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Original Article

Study of Post-operative Hypocalcemia in Total Thyroidectomy Patients: A Prospective Study

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Abstract

Introduction: Hypocalcemia is a common complication in patients undergoing thyroid surgery. It compromises the patient's quality of life and increases hospitalization time, costs, and mortality. Post-operative hypocalcemia can be acute or irreversible in lifetime supplements, depending on the degree of parathyroid injury.

Aim: This study aimed to analyze the prevalence of hypocalcemia in patients undergoing total thyroidectomy.

Materials and Methods: This prospective study was done on patients who underwent total thyroidectomy at our site hospital from August 2018 to August 2020. A total of 40 patients of both genders were registered for the study. All the patients were above 18 years of age. Post-operative serum calcium levels were recorded.

Results: Among all patients, enrolled 90% (36) were women, whereas only 10% (4) were men. Most patients are from the age group of 31–40 (37.5%) and least are from the age group above 50 years (10%). Post-operative hypocalcemia occurred in 16 (40%) patients and the major surgical indication for total thyroidectomy was swelling of the thyroid or goiter.

Conclusion: The risk factor for hypocalcemia development is multilevel. The suggested operational technique for preventing permanent hypocalcemia is a thorough dissection and protection of the parathyroid gland and its blood supply.

Key words: Hypocalcemia, Post-operative hypocalcemia, Thyroid disease, Thyroidectomy

INTRODUCTION

A popular treatment performed in the world is a complete thyroidectomy. In patients with thyroid cancer, Graves' disease, and toxic multidose goiter, complete thyroidectomy is recommended.[1] In recent years, total thyroidectomy has become an option, particularly in endemic iodine-deficient areas, to treat patients with multinodular goiter. Complete thyroidectomy is generally done when the diagnosis of thyroid lobectomy or lobectomy is performed in the case of a presumed benign condition, such as an asymptomatic multinodular goiter.[1,2] Thyroid surgery (total or near-total thyroidectomy) can lead to severe complications, including transient or permanent cordal palsy or severe bleeding.[3]

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However, hypocalcemia is the major complication after thyroid surgery.[3,4] Hypocalcemia frequently complicates the post-operative care of patients who have undergone thyroid surgery. This condition remains a common complication with an overall reported incidence in the adult population ranging from 1% to 50%.[5,6]

The risk factors predisposing to hypocalcemia after thyroid treatment are giant goiters, complete thyroidectomy, chronic goiters, carcinoma, and surgeons' experience, leading to devascularization or accidental removal of the parathyroid glands. Hypocalcemia can occur secondary to surgical trauma, devascularization, and unintended extraction of the glands.[7] Additional mechanisms, such as Vitamin D deficiency, an acute increase in calcitonin serum levels (because of gland handling during surgery), or a "hungry bone syndrome" are believed to contribute to this process.[8] Etiological considerations include post-operative alkalosis-induced hypocalcemia resulting from hyperventilation triggered by post-operative pain and dilution hypocalcemia.

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In most cases, hypocalcemia post-thyroidectomy is reversible, although it can take several months. A small number of patients (0–12%) remain during this time and are assumed to be permanent, even though the gap between temporary and permanent hypocalcemia ranges from 6 months to 1 year.[9] However, the patient is committed to lifelong symptomatic care with calcium or Vitamin D if the interval is permanent. The surgeon needs to make every effort to maintain one or more sustainable parathyroid, especially in total thyroidectomy or subtotal thyroidectomy, to avoid this complication.

Careful dissection and protection of parathyroid glands and their blood supply are recommended as an organizational strategy. Parathyroid glands must be correctly identified to help prevent accidental excision. Where less than 3 glands are found during the procedure, the probability of complication is higher.[10]

Factors that could predict post-thyroidectomy hypocalcemia development can help start calcium supplements early and thereby protect the patients from early hypocalcemia. In several studies, the occurrence of post-thyroidectomy hypocalcemia was correctly predicted by post-operative parathyroid hormone, which was lower than the value intraoperatively, or on the same day of the surgery, between 8 and 15 Pg/mL.[8]

Aim

This study aimed to determine the prevalence of post-operative hypocalcemia in patients undergoing total thyroidectomy.

MATERIALS AND METHODS

This prospective study was performed in the general surgery department from August 2018 to August 2020. The study included all patients who underwent total thyroidectomy. A total of 40 patients of both genders were enrolled for the study. All patients in the study were above 18 years of age. To prevent previously altered parathyroid functions, we excluded patients with altered pre-operative levels of calcium and excluded patients with prior radiation history, including those with a calcium supplement already excluded.

Post-operative Variables

Post-operative serum calcium levels (24 h after surgery) recorded. Postoperatively, hypocalcemic symptoms such as tingling and numbness of fingers, perioral region, muscles spasms, paresthesia, Chvostek's, and Trousseau's sign were noted if present. Histopathology reports were followed up to assess the condition of parathyroid glands in the surgical specimen. We have considered the presence of early hypocalcemia for calcium serum levels lower than 8.0 mg/dl measured 24 h after surgery.

Patients with near-total thyroidectomy were excluded from the study. To prevent previously altered parathyroid functions, we excluded patients with altered pre-operative calcium levels and excluded patients with prior radiation history, including those with a calcium supplement already excluded from the study.

RESULTS

A total of 40 patients have enrolled in the study; out of them, 36 patients were female and only 4 were male [Figure 1].

Patients enrolled for the study were divided into four groups, of which 13 patients were in the age group between <30, 15 were between 31 and 40 years, 8 were between 41 and 50 years, and 4 patients had >50 years [Figure 2]. The result showed that patients in the age group of 31–40 years were the highest and least in the age group of more than 50 years in our study.

