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ORIGINAL ARTICLE

Frequency of Post-Surgery Hypocalcaemia in Patients Undergoing Total Thyroidectomy

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ABSTRACT

Objective: To find out frequency of post-thyroidectomy hypocalcaemia among patients undergoing total thyroidectomy.
Study Design: A prospective cohort study.
Place and Duration: The Department of ENT, Shahida Islam Teaching Hosptial, Lodhran from January 2021 to December 2021.
Methodology: A total of 181 patients of both genders aged 12-65 years with multinodular goiter, carcinoma thyroid or recurrent goiter and who were indicated total thyroidectomy were included. At the time of enrollment, demographic characteristics like gender, age and residential status were noted. Pre-surgery thyroid profile and serum calcium were measure from institutional laboratory. Standard procedure protocols were followed for total thyroidectomy. Post-surgery, measurement of serum calcium level was done after 24-hours and serum calcium level<8.0 mg/dL was labeled as hypocalcaemia.
Results: In a total of 181 patients as per inclusion/exclusion criteria who underwent total thyroidectomy, 137 (75.7%) were female. Mean age was 43.6+8.2 years while 113 (62.4%) patients were aged between 40-60 years. Residential status of 98 (54.1%) patients was rural. Pre-surgery diagnosis was malignant in 41 (22.7%) patients while it was benign in 140 (77.3%) patients. Post-thyroidectomy hypocalcaemia was noted in 59 (32.6%) patients. Female gender (p=0.0251) and baseline hypertension (p=0.0287) were found to have significant association with post-thyroidectomy hypocalcaemia.
Clinical Implications: Following patients of hypocalcaemia would certainly give us information about the proportion of transient hypocalcaemia and permanent hypocalcaemia.
Conclusion: Frequency of post-thyroidectomy hypocalcaemia was found to be high (32.6%). Female gender and baseline hypertension were found to have significant association with post-thyroidectomy hypocalcaemia.
Keywords: Calcium, carcinoma thyroid, hypertension, hypocalcaemia, multinodular goiter, thyroidectomy.

INTRODUCTION

Thyroid surgery may lead to major complications like transient or permanent cordal palsy or severe hemorrhage but hypocalcaemia is known to be the commonest complication following thyroid surgery.[1-3] Post-surgery hypocalcaemia can either be transient or permanent. Incidence of transient post-surgery hypocalcaemia ranges between 1-68% while incidence of permanent hypocalcaemia has been reported to be ranging between 0-13%.[4-6] A local study from Karachi reported frequency of post-thyroidectomy hypocalcaemia to be 21.6%.[7] Around 20% of transient hypocalcaemia cases are recorded following total thyroidectomy but in cases undergoing bilateral central neck dissection, its proportion stacks up between 50-60%.[8]

Common symptoms of hypocalcaemia following thyroidectomy include cramps, tingling sensation paresthesia, tetanic contraction, fits, muscular spasms or prolonged QT interval on electrocardiogram and these symptoms can increase the duration of hospitalization among affected patients.[9,10] Most common reason behind post-thyroidectomy hypocalcaemia is the injury to parathyroid gland which could be because of parathyroid devascularization, obstruction of the venous drainage or due to inadvertent excision.[11] Hungry bone syndrome has also been reported to be one of the cases behind post-thyroidectomy hypocalcaemia where rapid transferring of calcium occurs in to the bones after surgery among patients who had thyrotoxicosis and/or intraoperative hemodilution.[9,11] Hypocalcaemia is known to be the commonest post-surgical complication among cases undergoing thyroidectomy while it is known to affect quality of life among affected patients. Moreover, hypocalcaemia among patients after thyroidectomy is documented to result in prolonged hospitalization and unwanted outcomes.[12,13]

Post-thyroidectomy hypocalcaemia seems to occur frequency but scarcity of local data exists estimating burden of post-thyroidectomy hypocalcaemia. It is important to point out potential factors influencing frequency of post-thyroidectomy hypocalcaemia so that measures can be adopted in addressing and managing the potential causes behind thyroidectomy related hypocalcaemia. The objective of present study was to find out frequency of post-thyroidectomy hypocalcaemia among patients undergoing total thyroidectomy.

