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Post Total Thyroidectomy Hypocalcaemia and relation with the Age of the Patient

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ABSTRACT

Objective: To find the magnitude of clinically overt hypocalcaemia post-total thyroidectomy and its relation with the age of the patient.

Study Design: Cross-sectional study.

Place and Duration of Study: Combined Military Hospital, Bahawalpur Pakistan, from Jan 2017 to Dec 2019.

Methodology: Sixty patients who were to undergo total thyroidectomy were included in the study in strict compliance with the inclusion and exclusion criteria. Patients were divided into two groups according to their ages. In Group-A, patients younger than 50 and Group-B, patients older than 50 years were included. All the patients were followed up by clinical examination for the development of clinically overt hypocalcaemia and confirmed by measurement of serum calcium.

Results: Mean age of the patients was 42.75±13.05 years, with an age range of 20 to 68 years. Of all the patients, 14(23.3%) were male, and 46(76.7%) were females. Seven patients in Group-A developed post-thyroidectomy hypocalcaemia clinically, whereas, in Group-B, only one developed this condition. Clinical post-thyroidectomy hypocalcaemia developed more often in the younger age group and these results were statistically significant (p= 0.023).

Conclusion: Clinically overt hypocalcaemia develops more often in younger patients after total thyroidectomy.

Keywords: Biochemical hypocalcaemia, Clinical hypocalcaemia, Post thyroidectomy hypocalcaemia, Total thyroidectomy,

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INTRODUCTION

Thyroid surgery is one of the most commonly performed surgeries in the neck, leading to post-thyroidectomy hypocalcaemia (PTHC) being the most commonly encountered complication after thyroid surgery [1,2]. Post thyroidectomy hypocalcaemia can be transient or permanent, and up to 4% of the patients will need lifelong calcium supplements to counter the effects of hypocalcaemia [3,4]. In addition, different risk factors have been identified leading to post thyroidectomy hypocalcaemia, including the age of the patient, type of surgery(redo surgery, total thyroidectomy), the experience of the surgeon, benign vs malignant disease, autoimmune thyroiditis, neck dissection.[5,6]

Severe post-thyroidectomy hypocalcaemia can pose a danger to life by causing laryngospasms and can lead to cardiac arrhythmia. Post-thyroidectomy hypocalcaemia can lead to prolonged hospital stays because of the potential dangers it poses to the life of the patient.[7] Post thyroidectomy hypocalcaemia can be prevented by either pre-operative oral calcium and Vitamin D supplements or post-operative either by giving calcium supplements through the parenteral route or orally.[8,9] Post-operative hypocalcaemia is treated by giving either oral calcium and Vitamin D supplements or intravenous calcium gluconate infusion in more severe forms of hypocalcaemia or resistance to oral calcium supplements. [8,10]

Though many factors can be considered risk factors for the development of post-thyroidectomy hypocalcaemia, this study aims to assess the age of the patient as an independent risk factor for the development of post-thyroidectomy hypocalcaemia.

METHODOLOGY

The cross-sectional study was carried out at Combined Military Hospital, Bahawalpur, a 400 bedded tertiary care hospital in south Punjab, from January 2017 to December 2019 after taking approval from the Research Review Board of the Hospital (IRB certificate EC-23-2021). Non-probability convenience technique was used for sampling. The sample size was calculated using OpenEpi online software for sample size estimation taking the incidence of clinically overt post-thyroidectomy hypocalcaemia as 7.8%.[11]

Inclusion Criteria: Patients of any age group, and of either gender, undergoing total thyroidectomy were included in the study.

Exclusion Criteria: Patients who had undergone parathyroidectomy or had evidence of pre-operative clinical or biochemical hypocalcaemia were excluded.

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Sixty patients who underwent total thyroidectomy were included according to the inclusion criteria. Patients were divided into two groups according to their ages. Patients younger than 50 were put in Group-A, and older than 50 years of age were placed in Group-B. Gender of the patient was considered a separate variable.The selected patients were followed up for the development of overt clinical signs of hypocalcaemia, including circumoral numbness and tetany or carpopedal spasms as overt signs of hypocalcaemia. Clinical hypocalcaemia was confirmed by measuring serum calcium biochemically, serum Calcium level less than 2.1mmol/L was considered hypocalcaemia.[12] The results were recorded in their respective groups.

Statistical Package for Social Sciences (SPSS) version 20.0 was used for the data analysis. Data analysis was done using SPSS version 20. Continuous variables were presented as Mean±SD. The categorical variables were presented as frequency and percentage. Statistical analysis was done to compare the frequency of development of post-operative hypocalcaemia in both groups to determine whether the difference was statistically important. The *p*-value of <0.05 was taken as significant.

RESULTS

Sixty patients who underwent total thyroi-dectomy were included according to the inclusion criteria. Out of all the patients, 14(23.3%) were male, and 46(76.7%) were females. The age of the patients ranged between 20 to 68 years, with a mean of 42.75± 13.05 years. Seven patients in Group-A developed post-thyroidectomy hypocalcaemia, whereas one in Group-B developed post-thyroidectomy hypocal-caemia.

