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Clinical Study of Thyroid Following Hypocalcemia

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ABSTRACT

Early hypocalcemia is the thyroid surgery's most common side effect. The factors (patient characteristics or changes in surgical technique) influencing hypocalcemia after thyroid surgery have been the subject of numerous investigations. This study evaluates the role that various factors played in the emergence of postoperative hypocalcemia. To determine the prevalence of hypocalcaemia after total thyroidectomy, our institution's experience, post-thyroidectomy hypocalcaemia and several clinical manifestations of post-thyroidectomy hypocalcaemia. It was a prospective study study from January 2022 to October 2023 at Department of General Surgery IN JMN Medical College, Kalyani. 100 patients were included in this study. Eight of the 100 patients who had thyroidectomies are scheduled for completion thyroidectomies (re-surgery) following prior hemithyroidectomies or subtotal thyroidectomies. These patients had preoperative benign FNAC reports and postoperative histopathological findings that revealed papillary malignancy in one patient and recurrent toxicity in another patient. Total thyroidectomy should be considered when treating thyroid lesions that are toxic or malignant, as it involves not only removing the thyroid but also preserving the parathyroids.

INTRODUCTION

Serious side effects from thyroid surgery, such as transitory or permanent cordal palsy or severe hemorrhage, are possible after a total or nearly total thyroidectomy. However, the most frequent side effect following thyroid surgery is hypocalcemia[1-3].

Any type of scientific research should be carefully thought out before beginning to ensure accuracy in order to appeal to future generations.

According to Dr. William Stewart Halsted, "The extirpation of thyroid gland perhaps better typifies than any operation the supreme triumph of the surgeon's art."

Any surgeon's daily life is more likely to include thyroid diseases and surgical treatment for thyroid abnormalities. Every three hours, a paper about thyroid diseases is presented in the current medical period.

Post-operative problems following thyroid surgery come in many forms and are more frequently reported by young and inexperienced doctors.

One possible early consequence following bilateral surgical thyroid ectomy is hypocalcemia. In the literature, temporary hypocalcaemia ranges from 9.2% to 25% and the frequency of permanent hypocalcaemia is between 0.5 and 2%[4].

Even in experienced hands the incidence of early transient post thyroidectomy hypocalcaemia is quite significant, some studies shows up to 59%[5].

Careful dissection is necessary to locate at least two parathyroid glands under direct eyesight in order to identify and spare them in order to prevent postoperative low calcium levels and their consequences. Postoperative hypocalcaemia is reported to occur more frequently following bilateral lobectomy than unilateral, with 9% and 1.9%, respectively, according to certain research[6].

In the postoperative period following thyroidectomies, early detection and fast initial treatment of post-thyroidectomy hypocalcaemia are essential for a satisfactory outcome[7].

Numerous indicators are currently being researched in order to develop a viable postoperative strategy for thyroidectomy surgeries that will successfully manage post thyroidectomy hypocalcaemia.

However, due to the cost and availability of the test in small-scale institutions, serum calcium estimation post-operatively is the most ideal tool for the early detection and management of post thyroidectomy hypocalcaemia[8].

MATERIALS AND METHODS

Methods of collection of data: In-depth history taking, careful clinical examination, appropriate radiological, haematological investigations including serum calcium and serum albumin, operative findings and follow-up of the cases was done after surgery for post-operative hypocalcemia were all used to collect data from patients undergoing total thyroidectomies.

- **Sample:** Minimum of 100 cases
- **Study design:** Prospective study
- **Study place:** Institute of JMN Medical College, Kalyani at Department of General Surgery
- **Stastical method:** Data collected was analyzed using descriptive statistical principles (like mean, proportions and percentages)
- **Inclusion criteria:** Patient over the age of 12 who is having a thyroidectomy and has thyroid swellings that have been clinically and pathologically detected
- **Exclusion criteria:**
  - Patients undergoing hemithyroidectomy/ lobectomy
  - Primary parathyroid pathologies
  - Age <12 years
  - Previous irradiation to neck
  - Patient already on calcium supplementation

RESULTS

In this study we followed 90 female patients and 10 male patients underwent total thyroidectomy (Table 1).

These 100 patients' preoperative thyroidectomy indications show that 14 patients are scheduled for thyroidectomy due to malignancy suspicion, 26

Table 1: Distribution with all parameter

Sex of study population	No of patients
Sex	
Male	10
Female	90
Total	100
Age	
12-30 years	32
31-40 years	32
41-50 years	24
More than 50 years	12
Total	100
Pre operative indications for total	
Tyroidectomy	
Malignancy	14
Toxic features	26
Swelling/goitre	60
Total	100
Nature of surgery	
Re-surgery/completion thyroidectomies	4
Total thyroidectomies	96
Total	100
Diagnosis	
Thyroid malignancy	10
Thyroid adenomas	20
Toxic MNG	06
Graves disease	04
Hashimotos thyroiditis	40
Lymphocitic thyroiditis	02
Nodular/colloid goitre	18
Total	100
Post-operative hypocalcaemia in study	
Yes	44
No	66
Total	100

