Original article

# Incidence and Risk Factors of Hypocalcemia After Thyroid Surgery in Rangpur Medical College Hospital

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**Abstract:**

**Background:**
Post-operative hypocalcemia is an important complication following thyroid surgery.

**Objectives:**
Current research aimed to study the incidence and risk factors of hypocalcemia after thyroid surgery.

**Methods:**
In this study, 40 patients, who had undergone total, sub-total & near-total thyroidectomy by bilateral exploration were included. Serial serum calcium measurements were recorded as well as details of the operation, patient's age, gender and pathological reports.

**Results:**
Most of the patients (45%) had multinodular goiter, (25%) had Papillary Carcinoma, (15%) had Folicullar Carcinoma, (12%) had thyroiditis, (03%) had Grave's disease. Total thyroidectomy was performed for (77.5%) of patients, Sub-total thyroidectomy for (17.5%) of patients and near-total thyroidectomy for (5%) of patients. Around 32.5% of patients developed hypocalcemia postoperatively; in 27.5% of them it was transient and in 5% was permanent.

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

**Key words:** Calcium Therapy, Hypocalcemia, Thyroidectomy, Thyroid gland.

## Introduction:

Thyroidectomy is one of the surgeries most frequently performed worldwide, and has an acceptable incidence of complications and sequelae which however can be uncomfortable, debilitating and sometimes, lethal[1]. Hypocalcemia is the most common complication after thyroid surgery, with a prevalence that varies from 1.6 to 68.0%[2]. The reported incidence of transient hypocalcemia ranges from 1.6% to 9.3% after subtotal thyroidectomy & from 6.9% to 42% after total thyroidectomy[3]. Direct or indirect damage, by devascularization of parathyroid glands, is the main cause of hypocalcemia after total thyroidectomy, but several factors affects the development of this complication[4].

To determine the incidence of hypocalcemia after thyroidectomy in our hospital, were viewed serum calcium and phosphate levels in patients who underwent total orsubtotal thyroidectomy. When hypocalcemia is predicted, treatment with prophylactic calcium and vit-D supplements can prevent the development of hypocalcemia.The grievous symptoms of hypocalcemia often appears within 48 hours after thyroidectomy. Symptoms are severe requiring calcium

oral/parenteral replacement therapy. Post operative hypoparathyroidism remains a clinical challenge for thyroid surgeons because of its frequency and the limited number of established preoperative predictors[5]. Current research aimed to study the incidence and risk factor of hypocalcemia after thyroid surgery.

**Materials and Methods:**

This prospective study was conducted in the Department of ENT & Head-Neck surgeryat Rangpur Medical College Hospital, in 40 patients from july 2020 to january 2021,who had undergone total, near-total thyroidectomy by bilateral exploration after taking informed written consent. All surgeries were performed by same surgical team experienced in head- neck surgery.

The patient with recurrent thyroid, concurrent lymph node dissection and pre-existing hypocalcemia were excluded. Preliminary workup included taking history, complete clinical examination, FNAC, thyroid profile. Ultrasound imaging of the thyroid gland and neck in general was done routinely.

Euthyroid state and general anesthetic fitness was the prerequisite for thyroidectomy.Vocal cords were assessed by indirect laryngoscopy prior to operation. Fasting serum calcium and phosphorus were measured preoperatively. Calcium and phosphorus measurements were repeated once immediately after the operation, unless they were abnormal. The patients also were evaluated in relation to the extend of surgery and underlying disease determind by histopathology.

Asymptomatic patients were not treated during the post operative period, irrespective of the results of serum calcium measurement. Patients with positive Trousseau's sign and Chvostek's signs but without other clinical signs or symptoms were classified as asymptomatic. Patients with paresthesia, tingling, muscle cramps, tetany, or weakness, were classified as symptomatic and treated according to severity.

**Results:**

The 40 patients (33 women and 07 men) who underwent thyroidectomy during the study period were included. Patient ages ranged from 21 to 60years, with an average age of 36 years. All the patients were euthyroid state before surgery.

Most of the patients (45%) had multinodular goiter, (25%) had Papillary Carcinoma, (15%) had Folicullar Carcinoma, (12%) had thyroiditis, (03%) had Grave's disease. About77.5% hypocalcemia of our study occurred after total thyroidectomy, 17.5% developed after subtotal thyroidectomy, 5% developed after near total thyroidectomy. Around 32.5% of patients developed hypocalcemia postoperatively; 27.5% of them it was transient and in 5% was permanent.

Around 54% of them developed on third Post-operative day, 31% on second Post-operative day, 08% on fourth Post-operative day, 07% on first Post-operative day. Among them, 62% were recovered by oral and 38% by parenteral medication.

