



Original Article

Evaluation of Variables Impacting the Onset of Hypocalcemia After Thyroid Surgery: A Postoperative Perspective

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ABSTRACT

All across the globe, thyroidectomy is a common surgical procedure. After thyroid surgery, hypocalcaemia, which can be caused by either temporary or permanent hypoparathyroidism, is the most prevalent side effect. **Objective:** To quantify the frequency of hypocalcemia in individuals treated with thyroid surgery. **Methods:** In this descriptive study/ cross-sectional study, sixty-three cases were considered. The ages of the patients ranged from 18–60 years. Researchers checked patients' blood calcium levels both before surgery and on day one after the procedure. Those who underwent a complete thyroidectomy were checked for symptoms of low calcium levels. Utilizing SPSS version 24.0, the analysis was carried out. **Results:** There were more females than males among the 63 patients. In terms of tumour kind, papillary cancer, follicular cancer, and Hurthle cell carcinoma were the most prevalent. Hypocalcemia was detected in 18 instances (28.6% of the total). Thirteen females and five males constituted up the eighteen patients with hypocalcemia. In seven cases (38.9%), the retrosternal extension of goiter was detected, while in eleven cases (61.1%), no such extension was detected. Additionally, in every case, postoperative complications such as seroma, transient hoarseness of voice, or a hematoma in the neck were noted. **Conclusions:** Hypocalcemia was more common in 28.6% of patients following thyroid surgery, according to this research. Without retrosternal extension, the majority of the cases were female. All patients also experienced seroma, temporary hoarseness of voice, and neck hematoma in addition to hypocalcemia.

INTRODUCTION

Total thyroidectomy is associated with a high risk of hypocalcaemia, which may be temporary or long-lasting. Temporary hypocalcaemia has an incidence of 1% to 68% and chronic hypocalcaemia of 0% to 13% according to the reports [1, 2]. In addition, bilateral central neck dissection increases the risk of transitory hypocalcaemia from 20% with complete thyroidectomy alone to 50% to 60% [3]. A longer hospital stay is associated with patients experiencing symptomatic hypocalcemia, which is awful. Muscle spasms, cramps, paresthesia, tingling, seizures,

tetanic contractions and an ECG showing a prolonged QT interval are all symptoms [4]. The parathyroid gland is the most prevalent site of post thyroidectomy complications. This could be because of unintentional removal of tissue, blockage of veins and arteries, or parathyroid devascularization. In addition to intraoperative hemodilution and postoperative thyrotoxicosis, other possible causes of hypocalcaemia after a thyroidectomy include hungry bone syndrome and the quick transfer of calcium into bones [5]. Postoperative blood calcium levels

should be thoroughly monitored in patients with high-risk goiters, such as toxic, retrosternal, or recurring goiters. It is critical to lay the groundwork for a safe outpatient thyroidectomy [6]. The most common side effect of thyroid surgery is hypocalcemia, which affects between 3% and 52% of people who have the procedure done, and 0.4% to 13.2% of those people [7, 8]. Hypocalcemia can be identified in a variety of ways after surgery. The conventional two-day hospitalization and serum calcium monitoring approach is still used by many medical facilities worldwide since the lowest amount of hypocalcemia often occurs within 48 hours after surgery [9]. While it is important to keep an eye out for signs of bleeding or airway blockage in the first twenty-four hours following surgery, calcium monitoring is usually not needed unless there are obvious complications during the procedure. This is because most patients only have mild pain after surgery and are able to get back to their regular routines rather fast. As several surgeons have mentioned, this could help reduce the likelihood of hypocalcemia and minimize the duration of hospitalization after surgery. In outpatient or short-stay settings, regular usage is expected when hypocalcemia is detected. If hypocalcemia is detected, patients may be sent home with a prescription for elemental calcium supplements [10, 11]. New research suggests that the rapid detection of hypocalcemia may be possible due to the shorter half-life of parathyroid hormone (PTH) than was previously believed. The eleventh Predicting the likelihood of postoperative hypocalcemia by routinely evaluating PTH is still not considered standard practice. Dissimilarities in assays, measurement times, and cutoff values make direct comparisons among studies difficult [12]. The diagnosis and management of hypocalcaemia following thyroidectomy have been approached from many angles. In an effort to identify patients at risk of post-thyroidectomy hypocalcaemia, intact parathyroid hormone testing has been used more recently following complete thyroidectomy [13].

