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Predictors of Hypocalcaemia Following Thyroidectomy

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Abstract

Background & Objectives: Hypocalcaemia is a common complication following thyroid surgery, which is multifactorial. The aim of this study was to identify risk factors for development of post-operative hypocalcaemia in cases of total thyroidectomy, near total thyroidectomy, and completion thyroidectomy with or without neck dissection.

Methods: From 1st November 2014 to 31st December 2016, 30 consecutive patients undergoing total thyroidectomy, near-total, and sub-total or completion thyroidectomy at Karnataka Institute of Medical Sciences Hospital were enrolled in this prospective study, longitudinal, cohort study. The primary endpoints were the occurrence of postoperative hypocalcaemia as by defined as a nadir corrected serum calcium 8.0 mg/dL or symptomatic hypocalcaemia.

Results: The 30 patients were analyzed. The average age was 42.53±15.86 years with 86.7% female. The most common indications for surgery were benign thyroid disease (80%). 18 patients (60%) experienced postoperative hypocalcaemia with 10 (33.3%) requiring intravenous calcium infusion. Risk factors for postoperative hypocalcaemia included inadvertent parathyroid removal during surgery further exemplified by the fact that there is lesser incidence of post-operative hypocalcaemia in patients undergoing near total thyroidectomy.

Introduction

Temporary hypocalcemia has been reported to occur in 1.6% to 50% of the patients undergoing bilateral thyroid resection. Permanent hypoparathyroidism results in 0% to 13% of patients after bilateral thyroid surgery [1]. A postoperative decrease of serum calcium is frequently observed within 2 to 5 days after a total or subtotal thyroidectomy, requiring exogenous replacement therapy to alleviate clinical symptoms [2]. Post-operative hypocalcemia is a major concern following thyroid surgery. It often extends the duration of the hospital stay and the need for biochemical tests, when severe; it can lead to serious complications and require intravenous therapy to alleviate the clinical symptoms [3].

Patient and Methodology

From 1st November 2014 to 31st December 2016, 30 consecutive patients undergoing total thyroidectomy, near-total, and sub-total or completion thyroidectomy with or without neck dissection at Karnataka Institute of Medical Sciences Hospital were enrolled in this prospective study, longitudinal, cohort study. Patients with end-stage renal disease, as determined from the medical record, were excluded. The study was approved by the Karnataka Institute of Medical Sciences Hospital institutional review board. Verbal and written informed consent was obtained for all participants in the study at the time of enrollment. Serum calcium was checked at 8 am daily post-operatively till discharge. Hypocalcemia was defined as corrected serum calcium less than 8 mg/dL. Patients with symptomatic hypocalcemia were those with reported paresthesia, perioral numbness, cramping and positive Chvostek's sign and Trousseau's sign. Throughout the hospitalization, patients were checked for signs and symptoms of hypocalcemia. Any patients with signs or symptoms of hypocalcemia were treated with intravenous calcium gluconate replacement. Patients were started on twice-daily oral calcium citrate 1,200 mg with vitamin D 500 IU on development of asymptomatic or symptomatic hypocalcaemia and continued on this supplementation at discharge until outpatient follow-up. Patients with asymptomatic hypocalcemia were maintained on oral therapy alone.

Results

Total thyroidectomy was done in 22 (73.3%) patients, near-total thyroidectomy was done in 3 (10%) patients, Total Thyroidectomy with Bilateral MRND was done in 2 (6.7%) patients, Total Thyroidectomy with Unilateral MRND was done in 2 (6.7%) patients and completion

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Operation	No. of patients	%
Total Thyroidectomy	22	73.3
Near Total Thyroidectomy	3	10.0
Total Thyroidectomy with Bilateral MRND	2	6.7
Total Thyroidectomy with Unilateral MRND	2	6.7
Completion Thyroidectomy	1	3.3
Total	30	100.0

Figure 1: Showing no. and types of thyroidectomies performed.

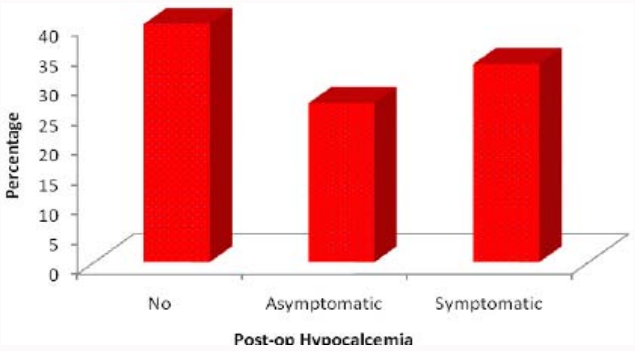

Figure 2: Showing incidence of Hypocalcemia.