All the 13 patients who developed hypocalcemia following thyroidectomy were of normal or under normal muscular built, with only one patient out of the 13 who had hypocalcemia following near total thyroidectomy was obese and of a short neck.

**Tables and Charts:**

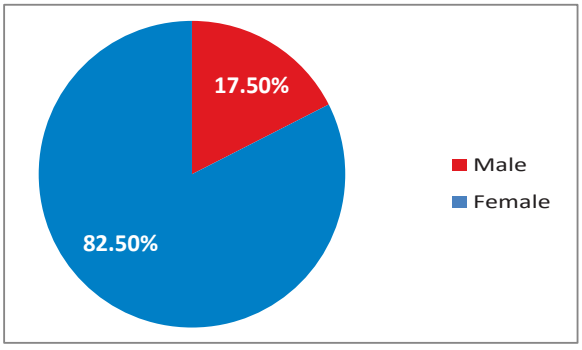



**Figure-1: Pie diagram showing the sex distribution of the postoperative hypocalcemic patients.**

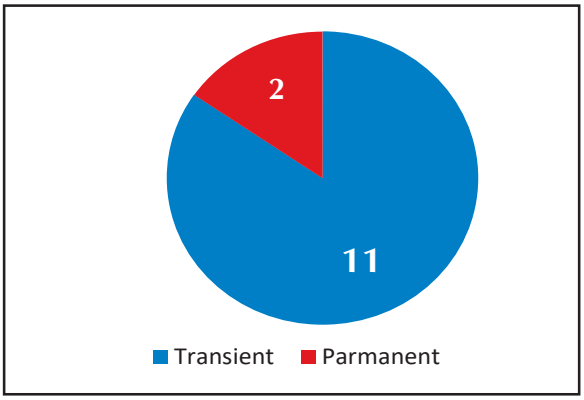



**Figure-2: Clinical types of hypocalcemia with occurrence according to duration**

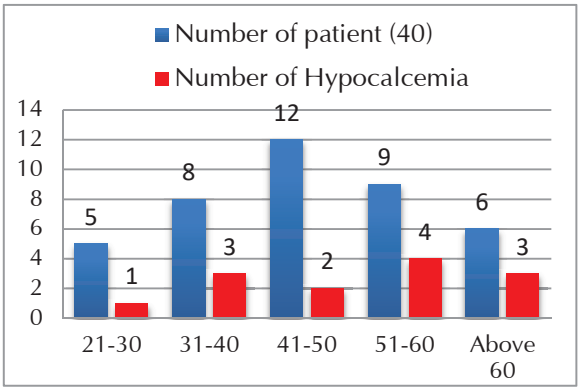



**Figure-3: Bar diagram showing the age distribution of the postoperative hypocalcemic patients.**

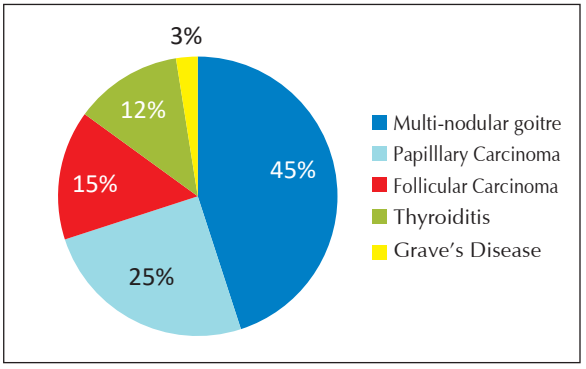



**Figure-4: Pie diagram showing types of thyroid diseases.**

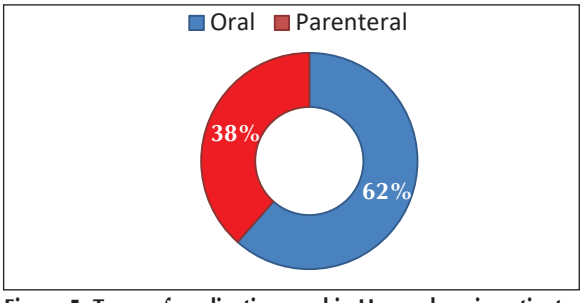



**Figure-5: Types of medication used in Hypocalcemic patients.**

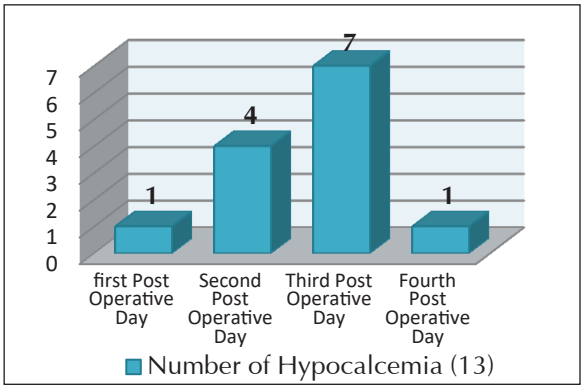



**Figure-6: Bar diagram showing hypocalcemia on post operative days**

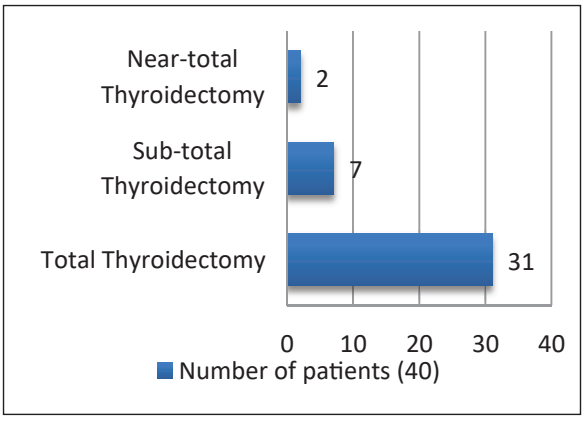



**Figure-7: Bar diagram showing types of surgery.**

**Discussion:**

Post operative hypocalcemia is one of the common complication following thyroid surgery. It is more common following total thyroidectomy. The increased incidence of hypocalcemia in post thyroidectomy patients may be attributed to hemodilution. Earlier studies also provide various other factors such as age, basic pathology, duration of surgery as reasons for increased incidence of hypocalcemia. When all glands are compromised by injury of the vascular pedicle, resection of unintended surgical manipulation and sudden significant fall in level of PTH occur, leading to more intense and faster hypocalcemia, hence causing the symptoms of hypocalcemia occurs secondary to hypoparathyroidism due to trauma, devascularization, or removal of the parathyroid glands that leadsto prolonged hospitalization, increased medical cost, and patient discomfort[5]. Therefore it is necessary to find risk factors for hypocalcemia and hypoparathyroidism following thyroidectomy and help to guide clinical practice. Collectively, our results demonstrate age groups, gender, operation type, disease type, types of complication, time of onset and recovery remedy.

We found that female patients (82.50%) are vulnareable than male (17.5%) to post operative hypoparathyroidism. Seum calcium is regulated by 1,25-dihydroxy cholecalciferol ( calcitriol ) through bone resorption, PTH through calcium reabsorption of renal tubules and calcitriol through calcium intestinal absorbtion. Previous study also showed that intrathyroidal parathyroid glands were more frequent in women

