

Frequency Of Post-operative Hypocalcaemia Following Thyroid Surgery At A Tertiary Care Hospital Of Sindh

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ABSTRACT:

Objective: The present study was conducted to determine the frequency of post-operative hypocalcaemia following thyroid surgery at a tertiary care hospital of Sindh

Study design: Observational study

Place and Duration: Department of surgery, Isra University Hospital from December 2014 to July 2017.

Materials and Methods: 100 cases of thyroid swellings were selected according to inclusion and exclusion criteria. Pre-operative patient history, physical examination, thyroid gland examination and laboratory investigations were performed. A serum calcium levels <8 mg/dl was taken as hypocalcemia. Data was analyzed on SPSS 21 version and P value (P< 0.05) was considered significant.

Results: Of 100 patients, 67% were female and 33% were male (P=0.0001). Female dominancy was noted with female to male ratio of 2.03:1. Age (mean± SD) was noted as 37.5 ± 9.5 years (19 – 48 years). Frequency of symptomatic hypocalcaemia was noted in 23% subjects post operatively. Mean± SD serum calcium and phosphate in post operative hypocalcemia subjects was noted as 7.31 ± 0.38 mg/dl and 2.95 ± 0.63 mg/dl respectively. Majority of symptomatic hypocalcemia were noted within 72 hours post operatively.

Conclusion: The present study reports 23% frequency of post thyroidectomy hypocalcemia noted within 72 hours post operatively. Goiters of long duration, recurrent goiters, hyperthyroidism and goiters with retro sternal extensions were found risk factors for the post thyroidectomy hypocalcemia.

Key words: Hypocalcemia, Phosphate, Post operative complications, Thyroid surgery.

INTRODUCTION:

Thyroid swelling and surgical procedures are now most common in life of a surgeon. Thyroid swellings are highly vascular and surrounding structures are always endangered. Parathyroid glands are pea shaped glands which lie within thyroid capsule, hence accidental resection is common. Post operative complications are frequent with the young surgeons. Post-operative hypocalcemia is an early complication following thyroid surgery¹. Incidence of permanent hypocalcemia is least ranges from 0.5% to 2%, while transient hypocalcemia accounts for more incidences that range from 9.2% to 25%². Fine tissue dissection to identify and spare the parathyroid glands is mandatory to prevent post-operative hypocalcemia. Resection of parathyroid glands usually follows the com-

plete thyroidectomy. 9% frequency of parathyroid loss is noted in bilateral thyroid resection compared to 1.9% in unilateral³. Neuromuscular hyper excitability is the most immediate manifestation of hypocalcemia, followed by occasional symptoms of psychosis. In chronic conditions the cataract, skin eczema and alopecia occur. Ectodermal changes are evident as early as 6 months post operative. Cardiac arrhythmias and intracranial calcification lesions occur if persistent hypocalcemia ensues. These long term complications have negative impact on the health, and socio-economic status of patients with financial loss⁴. Early recognition of post-thyroidectomy hypocalcemia and prompt therapeutic measures may halt the long term complications. Many predictors are under study for establishing and implementing an effective protocol to prevent the post-thyroidectomy hypocalcemia complications successfully⁵. Testing for serum calcium and its supplementation is effective tool which must be available in the hospitals. Serum calcium must be estimated as soon as possible post operatively during postthyroidectomy period.

The present study hypothesizes the large size thyroid goiters, recurrent and retro-sternal goiters, hyperthyroidism and thyroidectomy are associated with increased incidence of post thyroidectomy hypocalcemia. The present study was conducted to determine the frequency of post-operative hypocalcaemia following thyroid surgery at our tertiary care hospital

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MATERIALS AND METHODS:

The present observational study included 100 subjects from Department of surgery, Isra University Hospital from December 2014 to July 2017. Preoperatively patients were communicated for the purpose of study. They were reassured that the present study will cause no harm to them and no financial burden. Only blood samples will be collected for the biochemical tests. They were informed about that they have to sign the consent form voluntarily. A detailed medical and surgical history was taken from volunteers. The sample of 100 cases (both genders) was selected keeping the inclusion and exclusion criteria in view. The diagnosed cases went through bilateral surgical exploration. The cases with pre existing hypocalcemia, previous history of thyroid surgery, positive thyroid auto antibodies, thyroid cancers, lymphoma and nasopharyngeal malignancies were excluded. The patients reporting positive history of calcium, vitamin and mineral supplementations were in exclusion criterion. Pre-operative thyroid swellings were examined. Thyroid gland and cervical lymph node examination was performed pre operatively. Thyroid function tests, thyroid sonography, thyroid scanning (Tc^{99m}), thyroid autoantibodies, serum calcium and phosphate were ordered. Fine needle aspiration cytology (FNAC) was performed for malignancy suspicious thyroid swellings. Hyperthyroid patients were treated pharmacology to make them Euthyroid before surgery. IDL (Indirect laryngoscopy) was performed for vocal cord mobility and normality. Upon completion of patient preparation, the thyroid surgery was planned under general anesthesia. Surgical procedures were performed by senior surgeon. Parathyroid glands and

