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Early Prediction of Post Total Thyroidectomy Hypocalcaemia: Prospective Study

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Abstract

Background: Post-operative hypocalcemia is the commonest complication after thyroidectomy. Post-operative hypocalcemia is a major morbidity in patients that undergone thyroidectomy.

Aim of Study: We aimed in this study to study patients with increased risk to develop post thyroidectomy hypocalcaemia and to study early prediction, diagnosis and treatment.

Patients and Methods: Type of study was prospective study, study setting was conducted in Ain Shams University Hospitals and Kafr El-Sheikh General Hospital, study period was 18 month from January 2019 to June 2020. Obtaining approval from The Institutional Research Board and written informed consents from the participants.

Results: Most of the current study participants were females (78%) with mean age of (41.1±12.11) years. Twenty percent of patients had DM (20%), (14%) were hypertensive, (8%) had IHD and (10%) had other medical condition. Swelling was the most common clinical presentation (80%). Muti-nodular goiter was the most common US finding (76%), followed be solitary solid mass (20%) and L. Ns enlargement (10%) among our study patients. Follicular lesion was the most common FNA finding (60%), followed by colloid goiter (20%) and Hashimoto's thyroiditis (8%) among our study patients. Average Ca before was 9mg/dL, and declined to be 8. 4mg/dL 24h post-operative and 8.5mg/dL 48h post-operative with statistically significant differences (p<0.001). Hypocalcemia was founded in 10 (20%) of our patients after total thyroidectomy it was manifested in 6 (12%) patients and asymptomatic in 4 (8%) patients.

Conclusion: Serum calcium concentrations have been the basis of identification of post-operative hypocalcemia however this has been replaced by PTH levels being more sensitive and specific to the early prediction of transient as well as permanent hypocalcemia.

Key Words: *Early prediction – Post total thyroidectomy hypocalcaemia.*

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Introduction

POST-OPERATIVE hypocalcemia is the commonest complication after thyroidectomy. Post-operative hypocalcemia is a major morbidity in patients that undergone thyroidectomy **[1]**.

Hypocalcaemia is defined as a serum calcium level below 8.5mg/dl. Serum calcium measured both in mmol/l and mg/dl with normal range varying from 2.10 to 2.6mmol/l and 8.5 to 10.5mg/dl **[2]**.

Post-surgery hypocalcemia is caused by an inadequate secretion of Parathormone (PTH) by the parathyroid glands. Transitory hypoparathyroidism is the most frequent complication following total thyroidectomy and occurs in 16.5 to 71% of patients while permanent hypoparathyroidism is less frequent following total thyroidectomy with an incidence of 1.5 to 1.8% **[3]**.

Post-thyroidectomy hypocalcemia may be symptomatic or asymptomatic (biochemical). Manifestations of hypocalcemia include perioral numbness, parasthesia of hands/feet, Chvostek's sign, Trousseau sign, cramps, carpopedal spasms and tetany **[4]**.

Patients who underwent total thyroidectomy were found to be more likely to develop hypocalcaemia than those patients who had a completion thyroidectomy. Thyroidectomy of toxic goiters tend to be more bloody, requiring more diathermy to be used for hemostasis which may compromise the vasculature of the parathyroid glands leading to a higher risk of hypocalcemia post-operatively **[5]**.

Several laboratory tests have also been used to predict those who will develop hypocalcemia after thyroidectomy. The use of intact parathyroid hormone level (i-PTH) has been studied thoroughly, and in one study was found to be an early predictor of hypocalcemia **[6]**.

Many researchers have studied the best way to diagnose hypocalcemia as early as possible post-thyroidectomy. Currently, the most common and effective method is measuring the PTH level immediately after the surgery through the fast intra operative PTH essay. The principle behind the fast PTH assay is the half-life of PTH is 2 to 5 minutes; thus, the level of PTH 1 hour post-surgery, for example, provides a very precise indication of parathyroid function **[7]**.

