



CODEN [USA]: IAJPBB

ISSN: 2349-7750

**INDO AMERICAN JOURNAL OF
PHARMACEUTICAL SCIENCES**

SJIF Impact Factor: 7.187

<http://doi.org/10.5281/zenodo.3976947>Available online at: <http://www.iajps.com>

Research Article

**INFERIOR THYROID ARTERY LIGATION TO AVOID
HYPOCALCEMIA AFTER THYROIDECTOMY****¹Dr Aimen Saeed, ²Dr Fajar Roy, ³Dr Kainat Zaffar Laghari**¹King Edward Medical University, Lahore²King Edward Medical University, Lahore³King Edward Medical University, Lahore**Article Received:** June 2020**Accepted:** July 2020**Published:** August 2020**Abstract:**

Objective: The aim of the study was to determine the importance of Ligation of the inferior thyroid artery to avoid post-thyroidectomy hypocalcemia.

Methods: We conducted an observational study at the North Surgical department of Mayo Hospital, Lahore for one-year duration from May 2019 to May 2020. We randomized all patients undergoing partial and total thyroidectomy into two groups. Group I had the inferior thyroid artery (ITA) ligated, but in group II ITA was not ligated.

Results: 100 patients were operated on, most of them women. A type of transient hypocalcemia was observed in 4.5% of patients in group I and 3.5% of patients in group II. Persistent hypocalcemia was observed in 1.5% and 1.10% of patients in Groups I and II, respectively. The results were statistically insignificant (p value > 0.6).

Conclusion: In our study, ITA ligation was performed as a significant factor in the occurrence of postoperative hypocalcemia after thyroidectomy.

Key words: inferior thyroid artery, thyroidectomy, hypocalcemia, hypothyroidism.

Corresponding author:**Dr. Aimen Saeed,**

King Edward Medical University, Lahore

QR code



Please cite this article in press Aimen Saeed et al, *Inferior Thyroid Artery Ligation To Avoid Hypocalcemia After Thyroidectomy.*, Indo Am. J. P. Sci, 2020; 07(08).

INTRODUCTION:

Mortiz Schiff, a physiologist from Geneva in 1856, showed in experiments on dogs that complete extermination of the thyroid gland produces a sequence of ill effects that led to death. This work has been overlooked for over 25 years. Neither the sick Reverdin nor Theodor Kocher referred to Schiff when they first described the phenomenon of surgical deprivation of the thyroid gland. Kocher is a person who refines thyroidectomy techniques and reduces the incidence of postoperative hemorrhages. He also recognizes the importance of preserving the parathyroid glands. Hypocalcaemia or hypoparathyroidism are well known complications of thyroid surgery. Its frequency is a sensitive measure of the quality of thyroidectomy. For thyroid surgery, morbidity and mortality are more severe compared to some other surgeries and reported complication rates, but post-thyroid surgery varies significantly between surgeons and centers. Recurrent damage to the laryngeal nerve (0-15%), persistent hypothyroidism (1-13%), and postoperative complications (0-0.5%) have been reported in various studies of thyroid surgery. The difference in prices may reflect differences in the surgical experience or the number of operations performed at this hospital. The risk of complications depends on the extent of surgery, the nature of the disease and the surgeon's experience. Different specific surgical problems are encountered in different cases of recurrent thyroid disease, such as anatomically different goiter, located outside the sternum or even in the mediastinum, and it may be damage to the recurrent or parathyroid laryngeal nerve. We conducted a study to control the incidence and significance of postoperative hypocalcemia in inferior thyroid surgery with ligation of the artery.

