

HYPOCALCEMIA FOLLOWING THYROIDECTOMY; A PROSPECTIVE STUDY IN BASRAH, IRAQ**Rabee Hamed Qasim[@], Haider Kadhem Saeed^{*}, Ahmed M Al-Abbasi[#], & Mohammed Mosa Mohammed[^]**

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Abstract

This study aimed to find out the frequency of hypocalcemia in different thyroid procedures and the risk factors for its development.

One hundred thirty six patients underwent different thyroid surgeries for different thyroid diseases in the Surgical and Otolaryngology Departments of Basrah Teaching Hospital for three years from July 2016 to July 2019.

Patients mean age was 34.8 ± 7.5 years (range: 18-65 years). Male to Female ratio was 2:5. Of the total 136 patients, 35 patients underwent isthmusectomy and lobectomy, no case of hypocalcemia was reported (0%). Out of 71 patients who underwent sub-total thyroidectomy, three of them developed hypocalcemia (4.2 %). Out of 30 patients who underwent near-total or total thyroidectomy, nine of them developed hypocalcemia (30%). Whether the inferior thyroid artery was ligated or not, there was no significant difference in the development of hypocalcemia. Of the total 136 patients, 129 patients had benign pathology, 9 of them developed hypocalcemia (6.9 %); 7 patients had malignant pathology; 3 of them developed hypocalcemia (42.8%).

In conclusion, the frequency of hypocalcemia is correlated with the extent of thyroid resection; and it is more in malignant lesions but in most of the patients it was transient.

Key words: Prospective study, hypocalcemia, thyroidectomy, Basrah, Surgery.

Introduction

The term thyroid gland (Greek thyroidies) means shield-shaped¹. Surgery is the treatment of choice for majority of thyroid pathology^{1,2}. Thyroid surgery was hazardous until the mid-19th century when advances in general anesthesia, antisepsis, and hemostasis enabled surgeons to perform thyroid surgery with significantly reduced mortality. Nowadays surgical procedures in thyroid gland are generally safe and well tolerated. However, the occasional complications following such surgery may be life threatening or at least permanently disabling³. Hypocalcemia may occur secondary to surgical trauma,

devascularization, intentional removal of parathyroid gland, total thyroidectomy and the degree of invasion by tumor¹.

Post-thyroidectomy hypocalcemia is an early complication; therefore careful observation of the patients should be done especially for those categorized as high risk patients in the postoperative period. Several studies showed that transient hypocalcemia prevalence rate range is 6.8-46%, while permanent hypocalcemia rate vary from (0-3%)⁴⁻⁹. The recommended surgical strategy is; meticulous dissection and preservation of the parathyroid glands with their blood supply, while removal of one gland is not

associated with postoperative hypocalcemia; the same cannot be seen when two or more glands are removed.

Patients and methods

This prospective study was done at the General Surgery and Otolaryngology units in Basrah Teaching Hospital from January 2017 to January 2020. One hundred and thirty six patients (40 males and 96 females) with variety of thyroid diseases were admitted for different thyroid surgeries.

Patients were interviewed prior to surgery about their sociodemographic characteristics. Complete history, examination and investigations (including serum calcium level) were done preoperatively. At the operation, the risk factors for post-operative hypocalcemia were documented such as: Truncal ligation of inferior thyroid artery, the extent of thyroidectomy (isthmusectomy, lobectomy, subtotal thyroidectomy and near total thyroidectomy). All specimens were sent for histopathological

examination. Measurement of serum calcium level was done for all patients at first post-operative day and the day of hospital discharge usually (3-5) days. Written informed consent was obtained from each patient before enrollment in the study following a detailed explanation of the objectives and protocol of the study. This study was approved by the Ethical Committee in Basrah Teaching Hospital.

The data were analyzed using the SPSS (SPSS Inc., Chicago, IL, USA) version 23. Chi-square test was used to find the significance of differences in categorical parameters.

Results

One hundred thirty six patients were enrolled in this study (40 males, 29.412% and 96, 70.588% females). The mean age of the studied population was 34.8 ± 7.5 years (range: 18-65 years). Other socio-demographic findings are illustrated in table I, Histopathological and hypocalcemia results are demonstrated in table II.