Table 2: Distribution Pre-operative indications for thyroidectomy with all parameter and diagnosis

Pre-operative indications for thyroidectomy	No. of patients	Post thyroidectomy hypocalcaemia	Percentage
Malignancy	12	6	75.00
Toxic features	26	9	46.15
Swelling/goitre	60	6	20.00
Re-surgery/completion thyroidectomies	8	02	100.00
Total thyroidectomies	100	16	32.65
Diagnosis	No. of cases	Post thyroidectomy hypocalcaemia	Hypocalcaemia (%)
Thyroid malignancy	10	07	100.00
Thyroid adenomas	20	04	20.00
Toxic MNG	06	04	50.00
Graves disease	04	04	66.67
Hashimotos thyroiditis	40	08	21.05
Lymphocitic thyroiditis	02	00	0.00
Nodular/colloid goitre	18	06	33.33

patients are scheduled for thyroidectomy due to toxic features after toxicity control and 60 patients are scheduled for thyroidectomy due to complaints like swelling, goiter, or pressure effects (Table 2).

Out of the 100 thyroidectomies performed, 8 patients are scheduled for completion thyroidectomies (resurgery) after undergoing a hemithyroidectomy or subtotal thyroidectomy with a preoperative benign FNAC report and a posoperative histopathological finding showing papillary malignancy for one patient and recurrent toxicity for another patient.

The postoperative follow-up of the 100 thyroidectomized patients reveals the following HPE reports. The samples from 10 individuals who underwent total thyroidectomy revealed Papillary thyroid cancer, thyroid adenoma in 20 patients, toxic multinodular goiter in 8 patients and graves disease in 3 patients. 40 post-thyroidectomy specimens from patients had Hashimoto's thyroiditis, 1 had lymphocytic thyroiditis and 16 had nodular or colloid goitres.

In the course of our research, we discovered that 40 patients out of 100 in the sample group had post-operative hypocalcemia symptoms and signs.

Patients aged 12-30 years suffered post-operative hypocalcaemia at a rate of 25%, those aged 31-40 years at a rate of 27%, those aged 41-50 years at a rate of 25% and those aged more than 50 years at a rate of 71%.

Only 20% of patients with swelling or goitre are reported to have postoperative hypocalcaemia after total thyroidectomy in patients who had a pre-operative diagnosis of cancer. Around 46% of patients with toxic features also experienced postoperative hypocalcaemia.

The incidence of post-thyroidectomy hypocalcaemia in patients who underwent resurgeries, such as a complete thyroidectomy, is 100%.

According to the final postoperative HPE-based diagnosis, 10 out of 10 thyroid malignant patients in our study experienced post thyroidectomy hypocalcaemia, along with 20% of thyroid adenomas, 50% of patients with toxic multinodular goiters, 67% of patients with graves disease, 21% of patients with hashimoto's thyroiditis and 33% of patients with nodular or colloid goiters.

In our study, 40 out of 100 patients had postoperative hypocalcaemia and 61% of them showed symptoms on day 2 after surgery. The remaining patients had symptoms on day 1 after surgery.

DISCUSSIONS

According to a lot of data, females are more prone to thyroid disorders. Likewise, our study population reflects this.thyroid diseases are caused by women 92% of the time and men 8%[9].

The findings of our study indicate that thyroid conditions that may require thyroid surgery are common in people between the ages of 30 and 40.

However, the post thyroidectomy hypocalcaemia incidence is more prevalent in the older age group, specifically those who are over 50 years old. In a study titled The Impact of Age, Vitamin D Level and Incidental Parathyroidectomy on Postoperative Hypocalcemia after total or near total Thyroidectomy, Zedenius *et al*.[10] found that as people age, their postoperative vitamin D levels rise dramatically. Therefore, the frequency is 25 times higher for patients with more than 50 years of age.

Malignant illnesses undergo significant surgical dissection in order to clear the tumor, which results in a lower prevalence of post-thyroidectomy hypocalcaemia in benign diseases than in malignant disorders. A study by Sokouti *et al*.[11] on the incidence of temporary and permanent hypocalcemia following complete thyroidectomy for thyroid cancer finds a greater incidence of hypocalcemia following total thyroidectomy in thyroid cancer. When procedures are paired with radical neck dissection, the frequency rises even more.

More toxic thyroid diseases than non-toxic thyroid diseases have a higher prevalence of post-thyroidectomy hypocalcaemia, which is also related to the extensive surgical dissection performed on the toxic disorders to prevent recurrence of the disease.

The same explanation can be used to explain the complete absence of post-thyroidectomy hypocalcemia in the resurgeries in our study. Additionally, some literature on resurgeries suggests that severe fibrosis may contribute to vascular compromise and hypoparathyroidism.

The majority of those who require a complete thyroidectomy in our research cohort have a thyroid tumor or goiter[11].

Because of the patients' poor compliance during the study period, we focused primarily on immediate postoperative hypocalcaemia and did not analyze permanent hypocalcaemia.

According to our study, the prevalence of postoperative hypocalcaemia was around 35%, although the literature reported cases ranging from 27-80%[12].