MATERIAL AND METHODS:

This prospective observational study was conducted at the North Surgical department of

Mayo Hospital, Lahore for one-year duration from May 2019 to May 2020. All patients scheduled for thyroid surgery were included. Patients with thyroid neoplasms, goiter with low preoperative serum calcium levels. Patients were admitted to hospitals based on a thorough clinical and histopathological evaluation and the pre-operative protocol was followed. The pre-operative, operative and post-operative results of all patients were recorded in full detail. The patients were randomly divided into two different groups. Patients from group I had their lower thyroid arteries ligated and, similarly to group II, were left alone. All patients were operated on by experienced surgeons from the same ward but in different hospitals. Postoperative serum calcium levels were measured on days 2 and 14 in all patients. Clinical patients for the development of hypocalcemia were also routinely checked in the postoperative and follow-up periods for up to one year, also at night in the first month, monthly for three months, and then every three months. Patients showing symptoms of clinical or biochemical hypocalcemia were admitted or followed weekly for evaluation according to the patient's condition.

RESULTS:

One hundred patients were operated on. 96% were women (male to female ratio 1:24). Twenty patients (52.58%) were randomly assigned to group I, and 23 (47.52%) to group II. The majority of these patients in both groups were between 40 and 50 years of age. In group I, 7 (4.50%) patients experienced transient hypocalcemia and 3 (1.50%) patients experienced persistent hypocalcemia. However, in group II, transient hypocalcemia was found in 5 (3.5%) patients, and persistent hypocalcemia in 2 (1.10%) patients. Statistical analysis of these findings did not reveal any significant difference between the groups.

Table 1: Sex distribution of patients

Gender	=n	Percentage
Male	4	4
Female	96	96

Table 2: Patients characteristics consistent with an increased risk of post thyroidectomy symptomatic hypocalcemia

<ul style="list-style-type: none"> • Large goiter • High risk malignancy • Lymphadenectomy • Low preoperative calcium or vitamin D level • Graves' disease • Breast-feeding • Reoperation • Coincident primary hyperparathyroidism • Calcium malabsorption • Post gastric bypass • Celiac disease • Therapy with proton pump inhibitors

Table 3: Elemental calcium content in intravenous and oral calcium formulations

Formulation type amount	Elemental Ca, mg (%)
Calcium gluconate, 1g	93(9.3%)
Calcium chloride, 1g	273(27.3%)
Calcium carbonate, 1.25g	500(40%)
Calcium citrate, 1.9g	400 (21%)

DISCUSSION:

Post-operative hypocalcemia is a common and most frequently transient symptom following extensive thyroid surgery. can reveal iatrogenic damage to the parathyroid glands and permanent hypoparathyroidism. We prospectively assessed the incidence of hypocalcemia and permanent hypoparathyroidism in total or partial thyroidectomy. Tetany and wrist spasm are clinical signs that usually appear within a week of surgery. The first clinical signs of hypocalcemia are numbness, a tingling sensation, and symptoms of high intracranial pressure or seizures. Hypocalcemia can be considered persistent in patients who need calcium supplementation after one year. Hypocalcemia can be classified into five grades; Grade I - no spontaneous hypocalcemia, Grade II - sporadic hypocalcemia, Grade III - Serum Ca <8.5 mg%, Grade IV - Serum Ca <7.5 mg% and Grade V - Serum Ca <6.5 mg %. The four commonly cited possibilities of postoperative parathyroid insufficiency are accidental devascularization of one or more parathyroid glands, infarction during manipulation, inadvertent removal of parathyroid glands with thyroid flaps, or release of calcitonin as a result of manipulation during surgery. Calcitonin release as the cause of hypocalcemia has been rejected in various studies in the past. The other possibility of post-thyroidectomy hypocalcemia, hypoparathyroidism, was considered the most widely accepted. The primary source of blood supply to the parathyroid glands is the inferior thyroid artery. About 80–86% of the upper and 90–95% of the lower parathyroid arteries originate from the inferior thyroid artery. In