Intravenous calcium gluconate should be given 10-20ml of 10% solution slowly until the symptoms disappear, then 50ml of 10% calcium gluconate can be added to 500ml of 5% dextrose solution and administered by intravenous drip at a rate of 1ml/kg/h **[8]**.

Routine oral calcium and vitamin D supplements have been proposed to prevent the development of symptomatic hypocalcemia and to increase the likelihood of early hospital discharge after bilateral surgical treatment of the thyroid gland **[9]**.

Aim of the work:

Is to study patients with increased risk to develop post thyroidectomy hypocalcemia and to study early prediction, diagnosis and treatment.

Patients and Methods

A prospective study was conducted on a (50) patients with thyroid disease under treatment with total thyroidectomy in Ain Shams University Hospitals and Kafr El-Sheikh General Hospital. The duration of the study ranged from 6-12 months from January 2019 to June 2020.

Inclusion criteria:

All patients with thyroid disease under treatment with total thyroidectomy.

Exclusion criteria:

Patient refusal or inability to comprehence with the study, patient with osteopenia, osteoprosis and any metabolic bone disease, history of hepatic, renal or cardiac failure and organ transplantation, patient with previous history of parathyroid disease.

- *Sampling method:* Randomized.
- *Sample size:* 50 patients.
- *Ethical considerations:* Obtaining approval from The Institutional Research Board and written informed consents from the participants.
- *Study tools:*

The patients included in this study will be subjected to pre-operative assessment including:

1- *For diagnosis:* Complete history taking: Stressing on the following points:

- Symptoms of hyperthyroidism, compression symptoms (dysphagia, hoarseness of voice and dyspnea).
- Family history of thyroid neoplasm.
- Duration of thyroid disease.

Clinical examination (general and local): With special emphasis on: Neck examination for (scar of previous surgery, thyroid gland, position of trachea, lymph nodes and swellings in the neck).

Imaging: Neck ultrasound, thyroid scanning when indicated, SESTAMIBI scan for parathyroid glands when indicated.

2- *For pre-operative assessment:* CBC, PT, INR, Serum creatinine, SGPT, FBS, ECG, echocardiography, serum calcium, albumin, free T3, T4, TSH and fNAC will indicated.

Post-operative work up:

The level of PTH 2 hour post-surgery as it is the earliest predictor for post-operative hypocalcaemia, serum calcium, albumin, the specimen will be examined histopathological to detect any thyroid cancer.

Study procedures:

According to the case we will perform (total thyroidectomy, subtotal thyroidectomy or lobectomy).

Operative:

A- Extent of surgery.
B- Ligation of inferior thyroid artery.

Post-operative:

Technique of thyroidectomy:

1- Patient preparation (general considerations, education and informed consent, diet restriction and fluid supplement, skin preparation).
2- Patient positioning.
3- Skin preparation and draping.
4- Skin Incision and dissection.

5- Midline incision.
6- Dissection of the pyramidal lobe.
7- Dissection of lateral aspect of the thyroid gland.
8- Dissection of the superior pole.
9- Saving the superior parathyroid gland.
10- Saving the inferior parathyroid gland.
11- Preserving the recurrent laryngeal nerve.
12- Dissection of the anterolateral aspect of the trachea.
13- Central neck dissection.
14- Contralateral lobectomy of the thyroid gland.
15- Autotransplantation of the parathyroid gland.
16- Closure and dressing.
17- Post-operative care.

Statistical analysis:

The patient's data will be collected, tabulate processed and statistically analyzed. The statistical analysis will be conducted using the statistical package for the social sciences (statistical software, version 8). Charts were be used to illustrate data and relations where appropriate and $p<0.05$ was accepted as indicating statistical significance.

Results

Most of the current study participants were females (78%) with mean age of (41.1±12.11) years. Twenty percent of patients had DM (20%), (14%) had HTN, (8%) had IHD and (10%) had other medical conditions. Swelling was the most common clinical presentation (80%) as shown in (Table 1).

Table (1): Baseline characteristics of the population study.

