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INCIDENCE OF HYOCALCEMIA AFTER TOTAL THYROIDECTOMY (TT)- AN OBSERVATIONAL STUDY

General Surgery

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ABSTRACT

Background: Hypocalcemia is one of the most common complications after total thyroidectomy due to transient or permanent postoperative hypoparathyroidism. The primary cause of hypocalcemia is secondary hypoparathyroidism . Aims of our study determine incidence of hypocalcemia following total thyroidectomy .

Materials and Methods: A total of 74 patients undergoing total thyroidectomy during approximately 1 year in RIMS, Ranchi, were evaluated and the incidence of post-operative hypocalcemia was assessed using post-operative serum calcium values with 8 mg/dL as cutoff.

RESULTS: The incidence of post-operative hypocalcemia was 58.90 %, with symptomatic hypocalcemia 20.93 % ,(transient 18.62% and permanent 02.32%).

Conclusion: Hypocalcemia following total thyroidectomy although common and usually asymptomatic and self-limiting. In symptomatic hypocalcemia mainly it is transient in nature.

KEYWORDS

Hypocalcemia, Total Thyroidectomy

INTRODUCTION

One of the most frequent complications of thyroid surgery is postoperative hypocalcemia, due to transient or permanent postoperative hypoparathyroidism, mainly due to compromise of vascularization of the parathyroid glands or inadvertent resection of these. The primary cause of hypocalcemia is secondary hypoparathyroidism [1-9]. Risk factors for post-operative

hypocalcemia following total thyroidectomy include thyroid gland size, substernal extension of the thyroid, type of thyroid disorder, extent of surgery, and whether re-operation is necessary [1-8].

Hypocalcemia can be asymptomatic, particularly if calcium levels are only mildly reduced, or symptomatic with typical manifestations such as Chvostek's and Trousseau's signs, muscle spasms, perioral and peripheral paresthesia.. Severe neurological manifestations may occur if the condition is not adequately treated. Post-operative hypocalcemia requires calcium and Vitamin D supplementation, with monitoring until blood calcium returns to normal.

Thyroid surgery is the definitive management option for thyroid malignancies, and also for benign diseases such as multinodular goiter with compression symptoms[10]. Hypocalcemia following total thyroidectomy (TT) is a relatively frequent complication, which is sometimes difficult to correct. Temporary hypocalcemia occurs in 50–68% of postoperative TT patients [11,12], while permanent hypocalcemia occurs in 1.3-3% of postoperative-TT patients[13–15]. Temporary hypocalcemia is defined by various authors as a post-surgery decrease in calcium (Ca), lasting for 6 to 12 months; permanent hypocalcemia is a postoperative-TT decrease in Calcium lasting for more than 12 months[16]. Postoperative TT hypocalcemia depends on a number of factors, including biochemical blood parameters before and after surgery, clinical effects and factors related to surgery, surgical technique, surgeon's experience, the patients , and the disease [17].

Although the diverse causes of hypocalcemia include excessive discharge of calcium into urine due to surgical stress, hungry bone syndrome due to hyperthyroidism or hypercalcitonemia, and vitamin D deficiency, the most important causes include physical damage to the four parathyroid glands [18,19].

Production of parathyroid hormone (PTH) play an indispensable role regulating serum calcium, increasing the calcium levels in blood by increasing renal reabsorption of calcium, bone resorption and activation of calcidiol to stimulate intestinal calcium absorption; all this by means of PTH receptors coupled to G proteins present in these tissues. Thus any injury to the Parathyroid Glands leading to the reduction or loss of their function will generate a reduction in serum calcium which, when severe, can be life threatening, or in a lesser extent, affect importantly the quality of life of the patients and[increase the days of in hospital care[20,21].