Table: Development of Post Thyroidectomy Hypocalcaemia in the Study Groups (n=60)

Patients	Post Thyroidectomy Hypocalcaemia		p-value
	Present(n=8)	Absent (n=52)	
Group-A (<50 years)	7(23.3%)	23(76.7%)	0.023
Group- B (>50 years)	1(3.3%)	29(96.7%)	

Patients in both groups recovered from hypocal-caemia with the infusion of calcium gluconate without any immediate complications. However, patients were kept on oral calcium supplements till the next follow-up after two weeks. Statistical analysis was done to find the significance of the frequency of development of post-thyroidectomy hypocalcaemia in both groups. These results were statistically significant, indicating that post-thyroidectomy hypoc-alcaemia develops significantly more in patients younger than 50 years (*p*-value=0.023)

DISCUSSION

The study was conducted on patients who underwent total thyroidectomy. It was observed for the development of clinically overt manifestations of post-thyroidectomy hypocalcaemia like circumoral paresthesias or numbness and tetany or carpopedal spasms till 24 hours post-operatively, and biochemical assays confirmed hypocalcaemia. Hypocalcaemia was defined as serum calcium levels below 2.1mmol/L. The patients were divided into two groups according to their age. Patients in Group-A who were younger than 50 years developed more cases of clinical post-thyroidectomy hypocalcaemia than those in Group-B, indicating that younger patients have more propensity towards developing post-thyroidectomy hypocal-caemia than older patients.

Arman *et al*. found that post-thyroidectomy hypocalcaemia is associated with younger age after total or completion thyroidectomy. However, it is not statistically significant if we take biochemical post-thyroidectomy hypocalcaemia, but it is statistically significant if we take clinical post-thyroidectomy hypocalcaemia.[7] They found that patients in the older age group developed biochemical hypocalcaemia without any clinical manifestation. In contrast, biochemical hypocalcaemia was more closely related to the clinical manifestation of hypocalcaemia in younger patients. Arman *et al.* also found that post-thyroidectomy hypocalcaemia mostly occurs within the first 24 hours after surgery, with its incidence decreasing over time. Only 3.6% of the patients presenting with persistent hypocalcaemia after six months need lifelong supplementation of calcium.[7] Most patients do not need calcium supplements beyond six months after thyroid surgery.[8]

Three previous studies found that post-thyroidectomy hypocalcaemia is associated with low pre-operative serum calcium and parathyroid hor-mone levels. Patients' demographics like age, gender and ethnicity have no significant influence on clinical and biochemical hypocalcaemia.[9-11] Their findings do not match with the findings of our study, in which we found a negative correlation between age and the development of post-thyroidectomy hypoca-lcaemia clinically confirmed by biochemical assays.

Nemade *et al*. concluded in their study that early measurement of serum calcium levels post-operatively reliably predicts prolonged temporary hypocalcaemia and the need for oral calcium supplements in these patients.[12] Stedman *et al*. found that measuring serum calcium 24 hours post-operatively helps decide the need for calcium supplements and length of stay in the hospital and post-operative hospital visits. It also reliably predicts permanent post-thyroidectomy hypocalcaemia.[13]

Grainger *et al*. showed that post-thyroidectomy hypocalcaemia increases the length of stay in the hospital to a statistically significant level emphasizing the need to prevent, identify and treat post-thyroidectomy hypocalcaemia promptly.[14] Islam *et al*. have found that the normal range of parathormone 24 hours post total thyroidectomy is associated with no residual clinical or biochemical hypocalcaemia three months post operatively.[15] Khan *et al*. found that immediate pre-operative oral supplementation of Vitamin-D is associated with fewer cases of post-operative hypocalcaemia clinically and biochemi-cally.[16]

Järhult *et al*. have found out that not all patients having biochemical hypocalcaemia post thyroidectomy show overt signs of clinical hypocalcaemia, so no oral calcium supplementations are needed for all the biochemically hypocalcaemic patients. Oral calcium supplementations were restricted to patients who only had symptomatic hypocalcaemia after thyroidectomy without any adverse short- or long-term sequelae.[17] Xing *et al*. found that giving oral calcium and Vitamin D supplementation post total thyroidectomy reduces the need for intravenous calcium, reducing prolonged hospital stay.[18]

This study agrees with the findings of Arman and colleagues that post-thyroidectomy hypocalcaemia is associated with a younger age group. Furthermore, the younger age group is significantly associated with clinical or symptomatic post thyroidectomy hypocalcaemia, so there is a need to remain vigilant in this population after surgery on the thyroid to identify and treat the complications of hypocalcaemia effectively and find ways to prevent it by pre-operative means, including pre-operative oral calcium and Vitamin-D supplement. This saves the patients from a prolonged hospital stay for a potentially preventable condition.

This study has its shortcoming in terms of the small sample size. Therefore, there is a need to conduct the study with larger sample sizes to find people at risk to reduce the chances of post-thyroidectomy hypocalcaemia and length of stay in the hospital by devising a strategy to counter post-thyroidectomy hypocalcaemia by pre-operative and post-operative measures.

CONCLUSION

This study has demonstrated that post-operatively hypocalcaemia occurs most frequently in the younger age group after total thyroidectomy. Patients under 50 years are a susceptible population, so more vigilant monitoring of this age group is necessary for developing hypocalcaemia and preventing its immediate and long-term side effects.

Conflict of Interest: None.

Authors' Contribution

Following authors have made substantial contributions to the manuscript as under:

IA& MJM: Data acquisition, data analysis, critical review, approval of the final version to be published.

MH & SN: Conception, study design, drafting the manuscript, approval of the final version to be published.

SFN & FH: Data interpretation, critical review, approval of the final version to be published.

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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