Table I: Base line patient's data

Characteristic	No.	Percentage
Age distribution:		
<20 years	7	(5.14%)
20-29 years	31	(22.79%)
30-39 years	54	(39.72%)
40-49 years	26	(19.12%)
>50 years	18	(13.23%)
Male / Female ratio	2:5	
Type of Goiter:		
Multinodular	83	(61.03%)
Solitary nodule	45	(33.09%)
Diffuse goiter	6	(4.41%)
No goiter	2	(1.47%)
Functional state of thyroid gland:		
Euthyroid	102	(75%)
Hyperthyroid	32	(23.53%)
Hypothyroid	2	(1.47%)
Type of thyroid surgery:		
Isthmusectomy	3	(2.21%)
Lobectomy	32	(23.53%)
Subtotal thyroidectomy	71	(52.2%)
Near total/total thyroidectomy	30	(22.06%)
Total	136	

Table II: Histopathological and hypocalcemia results

Results	No.	Percentage
Histopathological results:		
Nodular colloid goiter	114	(83.82%)
follicular adenoma	9	(6.62%)
Carcinoma	7	(5.14%)
Thyroiditis	3	(2.21%)
Diffuse hyperplasia	2	(1.47%)
Colloid cyst	1	(0.74%)
Post-operative hypocalcaemia:		
Transient	9	(6.62%)
Permanent	3	(2.21%)
No hypocalcaemia	124	(91.17%)
Total	136	

Of the 136 patients enrolled in this study, intra-operative ligation of the inferior thyroid artery was done in 37 patients (27.21%), of those 4 patients (10.81%) developed postoperative hypocalcemia, while in 99 patients (72.79%) who didn't have ligation of the inferior thyroid

artery, post-operative hypocalcemia occurred in 8 patients (8.08%) only as shown in figures 1&2. No significant relation was found between intraoperative ligation of the inferior thyroid artery and post-operative hypocalcemia (P-value= 0.515).

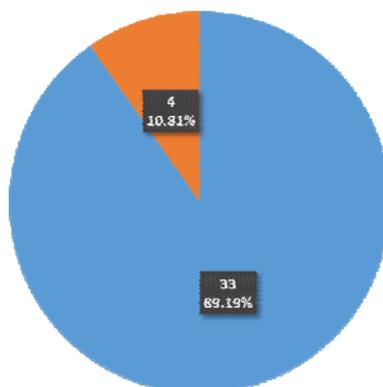


Figure 1: Frequency of postoperative hypocalcemia in patients with intraoperative ligation of the inferior thyroid artery.

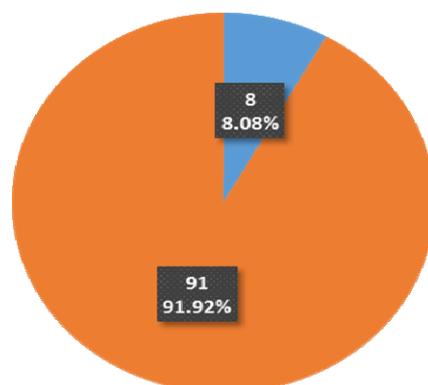


Figure 2: Frequency of postoperative hypocalcemia in patients without intraoperative ligation of the inferior thyroid artery.

There was significant relation between postoperative hypocalcemia and the type of thyroid surgery (P-value=0.001). In isthmusectomy and lobectomy cases, no postoperative hypocalcemia was reported. In 71 patients who underwent subtotal

thyroidectomy, 3 patients (4.23%) developed hypocalcemia while, in 30 patients who underwent near total thyroidectomy, 9 patients (30%) developed postoperative hypocalcemia as shown in table III.

