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Original Article

Evaluation of Serum parathyroid hormone level measurement in total thyroidectomy patients

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Abstract:

Background: *Postoperative hypoparathyroidism is a common complication after total thyroidectomy. It is necessary to diagnose hypoparathyroidism immediately after total thyroidectomy for minimizing complications.*

Objective: *The objective of this study was to measure and to evaluate the serum parathyroid hormone level in total thyroidectomy patients.*

Methods: *This prospective observational study was carried out in the Department of Clinical Pathology in collaboration with Department of Surgery & Department of Otolaryngology of BSMMU and Department of Otolaryngology of DMCH, Dhaka, during the period of September 2010 to August 2011.*

Results: *Total 65 patients were studied irrespective of age and sex. Decreased serum PTH was found in 9 cases and normal parathyroid hormone was found in 56 cases. Male was 16.0% and female was 84.0%. Females were predominant. The incidence of hypoparathyroidism was 41.5%. Asymptomatic hypoparathyroidism was found in 8 and symptomatic hypoparathyroidism was found in 1 cases. Decreased serum PTH was developed mostly in malignant thyroid diseases. In relation to preoperative PTH values, intraoperative PTH levels were lower from 5.48% to 90.0%, (mean±SD in percentage is 65.3±16.7, p=.001) which is significant in paired t test. The mean difference of intraoperative (20 minutes after total thyroidectomy), parathyroid hormone levels were statistically significant ($p<0.05$) between patient with decreased parathyroid hormone and patient with normal parathyroid hormone in unpaired t-test.*

Conclusion: *Serum parathyroid hormone level significantly decreased 20 minutes after total thyroidectomy. If clinical sign symptoms of hypoparathyroidism are not developed in postoperative period, patient is safe and can be discharged from hospital.*

Keywords: *Serum parathyroid hormone, Total thyroidectomy.*

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Introduction:

Total thyroidectomy is indicated in patients with thyroid malignancy, thyrotoxicosis or toxic multinodular goiter and chronic thyroiditis.[1] Total thyroidectomy is associated with specific complications like haemorrhage/ haematoma, recurrent laryngeal nerve injury and hypoparathyroidism.[2] Post thyroidectomy hypoparathyroidism develops due to parathyroid trauma, devascularization or inadvertent removal of parathyroid gland during thyroid resection.[3] Disease of thyroid gland is a contributor factor of developing post thyroidectomy hypoparathyroidism. Cancer, Hashimoto's thyroiditis, and Grave's disease are high risk disease process that causes more post thyroidectomy hypo-parathyroidism[4]. Females are major victim of thyroid diseases.[5] The incidence of hypoparathyroidism ranges from 1.6% to 50% after total thyroidectomy.[6, 7]

Patients with acute hypoparathyroidism may present with symptoms of hypocalcaemia like numbness of the distal extremities, circumoral paresthesias, and/or carpopedal spasm, seizure, laryngospasm and arrhythmias.[8] Hypoparathyroidism with subsequent hypocalcaemia following thyroid surgery is the major factor that determines length of hospital stay.[9] To minimize complications and early discharge, we should be able to identify the patients of hypoparathyroidism.[10]

Methods:

This prospective study was carried out in the Department of Clinical Pathology in collaboration with Department of Surgery, Department of Otolaryngology of BSMMU and Department of Otolaryngology of DMCH, Dhaka, during the period of September 2010 to August 2011. All patients who came for total thyroidectomy were included in this study irrespective of age and sex. Known patients of hypoparathyroidism and patients of chronic renal failure were excluded from this study. After taking informed consent, a careful history and the details information were recorded by the investigator in a predesigned questionnaire. With all aseptic precaution preoperatively 5ml blood was taken for serum PTH. Then intraoperatively (20 minutes after total thyroidectomy) 5 ml blood was taken for serum PTH. Blood samples were stored in refrigerator at -20°C before measurement of serum PTH. Serum PTH was measured in batches. Serum PTH was measured using chemiluminescent assay by Immulite 2000 XPi in the Department of Microbiology & Immunology, BSMMU. Statistical analysis was done by unpaired Student t-test using window based computer software devised with Statistical Packages for Social Sciences (SPSS-16.0).

Normal range of PTH is 10-65 pg/ml[11]

Results:

This study included 65 patients. The mean (±SD) age of the patients was 39.15±13.18 years showed in Table I

Table I

Age distribution of the study patients (n=65)

Age (in years)	Number of patients	Percentage
≤20	8	12.3
21-30	14	21.5
31-40	13	20.0
41-50	21	32.3
>50	9	13.8
Mean±SD	39.15	±13.18
Range (min-max)	(15	-75)

With range from 15 to 75 years.

The table I shows male was found 15 and female was found 50. The male female ratio was 1:3.3. Females are predominant.

Table II

Sex distribution of the study patients (n=65)

Sex	Number of patients	Percentage Ratio	(Male: Female)
Male	15	22.5	
Female	50	77.5	1:3.3
Total	65	100	

Table III shows number and percentage of hypoparathyroidism patients. Total 9 patients developed hypoparathyroidism. Percentage of hypoparathyroidism patients was 13.85%.

Table III

Distribution of postoperative hypoparathyroid and normal parathyroid hormone patients (n=65)

	Number of patients	Percentage
Hypoparathyroid hormone	9	13.85
Normal parathyroid hormone	56	86.15
Total	65	100

The table IV shows the hypoparathyroidism developed in different diseases of the study patients. Hypoparathyroidism developed 44.45% in papillary carcinoma patients, 33.33% in multinodular goitre patients, 11.11% in follicular carcinoma patients, and 11.11% in medullary carcinoma patients.