It was set out to learn more about hypoparathyroidism after thyroid surgery and how PTH readings can help find those who could be at danger of hypocalcemia.

METHODS

This cross-sectional/descriptive study was conducted at Department of Surgery, Bakhtawar Amin Trust Teaching Hospital, Multan. Duration was 14 months from Jan 2023 to Dec 2023 after getting approval with reference no 2642/MD/BATTH and comprised of 63 patients. Patient demographics information including age, sex, Body Mass Index (BMI), and tumor type were collected once written consent was obtained. To calculate the sample size of the study, using the prevalence of hypocalcemia as 0.03, $d = 0.075$ and $N = 63$ in the following formula's $= (Z_{1-\alpha/2})^2 * p(1-p)$

d^2 [35]. This study did not include individuals who had hyperparathyroidism, hypocalcemia, hyperparathyroidism after parathyroid auto transplantation, or who were already taking calcium supplements. The patients' ages varied from eighteen to sixty. No patient has ever had parathyroid surgery or neck dissection done before. All of the patients were in good health going into the operation. Neither patient was on any medication that could alter their serum calcium metabolism, including antiresorptive agents, oral calcium/vitamin D supplements, antiepileptic drugs, anabolic agents, thiazide type diuretics, or hormone replacement therapy for postmenopausal women. Neither patient also displayed any symptoms of metabolic bone disease. Donated blood was tested for a whole range of diseases and conditions, including thyroid function, calcium and parathyroid hormone levels, coagulation profile, kidney and liver function, and fasting blood sugar. The patients underwent a CT scan of the neck with contrast, a plain chest X-ray with a P-A view, and a thyroid scan. Hypocalcemia occurred at a certain frequency. An analysis was conducted with the help of SPSS version 24.0. Frequency and percentage was used to represent qualitative variables, while mean and Standard Deviation (SD) are used to describe continuous variables. Descriptive analysis was conducted.

RESULTS

Included cases had age 40.7 ± 20.38 years and BMI 23.8 ± 5.73 kg/m². There were more females than males among the 63 patients. In terms of tumor kind, papillary cancer, follicular cancer, and hurthle cell carcinoma were the most prevalent (Table 1).

Table 1: Demographics of the Cases that were Enrolled (n=63)

Variables	Mean / N (%)
Age	40.7
BMI	23.8
Gender	
Male	23 (36.5%)
Female	40 (63.5%)
Types of Tumor	
Hurthle Cell Carcinoma	30 (47.5%)
Follicular Cancer	23 (36.5%)
Papillary Cancer	10 (15.9%)

Among the total patients, 33 (52.4%) had cancer in the contralateral lobe (Figure 1).

Malignancy in contralateral lobe

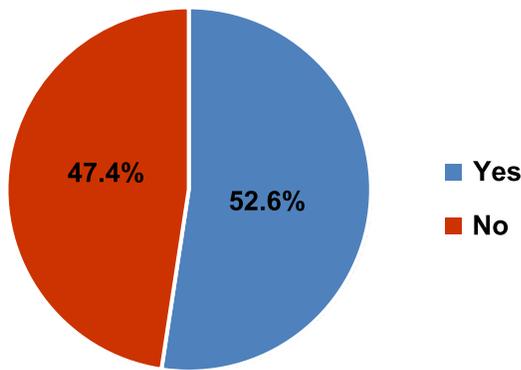


Figure 1: Prevalence of Cancer in the Lobe on the Opposite Side Hypocalcemia was detected in 18 instances (28.6% of the total). Thirteen females and five males constituted up the eighteen patients with hypocalcemia (Table 2).

