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Temporary hypocalcemia following total thyroidectomy at a tertiary care centre- a cohort study

KEYWORDS: total thyroidectomy,temporary hypocalcaemia, papillary carcinoma , thyroiditis

Rajendran .C.V
Additional Professor, Department of Surgery, Government Medical College, Thiruvananthapuram, Kerala, India.

Joby John
Associate Professor , Department of Surgery, Government Medical College, Thiruvananthapuram, Kerala, India.

Unnikrishnan Govindan
Assistant Professor, Department of Surgery, Government Medical College, Thiruvananthapuram, Kerala, India.

ABSTRACT **Background :** Thyroid surgery is one of the commonest surgical procedures, done for simple cosmesis to advanced malignancy all over the world. Hypocalcaemia is one of the many complications associated with thyroidectomy. Our study was conducted to describe the prevalence of temporary post-operative hypocalcemia and to describe its clinical manifestations that occur in patients undergoing thyroidectomy with a standardized approach. **Materials and methods:** We conducted this study in the department of surgery medical college Trivandrum during 2013-2014 after obtaining the institutional ethical clearance before conducting this study. **Inclusion criteria:** cases irrespective of benign or malignant admitted for thyroidectomy above 13 years of age in the department of surgery were included in the study. **Exclusion criteria:** Patients with previous neck surgeries and irradiation, patients with extra thyroidal extension per operatively, patients planned for neck dissection along with thyroidectomy were excluded from the study. **Result :** This study has shown that about 22 percent of the patients have temporary hypocalcemia in our institution. Hypocalcaemic patients were more in 31-40 age group whereas in normocalcaemic group, the predominant group was 41-50. The main pathology in hypocalcaemic group, was papillary carcinoma followed by thyroiditis. **Discussion:** Our study has more hypocalcemia in females, and its occurrence is more common in patients with papillary carcinoma and thyroiditis. Moreover, in this study, anxiety was the most common and consistent symptom associated with biochemical evidence of hypocalcemia

Introduction

Thyroid surgery is one of the commonest surgical procedures done all over the world for a multitude of indications ranging from simple cosmesis to advanced malignancy. Due to the presence of many neurovascular structures within the region of the gland, this surgery can be associated with many complications. There is a wide variety of complications associated with thyroidectomy, of which hypocalcemia is a significant problem. The various mechanisms for post operative hypocalcemia are parathyroid insufficiency resulting from damage to parathyroid glands through direct injury, removal or even devascularisation(1).Apart from from hypoparathyroidism, various other causes for postoperative hypocalcemia have been suggested including hemodilution, hypercalciuria secondary to surgical stress, hungry bone syndrome, which is found in patients with hyperthyroidism, osteodystrophy and autoimmune fibrosis compromising parathyroid vascularization and calcitonin release secondary to thyroid gland manipulation(2). Other mechanisms proposed are post thyroidectomy hypoalbuminemia, functional hypoparathyroidism and calcitonin release during surgery 9 11(3-5).

Incidence of incidental parathyroidectomy in thyroid surgery is reported to vary between 8 to 19% [3, 4]. The incidence of post-operative hypocalcemia ranges from 1.6% to 80 % (6-9). This wide variation in the incidence of temporary hypocalcemia is due to the difference in the type of thyroidectomy done and the techniques adopted (10, 11). Most of the temporary hypoparathyroidism resolves within a period of 12 months (8, 12). These patients with hypocalcemia in the post-operative period present with symptoms ranging from mild paresthesia, painful tetany to life-threatening complications like laryngospasm or arrhythmia (13).

This observational study was conducted to describe the prevalence of temporary post-operative hypocalcemia and to describe its clinical manifestations that occur in patients undergoing thyroidectomy with a standardized approach. Our hypothesis was that application of bipolar diathermy close to the thyroid capsule following the approach to thyroidectomy as described by del bridge et all will result in lower incidence of hypocalcemia.