Variable	(n=50)
Age (years):	
• Mean ± SD	41.1±12.11
• Range	(25-70)
Gender:	
• Males (n, %)	11 (22%)
• Females (n, %)	39 (78%)
Swelling duration (months):	
• Mean ± SD	5±1.4
• Range	(2-8)
Comorbidities:	
• Diabetes mellitus	10 (20%)
• Hypertension	7 (14%)
• Ischemic heart diseases	4 (8%)
• Others (CLD, COPD, MR)	5 (10%)
Clinical presentations:	
• Swelling	40 (80%)
• Toxic symptoms	12 (24%)
• Pain	5 (10%)
• Pressure symptoms	4 (8%)

Table (2) showed that average ca before was 9mg/dL, and declined to be 8.4mg/dL 24h post-operative and 8.5mg/dL 48h post-operative with statistical significant differences ($p<0.001$).

Table (2): Changes in serum Ca before and after the operation.

Ca level (n=50)	Before operation	24h post-operative	48h post-operative
Mean ± SD (mg/dL) Range (mg/dL) *p*-value	9±1.2 (7.8-11.1)	8.4±1.5 (6.7-10.2) <0.001 * 1	8.5±1.2 (7.1-10.3) 0.001 *1

1: Paired *t*-test. *: Statistically significant as $p<0.05$.

Table (3) shows that average PTH before was 40.5pg/ml, and declined to be 25.3pg/ml 2h post-operative with statistical significant difference ($p<0.001$).

Table (3): Changes in serum PTH before and after the operation.

PTH level (n=50)	Before operation	2h post-operative	*p*-value
Mean ± SD (mg/dL)	40.5±23.4	25.3±10.2	0.001 *1
Range (mg/dL)	(15-68.2)	(4-63)	

1: Paired *t*-test. *: Statistically significant as $p<0.05$.

Table (4) showed there was no statistically significant difference between normocalcaemic and hypocalcaemic groups as regards demographic findings, clinical presentation, pre-operative ultrasonographic finding or number of identified parathyroid glands.

Table (4): Comparison between patients with and without post-operative hypocalcaemia.

Variable	Normocalcaemia (N=40)	Hypocalcaemia (N=10)	*p*-value
Age (years):			
• Mean ± SD	39.8±9.4	401±11	0.132[1]
Gender:			
• Males (n, %)	8 (20%)	3 (30%)	0.409[2]
• Females (n, %)	32 (80%)	7 (70%)	
Clinical presentation:			
• Swelling	31 (77.5%)	9 (9%)	0.224[2]
• Toxic symptoms	12 (30%)	0 (0%)	
• Pain	3 (7.5%)	2 (2%)	
• Pressure symptoms	5 (80%)	2 (2%)	
Ultrasound findings:			
• Multi nodular goiter	30 (75%)	8 (8%)	0.08[3]
• Solitary solid mass	8 (20%)	2 (2%)	0.07[2]
• Lymph node enlargement	4 (10%)	1 (1%)	0.253[2]
• Solitary cystic mass	3 (7.5%)	0 (0%)	0.226[2]
Number of identified parathyroid glands:			
• Identification of 4 parathyroid glands	35 (87.5%)	9 (9%)	0.212[2]
• Identification of 3 parathyroid	5 (12.5%)	1 (1%)	0.212[2]

1: Student *t*-test. 3: Chi square test.
2: Fisher exact test. *: Statistically significant as $p<0.05$.

Tables (5) showed there was statistically significant difference between normocalcaemic and hypocalcaemic groups as regards the mean serum calcium levels 24, 28 hours post-operatively.

Table (5): Comparison of serum calcium in patients with and without hypocalcaemia.

Variable	Normocalcaemia (N=40)	Hypocalcaemia (N=10)	*p*-value
Pre-operative (mg/dL):			
• Mean ± SD	9±1.	9±1.	0.983[1]
• Range	(7.8-11.1)	(7.7-11)	
24 hours post-operative(mg/dL):			
• Mean ± SD	9±1.5	7.3±0.	<0.001 * 1
• Range	(8-10.2)	(6.7-7.7)	
24 hours post-operative(mg/dL):			
• Mean ± SD	9.1±1.	7.3± 0.	<0.001 * 1
• Range	(8.2-10.3)	(7-8)	

1: Student *t*-test. *: Statistically significant as $p<0.05$.