Variables	Post-op development of Hypocalcemia		Total	P value
	No	Yes		
Volume of the gland	0.14±0.21	0.13±0.13	0.13±0.16	0.816
Albumin (g/dL)	4.12±0.32	4.13±0.44	4.12±0.39	0.940
Hemoglobin (g/dl)	11.90±1.03	11.74±1.34	11.80±1.21	0.727
Total Count (cells/cumm)	8008.33±2528.55	6950.00±2510.04	7373.33±2529.13	0.269
Serum Creatinine (mg/dl)	0.87±0.16	0.81±0.17	0.83±0.16	0.375
ALP (U/L)	68.25±23.29	70.61±23.10	69.67±22.8	0.787

Figure 3: Showing comparision of various factors between group 1 and group 2.

thyroidectomy was done in 1 (3.3%) (Figure1). Patients who developed hypocalcaemia postoperatively were considered as Group 1 and those who did not ask Group 2. 12 (40%) patients did not develop post-operative hypocalcemia, 18 (60%) patients developed hypocalcemia out of which 8 (26.7%) patients had asymptomatic hypocalcemia and 10 (33.3%) had symptomatic hypocalcemia (Figure 2). There was found to be lesser incidence of post-operative hypocalcemia in patients undergoing near total thyroidectomy than total thyroidectomy (Figure 3). Parathyroid was preserved or auto-transplanted in 20 (66.7%) and 2 (6.7%) patients respectively and there was found to be lesser incidence of post-operative hypocalcemia in these patients (Figure 4). Incidental parathyroidectomy was done in 8 (26.7%) patients. There was no operative mortality. There was no incidence of transient vocal cord paralysis. There was no significant difference in pre-operative hemoglobin, albumin, white blood count, serum creatinine, alkaline phosphatase and thyroid gland volume in group 1 and group 2 (Figure 5).

PROCEDURE	HYPOCALCEMIA	ASYMPTOMATIC	TOTAL	P Value
Total thyroidectomy	14	8	22	0.5
Total thyroidectomy with B/L MRND	2	0	2	0.23
Total thyroidectomy with U/L MRND	1	1	2	0.76
Near total thyroidectomy	0	3	3	0.02
Completion Thyroidectomy	1	0	1	0.4
Total	18	12		

Figure 4: Showing incidence of Hypocalcaemia in various thyroid surgeries.

Parathyroid	Post-op development of Hypocalcemia		Total
	No	Yes	
No	1(8.3%)	7(38.9%)	8(26.7%)
Yes	11(91.7%)	11(61.1%)	22(73.3%)
Total	12(100%)	18(100%)	30(100%)

P=0.099+, significant, Fisher Exact test

Figure 5: Showing incidence of hypocalcemia in patients with relation to visualization of parathyroid glands.

Discussion

It is clear that impaired parathyroid function is the major contributing factor for clinically relevant hypocalcemia. Proper surgical technique is of utmost importance in preserving viable parathyroid glands and several factors have been associated with impaired post-operative function. Susceptibility of parathyroid glands to injury during neck dissection mainly resides in their widely variable anatomical position, their relationship with the thyroid gland, and in their very delicate vascular supply. A higher incidence of postoperative hypocalcemia is seen after total thyroidectomy versus subtotal thyroidectomy. Other factors associated include central neck dissection, reoperative cases, surgery for substernal goiter, surgery for carcinoma and surgery for Grave's disease. A study done by Haluk Recai Unalp et al. [4] published in 2008, in Turkey including 143 patients concluded that near-total Thyroidectomy can offer an advantage over total Thyroidectomy in terms of postoperative hypocalcemia in the patients with benign multinodular goiter. A study done by Bassam Abboud et al. [5] done in 2001, Lebanon also concluded similar results with total Thyroidectomy, elevated free thyroxine level, and parathyroid autotransplantation as independent risk factors for post thyroidectomy hypocalcemia. A study done by Yesim Erbil et al. [6] in 2009, Turkey including 200 consecutive patients with nontoxic multinodular goiter treated by Total Thyroidectomy and Near Total Thyroidectomy showed age and Total thyroidectomy to be significantly associated with postoperative hypocalcemia. In this study it was found that incidence of hypocalcemia following total thyroidectomy was found to be higher especially if parathyroids were not preserved.

References

1. Stell and Maran's Textbook of head and neck surgery and oncology 5th

edition: Hodder Arnold Publication. John Watkinson, Ralph W Gilbert. 2012.

2. Sabiston Textbook of surgery: The biological basis of modern surgical practice 19th edn. Courtney M, Townsend Jr, editors. Elsevier Saunders. 2012.
3. Gregory W Randolph. Surgery of the Thyroid and Parathyroid Glands 2nd edn. Elsevier Saunders. 2013;736.
4. Unalp HR, Erbil Y, Akguner T, Kamer E, Derici H, Issever H. Does near total thyroidectomy offer advantage over thyroidectomy in terms of postoperative hypocalcemia? Int J Surg. 2009;7(2):120-5.
5. Abboud B, Sargi Z, Akkam M, Sleilaty F. Risk factors for postthyroidectomy hypocalcemia. J Am Coll Surg. 2002;195(4):456-61.
6. Erbil Y, Ozbey NC, Sari S, Unalp HR, Agcaoglu O, Ersöz F, et al. Determinants of postoperative hypocalcemia in vitamin D–deficient Graves' patients after total thyroidectomy. Am J Surg. 2011;201(5):685-91.