Table III: The types of operations and relation to hypocalcemia

Operation type	Hypocalcemia		Total	Percentage
	No	Yes		
Isthmusectomy	3	0	3	0%
Lobectomy	32	0	32	0%
Subtotal thyroidectomy	68	3	71	4.2%
Near total thyroidectomy	21	9	30	30%
Total	124	12	136	8.82%

There was a significant relation between postoperative hypocalcemia and histopathological results (P-value=0.001). Of the 136 patients enrolled, 129 patients (94.85%) had benign disease, 9 of them (6.98%) developed postoperative hypocalcemia. While, 7 patients (5.14%) had malignant disease, of them 3 patients (42.86%) developed postoperative hypocalcemia.

Discussion

Hypocalcemia is defined as a serum calcium level under 8 mg/dl for at least two consecutive measurements, and hypocalcaemia is considered to be severe when the patient experienced clinical symptoms and signs of hypocalcemia. Permanent hypoparathyroidism is defined by the requirement for vitamin D or calcium supplementation to maintain eucalcemia for one year after thyroidectomy.

One hundred thirty six patients were enrolled in this prospective study, forty patients were males and ninety-six patients were females, with a male to female ratio 2:5. In other studies^{1,10,11}, the male to female ratio may be as low as 1:8.

The most common age group for patients with goiter at time of presentation was 20-40 year of age¹¹. In this study, most of the patients were in the age group (30-39) year of age (39.7 %), with little number

of patient below 20 years and over 50 years.

The most common type of goiter at presentation is multinodular goiter followed by clinically solitary nodule¹¹. In our study, similar result was obtained as 61% of the patients presented with multinodular goiter and 33.8% with solitary nodule.

Most of the patients with goiter were presented with euthyroid state¹¹. In our study, 75% were euthyroid, 23.5% were hyperthyroid, and 1.4% were hypothyroid.

The standard surgical procedure for multinodular goiter is subtotal thyroidectomy, and for carcinoma of thyroid diagnosed preoperatively is near total or total thyroidectomy^{1,12}. In this study, subtotal thyroidectomy was done in 52.2% of the patients while near-total thyroidectomy was done in 22%.

In spite of the fact that carcinoma was diagnosed in 7 patients only, the commonest histopathological finding in thyroidectomy specimens was nodular colloid goiter (68.8%)¹¹. The incidence of cancer in goiter is 6.4% in one study in our country¹¹. In our study, nodular colloid goiter was found in 83.8% of specimens and the incidence of cancer was 5.14%, which was similar to Barnouti et al¹¹. The incidence of transient postoperative hypocalcemia and

permanent hypoparathyroidism is variable from 6.8-46% for transient hypocalcemia, 0-33% for permanent hypocalcemia⁴⁻⁹. In this study, the incidence of transient hypocalcemia and permanent hypoparathyroidism was 6.6% and 2.2% respectively.

Analysis of risk factors for development of postoperative hypocalcemia showed that; no significant statistical difference between truncal ligation of inferior thyroid artery versus ligation of the branches of inferior thyroid artery at the capsule of thyroid gland 10.8% versus 8.08% with a P-value of 0.617. This result is similar to other studies like Chaudhary et al¹⁰ and Rogério et al⁹, while other studies like that done by Thomasuch et al¹³ recommended that ligation of inferior thyroid artery at the thyroid capsule is a better technique and have less incidence of hypocalcemia.

On the other hand, the incidence of hypocalcemia was higher in near-total or

total thyroidectomy (9 out of 30 patients) (30%), while in subtotal thyroidectomy; the incidence was (3 out of 71 patients) (4.2%). This result is similar to that obtained in other studies like Van Gregory et al¹ and Hany Ali et al¹⁴. In our study, the incidence of hypocalcemia was more in malignant tumors than a benign disease (3 out of 7 patients) versus (9 out of 129 patients) (42.8%) versus (6.9%). This result was similar to that in other studies like Van Gregory et al¹, Hany Ali et al¹⁴ and Lamade et al¹⁵.

In conclusion, morbidity in thyroid surgery like postoperative hypocalcemia is related to the state of the parathyroid gland during surgery in many cases. In most of post-thyroidectomy cases, hypocalcemia was transient and occurred in early postoperative period. The extent of thyroid resection is a risk factor for the onset of hypocalcemia, also malignant thyroid disease is a risk factor for hypocalcemia.

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