owing to the high occurance rates of parathyroid injury and hypocalcemia[6].

In this study, 20% hypocalcemia found in between 21- 30 years, 37.5% in between 31-40 years, 16% in between 41-50 years, 44.4% in between 51- 60 years, 50% above 60 years of age. Paolo Del Rio et al. also found 14.7% less than 40 years, 20.8% % in between 41- 50 years, 26% in between 51- 60 years, 38.5% above 60 years[7]. Among the hypocalcemic patients, 77.5% hypocalcemia were found after total thyroidectomy, 17.5% developed after subtotal thyroidectomy, 5% developed after near total thyroidectomy. It coincides with the study reported by M. Raja[4]. 85% patients were developed transient and 15% permanent thypocalcemia. In this study, 45% hypocalcemia develop in multi-nodular goiter, 25% in papillary carcinoma, 15% in follicular carcinoma, 12% thyroiditis, 3% in Grave's disease. This picture is consistent with other acceptable publications[4]. 54% patients were developed hypocalcemiaon third post-operative day, 31% on second post-operative day, 08% on fourth post-operative day and 07% on first post-operative day. That correlates with the study done by Alexander de Andrade Sousa[8]. 62% of the hypocalcemic patient were recovered by oral medication and 38% by parenteral medication.

From above all discussion it is evident that incidence of development of hypoclacemic tetany after post thyroidectomy and the time of its occurrence fully coincides with other studies found elsewhere which shows the relevance of the outcome of this series. In this study, we performed a retrospective analysis of 40 patients and used statistical tools to analyze clinical data.

**Conclusion:**

Clinically significant hypocalcemia after thyroid surgery is transient in most of the cases. Although the causes are multifactorial, total thyroidectomy is the most important risk factor for hypocalcaemia. Its incidence is associated with ligation of the inferior thyroid artery and it can be only reduced by using appropriate surgical procedure. The recommended surgical strategy is meticulous dissection and preservation of at least one parathyroid gland and their blood supply to prevent permanent hypoparathyroidism. Further study is needed to establish the correlation between post operative hypocalcemia and ligation of inferior thyroid artery during thyroid surgery.

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