METHODOLOGY

Study Design, Place and Duration: This prospective cohort study was conducted at The Department of ENT, Shahida Islam Teaching Hosptial, Lodhran from January 2021 to December 2021.
Sample Size: Considering 95% confidence level, 6% margin of error and expected frequency of post-thyroidectomy hypocalcaemia as 21.6%,[7] the sample size was turned out to be 181.
Sample Selection: Inclusion criteria were patients of both genders aged 12-65 years with multinodular goiter, carcinoma thyroid or recurrent goiter and who were indicated total thyroidectomy. Exclusion criteria were concomitant central neck lymph node dissection, history of concomitant parathyroidectomy, hyperparathyroidism, known history of hypocalcaemia or any past history of chemotherapy or radiotherapy related to head or neck.
Data Collection: Approval was acquired from Institutional Ethical Committee. Informed and written consents were obtained from all study participants ensuring privacy of their data. At the time of enrollment, demographic characteristics like gender, age and residential status were noted. Pre-surgery thyroid profile and serum calcium were measure from institutional laboratory. Standard procedure protocols were followed for total thyroidectomy. Post-surgery, measurement of serum calcium level was done after 24-hours and serum calcium level<8.0 mg/dL was labeled as hypocalcaemia.[11] Patients having hypocalcaemia were treated with intravenous calcium. A specific proforma was formed to record all study data.
Data Analysis: For data analysis, "Statistical Package for Social Sciences (SPSS)", version 26.0 was utilized. Categorical data was highlighted as frequencies and percentages. Numeric data was shown as mean±Standard deviation (SD). Patients with post-

thyroidectomy hypocalcaemia were compared for study variables with those who were not having post-thyroidectomy hypocalcaemia applying chi-square test. P-value<0.05 was marked as significant.

RESULTS

In a total of 181 patients as per inclusion/exclusion criteria who underwent total thyroidectomy, 137 (75.7%) were female. Mean age was 43.6+8.2 years while 113 (62.4%) patients were aged between 40-60 years. Residential status of 98 (54.1%) patients was rural. Pre-surgery diagnosis was malignant in 41 (22.7%) patients while it was benign in 140 (77.3%) patients. The mean baseline serum calcium levels were 9.34±1.3 mg/dl. Table-1 is showing baseline characteristics of all study cases.

Table-1: Baseline Characteristics of Patients Undergoing Total Thyroidectomy (n=181)

Characteristics		Number (%)
Gender	Male	44 (24.3%)
	Female	137 (75.7%)
Age (years)	<40	36 (19.9%)
	40-60	113 (62.4%)
	>60	32 (17.7%)
Residential Status	Urban	83 (45.9%)
	Rural	98 (54.1%)
Preoperative Diagnosis	Benign	140 (77.3%)
	Malignant	41 (22.7%)
Hypertension		46 (25.4%)

As serum calcium levels were assessed after 24 hours post-surgery. It was found that mean serum calcium levels were 8.24±0.31 mg/dl while hypocalcaemia was noted in 59 (32.6%) patients as shown in figure-1.

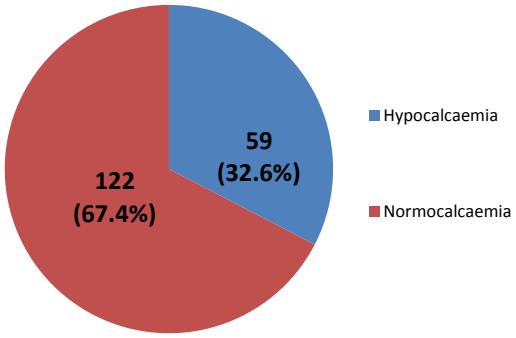

Figure-1: Frequency of Post-Thyroidectomy Hypocalcaemia (n=181)

Gender distribution for presence of post-thyroidectomy hypocalcaemia showed that there were 51 (86.5%) female were having hypocalcaemia versus 86 (70.5%) who had normoglycaemia (p=0.0251). Presence of hypertension was found to have significant association with hypocalcaemia as 21 (35.6%) patients with post-thyroidectomy hypocalcaemia had hypertension in comparison to 25 (20.5%) who had normocalcaemia (p=0.0287). Mean serum calcium levels were significantly low among patients with hypocalcaemia versus those who had normal calcium levels (p<0.0001). No significant association of age, residential status or pre-surgery diagnosis was found with hypocalcaemia. Table-2 is showing complete details about comparison of study variables with respect to post-thyroidectomy hypocalcaemia.