Table 2: Distribution of Hypocalcemia among study participants

Variables	N (%)
Hypocalcemia	
Yes	18 (28.6%)
No	45 (71.4%)
Gender of Hypocalcemia	
Female	13 (20.6%)
Male	5 (7.9%)

Fourteen instances (77.8%) had transitory hypocalcemia (Figure 2).

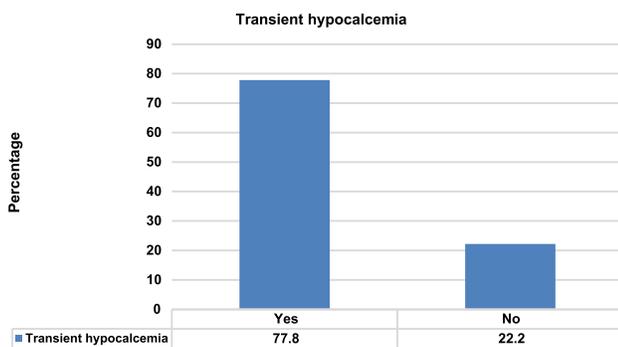


Figure 2: Frequency of Transient Hypocalcemia

In seven cases (38.9%), the retrosternal of the goiter was detected, while in eleven cases (61.1%), no such extension was detected (Table 3).

Table 3: Examinations Connected Hypocalcemia with Retrosternal Extension upon Discharge (n=18)

Retrosternal Extension	N (%)
Yes	7 (38.9%)
No	11 (61.1%)

Additional postoperative problems that were observed in all instances were seroma, temporary hoarseness of voice, and a hematoma in the neck (Figure 3).

Complications

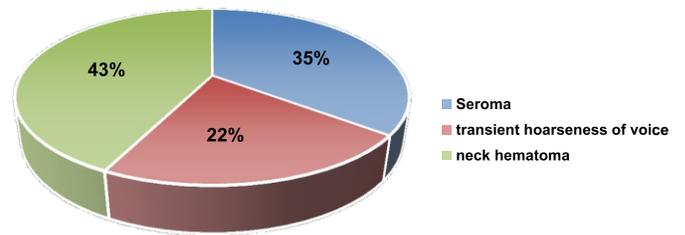


Figure 3: The Incidence of Additional Complications among Patients

DISCUSSION

It was found that 28.6% of patients experienced hypocalcemia following thyroid surgery are in line with the worldwide incidence recorded by Aghsaiefard Z et al [14]. Following a month of follow-up, not all patients had symptoms or signs of hypocalcemia. The percentage of patients with clinical hypocalcemia was a mere 6%. Since this is the population that would require more care, it is more reliable to utilize the percentage of patients experiencing symptoms. These results demonstrate that postoperative blood calcium levels are not enough to determine whether patients undergoing thyroid surgery are at risk of clinical hypocalcemia. A significant risk factor for surgical patients was hypocalcemia. After a total thyroidectomy, 78.6% of patients experienced transient hypocalcemia, and 21.4% developed persistent hypocalcemia [15]. In current study, included cases had age 40.7 ± 20.38 years and BMI 23.8 ± 5.73 kg/m². There were more females than males among the 63 patients. In terms of tumor kind, papillary cancer, follicular cancer, and Hurthle cell carcinoma were the most prevalent. These findings were comparable to a few of the earlier studies [15, 16]. Malignancy in the contralateral lobe was detected in 28 instances (52.6%) [17]. The results of this study were very comparable to those of a Greek study that analyzed data from 2043 thyroid surgeries performed at a university hospital [18]. Patients who underwent a full thyroidectomy were 40.4% more likely to experience hypocalcemia than those who underwent a near-total or partial thyroidectomy, with rates of 24.7% and 9.05 percent, respectively, for these procedures. In contrast to persistent hypocalcemia, which can range from 0.5 to 24%, transient hypocalcemia can vary between 5.4% and 26%, as reported by Zobel MJ et al [19]. Hypocalcemia was most common in patients who had full thyroidectomy, according to Tolone S et al [20]. Baldassarre RL et al., reported that between 0.33 and 66 percent of patients had hypocalcemia after a total thyroidectomy [21]. The incidence can be anywhere from 1.6% to 50%, as reported by Patricio Gac E et al [22]. While Van den Eynde F et al., found a smaller range of hypocalcemia following total thyroidectomy, he confirmed that literature has shown a substantial frequency of 0.1% to 32% [23]. The results corroborated those of previous

