocalcaemia is 20-30%[2]. For this reason all patients after total thyroidectomy must be monitored closely and there serum calcium level must be observed frequently [1,2]. During total thyroidectomy there are chances of devascularization of para thyroid gland which is the most common reason for post-operative hypocalcemia,other causes are accidental damage or removal of parathyroid gland especially after neck dissection for malignancy.[3,4] nowadays thyroid surgery is consider as daycare surgery but there are some contraindication for thyroid surgery to be daycare surgery which are recurrent laryngeal nerve injury, postoperative bleeding and hypocalcemia[1,4] After total thyroidectomy hypocalcemia is one of the most common and serious complication [5,6,7]. It mostly present within first 24 hours. This study evaluated the frequency of hypocalcaemia after complete thyroidectomy. In this study, we closely observed hypocalcemia in patients with neck dissection (83.3%) and with reference to patients age(66.7%)[6,8] It is noteworthy that a limited amount of research data is available in which all the two factors are studied in our country .Also the number of patients selected for the studies is small(65 patients and 74 patients)[6,8]. Keeping in view of this fact larger sample size was chosen for the study. Study was conducted in 200 patients .

Objectives:-The basic aim of this research was

1. To Identify frequency of hypocalcaemia in the patients undergoing complete thyroidectomy.
2. To observe the factors leading to hypocalcaemia in patients undergoing total thyroidectomy.

Operational Definition:- Hypocalcaemia: All patients having serum calcium level below 8mg/dl(<2mmol.L) were regarded as hypocalcaemia . It was analyzed through laboratory investigation (Serum Calcium) at 6,12,24 and 36hrs intervals. Hypocalcaemia was labeled when detected in any of the sample intervals.

Factors Leading to Hypocalcemia

1. Cervical Lymph Node Dissection:

Cervical lymph node dissection was undertaken when there was extensive involvement of the thyroid tissue due to disease such as Carcinoma Thyroid and Retrosternal extension of Thyroid Gland (Central Lymph node dissections from V1 to V6 levels)

(V1= Submental, V2= Upper Jugular, V3= Middle jugular, V4= Inferior Jugular V5= Posterior Triangle V6=Central)

Age: Hypocalcaemia was observed in patients having age less than 40yrs.

MATERIAL AND METHODS

Study Design: It was a descriptive case Study

Setting: Research was conducted in department of surgery, Sir Ganga Ram Hospital Lahore.

Duration of Study: Duration of Study will be 2 years .

Sample Size: Sample size of 200 patients was calculated with 95% confidence level .and with 6.5% margin of error and expected percentage of hypocalcaemia i.e. 27.6%(least among all) is taken in patients undergoing total thyroidectomy.

Sampling Technique: Patients were selected on Non-probability Purposive sampling base.

SAMPLE SELECTION:

Inclusion criteria:

a. All patients both Male and Female operated for total thyroidectomy with normal Pre-operative Serum Calcium Levels (8mg/dl)
b. All patients underwent cervical lymph node dissection in total thyroidectomy (Carcinoma Thyroid/Retrosternal extension of thyroid).

Exclusion Criteria: Patients Less than 15yrs of Age Patients having inflammatory enlargement of thyroid gland categorized through Autoantibodies assessment.

DATA COLLECTION PROCEDURE

200 cases were included in the research that has undergone total thyroidectomy. All the patients were taken from Surgical Floor of Sir Ganga Ram hospital, Lahore. The basic demographic data was obtained preoperatively. Besides all baseline investigations preoperative assessment of Serum Calcium was performed. Patient underwent serum Calcium assessment at 6hrs, 12hrs,24 hrs, 36hrs after surgery. Hypocalcaemia was labeled if detected in any of sample intervals. Then factors leading to hypocalcaemia as Cervical Lymph node dissection, age less than 40yrs (as per operational definition) were looked for in all the patients who have developed hypocalcaemia. All Surgeries were performed by Consultant in charge of the unit to avoid intraoperative bias. We collected all the data on a proforma .

DATA ANALYSIS PROCEDURE

We used SPSS version 17 to analyze the data. Simple descriptive statistics , giving Mean and Standard deviations of quantities variables (Age, Serum Calcium Levels,) and Frequency and percentage for qualitative variables like Hypocalcaemia, Factors leading to hypocalcaemia like Cervical Lymph node dissection ,Age(less than 40yrs).