Tables (6) showed there was statistically significant difference between normocalcaemic and hypocalcaemic groups as regards the mean parathyroid hormone level 2 hours post-operatively.

Table (6): Comparison of PTH in patients with and without hypocalcaemia.

Variable	Normocalcaemia (N=40)	Hypocalcaemia (N=10)	*p*-value
Pre-operative (pg/dL):			
• Mean ± SD	40.5±23.	39.8±22.	0.625[1]
• Range	(15-68.2)	(14-67)	
2 hours post-operative(pg/dL):			
• Mean ± SD	39.1±21.	12.5±10.	<0.001 * 1
• Range	(14-63)	(4-24)	

1: Student *t*-test. *: Statistically significant as $p<0.05$.

Tables (7) show there was statistically significant difference between normocalcaemic and hypocalcaemic groups as regards the relative decline in calcium 24, 28 hours post-operatively and as regard the relative decline in PTH level 2 hours post-operatively.

Table (7): Relative decline of serum calcium and parathyroid hormone in patients with and without hypocalcaemia.

Variable	Normocalcaemia (N=40)	Hypocalcaemia (N=10)	*p*-value
Relative decline in calcium:			
• 24 hours	1.5%	15.7%	<0.001 * 1
• 48 hours	0.73%	12.4%	
Relative decline in PTH:			
• 2 hours	2.8%	63.2%	<0.001 * 1

1: Fisher exact test. *: Statistically significant as $p<0.05$.

Table (8) shows that PTH % of reduction was considered better negative than positive predictor for hypocalcemia with higher specificity.

Table (8): Validity of PTH in prediction of

	Cut-off	Sn	Sp	PPV	NPV
PTH	62%	76%	92%	84.3%	95.2%

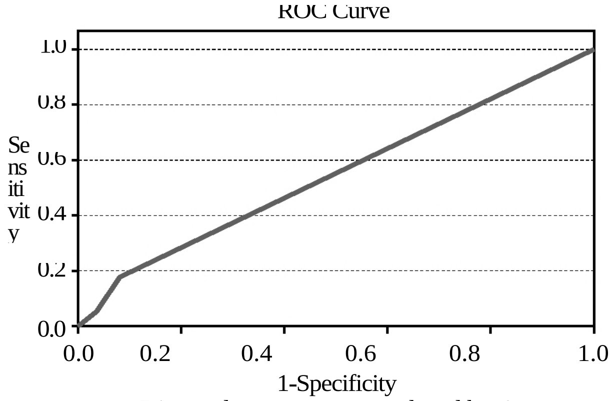
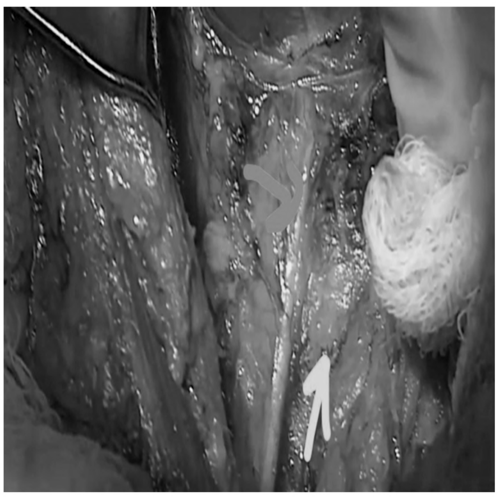


Fig. (1): ROC curve of PTH reduction in hypocalcemia.

Fig. (2): Identification and preservation of parathyroid gland.

Fig. (3): The orange arrow show recurrent laryngeal nerve and green arrow show parathyroid gland.



