

Original Research Article

Study of the risk factors for post-operative hypocalcemia after thyroid surgery

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ABSTRACT

Background: Hypocalcemia is still a common post-operative consequence following total thyroidectomy, generating potentially serious symptoms and concern in patients and lengthening hospital stays. This study was conducted to evaluate the risk factors for post-operative hypocalcemia after thyroid surgery.

Methods: In this study, 60 patients who underwent thyroidectomy were included. Patients with concomitant lymph node dissection and hypocalcemia were excluded from the study. Serial serum calcium measures were taken and information about the operation, such as the patient's age and gender, whether the inferior thyroid artery was ligated or not, and the pathological report.

Results: In 60 patients, 17 patients were had post-operative hypocalcemia. 3 in 5 patients (60%) with Hashimoto thyroiditis had hypocalcemia, followed by toxic multinodular goiter (MNG) (37.5%), thyroid adenomas (33.33%) and Graves' disease (33.33%) had hypocalcemia after thyroidectomy.

Conclusions: To conclude, hypocalcemia is a common side effect of total thyroid surgery, and it is caused by the unintentional removal of parathyroid glands or injury or spasm of the blood arteries that supply them.

Keywords: Hypocalcemia, Thyroidectomy, Thyroid disease, Parathyroid

INTRODUCTION

Total thyroidectomy is widely recommended for benign thyroid diseases, and as a result, the number of these treatments has risen considerably in previous decade.¹⁻³ Thyroid surgery (total/near-total thyroidectomy) might result in serious consequences such as transitory or permanent cordal palsy and severe bleeding. Hypocalcemia, on the other hand, is the most common consequence following thyroid surgery.⁴⁻⁶ Hypocalcemia can be an asymptomatic laboratory finding/a potentially fatal metabolic disorder.⁷ Hypocalcemia due to transient or definite hypoparathyroidism was most common post-thyroidectomy consequence, occurring in 63% of the cases.⁸

Transient hypocalcemia is common and is a leading cause of early death, delayed discharge, and hospital readmissions.⁹ A variety of factors causes hypocalcemia following complete thyroidectomy, direct or indirect injury to the parathyroid glands due to devascularization; however various factors influence the occurrence of this condition.³ It is usual practice to monitor patients after thyroid surgery for clinical signs or symptoms of hypocalcemia and measure serum calcium and phosphorus levels.⁷

Even if having a thorough understanding of thyroid anatomy and the embryological origins of parathyroid glands is the most important factor in reducing post-operative hypocalcemia.¹⁰ The capacity of the surgeon to forecast the beginning of hypocalcemia after

thyroidectomy is critical for post-operative care. Early diagnosis of any risk of hypocalcemia will shorten hospital stays and prevent the need for unnecessary laboratory tests.⁶

Regardless matter how brief this issue is, the risk of developing hypocalcemia necessitates constant monitoring to ensure correct care and the treatment.

METHODS

This prospective study was conducted in the department of general surgery at Sree Balaji medical college and hospital between December 2017 to May 2020 in 60 patients who had undergone total, near-total thyroidectomy. Convenient sample size was taken for this study; patients presenting during the study period were included in the study. Informed consent and institutional ethics committee approval were obtained. Ultrasound imaging of the thyroid gland and the neck was conducted in order. When clinical evidence of mediastinal extension was found, a plain helical computerized tomography was performed. Patients undergoing total/near-total thyroidectomy had their data collected through careful history collection, rigorous clinical examination, appropriate radiographic, hematological studies including serum calcium and serum albumin, operative findings, and post-operative hypocalcemia follow-up. The study excluded patients with primary parathyroid disorders, past neck irradiation, and currently taking calcium supplements. Data were collected and presented as frequency and percentage.

RESULTS

In this study, 60 patients who underwent thyroidectomy were studied. Patients with altered calcium before surgery were excluded. 56 female and 4 male patients were included as shown in the Table 1. 18 patients between 30 years of age underwent thyroidectomy (Table 2), and 36 were between 30 to 50 years old. Out of the total 60 surgeries done, 14 were hemithyroidectomy and 46 were total thyroidectomy (Table 3). 32 patients with swelling/goiter, 11 patients with toxic features, and 9 patients with thyroiditis underwent thyroidectomy as shown in the Table 4. Based on the histopathological report, Hashimoto thyroiditis (60%) was higher in our study (Table 5). 3 in 8 patients with toxic multinodular goiter had hypocalcemia (37.5%), followed by 4 cases with Thyroid adenomas, 1 case with Graves’ disease had hypocalcemia after thyroidectomy. 17 patients (56.66%) had hypocalcemia after thyroidectomy as shown in the Table 6.