1907, Halsted and Evans first concluded from anatomical studies that in order to maintain the circulation of the parathyroid glands, the lower thyroid artery should not be ligated during thyroid surgery. Since then, the issue of inferior thyroid artery ligation during surgery as the cause of hypoparathyroidism has been raised in several publications. Several studies have been carried out in the past in different parts of the world to compare the effect of ITA binding with non-binding with inconclusive results. Some surgeons recommend that the branches of the inferior thyroid artery be ligated at the capsule of the thyroid gland to avoid devascularization of the parathyroid glands. Bashir et al and Nies et al. Found no significant statistical difference between the ligation of the inferior thyroid artery trunk and the ligation of the inferior thyroid artery branches in the thyroid capsule. Similarly, Aranjó et al. Found no significant difference in postoperative serum calcium levels between lower thyroid artery trunk ligation and no lower thyroid artery ligation. Schmauss and his colleagues claimed. Reduction in the incidence of hypocalcemia after failure to ligation of the lower thyroid artery in their study. Thomusch et al. Recommended ligation of the inferior thyroid artery in the thyroid capsule as a better technique and a lower incidence of hypocalcemia. There was no statistically significant difference in postoperative hypocalcemia between the ligation of the inferior thyroid and non-ligation of the arteries. In most cases, postoperative hypocalcemia is transient. Among them, some patients develop asymptomatic transient hypocalcemia and some develop symptomatic

transient hypocalcemia within one week after surgery, which may last from weeks to months. Up to 30% of postoperative asymptomatic transient hypocalcemia in the first postoperative period and 6% of temporary hypocalcemia requiring calcium supplementation have been reported in the literature. Transient hypocalcemia can be observed after any thyroid surgery, and the condition of these patients improves with calcium supplementation. Only a few patients (0.1-3%) have postoperative persistent hypocalcemia. Post-thyroid surgery hypocalcemia should be considered persistent in patients who require calcium supplementation after one year of surgery. In this study, the incidence of persistent hypocalcemia in both groups was less than 2%. The incidence of persistent hypocalcemia reported in various studies is 0.7% 5, 5% 12, 5.4% 15 and 7.7%. Nies et al. And Kovacs et al .15 observed that the transient mild hypocalcemia may not be caused by parathyroid insufficiency. It can also be seen after other operations that involve blood loss or hypoalbuminemia. They believe that fluid shifts and dilution effects may cause transient hypoalbuminemia; thus, the calcium binding capacity is lowered, resulting in a reduction in total serum levels. This effect does not affect the level of ionized calcium. It may also cause asymptomatic hypocalcemia in the immediate postoperative period. Hypoparathyroidism can cause severe or prolonged hypocalcemia, which is rarely seen. Iqbal et al. Noticed that 18.8% of patients undergoing total thyroidectomy developed asymptomatic hypocalcemia, and that transient symptomatic hypocalcemia requiring calcium supplementation occurred in 5.45% of patients. None of the patients in their study had permanent hypoparathyroidism. They emphasize the observance of strict dissection of the capsule during the operation. Melanie reports in the study that a thyroid surgeon is ultimately responsible for preventing hypocalcemia. The amount of thyroid tissue removed directly correlates with the risk of damage to the parathyroid glands. A patient who undergoes a thyroid lobectomy is virtually guaranteed not to have hypoparathyroidism. Richards' hypoparathyroidism following thyroidectomy is usually associated with disruption of blood supply rather than inadvertent removal of the parathyroid glands. when the viability of the parathyroid glands is uncertain, they are ground up and auto-transplanted into the stripe muscle. although the patient only needs one healthy parathyroid gland to have normal parathyroid function, the goal of the surgeon is to leave the patient with the four functions of the parathyroid gland. In our study, it was observed that hypocalcemia was more common at relatively younger ages in both groups. This may be due to high skeletal calcium uptake under the influence of androgens at a young, rising age, and the decreased

serum calcium levels may be at the expense of the skeletal integrity of the growing skeleton. The biochemical thresholds at which symptoms of hypocalcemia appear are variable and unpredictable. The mechanism for this is unclear, but it may be due to neuromuscular regulation and a lowering of the symptom threshold for hypocalcemia.

CONCLUSION:

ITA ligation was not a significant factor in the development of post-operative hypocalcemia after thyroidectomy.