MATERIAL AND METHODS

This study was conducted at Rajendra Institute Of Medical Sciences (RIMS), Ranchi from February 2019 to March 2020. Inclusion criteria patients above the age of 16 years undergoing total thyroidectomy for both benign and malignant etiology were included in the study. Exclusion criteria for this study were previous hemithyroidectomy, lobectomy, resection of thyroid gland, and diagnosed pathology of parathyroid glands, previous neck surgeries, pre-existing hypocalcemia, previous irradiation to neck, patients with renal dysfunction. The patient have been informed in detail about the nature of the study and after obtaining informed consent, the study was conducted in the following manner .The detail history, and clinical examination of all the patients were done. The relevant Laboratory investigation like blood investigation as total serum calcium, ionised serum calcium , serum albumin, parathyroid hormone(PTH), 25-hydroxyvitamin D (25-hydroxy Vit D), thyroid function tests, ultrasound neck, FNAC.

Post-operative hypocalcemia was defined as a serum total calcium of <8 mg/dL within 24-72 hours after surgery[22]. After Total thyroidectomy, one hour postoperative ionised calcium measurement were taken by arterial blood gas analysis. Postoperatively after 24 hours another ionised calcium level was measured. Patients were observed in the ward for signs and symptoms of hypocalcemia, such as Chvosteks, trousseaus sign, perioral numbness, tingling and muscle spasms. Patients who were found to be clinically hypocalcemia were given slow intravenous infusion of 10ml of 10% calcium gluconate. Patients were subsequently assessed for clinical signs of hypocalcemia and if found, were given oral calcium supplementation 500mg thrice daily. In patients who had low biochemical ionised calcium post operatively without symptoms or clinical signs of hypocalcemia were given prophylactic oral calcium supplementation 500mg thrice daily.

In the literature, the majority of patients exhibit asymptomatic hypocalcemia and need no treatment, or only oral administration of Ca and vitamin D preparations[23]. Patients with neuromuscular symptoms received intravenous infusion of injection calcium gluconate (0.5 mg elemental calcium/kg/h).

RESULTS

A total of 74 patients were included in this study, who underwent total thyroidectomy. From February 2019 to March 2020, 74 patients underwent TT . In this study there were 63 women (81.40%) and 11 men (18.60%) underwent total thyroidectomy, shown in [Figure-1]. This gross difference in sex distribution is due to almost all thyroid disorders are more common with females as described by many literatures.

The median age in our study was 43 years with 03 patients belonging to the <20 years age group, 16 in the 20-30 years group, 27 in the 31-40 years group, 21 in the 41-50 years, 07 in the >50 years age group. Age distribution of patients is shown in [Figure-2].

The pathological diagnoses being colloid goiter in 46 patients (62.16%), papillary carcinoma of thyroid in 11 patients (14.86%), follicular neoplasm in 07 patients (09.45%), toxic nodular goiter in 06 patients (08.10%), autoimmune thyroiditis in 04 patients (05.40%), as shown in[Figure 3].

Out of 74 patients, post-operative hypocalcemia developed in 43 patients (58.90%). Of them, 34 patients (79.07%) were diagnosed with asymptomatic hypocalcemia. Clinical symptoms were present in 09 out of 43 patients with hypocalcemia (20.93%).

Patients were followed up for 12 months. There was no loss to follow-up and no mortality in the study.

Table 1- Total no. of patients with sex distribution

Sex	No. of patients	Percentage
Male	11	18.6%
Female	63	81.4%
Total	74	100%

Table 2- Age distribution of patients

Age Distribution (years)	No. of patients	Percentage
<20	03	04.05%
20-30	16	21.62%
31-40	27	36.48%
41-50	21	28.37%
>50	07	09.40%

Table 3- FNAC of Thyroid swelling

FNAC	No. of Patients	Percentage
Colloid Goiter	46	62.16%
Toxic Nodular Goiter	06	08.10%
Papillary Carcinoma Thyroid	11	14.86%
Follicular Neoplasia	07	09.45%
Autoimmune Thyroiditis	04	05.40%
Total	74	100%