RESULTS

Study was performed over200 patients who underwent Total Thyroidectomy at Surgical department of Sir Ganga Ram Hospital, Lahore. Serum Calcium levels were recorded at 6, 12, 24 and 36 Hours post-operatively. following details were observed: age, gender and pre-operative diagnosis of the patient as summarized in table 8-1. Patients age ranged between 20 to 40 years with a mean age of 32 years. 82 patients were males and 118 were females. we focus our study only on clinically pronounced hypocalcaemia, we considered only those patients with a serum calcium level less than 8 mg/dl and who in most cases required calcium replacement.

Table 1: Details of the Study Sample

Parameters	Size
Male	82
Female	118
Cancer	10
Adenoma	18
Retro Sternal goiter	27
Normal Goiter	145

A total of 102 (51%) patients were found to have hypocalcaemia at any time period post-operatively (followed to max 36 Hours), while serum calcium was reported with in normal range in 98 (49%) patients.

Out of those 102 hypocalcaemia patients, 11 (10.78%) developed hypocalcaemia during the first 6 post-operative hours, 13 (12.74%) developed hypocalcaemia during the next 6 hours, 62 (60.78%) developed hypocalcaemia after 1 day (24 hours) and 16 (15.68%) developed hypocalcaemia after 36 hours as shown in table 8-2 and summarized in the following pie chart.

Table 2: Frequency of Hypocalcaemia after Total Thyroidectomy

Hypocalcaemia(n=102)	Frequency	Relative	Cum. Relative
6 Hours Post-Op	11	0.11	0.11
12 Hours Post-Op	13	0.13	0.24
24 Hours Post-Op	62	0.61	0.85
36 Hours Post-Op	16	0.15	1.00

n = 200 Hypocalcaemia in first 36 Hours = 102

The patients who underwent total thyroidectomy included those with Cancer, adenoma, retrosternal, and normal goiters. The results were further analyzed according to the pathology of the patient leading to total thyroidectomy and it was found that the frequency of post-operative hypocalcaemia was higher (70%) in patients with thyroid malignancy, followed by retrosternal goiter (66.67%), owing to the degree of neck dissection and manipulation required in these cases. These findings have been summarized in table 8-3.

Table 3: Frequency of Hypocalcemia according to diagnosis of the patient. (n=200)

Diagnosis	Total	Frequency	% age
Cancer	10	7	70
Adenoma	18	3	16.67
Retrosternal	27	18	66.67
Normal Goiter	145	74	51.03

The data was also analyzed for any association with gender of the patient and it was found that the percentage of the patient who developed post-operative hypocalcaemia was significantly higher in females (63.56%) as compared to males (32.93%); a female: male ratio of 1.93:1 as shown in table 8-4.

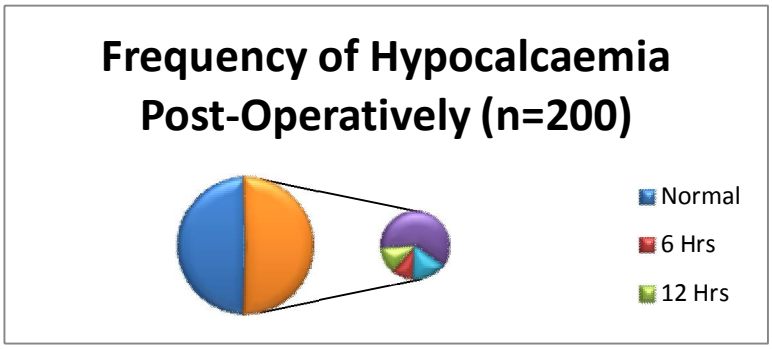

Table 4: Frequency of Post-operative Hypocalcaemia according to Gender

Gender	Total	Normo – calcaemia	Hypocalcaemia	Percentage (%)
Male	82	55	27	32.93
Female	118	43	75	63.56

The patients in the study group were sub grouped according to age, to see the frequency of post-operative hypocalcaemia according to age and what we found was there was an increase incidence of post-operative hypocalcaemia in patients aged 36-40 years (63.92%) followed by very young patients aged 20-25 years (57.89%) as shown in table 8-5.