For four patients who had accidentally damaged their parathyroid glands while they were on the operating table, we performed parathyroid autotransplantation during the research period and post-thyroidectomy hypocalcaemia didn't develop in those patients.

Patients who present with hypocalcemia are those for whom parathyroid auto transplantation was not performed in a study by and Zedenius *et al*.[10] where their team followed routine parathyroid auto transplantation incidence of hypocalcemia was decreased. After conducting a 100-case series with complete thyroidectomy and parathyroid autotransplantation, Zedenius *et al*.[10] revealed their findings in their study and came to the conclusion that there was no lasting hypocalcaemia in their study group.

Many writers used various intraoperative approaches to identify the parathyroid in order to prevent post-thyroidectomy hypocalcaemia. Some of them include Esselstyn CB's use of parathyroid blush on a table, Silverberg's staining of parathyroids with methylene blue, Ramao's intravenous use of methylene blue to identify parathyroids, Sakouti *et al*.[11] use of polarized spectral imaging, Soon *et al*.[13] use of a portable gamma camera with sestamibi radiotracer.

CONCLUSION

Our research led us to the conclusion that transient hypocalcaemia following thyroidectomy is a common complication that can be avoided by exercising extreme caution during preoperative patient preparation, careful dissection during surgery, early detection of parathyroids, routine monitoring of serum calcium following surgery and prompt treatment. Parathyroid auto-transplantation should be considered if the parathyroids unintentionally suffer damage during the procedure. Only the utmost supervision should be used when doing thyroid resections. To prevent hypocalcaemia, surgeons should use caution when treating patients above the age of 50. The surgeon should think about performing a total thyroidectomy, which not only removes the thyroid but also saves parathyroid tissue, to treat toxic and malignant thyroid lesions. Small-scale hospitals can reliably and affordably detect hypocalcemia following thyroid surgery by serially monitoring serum calcium levels both before and after surgery and carefully observing the signs and symptoms of hypocalcemia.

REFERENCES

1. Harris, A.S., E. Prades, O. Tkachuk and H. Zeitoun, 2016. Better consenting for thyroidectomy: Who has an increased risk of postoperative hypocalcaemia? Eur. Arch. Otorhinolaryngol., 273: 4437-4443.
2. Bhattacharyya, N. and M.P. Fried, 2002. Assessment of the morbidity and complications of total thyroidectomy. Arch. Otolaryngol. Head. Neck. Surg., 128: 389-392.
3. Sitges-Serra, A., S. Ruiz, M. Girvent, H. Manjón, J.P. Dueñas and J.J. Sancho, 2010. Outcome of protracted hypoparathyroidism after total thyroidectomy. Br. J. Surg., 97: 1687-1695.
4. Kim, Y.S., 2012. Impact of preserving the parathyroid glands on hypocalcemia after total thyroidectomy with neck dissection. J. Korean. Surg. Soc., 83: 75-82.
5. Warren, F.M., P.E. Andersen, M.K. Wax and J.I. Cohen, 2002. Intraoperative parathyroid hormone levels in thyroid and parathyroid surgery. Laryngoscope., 112: 1866-1870.
6. Baldassarre, R.L., D.C. Chang, K.T. Brumund and M. Bouvet, 2012. Predictors of hypocalcemia after thyroidectomy: Results from the nationwide inpatient sample. ISRN. Surg., 2012: 1-7.
7. Roh, J.L., J.Y. Park and C.I. Park, 2008. Prevention of postoperative hypocalcemia with routine oral calcium and vitamin D supplements in patients with differentiated papillary thyroid carcinoma undergoing total thyroidectomy plus central neck dissection. Cancer., 115: 251-258.
8. Ancuta, L., C. Vanessa and G. Biliotti, 2009. Calcium level, a predictive factor of hypocalcemia following total thyroidectomy. Jurnalul. Chirurgie. Iasi., Vol. 15
9. Williams, N. and P.R. O'Connell, 2013. Bailey and Love's Short Practice of Surgery 26E. 26th Edn., CRC Press;, London, UK., ISBN-10: 1444121278, Pages: 1530
10. Zedenius, J., C. Wadstrom and L. Delbridge, 1999. Routine autotransplantation of at least one parathyroid gland during total thyroidectomy may reduce permanent hypoparathyroidism to zero. ANZ. J. Surg., 69: 794-797.

11. Sakouti, M., V. Montazeri and S. Golzari, 2010. The incidence of transient and permanent hypocalcemia after total thyroidectomy for thyroid cancer. Int. J. Endocrinal. metabolism., 1: 7-12.
12. Lo, C.Y. and K.Y. Lam, 1998. Postoperative hypocalcemia in patients who did or did not undergo parathyroid autotransplantation during thyroidectomy: A comparative study. Surgery., 124: 1081-1087.
13. Soon, P.S.H., C.J. Magarey, P. Campbell and B. Jalaludin, 2005. Serum intact parathyroid hormone as a predictor of hypocalcaemia after total thyroidectomy. ANZ. J. Surg., 75: 977-980.