Table-IV

Distribution of hypoparathyroidism in different diseases (n=9)

Diseases	Number of patients(n=9)	Percentage
Papillary carcinoma	4	44.45
Multinodular goitre	3	33.33
Follicular carcinoma	1 1	11.1111.11
Medullary carcinoma		
Total	9	100

The table V shows among 9 hypopara-thyroidism patients asymptomatic hypoparathyroidism was found in 8 patients and symptomatic hypoparathyroidism was found in 1 patient.

Table-V

Distribution of symptomatic hypoparathyroidism and asymptomatic hypoparathyroidism patients (n=9)

	No. of patients	Percentage
Asymptomatic hypoparathyroidism	8	89
Symptomatic hypocalcaemia	1	11
Total	9	100

The table VI shows the preoperative and intraoperative PTH level of the patients with hypoparathyroidism. The mean Preoperative PTH was 34.90±17.71pg/ml with range from 15.50 pg/ml to 78.80 pg/ml. The mean intraoperative PTH was 6.20±2.57pg/ml with range from to 3.00 pg/ml to 9.70/ml. In relation to preoperative PTH values, intraoperative PTH levels were lower from 60.45% to 90.0%, (mean±SD in percentage is 79.99±10.57, p=.001) which is significant in paired t test.

Table VI

Mean distribution of preoperative and intraoperative serum PTH level of the patients with hypoparathyroidism (n=9)

Serum PTH level (pg/ml)	Patients (n=9)			
	Mean	±SD	Min	-Max
Preoperative PTH	34.90	±17.71	(15.50	-78.80)
Intraoperative PTH	6.20	±2.57	(3.00	-9.70)
Decreases in percentage	79.99	±10.57	(60.45	-90.00)

t value=5.21, df=8, p value=0.001, P value reached from paired t-test

Discussion:

Postoperative hypoparathyroidism with hypocalcaemia is a common and major problem following thyroid surgery.[2] It often extends the duration of the hospital stay and the need for biochemical tests, when severe; it can lead to serious complications.

In this study, a total 65 cases were evaluated. The mean age of the patients was 39.15 SD±13.18 years ranging from 15 to 75 years. In other study by Qari FA[12] reported that mean age (mean ± SD) was 39.35 ± 13.97 which is consistent with this study.In this study, study, 15 were male and 50 were female. The male female ratio was 1:3.3. Females are major victim of thyroid diseases[5]. So, our observation is consistent with the others. The incidence of hypoparathyroidism was 13.8% after total thyroidectomy[6]. Lewandowicz M, Kuzdak K, Pasieka Z, 2009[7] showed in their study that incidence of hypoparathyroidism was 22.5%). Incidence of hypoparathyroidism of this study was 13.85% which was within the international norms.

Disease of thyroid gland is a contributor factor of developing post thyroidectomy hypocalcaemia. Cancer, Hashimoto's thyroiditis, and Grave's disease are high risk disease process that causes more post thyroidectomy hypoparathyroidism. Higher incidence of hypoparathyroidism with malignant 25% and toxic goitre 11.4% than that in simple nodular goitre 3.6%, the high incidence of hypoparathyroidism in thyrotoxicosis was also noted by Wingert DJ et al[4]. In this study, hypoparathyroidism developed in 44.45% papillary carcinoma patients, 33.33% in multinodular goitre patients, 11.11% in follicular carcinoma patients, and 11.11% in medullary carcinoma patients. Here, malignancy is also the first contributor factor of developing hypocalcaemia. So, it is consistent with the other study.

In this study, total hypoparathyroidism patients were 9. The symptoms of hypoparathyroidism make patients meet unwanted situations. However only 1 hypoparathyroidism patients developed symptoms of hypocalcaemia in our study. Asymptomatic hypoparathyroidism was found in 89% patients and symptomatic hypoparathyroidism was in 11% patients. A study with 100 study populations, the percentage of symptomatic hypoparathyroidism was 9%[13] and in the study of Gac EP et al[14] with 448 study population, the symptomatic hypoparathyroidism was 15%. So, the result of this study is within the international norms.

Parathyroid gland insufficiency is a common complication after thyroid surgery[15]. The concept of monitoring parathyroid hormone levels intraoperatively was first described by Nussbaum in 1988[16]. Recently, it has been suggested that quick PTH assay may play a role in establishing the diagnosis of symptomatic hypoparathyroidism after total thyroidectomy[17,18,19] and they showed that PTH decline >62.5%. In our study, the preoperative and intraoperative PTH level of the patients with hypoparathyroidism. The mean preoperative PTH was 34.90±17.71 pg/ml with range from 15.5 to 78.80 pg/ml. The mean intraoperative (20 minutes after total thyroidectomy) PTH was 6.20±2.57 pg/ml with range from to 3.00 pg/ml to 9.70pg/ml. In relation to preoperative PTH values, intraoperative PTH levels were lower from 60.45% to 90.0%, (mean±SD in percentage and mean was 79.99±10.57, p=.001) which is significant in paired t test. In study population, intraoperative PTH levels were lower from 60.45% to 90.0 %, (mean±SD in percentage is 51.86±19.34, p=.001) which is consistent with other study.

Conclusion:

Serum parathyroid hormone level significantly decreased after total thyroidectomy.

Hypoparathyroidism developed more in female and in malignant thyroid diseases. If clinical sign symptoms of hypocalcaemia due to hypoparathyroidism are not developed in postoperative period, patient is considered safe.

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