Materials and methods

We conducted this study in the department of surgery medical college Trivandrum during 2013-2014. This study is a part of a bigger study. We had obtained the institutional ethical clearance before conducting this study and was done as per the standards of the declaration of Helsinki. Patients undergoing suture less thyroidectomy in our institution constituted the study participants. We selected 500 patients undergoing thyroidectomy using a systematic sampling technique. This hospital-based cohort included patients who underwent thyroidectomy in the classical method and using bipolar diathermy. Adequate sample sizes were calculated before conducting the study to power the study. All cases irrespective of benign or malignant admitted for thyroidectomy in all units in the department of surgery were included in the study. It included all eligible adult patients above 13 years of age. Patients with previous neck surgeries and irradiation were excluded from the study. In addition, patients with extra thyroidal extension per operatively were excluded from the study. Patients planned for neck dissection along with thyroidectomy were excluded from the study.

All thyroidectomies were done by the concerned consultants following standard operative techniques described by del bride et all. The hemostasis was achieved either by ligature method or using bipolar or monopolar diathermy depending on the operating surgeon. In all cases, external laryngeal nerves, recurrent laryngeal nerve, recurrent laryngeal nerves and parathyroid were identified and safeguarded.

We collected details about variables like demographic variables like age, sex, type of surgery, post-operative calcium levels, presence or absence of various signs of hypocalcemia and histopathology report. Standard operative definitions for variables were assigned. Post-operative calcium at 24 hours and various clinical signs of hypocalcemia were the outcome variables we studied.

All patients were monitored for clinical signs of post-operative hypocalcemia and serum levels were measured at 24 hours. All data were taken in a pretested case report form and entered into an excel

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based database by junior residents given training in data abstraction procedures. Throughout the procedures, patient confidentiality was maintained by taking care not to include any patient identifiers in the case report form.

All statistical analysis was done in R statistical environment. Descriptive statistics were summarized with mean and standard deviation for normal data and median and interquartile range for non-normal data. Group wise summaries for various variables of relevance were calculated. Comparisons of categorical variables were calculated with chi-square test. Any p value less than 0.05 is considered significant.

Results

As shown in table 1, there were 421(84%) females and 79(16%) females. Patients belonging to the 41-50 age group constituted the largest subgroup (37%). With regard to the histopathology, 212(42%) of the patients had colloid goitre, followed by papillary carcinoma.

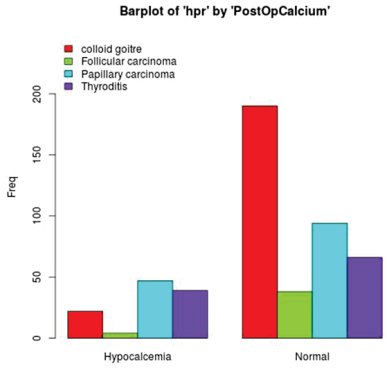
Table 1: Baseline characteristics of the patients

Variable	[ALL] N=500
sex:	
Female	421 (84.2%)
Male	79 (15.8%)
age:	
<20	26 (5.20%)
20 – 30	18 (3.60%)
31 – 40	134 (26.8%)
41 – 50	183 (36.6%)
51 – 60	103 (20.6%)
>60	36 (7.20%)
histopathology:	
colloid goitre	212 (42.4%)
Follicular carcinoma	42 (8.40%)
Papillary carcinoma	141 (28.2%)
Thyroiditis	105 (21.0%)

Out of 500 patients, 112(22.4%) patients had biochemical evidence of hypocalcemia at 24 th hour, which was statistically significant (table 2). In patients with hypocalcemia , female patients were more in number compared to males, but the difference was not statistically significant. Hypocalcemic patients were more in 31-40 age group whereas in normocalcemic group, the predominant group was 41-50. In hypocalcemic group, the main pathology was papillary carcinoma followed by thyroiditis (figure 1). However, in the normocalcemic group; colloid goitre constituted the major subgroup(p value <0.001).