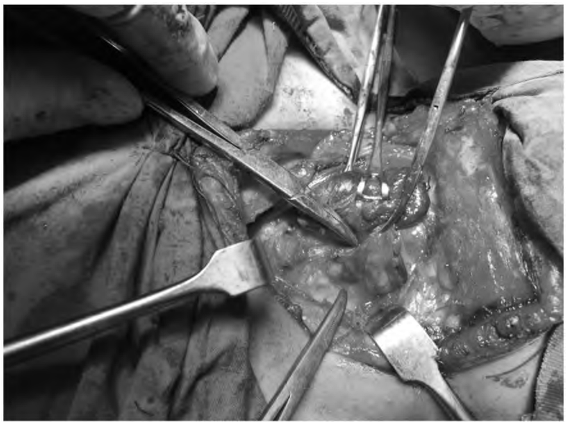


Fig. (4): Identification and preservation of parathyroid gland between true and false capsule of thyroid gland.

Discussion

Hypoparathyroidism is another feared complication of thyroid surgery. The parathyroid glands produce parathyroid hormone (PTH), which is intimately involved in the regulation of serum calcium. PTH increases serum calcium levels by causing bone resorption, increasing renal absorption of calcium. PTH also increases renal excretion of phosphorus. Therefore, low PTH levels result in high serum phosphorus levels **[10]**.

Inadequate production of PTH leads to hypocalcemia. Hypoparathyroidism, and the resulting hypocalcemia, may be permanent or transient. The rate of permanent hypoparathyroidism is 0.4-13.8%. The condition may be due to direct trauma to the parathyroid glands, devascularization of the glands, or removal of the glands during surgery **[11]**.

The rate of temporary hypocalcemia is reportedly 2-53%. The cause of transient hypocalcemia after surgery is not clearly understood. It may be attributable to temporary hypoparathyroidism caused by reversible ischemia to the parathyroid glands, hypothermia to the glands, or release of endothelin-1. Endothelin-1 is an acute-phase reactant known to suppress PTH production, and levels have been elevated in patients with transient hypoparathyroidism **[12]**.

Other hypotheses have been put forth to account for transient hypocalcemia not caused by hypoparathyroidism. These include calcitonin release and hungry-bone syndrome. Calcitonin is produced by the thyroid and inhibits bone breakdown while stimulating renal excretion of calcium. Its effects on calcium metabolism oppose those of PTH **[12]**.

An important disadvantage of total thyroidectomy is the high incidence of hypocalcemia due to parathyroid gland devascularization. A low complication rate is the advantage of subtotal thyroidectomy, but secondary thyroidectomy may be necessary because of recurrence after subtotal thyroidectomy and is associated with increased morbidity and related to recurrent laryngeal nerve injury and hypoparathyroidism resulting from parathyroid gland devascularization **[13]**.

By developing a thorough understanding of the anatomy and of the ways to prevent each complication, the surgeon can minimize each patient's risk. The surgeon's experience is a significant contributor to various complications during thyroid surgery. In general, the essential objectives for thyroidectomy are sparing the parathyroid glands, avoidance of injury to Recurrent Laryngeal Nerves (RLN), an accurate hemostasis and an excellent cosmesis **[14]**.

An effective method of evaluation of parathyroid function is to follow ionized calcium (or total calcium and albumin) levels in the perioperative period. If iatrogenic hypoparathyroidism is a concern, close follow-up care is warranted until calcium levels demonstrate that parathyroid function is intact **[15]**.

Alternatively, a normal post-operative PTH level can accurately predict normocalcemia after thyroid surgery. Identification of at-risk patients with low PTH levels will facilitate prompt calcium replacement therapy and safe early discharge from hospital. The key to parathyroid preservation is identifying the parathyroids and preserving their blood supply by ligating all vessels distal to them. Ligate the vessels as close to the thyroid gland as possible. Recognition of the parathyroid glands, which appear in various shapes and which have a caramel-like color, is critical. When they lose their blood supply, they often darken in appearance **[16]**.

Patients who have asymptomatic hypocalcemia in the early post-operative period should not be treated with supplemental calcium. The hypocalcemia state may stimulate the stunned parathyroid glands to produce PTH while in symptomatic patients, 1-2 months, an attempt to wean the patient off oral calcium may be made to reveal if the hypoparathyroidism is temporary. Dependence on calcium supplementation for longer than 6 months usually indicates permanent hypoparathyroidism **[17]**.