recurrent laryngeal nerves were preserved by lateral mobilization and fine capsular dissection technique. Post-operative vocal cords examination was performed after extubation. Blood samples were collected at six hours post-operatively for serum calcium estimation. Repeated blood samples were analysed for serum calcium till discharge of patients. Hypocalcemia was defined as serum Ca⁺⁺ <8 mg/dl⁶. Post operative hypocalcemia was confirmed postoperatively and was treated as per standard protocol of intravenous calcium (1 mg/kg body weight) in 0.9% NaCl solution⁶. Post operative patients were asked for regular follow ups. Pre structured proforma and consent form were designed. Consent form was signed by volunteers. Data was entered and saved in the pre structured proforma. Confidentiality of data was maintained. Ethical approval was taken from institute. Statistical analysis was performed on Statistics 9.0 (IBM, incorporation, USA). Kolmogorov - Smirnov test checked the normality by Gaussian data distribution. Continuous and categorical variables were analyzed by Student t- test and Chi square test respectively. Analysis was performed at 95% CI (P <0.05) for statistical significance.

RESULTS:

Of 100 patients, 67% were female and 33% were male (P=0.0001). Female dominancy was noted with female to male ratio of 2.03:1. Age (mean ± SD) was noted as 37.5 ± 9.5 years (19–48 years). Baseline and post operative findings of patient’s characteristics and biochemical tests are shown in table 1. Frequency of symptomatic hypocalcaemia was noted in 23% subjects post operatively. Mean± SD serum calcium and phosphate

	Baseline (Mean±SD)	Post operative (Mean±SD)	P-value
Age (years)	37.5 ± 9.5	-	-
BMI (kg/m ²)	28.9±7.5	27.8±8.45	0.09
Hemoglobin (g/dl)	12.67± 5.6	11.87± 6.31	0.04
RBC counts (x10 ⁹ /µl)	4.8±1.31	3.98±1.51	0.03
WBC counts (x10 ³ /µl)	7.38±8.16	6.08±7.63	0.10
Platelets (x10 ⁹ /µl)	4.81±1.13	3.71±0.93	0.09
Alkaline phosphatase (IU)	120.1±23.5	123.5±15.7	0.07
Serum Albumin	4.5±0.09	3.98±0.89	0.07
Serum calcium (mg/dl)	10.3±2.35	9.31±3.35	0.04
Serum phosphate (mg/dl)	2.35±0.76	2.05±1.76	0.05

Table. 1. Demographic characteristics and Biochemical findings of study population (n=100)

	Normocalcemia	Hypocalcemia	P-value
Serum Ca ⁺⁺ (mg/dl)	9.31±3.35	7.31±0.38	0.048
Serum PO ⁴⁻ (mg/dl)	2.05±1.76	2.95±0.63	0.09

Table. 2. Post operative serum calcium and phosphate

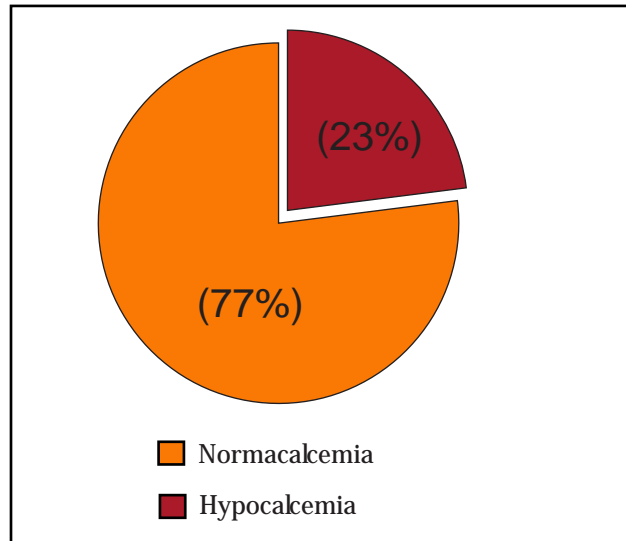


Fig.1 Frequency of Hypocalcemia

in post operative hypocalcemia subjects was noted as 7.31 ± 0.38 mg/dl and 2.95 ± 0.63 mg/dl respectively (Table 2). Majority of symptomatic hypocalcemia were noted within 72 hours post operatively fig. 1. Long term hypocalcemia was not noted in any of subjects in present study. Large thyroid goiters of long duration, recurrent goiters, hyperthyroidism and goiters with retro sternal extensions proved risk factors for the post operative hypocalcemia.