The pre-operative surgical indication predisposing for total thyroidectomy consisted, 4 patients of malignancy, 14

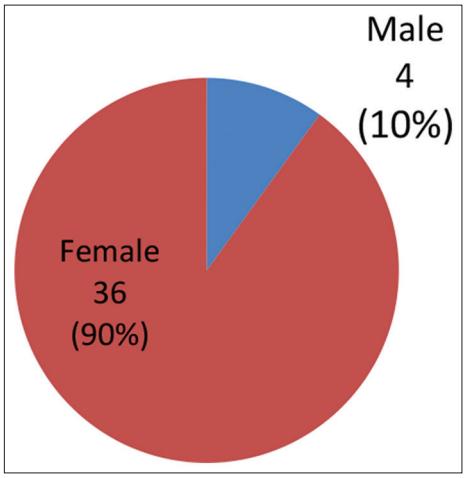

Figure 1: Distribution of gender in the patients

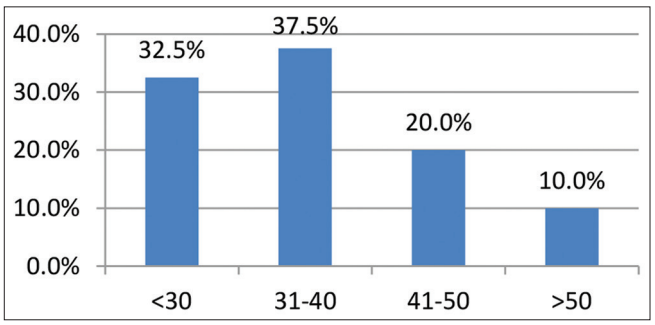

Figure 2: Distribution of age in the patients

patients of toxic features, and 22 patients with swelling/goiter [Figure 3]. Based on the result, the patients with swelling/goiter (55%) were the highest and patients with malignancy (10%) were the least in the study.

Based on evaluation of post-operative serum calcium level, it was observed that 16 patients had hypocalcemia and 24 patients had no hypocalcemia [Figure 4].

DISCUSSION

Post-operative hypocalcemia is a significant concern after a thyroid operation. It often increases the duration of hospitalization and significantly increases the overall cost of a thyroidectomy.[1,2] When severe, it can lead to severe complications and requires therapy to alleviate clinical symptoms and prevent serious complications.[4,5] The mechanism of hypocalcemia after thyroidectomy is not precisely disclosed, although it is accepted to be multifactorial; factors such as surgical technique, parathyroid damage (injury, edema, infarction, and ischemia), the extent of thyroidectomy, hyperthyroidism, malignancy, patient gender, perioperative serum calcium drop, presence of thyroiditis, diabetes, and number of the identified parathyroid gland during surgery can be considered as etiological factors.[11]

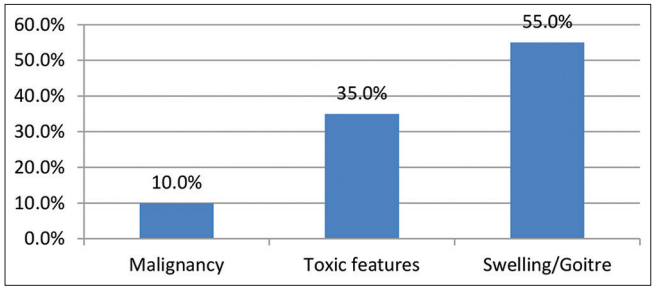

Figure 3: Pre-operative indication for total thyroidectomy

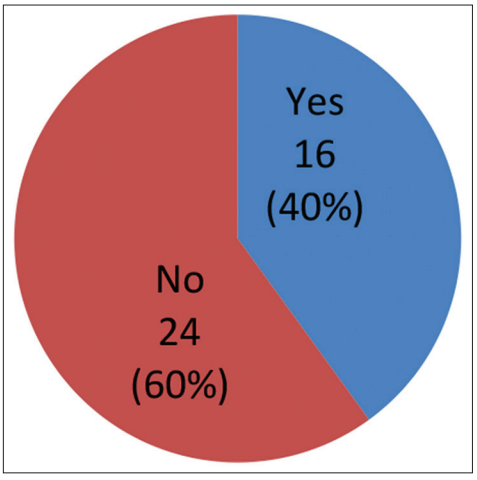

Figure 4: Post-operative hypocalcemia observed

After thyroidectomy, hypocalcemia is observed within 12 h after the operation, and it resolves spontaneously by 24 h in most patients. Hypocalcemia can remain permanent when caused by irreversible injury to the parathyroid glands.[12] The patients must be monitored before discharge to avoid the development of clinically relevant hypocalcemia.

In our study, 40% of patients showed post-operative hypocalcemia, whereas 60% of patients did not show any post-operative hypocalcemia; these findings are consistent with Sperlongano *et al.* study, which observed hypocalcemia in 27 out of 180 patients following thyroidectomy in total with 40.7%, 22.2%, 29.6%, 3.7%, and 3.7%, 2nd, 4th, and 5th day, hypocalcemia in all cases.[13]

Babu carried out their study in 75 patients who underwent total thyroidectomy; he found that 26 patients had hypocalcemia and 49 patients had no hypocalcemia.[14]

In another prospective study of 102 Pasque *et al.* patients, 18 patients experienced hypocalcemia, 38.8% on the 1st day after surgery, 22.2% on the 2nd day after surgery, and 33.3% on the 3rd day off, and 5.5% on the 4th day after the surgery.[12]

CONCLUSION

Transient hypocalcemia is one of the most common post-operative complications following thyroid surgery in clinical practice. It can be prevented with pre-operative preparation of patients with extreme caution and meticulous pre-operative dissection, prompt identification of parathyroids, and frequent post-operative monitoring of serum calcium.

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