The main objective of this study was to study patients with increased risk to develop post thyroidectomy hypocalcemia and to study early prediction, diagnosis and treatment.

A prospective study was conducted on a (50) patients with thyroid disease under treatment with total thyroidectomy in Ain Shams University Hospitals and Kafr El-Sheikh General Hospital. The duration of the study ranged from 6-12 months.

The main results of the study were as following:

Most of the current study participants were females (78%) with mean age of (41.1±12.11) years. Twenty percent of patients had DM (20%), (14%) were hypertensive, (8%) had IHD and (10%) had other medical condition. Swelling was the most common clinical presentation (80%).

Our results are in agreement with study of El-Nemr et al., [18] as they reported that the mean age of 50 patients is 35.2±8.23, of them, 38 (76.0%) were females and 12 (24%) were males.

Similarly, Rosa et al., [19] found that of the one hundred and forty patients whose records were analyzed, the majority were female and between 40 and 59 years of age.

Total thyroidectomy is the primary surgical modality in the treatment of thyroid malignancies and also frequently used for treatment of benign thyroid disorders [20].

The present study showed that muti-nodular goiter was the most common US finding (76%), followed be solitary solid mass (20%) and L. Ns enlargement (10%) among our study patients. Follicular lesion was the most common FNA finding (60%), followed by colloid goiter (20%) and Hashimoto's thyroiditis (8%) among our study patients.

Our results are supported by study of Arnepalli et al., [21] as they reported that of 37 patients 25 were diagnosed with multinodular goiter (68%), 3 with Hashimoto's thyroiditis (8%), 7 with papillary carcinoma (19%) and 2 with follicular adenoma (5%). Of 6 male patients 4 (67%) patients had multinodular goiter (mng), 1 patient papillary carcinoma of thyroid and 1 patient had invasive follicular carcinoma. Of 43 patients, 37 (86%) patients were females.

Thyroidectomy is one of the most frequent operations performed in iodine-deficient regions. The most common complications of thyroidectomy include vocal cord palsy and hypocalcemia. Hypocalcemia is frequently encountered after thyroidectomy and it continues to challenge even the experienced surgeon. The incidence of post-operative hypocalcemia is reported to vary from 1. 6% to above 50% [22].

The current study showed that average Ca before was 9mg/dL, and declined to be 8.4mg/dL 24h post-operative and 8.5mg/dL 48h post-operative with statistically significant differences (p <0.001). Hypocalcemia was founded in 10 (20%) of our patients after total thyroidectomy it was manifested in 6 (12%) patients and asymptomatic in 4 (8%) patients.

Our results are in line with study of Pradeep et al., [23] as they found that 30.34% (n=44) developed Clinically Significant Hypocalcemia (CSH) after 24 hours of surgery.

In the study of El-Nemr et al., [18], the overall incidence of hypocalcemia was 18% which agrees with the international incidence published worldwide by Asari et al., [24]. Not all those patients developed symptoms and signs of hypocalcemia even after one month of follow-up. Only 6% of all patients developed clinical hypocalcemia. In their opinion, the percentage of symptomatizing patients is a more reliable parameter as this is the group of patients who would require closer follow-up. This proves the theory that post-operative serum calcium alone is not quite reliable to detect thyroid surgery patients at risk of developing clinical hypocalcemia. Incidence of hypocalcemia was significantly related to the extent of operation done. There was a high incidence of transient hypocalcemia after total thyroidectomy (16%), while incidence of permanent hypocalcemia after total thyroidectomy was 2%.

According to, Trottier et al., [25] reported that most of the higher rates of hypocalcemia have been observed in patients who had total thyroidectomies. Mehanna et al., [26] reported hypocalcemia after total thyroidectomy to occur in 0.33 to 65% of cases. Asari et al., [24] reported an incidence of 1. 6% to 50%. Kerimoglu et al., [27] reported a lower range as he confirmed that literature has reported a high incidence of hypocalcemia between 0. 1% and 32% following total thyroidectomy.