Table 2: Summary descriptives by post operative calcium

	[ALL] N=500	Hypocalcemia N=112	Normal N=388	p value
sex:				0.596
Female	421 (84.2%)	92 (82.1%)	329 (84.8%)	
Male	79 (15.8%)	20 (17.9%)	59 (15.2%)	
age:				0.451
<20	26 (5.20%)	6 (5.36%)	20 (5.15%)	
20 – 30	18 (3.60%)	3 (2.68%)	15 (3.87%)	
31 – 40	134 (26.8%)	39 (34.8%)	95 (24.5%)	
41 – 50	183 (36.6%)	36 (32.1%)	147 (37.9%)	
51 – 60	103 (20.6%)	21 (18.8%)	82 (21.1%)	
>60	36 (7.20%)	7 (6.25%)	29 (7.47%)	
hpr:				<0.001
colloid goitre	212 (42.4%)	22 (19.6%)	190 (49.0%)	
Follicular carcinoma	42 (8.40%)	4 (3.57%)	38 (9.79%)	
Papillary carcinoma	141 (28.2%)	47 (42.0%)	94 (24.2%)	
Thyroditis	105 (21.0%)	39 (34.8%)	66 (17.0%)	



There was a statistically significant association between hypocalcemia and various clinical signs. Anxiety was the most common clinical sign positively associated with hypocalcemia(table 3) and was statistically significant.

Table 3: clinical signs versus hypocalcaemia

Var	[ALL] N=500	Hypocalcemia N=112	Normal N=388	p.overall
TroussiersSign:				<0.001
Absent	460(92.0%)	77 (68.8%)	383(98.7%)	
Present	40 (8.00%)	35 (31.2%)	5 (1.29%)	
MuscleSpasm:				<0.001
Absent	454(90.8%)	69 (61.6%)	385(99.2%)	
Present	46 (9.20%)	43 (38.4%)	3 (0.77%)	
neuromuscularDefect:				0.050
Absent	498(99.6%)	110(98.2%)	388 (100%)	
Present	2 (0.40%)	2 (1.79%)	0 (0.00%)	
anxiety:				<0.001
Absent	422(84.4%)	41 (36.6%)	381(98.2%)	
Present	78 (15.6%)	71 (63.4%)	7 (1.80%)	

Discussion

In this study, we explored the prevalence of hypocalcemia in patients undergoing thyroidectomy for various indications. This study has shown that about 22 percent of the patients have temporary hypocalcemia in our institution.

In addition, our study has more hypocalcemia in females, and its occurrence is more common in patients with papillary carcinoma and thyroiditis. Moreover, in this study, anxiety was the most common and consistent symptom associated with biochemical evidence of hypocalcemia. Our study has shown temporary hypocalcemia in 22 percent of the patients. In literature, there are wide variations in the reported prevalence of hypocalcemia. In the study by Abboud et all, hypocalcemia occurred in 17 percent of patients(8), where as in the study by Baldassarre et all, it was 9 percent(14). Another study showed that 37 percent of patients developed hypocalcemia(15). At the same time, the incidence was 22 percent in a study conducted by Demeester et all(4). The reported incidences are different in different studies, ranging from 0.3 to 66 percent(6-11).This This grossly divergent prevalence of hypocalcemia may be due to the different types of operation being conducted and due to different approaches to thyroidectomy.

In our study, the incidence of hypocalcemia was higher in the subgroup with papillary carcinoma(42%). This is in consistent with the results by Roh et all(44%)(16). In a series by Khafif et all the prevalence in this subgroup was only 14 percent(17). However, hypocalcemia in patients with papillary carcinoma undergoing total thyroidectomy could be as high as 60 percent as in the study by Peria et all(18). These diverse results could be due to the same reasons as mentioned earlier. Difference in the size and extra thyroidal spread

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could be other potential reasons.

The prevalence of post operative temporary hypocalcemia was higher in our study (35%). Our result is in consistent with that in literature (19).

Our study has used a systematic sampling methodology for the selection of the participants in the study. As a result, the results are generalizable compared with other studies where consecutive patients were recruited. One of the drawbacks of the study is the inclusion of only total thyroidectomy in the selection of patients and not including patients with neck dissection in the study. Another issue with our study could be the use of different techniques to tackle the bleeding, including both tie and ligature method to depending only on diathermy. We have not analyzed the difference in hypocalcemia between these groups.

Our study has shown that postoperative hypocalcemia is in the acceptable range in total thyroidectomy done in our institution.

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