studies which found that twenty-five percent of hypocalcemia patients were transient and that five percent were persistent. There were more women than men among the 18 individuals with hypocalcaemia. Eleven instances (61.1%) did not have any evidence of a retrosternal goiter, whereas seven cases (38.9%) did. They were quite consistent with what had been found in other studies [24, 25]. Every single patient also had seroma, a temporary hoarseness of voice, and a hematoma of the neck as postoperative sequelae. Regarding references [26, 27]. Hypocalcaemia is a common complication that can develop soon after surgery. Hypocalcaemia following thyroid surgery has recently gained attention, and scientists are trying to figure out why. There is a great deal of debate on the best and timeliest ways to accurately anticipate whether a patient will experience transitory or chronic hypoparathyroidism following surgery [28]. A method or operation that is guaranteed to not fail Regular calcium monitoring after outpatient thyroidectomy is still recommended by Aldhafar A et al., even if postoperative PTH levels are detected. Even if the PTH level is incorrectly determined to be normal, this remains true [29]. The practice of thyroidectomy as an outpatient procedure has been authorized by two major international health organizations. Two such groups are the Australian Endocrine Surgeons Society and the American Thyroid Association [30]. The results of a Canadian study on outpatient thyroid surgery show that the procedure may be safely and effectively done as an outpatient therapy with minimal risk of complications. Assuming thorough patient evaluation and screening precedes surgery, this should be possible. Blood calcium concentrations are no longer used to diagnose post-operative hypocalcaemia; instead, PTH levels are used since they are more sensitive and specific for the early detection of both transient and permanent hypocalcaemia. The diagnosis of postoperative hypocalcaemia was previously based on blood calcium values. The postoperative PTH, sometimes called the fast PTH test, was able to predict persistent hypocalcaemia with an overall accuracy of 98% in this investigation. This research suggested that a thorough thyroidectomy is the best way to reduce the risk of problems and try again with the operation. [31]. Furthermore, it was shown that confirmed hypoparathyroidism was considerably more common in tumor pathology patients. Several studies have looked into the traits that have been associated with complications after thyroid surgery [32]. Age, gender, enlarging gland size, inflammation, fibrosis, thyroidectomy depth, and lymph node dissection are all variables to consider. Major surgery, recurrent treatments, and the surgeon's degree of experience can also induce hypocalcaemia following a thyroidectomy [33]. In individuals with Graves' disease or who have undergone redo surgery, this symptom might be caused by adhesions

within the thyroid glands capsule and its parathyroid gland [34, 35].

CONCLUSIONS

Hypocalcemia was more common in 28.6% of patients following thyroid surgery, according to this research. Without retrosternal extension, the majority of the cases were female. All patients also experienced seroma, temporary hoarseness of voice, and neck hematoma in addition to hypocalcemia.

Authors Contribution

Conceptualization: TJ

Methodology: TJ

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Writing, review and editing: TJ, JMT, SB, AA¹

All authors have read and agreed to the published version of the manuscript.

Conflicts of Interest

The authors declare no conflict of interest.

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