

Hypocalcemia and its Risk Factors in Post Thyroidectomy – A Prospective Study

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A B S T R A C T

Introduction: Postoperative hypocalcemia is a champion among the troubles for thyroidectomy, its recurrence will be a more prominent sum as a relatable point following total thyroidectomy over after other a more noteworthy sum preservationist thyroidectomy. Current research aimed to study the incidence and risk factors of hypocalcemia after thyroid surgery.

Material and methods: In this study, 30 patients, who had undergone total, near-total thyroidectomy by bilateral exploration were included. Serial serum calcium measurements were recorded as well as details of the operation, patient age and gender, ligation of the inferior thyroid artery or not, pathological report.

Results: Most of the patients (62%) had simple multinodular goiter, (15%) had Grave's disease, (11%) had toxic nodular goiter, (7%) had thyroiditis, and (5%) had cancer. Total thyroidectomy was performed for (78%) of patients, near-total thyroidectomy for (22%) of patients. Around 30% of patients developed hypocalcemia postoperatively; in 24% of them it was transient and in 6% was permanent.

Conclusion: Post-thyroidectomy hypocalcemia is a relatively common complication but it is transient in the majority of the patients.

Keywords: Calcium Therapy, Hypocalcemia, Thyroidectomy

INTRODUCTION

Total thyroidectomy is universally suggested for benign pathologies of the thyroid gland and accordingly the number of these procedures has been increasing dramatically in the last 10 years.^{1,2} Even if the most indicated surgical technique is used, the percentage of the most frequent postoperative complication, transient hypocalcemia, is high and represents the major cause of premature failure, late discharge and hospital re-admissions.³ Direct or indirect damage, by devascularization of the parathyroid glands, is the main cause of hypocalcemia after Total thyroidectomy, but several factors affect the development of this complication.⁴ Hypocalcemia after total thyroidectomy is due to hypoparathyroidism produced by parathyroid trauma, devascularization or accidental removal of the parathyroid glands during surgery. This condition remains a common complication with an overall reported incidence in the adult population ranging from 1% to 50%.⁵⁻⁹ Reported data on pediatric series are scarce and a range of 30-40% of parathyroid dysfunction leading to hypocalcemia after thyroidectomy has been reported.^{10,11} Transient hypocalcemia accounts for most of the cases, while less than 4% may develop permanent hypoparathyroidism.^{8,10} Irrespective of the transient nature of this complication, the likelihood of developing hypocalcemia requires careful monitoring for proper care and timely treatment. Current research aimed to study the incidence and risk factors of

hypocalcemia after thyroid surgery.

MATERIAL AND METHODS

This prospective study was conducted in the Department of General surgery at Government Medical College and Hospital, Pudukkottai in 30 patients, who had undergone total, near-total thyroidectomy by bilateral exploration. The patient with concurrent lymph node dissection and pre-existing hypocalcemia were excluded. Preliminary workup included complete clinical examination, biochemical assay of hormone profile. Ultrasound imaging of the thyroid gland and neck in general was done routinely. Aspiration cytology was performed from all solitary nodules and nodules showing suspicious features on clinical examination or ultrasound imaging. Plain helical computerized tomography was done when clinical evidence of the mediastinal extension was noted. Hyperthyroidism was controlled before the operation. Vocal cords were assessed by indirect laryngoscopy prior to operation. Fasting serum calcium and phosphorus were measured preoperatively; additionally, free thyroxine and thyrotropin levels were measured to assess thyroid function, and BUN and creatinine levels were measured to assess renal function. Calcium and phosphorus measurements were repeated once immediately after the operation, unless they were abnormal.