DISCUSSION:

The present study reported on the frequency of hypocalcemia in post operative thyroidectomy patients from our tertiary care hospital. The surgical wards and operation theaters were well equipped with modern facilities. The present study found young age (mean \pm SD) noted as 37.5 ± 9.5 years (19 – 48 years), this is in keeping with previous studies^{2,3}. The female dominance noted in present study with F: M ratio of 2.03:1 (P=0.0001 which) is consistent with findings with previous studies¹⁻⁶. A previous study⁶ reported 76% of thyroid surgeries which were performed on benign thyroid swellings which is consistent to present study as majority of cases were having benign thyroid lesions. The present study reports 23% frequency of hypocalcemia noted within 72 postoperative hours. A previous study⁶ reported 23% frequency of hypocalcemia which is in line with present study. Long term hypocalcemia was not noted in any of subjects in present study. This decrease in post operative hypocalcemia has been attributed to improved surgical techniques in hands of senior surgeons with few complications in post operative thyroidectomy patients^{8,20,21}. Transient post- thyroidectomy hypocalcemia is frequent complication noted in 0.5% to 75% of thyroid surgery cases⁹. Wide range of hypocalcemia frequency is because of surgeon expertise of parathyroid gland sparing

techniques. Previous studies^{10,11} had shown the post operative hypocalcemia observed during 24 to 48 hours post operatively, this supports the present study. In present study, all of hypocalcemia cases were noted during first 72 hours post operatively. Hypocalcemia is a serious life threatening complication^{10,11} hence thyroidectomy worth to be performed by senior surgeons and should be taken as team work task. In present study, the mean \pm SD serum calcium and phosphate in post operative hypocalcemia subjects was noted as 7.31 ± 0.38 mg/dl and 2.95 ± 0.63 mg/dl respectively, this is in agreement with previous studies^{6,10,11}. Previous studies^{12,13} have reported 50% frequency of post thyroidectomy hypocalcemia which is in contrast to present and previous studies^{6,10,11}. However, the hypocalcemia findings of present study is consistent with a previous study¹⁴ that reported hypocalcemia frequency of 21.6% in post thyroidectomy patients. In present study, hypocalcemia was not noted in any of patients, this is in agreement with previous studies^{6,14}. A previous study¹⁵ reported transient hypocalcaemia in 26.7% of Euthyroid cases which is in high frequency compared to present study, however, transient nature of hypocalcemia is a consistent observation. Transient hypocalcemia of present study is in full agreement with another previous study¹⁶. In the present study, 23% hypocalcemia occurred within 72 post operative hours, this is consistent with previous studies^{14,17}. Large thyroid goiters of long duration, recurrent goiters, hyperthyroidism and goiters with retro sternal extensions proved risk factors for the post operative hypocalcemia which is similar to previous studies^{18,19}. From the evidence based findings of present study and review of literature, it is suggested that the hypocalcemia may be prevented by careful surgical exploration by expert senior surgeons. Present research had limitations of small sample size, and other laboratory investigations of serum cholecalciferol and parathyroid hormones were not available. However, the present study provides significant clinical experience of how hypocalcemia may be prevented by careful thyroidectomy, and mortality may be prevented by treating the transient hypocalcemia which may prove fatal otherwise.

CONCLUSION:

The present study reports 23% frequency of post thyroidectomy hypocalcemia noted within 72 hours post operatively. Long term hypocalcemia was not noted in any of subjects. Goiters of long duration, recurrent goiters, hyperthyroidism and goiters with retro sternal extensions were found risk factors for the post thyroidectomy hypocalcemia.

REFERENCES:

1. Arumugam S, Mohankumar A, Muthukumaraswamy A, Anandan H. Clinical Study of Hypocalcemia following Thyroid Surgery. *Int J Sci Stud*, 2017; 4(11):37-41.