REFERENCES:

1. Sapmaz, Ali, and Murat Özgür Kılıç. "The Effect of Truncal/Terminal Ligation of Inferior Thyroid Artery on Hypocalcemia after Total Thyroidectomy." *Indian Journal of Surgery* (2020): 1-4.
2. Jha, Chandan Kumar, Anjali Mishra, Gyan Chand, Gaurav Agarwal, Amit Agarwal, and Saroj Kanta Mishra. "Truncal Ligation of Inferior Thyroid Artery Does Not Affect the Incidence of Hypocalcaemia After Central Compartment Lymph Node Dissection." (2020).
3. Iqbal, Azhar, Noreen Maqbool Bokhari, Mubashir Zafar, and Sarfraz Khan Janjua. "Comparative Analysis of Parathyroid Functions among Sub-total Thyroidectomy Patients after Ligation of Inferior Thyroid Artery." *Asian Journal of Research in Surgery* (2019): 1-8.
4. Zedan, Ayoub M. "Incidence and Risk Factors of Hypocalcaemia in Post Thyroidectomy Patients in Tikrit Teaching Hospital." *Indian Journal of Public Health Research & Development* 10, no. 9 (2019): 623-628.
5. Qasim, Rabee Hamed, Haider Kadhem Saeed, Ahmed M. Al-Abbasi, and Mohammed Mosa Mohammed. "HYPOCALCEMIA FOLLOWING THYROIDECTOMY; A PROSPECTIVE STUDY IN BASRAH, IRAQ." *Basrah Journal of Surgery* 26, no. 1 (2020): 46-50.
6. Surriah, Mohammed Hillu, and Amine Mohammed Bakkour. "POST-THYROIDECTOMY HYPOCALCEMIA AND ITS RISK FACTORS هل تقفارملا تروطخلا لماوعو تيفردلا تدغلا لاصنتسا تايلمع دعب مدلا سلك صقن." *Journal of the Arab Board of Health Specializations Vol* 20, no. 4 (2019).
7. Shehata, Mohamed Salah, Ibrahim Aboufotouh Mohammed, and Ahmed Magdy ELHaddad. "The need to give calcium supplementation after total thyroidectomy." *Al-Azhar International Medical Journal* (2020).
8. Prabhakaran, Aswin, Riju Ramachandran, Pradeep Jacob, Misha JC Babu, and

- Gopalakrishnan C. Nair. "Complications following thyroidectomy for benign thyroid diseases and their correlation with clinical, anatomical, and biochemical parameters." *Formosan Journal of Surgery* 53, no. 3 (2020): 81.
9. Latif, Sehrish, Humeranaz Altaf, Sania Waseem, Fareeha Farooqui, Omar Shahzad Altaf, and Mohammad Amir. "A retrospective study of complications of total thyroidectomy; is it a safe approach for benign thyroid conditions." *JPMA* 69, no. 1470 (2019).
 10. Elgamaal, Ahmed S., Asem Fayed, Mohammed A. Elbalshy, and Mohamed M. Aziz. "Evaluation of intracapsular total thyroidectomy as a safe method in benign thyroid diseases." *International Surgery Journal* 6, no. 8 (2019): 2682-2685. Elgamaal, Ahmed S., Asem Fayed, Mohammed A. Elbalshy, and Mohamed M. Aziz. "Evaluation of intracapsular total thyroidectomy as a safe method in benign thyroid diseases." *International Surgery Journal* 6, no. 8 (2019): 2682-2685.
 11. SALAMA, MOSTAFA MAHMOUD. "Role of Oral Calcium and Vitamin D Supplementation in Preventing Post-Thyroidectomy Hypocalcemia." *Med. J. Cairo Univ* 88, no. 1 (2020).
 12. Allen, Evan, and Abbey Fingeret. "Anatomy, Head and Neck, Thyroid." In *StatPearls [Internet]*. StatPearls Publishing, 2019.
 13. Gado, Waleed. "total thyroidectomy as primary surgical management for nonmalignant thyroid disorders." *Journal of Surgery* (2019).
 14. Paduraru, Dan Nicolae, Daniel Ion, Mara Carsote, Octavian Andronic, and Alexandra Bolocan. "Post-thyroidectomy Hypocalcemia–Risk Factors and Management." *Chirurgia (Bucur)* 114, no. 5 (2019): 564-570.