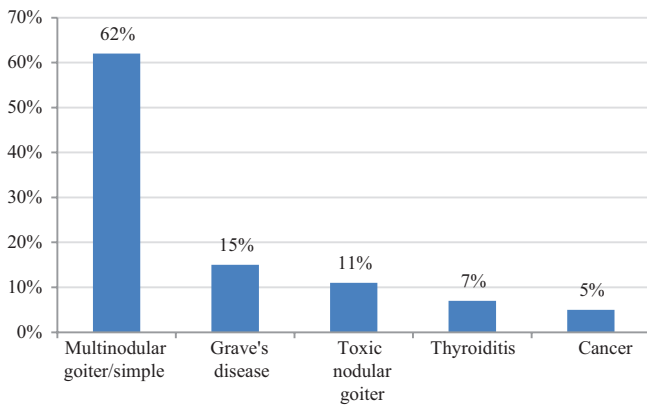


Figure-1: Types of thyroid diseases

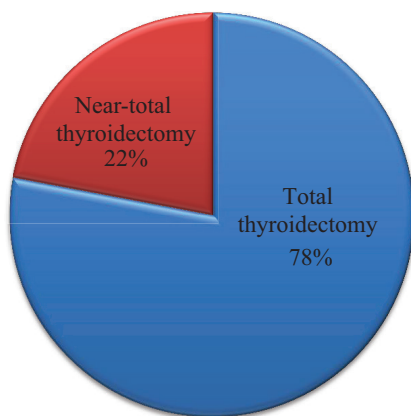


Figure-2: Distribution of hypocalcemia according to the type of surgery

RESULTS

The 30 patients (23 women and 7 men) who underwent thyroidectomy during the study period were included. Patient ages ranged from 19 to 64 years, with an average age of 41 years. All 30 patients with hyperthyroidism were treated with methimazole and α -blocker drug. All had normal free thyroxine and triiodothyronine levels before the operation. 67% of patients were euthyroid, 29% were hyperthyroid, and 4% were hypothyroid. Most of the patients (62%) had simple multinodular goiter, (15%) had Grave's disease, (11%) had toxic nodular goiter, (7%) had thyroiditis, and (5%) had cancer (fig-1). Total thyroidectomy was performed for (78%) of patients and near-total thyroidectomy for (22%) of patients. Around 30% of patients developed hypocalcemia postoperatively; in 24% of them it was transient and in 6% was permanent. All the patients with CA had post-thyroidectomy hypocalcemia while (60%) of patients with thyroiditis had hypocalcemia (fig-2). All the 3 patients who developed hypocalcemia following total thyroidectomy were of normal or under normal muscular built, with only one patient out of the 4 who had hypocalcemia following near-total thyroidectomy was obese and of a short neck.

DISCUSSION

Postoperative hypocalcemia is a major concern after thyroid operation. It often lengthens the duration of hospitalization and the need for biochemical tests, and it significantly increases the overall cost of a thyroidectomy. When severe, it

can lead to serious complications and requires IV therapy to alleviate clinical symptoms and prevent serious complications. Although hypocalcemia reverses spontaneously in most patients, it can remain permanent when caused by irreversible injury to the parathyroid glands.^{12,13} Various clinical, biologic, and surgical factors may contribute to decreased serum calcium after thyroid operation.^{14,15} After thyroidectomy, whether unilateral or bilateral, moderate, asymptomatic hypocalcemia is observed within 12 hours after the operation, and it resolves spontaneously by 24 hours in most patients. Elevation of serum calcitonin secondary to manipulation of the thyroid was also initially suspected to participate in this calcium decrease, but this has not been confirmed in recent studies.^{15,16}

In some reports, the risk of hypocalcemia is not alleviated by the correction of hyperthyroidism. It is correlated with the pretreatment serum levels of free thyroxine³ and with markers of the bone turnover rate, such as serum alkaline phosphatase levels and urinary hydroxyproline.¹⁷ Wingert and colleagues⁶ found that risk for transient hypocalcemia after thyroid operation for Graves' disease is 20 times higher than in other groups. Other authors showed that vitamin D metabolites and seasonal changes in calcium homeostasis affect the incidence of postoperative tetany in patients with Graves' disease.¹⁸

Various mechanisms can impair parathyroid function during thyroid operation, including trauma to, devascularization of, or inadvertent excision of the parathyroid glands. The etiology of hypocalcemia seems to be a multifactorial phenomenon, but the most important factor is the iatrogenic surgical trauma to parathyroid glands, closely related to the extent of operation.^{14,19}

CONCLUSION

Clinically significant hypocalcemia after thyroid operation is transient in most of the cases. Its incidence is related to the extent of the surgical procedure especially if this was associated with ligation of the inferior thyroid artery and it can be only reduced using the correct surgical procedures.

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