Table 4- Post Operative Hypocalcemia

Asymptomatic	34	79.07%
Symptomatic	09	20.93%
Total	43	100.00%

Table 5 -Symptomatic Patients in postoperative Hypocalcemia

Symptomatic	No of Patients	Percentage
Transient	08	18.61%
Permanent	01	02.32%
Total	09	20.93%

DISCUSSION

Postoperative -TT, hypocalcemia is one of the most common complications. According to the literature, postoperative-TT hypocalcemia occurs in 50–68% of patients [11,12]. In our study, postoperative-TT hypocalcemia developed in 58.10% of the patients. Rosato et al. found that 10% of patients had symptomatic hypocalcemia [11]. However, that study included patients who had TT (64.3%) and smaller-scale surgeries on the thyroid (35.7%) . Temporary post-operative hypocalcemia develops more often in patients who have a markedly decreased level of serum Calcium before surgery.

In Our study population of Male 18.6% and female contributes 81.4% of thyroid disorders. It was also found in a study conducted by Thomusch *et al.* that hypoparathyroid complications were more in female patients compared to male patients [24]. The median age in our study was 43 years, and the most common age group was 31-40 years. Middle-aged women are most commonly affected with thyroid disorders. Study conducted by Bhattacharyya and Friend who reported a mean age of 48.3 years in their study on 517 patients conducted for the assessment of morbidity and complications of total thyroidectomy[25]. However, the postoperative-TT, hypocalcemia incidence is more common in the advancing age group, i.e., more than 50 years. Benign diseases show less incidence of post-thyroidectomy hypocalcemia than the malignant diseases, this attribute to the extensive surgical dissection performed in malignant disorders to obtain tumor clearance. In a study conducted by Sakouti *et al*[26] regarding the incidence of transient and permanent hypocalcemia after total thyroidectomy for thyroid cancer reveals higher incidence of hypocalcemia after total thyroidectomy in malignant diseases of the thyroid. The incidence increases more with surgeries combined with radical neck dissection. The incidence of post-thyroidectomy hypocalcemia is more in the toxic thyroid diseases than non-toxic diseases, this also attributes to the extensive surgical dissection in the toxic disorders to avoid recurrence of the disease. In our study the incidence of post-operative hypocalcemia was approximately 58.10%. In literature, it was reported from 27% to 80%[26]**].** For prevention of post-thyroidectomy hypocalcemia many authors followed identification of parathyroid intraoperatively by various methods.

We conducted this study to determine the incidence of hypocalcemia and to assess the importance of intraoperative identification of the parathyroid glands during thyroid surgery in the prevention of this complication. The incidence of symptomatic post-operative hypocalcemia in our study was 20.93%, i.e. 09 patients among 43, overall of which 08 cases were transient (18.60%) and 1 case was permanent (02.32%). In another study conducted by Thomusch et al., the incidence of transient parathyroid hypofunction was 6.4% while permanent dysfunction occurred in 1.5% of patients[24]. The most common pre-operative clinical and radiological diagnosis in our study was multinodular goiter seen in 51 patients(68.91%), while the most common pathological diagnosis ascertained by FNAC was colloid goiter seen in 62.16%. This was similar to the results obtained in the study conducted by Nair *et al.* who showed a diagnosis of multinodular goiter in 69.35%.[27].

In our study, we observed that the incidence of hypocalcemia postoperatively could be reduced if proper care was taken to visualize the parathyroid glands and preserve their blood supply which comes from the inferior thyroid artery. In a study by Sheahan *et al.*, there was a higher incidence of permanent hypoparathyroidism if <3 parathyroid glands were identified and preserved[28]. In the study by Thomusch *et al.*, <2 parathyroid glands identified and preserved intraoperatively resulted in an increased incidence of permanent post-operative hypoparathyroidism[24].

CONCLUSION

Most common complication of postoperative TT is hypocalcemia. Transient hypocalcemia is a frequent complication and permanent hypocalcemia is less common which can be prevented with preoperative prepration of patients with extreme caution and intraoperative meticulous dissection, identification of parathyroid glands, and postoperative frequent monitoring of serum calcium and early treatment can prevents significant morbidity.

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