2. Thomusch O, Machens A, Sekulla C, Ukkat J, Brauckhoff M, Dralle H. The impact of surgical technique on postoperative hypoparathyroidism in bilateral thyroid surgery: A multivariate analysis of 5846 consecutive patients. *Surgery*, 2003;133:180-5
3. Puzziello A, Rosato L, Innaro N, Orlando G, Avenia N, Perigli G, Calò PG, et al. Hypocalcemia following thyroid surgery: incidence and risk factors. A longitudinal multicenter study comprising 2,631 patients. *Endocrine* 2014; 47:537-542.
4. Delbridge L. Total thyroidectomy: The evolution of surgical technique. *ANZ J ssSurg* 2003;73:761-8
5. Kim YS. Impact of preserving the parathyroid glands on hypocalcemia after total thyroidectomy with neck dissection. *J Korean Surg Soc* 2012;83:75-82.
6. Baldassarre RL, Chang DC, Brumund KT, Bouvet M. Predictors of hypocalcemia after thyroidectomy: Results from the nationwide inpatient sample. *ISRN Surg* 2012; doi:10.5402/2012/838614.
7. Leahu A, Carroni V, Biliotti G. Calcium level, a predictive factor of hypocalcemia following total thyroidectomy. *Jurnalul de Chirurgie Iasi*, 2009;5:148-52.
8. Nair CG, Babu MJ, Menon R, Jacob P. Hypocalcaemia following total thyroidectomy: An analysis of 806 patients. *Indian J Endocr Metab*, 2013; 17:298-303.
9. Lo CY, Lam KY. Postoperative hypocalcemia in patients who did or did not undergo parathyroid autotransplantation during thyroidectomy: A comparative study. *Surgery*, 1998;124:1081-6
10. Wang J, Gu J, Han Q, Wang W, Shang J. Value of intraoperative parathyroid hormone monitoring in papillary thyroid cancer surgery: can it be used to guide the choice of operation methods? *Int J Clin Exp Med*, 2015; 8(5):7778-85.
11. El-Shinawi M, El-Anwar A, Nada M, Youssef T, Fakhry E, Raslan S, et al. Oral calcium and vitamin D supplementation after total thyroidectomy: Does it worth?. *Thyroid Res Pract*, 2014;11:98-102.
12. Sakouti M, Montazeri V, Golzari S. The incidence of transient and permanent hypocalcemia after total thyroidectomy for thyroid cancer. *Int J Endocrinal Metab*, 2010;1;7-12.
13. Page C, Strunski V. Parathyroid risk in total thyroidectomy for bilateral, benign, multinodular goiter: Report of 351 surgical cases. *J Laryngol Otol* 2007; 121: 237-41.
14. Warren FM, Andersen PE, Wax MK, Cohen JL. Perioperative parathyroid hormone levels in thyroid surgery: Preliminary report. *Laryngoscope*, 2004; 114:689-93.
15. Usha Menon V, Sundaram KR, Ummikrishnan AG, Jayakumar RV, Nair V, Kumar H. High prevalence of undetected thyroid disorders in an iodine sufficient adult in south Indian population. *J Indian Med Assoc*, 2009; 107:72-7.
16. Shaha AR, Jaffe BM. Parathyroid preservation during thyroidectomy. *Am J Otolaryngol*, 1998; 19:113-7.
17. S. M. Wilhelm and C. R. McHenry, "Total thyroidectomy is superior to subtotal thyroidectomy for management of graves' disease in the United States," *World Journal of Surgery*, 2010; 34(6), 1261-64.
18. Iqbal M, Subhan A, Baig MS, Shah MS. Frequency of hypocalcemia in total thyroidectomy. *J Surg Pak*, 2010; 15 (2):87-91.
19. Francesco Di, Casella C, Bugari G, Lacobello C, Salemi B. Identification of patients at low risk for thyroidectomy-related hypocalcemia by intraoperative quick PTH. *World J Surg*, 2006; 30:1428-33.
20. Thomusch O, Machens A, Sekulla C. Multivariate analysis of risk factors for postoperative complications in benign goiter surgery; prospective multicenter study in Germany. *World J Surg*, 2000; 24:1335-41.
21. Fahmy FF, Gillett D, Lolen Y. Management of serum calcium level in post thyroidectomy patients. *Clin Otolaryngol*, 2004; 29:735-9.
22. Riju R, Jadhav S, Kanthaswamy R, Jacob P, Nair CG. Is total thyroidectomy justified in multinodular goitre. *J Indian Med Assoc*, 2009; 107:223-5.
23. Iqbal M, Parveen S. Recurrent Laryngeal Nerve Palsy and Hypocalcemia with and without Bilateral Ligation of Inferior Thyroid Artery in Total Thyroidectomy. *J Surg Pak*, 2015; 20 (1):19- 22.
24. Salinger EM and Moore JT. Peri operative indicators of hypocalcemia in total thyroidectomy: the role of vitamin D and parathyroid hormone. *Am J Surg*, 2013; 206: 876-881.
25. Bliss RD, Gauger PG, Delbridge LW. Surgeon's approach to thyroid gland- Anatomy and surgical technique. *World J Surg*, 2011; 24:891- 7.