Karamanakos et al., [28] conducted a retrospective study on 2043 cases of thyroidectomy performed at a university hospital in Greece and published results almost close to our study. He stated a higher incidence of hypocalcemia in total thyroidectomy patients of 40.4% compared to 24.7% in near total thyroidectomy patients and 9. 05% in subtotal thyroidectomy patients. Fahmy et al., [29] reported that transient hypocalcemia ranges from 5.4 to 26%, while permanent hypocalcemia ranges from 0.5 to 24%.

Karamanakos et al., [28] stated that the incidence of transient hypocalcemia in several studies varied from 6.9% to 46%, while a rate of 0.4% to 33% has been reported for permanent hypocalcemia.

Post-surgery hypocalcemia is caused by an inadequate secretion of parathormone (PTH) by the parathyroid glands. Transitory hypoparathyroidism is the most frequent complication following total thyroidectomy and occurs in 16.5 to 71 % of patients. This large range in the incidence of hypoparathyroidism in the literature is explained by the heterogeneity of its diagnosis in existing studies; only clinical or a combination of clinical and laboratory diagnostic techniques have been used. Permanent hypoparathyroidism is less frequent following total thyroidectomy, with an incidence of 1.5 to 1.8% [30].

In the study in our hands, average PTH before was 40.5pg/ml, and declined to be 25.3pg/ml 2h post-operative with statistically significant difference (p<0.001).

Our results are supported by study of Kumar et al., [31] as they reported that all patients had normal pre-operative serum PTH level. Out of 30 patients, 14 (46.67%) had intra-operative PTH below normal. All patients with clinical hypocalcemia had below normal PTH.

The present study showed that there was no statistically significant difference between normocalcaemic and hypocalcaemic groups as regards demographic findings, clinical presentation, preoperative ultrasonographic finding or number of identified parathyroid glands. Our results are in agreement with study of Pradeep et al., [23] as they found that age of the patient (p=0.2) and nodule size (p-0.17) was not significantly different between the groups.

Regarding Lam & Kerr [23], found that a greater proportion of the women in their study were affected by thyroid disease, but that there was no association between patient sex and hypoparathyroidism. They also found that hypoparathyroidism was not correlated with age or indication of surgery (i.e., malignancies, Graves' disease, goiter, and familial endocrine disease).

Incidence of post-operative hypocalcemia following total thyroidectomies can be taken as factor for assessing the quality of the surgery performed. Development of hypocalcemia is likely to be multifactorial, common causes being devascularization, secondary to parathyroid injury, inadvertent removal of parathyroid gland, hemodilution and " stunning" from dissection [33].

The current study showed that there was statistically significant difference between normocalcaemic and hypocalcemia groups as regards the mean serum calcium levels 24, 28 hours post-operatively. Pre-operative calcium levels have been used to predict hypocalcemia post-operatively [34]. Yamashita et al., [35] have reported lower pre-operative calcium levels in patients developing hypocalcemia.

Asari et al., [24] found that total serum calcium levels alone; measured during the first 2 postoperative days, cannot predict transient hypoparathyroidism correctly.

The most common problem encountered after TT (total thyroidectomy) is hypocalcemia, which can either be temporary or be permanent. Temporary hypocalcemia can be Biochemical (BH) or Symptomatic Hypocalcemia (SH), which usually develops 24 to 48 hours after the thyroidectomy. Hence, patients have to be observed for this period before they can be discharged in order to prevent development of CSH (clinically significant hypocalcemia) at home [36].

In the study in our hands, there was statistically significant difference between normocalcaemic and hypocalcemia groups as regards the mean parathyroid hormone level 2 hours post-operatively. There was statistically significant difference between normocalcaemic and hypocalcemia groups as regards the relative decline in calcium 24, 28 hours post-operatively and as regard the relative decline in PTH level 2 hours post-operatively. PTH% of reduction was considered better negative than positive predictor for hypocalcemia with higher specificity (92%), its sensitivity was 76%.