Table 1: Description of study patients.

Gender	No. of patients
Male	4
Female	56
Total	60

Table 2: Age distribution of study patients.

Age group (years)	No. of patients
<30	18
31-40	22
41-50	14
>51	6

Table 3: Type of surgery performed.

Type of surgery	No. of patients
Hemithyroidectomy	14
Total thyroidectomy	46

Table 4: Pre-operative indications of thyroidectomy.

Pre-operative indications	No. of patients
Toxic features	11
Swelling/goiter	32
Thyroiditis	9
Malignancy	8

Table 5: Post-thyroidectomy hypocalcemia in the study population.

Post-thyroidectomy hypocalcemia	No. of patients
Yes	17
No	43

Table 6: Distribution of diagnosis in post-operative hypocalcemia.

HPE report	No. of cases	No. of hypocalcemia cases	Percentage (%)
Thyroid malignancy	8	2	25
Thyroid adenomas	12	4	33.33
Toxic MNG	8	3	37.5
Graves’ disease	3	1	33.33
Hashimoto thyroiditis	5	3	60
Lymphocytic thyroiditis	4	0	0
Nodular/colloid goiter	20	4	20
Total	60	17	28.33

DISCUSSION

After thyroid surgery, hypocalcemia is a typical consequence. It usually happens within the first several days of surgery and might be symptomatic or asymptomatic. Between 6.9 and 49% of patients develop transient hypoparathyroidism after thyroid surgery.^{6,10-13}

In this study, the data of 60 patients that underwent thyroid surgery were retrospectively reviewed and

hypocalcemia was detected in 17 (28.33%) cases. The incidence of hypocalcemia in our study comes in agreement with the incidence reported in the literature.

In literature, some studies were found that states transient hypocalcemia to be associated with advanced age, whereas others reported an association with younger age.⁶ In addition, there was no significant intergroup difference in patient age in this study. We divided patients into four age groups (Table 2) but no significant differences have been noticed between groups.

We found gender as a key risk factor for hypocalcemia in the literature, with females appearing to be more prone to developing this problem.¹⁴ In this present study, it is seen that females contribute more to this disorder compared to men. The exact cause beyond that phenomenon is still under debate. This sex disparity could be attributed to the effect of sex hormones on parathyroid secretion, genetic differences, signalling pathway alternations, or anatomic differences.¹⁴

Hyperthyroidism has been identified as a risk factor for hypocalcemia development in the literature; nevertheless, it is unclear why thyrotoxic thyroidectomies have a higher rate of hypocalcemia; yet, this is somewhat unexpected given that the thyroid gland in thyrotoxicosis is larger than usual and highly vascularized, making surgery more difficult.⁴ In the current study, toxic goiter was a significant risk factor for hypocalcemia.

Thyroidectomy for carcinoma is described by some authors as a higher-risk procedure since the posterior capsule is drastically removed with the gland in the case of malignant disease, which is why parathyroid glands are at higher risk of injury due to the danger of nerve injury.^{6,15} In our investigation, like in others, we found that hypocalcemia developed in 25% of patients with pre-operative malignant or suspected malignant diagnosis and 33.33% of patients who underwent surgery for benign pathology (thyroid adenoma).

Although the benefits and risks of total thyroidectomy are still debated, it is becoming more common. Hypocalcemia was much less common among lobectomy patients than among total thyroidectomy patients in our study.

Limitations, further multicentre (and therefore multi-surgeon) studies with higher sample sizes need to be done to investigate hypocalcaemia after completion of thyroidectomy.

CONCLUSION

In the majority of cases, clinically significant hypocalcemia following thyroid surgery is transitory. The findings reveal that the only variables that influence early hypocalcemia development are sex (female gender is a substantial risk factor), surgical method, and

perioperative changes in serum calcium (among all variables tested). Thus, prophylactic and therapeutic management may be quite similar to the recommendations in primary total thyroidectomies.

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Ethical approval: The study was approved by the Institutional Ethics Committee

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