Table-2: Comparison of Study Variables with respect to Post-Thyroidectomy Hypocalcaemia (n=181)

Study Variables		Hypocalaemia		P-value
		Yes (n=59)	No (n=122)	
Gender	Male	8 (13.5%)	36 (29.5%)	0.0251
	Female	51 (86.5%)	86 (70.5%)	
Age (years)	<40	14 (23.7%)	22 (18.0%)	0.6010
	40-60	34 (57.6%)	79 (64.8%)	
	>60	11 (18.6%)	21 (17.2%)	
Residential Status	Urban	29 (49.2%)	54 (44.3%)	0.5360
	Rural	30 (50.8%)	68 (55.7%)	
Preoperative Diagnosis	Benign	45 (76.3%)	95 (77.9%)	0.8097
	Malignant	14 (23.7%)	27 (22.1%)	
Hypertension		21 (35.6%)	25 (20.5%)	0.0287
Serum Calcium in mg/dL (Mean±SD)		7.65±0.31	8.68±0.44	<0.0001

DISCUSSION

Hypocalcaemia is considered to be an important complications following thyroidectomy and it most commonly occurs on the 1st day following thyroidectomy.[11] Hypocalcaemia can be symptomatic or asymptomatic. In the present study, we found that frequency of post-thyroidectomy hypocalcaemia was 32.6%. Literature reports frequency of transient hypoparathyroidism following thyroidectomy to be ranging between 7-49%.[11-16] Del Rio et al from Italy reported that 37.7% patients who underwent thyroidectomy were found to have hypocalcaemia (serum calcium < 8.0 mg/dl) after 24-hours following surgery which is close to what we observed.[11] Qari FA reported frequency of transient hypocalcaemia to be 39% following thyroidectomy.[17] Rajput A et al reported 39% patients to have post-thyroidectomy hypocalcaemia.[18] Warren FM et al reported 41.2% of patients to have hypocalcaemia following thyroidectomy.[19] A local study done by Iqbal M et al found frequency of hypocalcaemia following thyroidectomy to be 21.6%.[7] The exact mechanism behind transient hypocalcaemia following thyroidectomy is not fully understood but is described to multifactorial. The variation in frequency of hypocalcaemia post-thyroidectomy could be attributed to difference in population characteristics, variations in operational definitions, difference in surgical approaches and surgeon's expertise.[20,21]

In this study, we found that female gender and hypertension were found to have significant association with post-thyroidectomy hypocalcaemia. This is in accordance with findings of del Rio P et al from Italy where they found that 88.2% cases of hypocalcaemia were females in comparison to 73.7% with normocalcaemia (p<0.0001).[11] Many studies have shown that female gender has significant association with post-thyroidectomy hypocalcaemia.[14,15,20,21] No exact mechanism behind female predominance with post-thyroidectomy hypocalcaemia has been elaborated in the literature but effects of female sex hormones on parathyroid hormone secretions, genetic variations and anatomic differences could possibly be attributed to this finding.[22] Researchers in the past have reported surgical techniques, parathyroid iatrogenic injury, gender, perioperative serum calcium level drop, diabetes and hypertension to have significant association with post-thyroidectomy hypocalcaemia.[23-25]

Being a single center study with a relatively modest sample size are some of the limitations of this study. We only measured post-thyroidectomy serum calcium levels after 24-hours and as we known that most of the patients who develop hypocalcaemia are reported within first 24-hours while many of these cases return to normal calcium levels within few days so further following these patients about their serum calcium levels would have given us better insights. Following patients of hypocalcaemia would certainly give us information about the proportion of transient hypocalcaemia and permanent hypocalcaemia.

CONCLUSION

Frequency of post-thyroidectomy hypocalcaemia was found to be high (32.6%). Female gender and baseline hypertension were

found to have significant association with post-thyroidectomy hypocalcaemia.

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