Our results were supported by El-Nemr et al., [18] study, was designed to detect the usefulness of post-operative PTH as a predictor of post thyroidectomy hypocalcemia and fortunately their results agreed with most of the aforementioned publications. Out of the 9 patients who developed laboratory hypocalcemia, one patient had subnormal post-operative PTH level (<12pg/ml) and the remaining 8 patients had a low normal PTH level (12pg/ml). Moreover, the decline in post-operative PTH level was found to be significant (p-value <0.05) between hypo and normocalcaemic patients.

In the study of Pradeep et al., [23], the post-operative iPTH of ≤10pg/mL at 8 hours after surgery had a sensitivity of 68%, specificity of 73%.

In a prospective study of 40 patients, Lam et al., [23] noted that all 12 patients who developed postoperative hypocalcemia had 1-hour post-operative PTH levels that were less than or equal to 8pg/mL. Pattou et al., [37] reported that a post-operative PTH level of 12pg/mL or less was very predictive of hypocalcemia; however, they did not report how many hours after surgery the PTH values were obtained.

In a meta-analysis of 27 papers, Grodski & Serpell [38] reiterated this recommendation, reporting that post-operative PTH at any time within the first post-operative day following total thyroidectomy can be used to accurately predict the development of hypocalcemia and anticipate the need for calcium replacement.

Furthermore, Asari et al., [24] agreed that day one post-operative PTH measurements may be considered as the most reliable predictor for determining transient or permanent hypoparathyroidism. Kwon et al., [39] reported that sensitivity of post-operative serum PTH to predict post thyroidectomy hypocalcemia was ranging from 64% to 100% and specificity ranging from 72% to 100%.

Conclusion:

Serum calcium concentrations have been the basis of identification of post-operative hypocalcemia however this has been replaced by PTH levels being more sensitive and specific to the early prediction of transient as well as permanent hypocalcemia.

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التنبؤ المبكر لنقص نسبة الكالسيوم بعد إستئصال الغدة الدرقية الكلى: دراسة مستقبلية

المقدمة: يعد نقص الكالسيوم بالدم بعد العملية الجراحية من أكثر المضاعفات شيوعاً بعد إستئصال الغدة الدرقية. يعتبر نقص كالسيوم الدم بعد الجراحة من الأمراض الرئيسية التى تصيب المرضى الذين خضعوا لعملية إستئصال الغدة الدرقية.

الهدف من الدراسة: هدفنا فى هذه الدراسة هو دراسة المرضى الذين لديهم مخاطر متزايدة للإصابة بنقص كالسيوم الدم بعد إستئصال الغدة الدرقية الكلى ودراسة التنبؤ المبكر والتشخيص والعلاج.

طرق البحث: أجريت هذه الدراسة الإستباقية على (٥٠) مريضاً يعانون من أمراض الغدة الدرقية تحت العلاج بإستئصال الغدة الدرقية الكلى فى مستشفيات جامعة عين شمس ومستشفى كفر الشيخ العام. مستوى هرمون الغدة الجار درقية بعد ساعتين من الجراحة لأنه أول مؤشر على نقص كالسيوم الدم بعد الجراحة.

النتائج: كان هناك فرق معتد به إحصائياً بين مجموعتين كالسيوم الدم الطبيعى ونقص كالسيوم الدم فيما يتعلق بمتوسط مستوى هرمون الغدة الجار درقية بعد ساعتين من الجراحة. كان هناك فرق معتد به إحصائياً بين مجموعتى كالسيوم الدم الطبيعى ونقص كالسيوم الدم فيما يتعلق بالإنخفاض النسبى فى الكالسيوم ٢٤، ٤٨ ساعة بعد الجراحة وفيما يتعلق بالإنخفاض النسبى فى مستوى هرمون الغدة الدرقية بعد ساعتين من الجراحة.

الإستنتاج: مستويات هرمون الغدة الدرقية أكثر حساسية وتحديداً للتنبؤ المبكر بنقص كالسيوم الدم العابر وكذلك الدائم بعد ساعتين من إجراء إستئصال الغدة الدرقية.