Table 5: Frequency of Post-Operative Hypocalcaemia according to Age Group

Age (Years)	Total	Frequency	Percentage
20 – 25	19	11	57.89
26 – 30	39	7	17.95
31 – 35	45	22	48.88
36 – 40	97	62	63.92

DISCUSSION

Total thyroidectomy is considered as gold slandered procedure for multinodular disease. Most common complication of this procedure is Hypocalcaemia and patient may present with paresthesia, tingling sensations , cramps, tetany and convulsions.[9,10,11] There are many reason for hypocalcemia after thyroidectomy ,which can be haemodilution by giving intravenous fluid post operatively, by manipulating thyroid gland calcitonin may released, due to surgery stress urinary calcium excretion can be increased and patients who have metabolic bone disease can develop hungry bone syndrome.[12,13,14] However, hypo-parathyroidism through devascularization of parathyroid glands or direct injury and or removal is the most likely cause of postoperative hypocalcaemia.[15,16] This post-operative hypocalcaemia is a serious concern. It often results in increase length of patient stay in hospital and the need for laboratory investigations. When severe enough, it can lead to some serious complications and therefore it may need intravenous calcium administration to improve the clinical symptoms.[17,18,19] Although there is spontaneous recovery most of the time, it can sometime remain permanent incases when it is due to irreversible damage to parathyroid glands. In such cases patient need treatment for all his life and follow up are therefore required to ovoid the subtle potentially lethal complication. [20,21,]

In the present study, postoperative hypocalcaemia was seen in 102 (51%) of 200 patients with total thyroidectomy. These figures are consistent with previous reports of Raffaelli et al. (2010) [21,22] which showed same result of post-operative hypocalcaemia after complete thyroidectomy to be 50% in retrospective study and 82.1% in prospective study. The previous study did not cover serum calcium levels during the first 6 post-operative hours which we found to be 11%. However, in the previous study serum calcium levels were also measured at 12, 24 and 36 hours post-operatively as we did, and we found frequency of hypocalcaemia during these time periods to be 13%, 62% and 16% which is again consistent with previous study where they were found to be 12.5%, 62.5% and 17% respectively.

The slightly increased frequency of hypocalcaemia in the present study compared to the previous study can be explained by the extent of the disease; being a developing country and lack of education, patients reported at late stage when either the tumor has advanced or the size was too large in cases of benign lesions.

The frequency of hypocalcaemia was found to be quite higher in patients ranged 36-40 years, this impression resulted from the fact that the number of patients with malignancy was higher between 36-40 years and was related to increase frequency of post-operative hypocalcaemia. The results were also analyzed according to the pre-operative clinical diagnosis of the patient and it was found that there are more chances to develop hypocalcaemia in patients with thyroid cancer.[23,24]. It is mention in some studies that accidental injury to parathyroid gland and hypocalcaemia is due to aggressive approach in surgery for thyroid cancer.[15] but in malignant cases when lymph nodes are involved neck dissection is mandatory in such situation there are more chances to develop hypocalcaema. The altered anatomy of these patients may have been responsible for parathyroid tissue removal.

There frequency of hypocalcaemia was higher in females than males with a Female: Male Ratio of 1.93:1 which is consistent with the previous study conducted by Qasaimeh GR et al (2011)[24] and Randall L. Baldassarre et al(2012)[25] where they found that the Female: Male ratio of - hypocalcaemia after complete thyroidectomy was 2.1:1. This association between hypocalcaemia after surgery and female gender also mentioned in some studies is because that females are more prone to Vitamin D and calcium deficiency than males.[23,24,25]

CONCLUSION

It was found that most of the patients (62, 60.78%) developed hypocalcaemia after 24 hours. It is also noteworthy that this was the time where most of the patients (86, 84.31%) were hypocalcaemia and only a small proportion (16, 15.68%) developed hypocalcaemia thereafter. It is therefore advisable that in total thyroidectomy patients, a serum calcium level should be carried out after first 24 hours post-operatively in routine as it has the

potential to reveal a greater share of patients who are at risk of developing hypocalcaemia post-operatively. It was also established that there was an increased risk of post-operative hypocalcaemia in younger patients, females and those with thyroid malignancies.

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