

Risk Factors and Frequency of Hypocalcaemia in Unintentional Parathyroid Gland Removal During Thyroid Surgical Interventions

Hurtamina Khan¹, Shireen Ramzan², Zahid Mehmood¹, Razzaq Dogar², and Javed Jamali²

ABSTRACT

Objectives: To identify the risk factors and to determine the frequency of hypocalcaemia in unintentional parathyroid gland removal during thyroid surgical interventions at a tertiary care hospital in Karachi

Methodology: Retrospective study of two years was conducted at Jinnah Postgraduate Medical Centre (JPMC), Karachi from April 2016 to April 2018. The Head & Neck department's records were accessed and analyzed using a proforma.

Results: Total 86 patients were identified. Twenty-four (24) cases from the total of 86 were found to be malignant, which were treated accordingly, resulting in temporary hypocalcaemia in seven (7) cases. Six (6) Cases of Papillary Ca (total thyroidectomy with central neck dissection) resulted in temporary hypocalcaemia in two (2) cases. Seven (7) multinodular goiter (total thyroidectomy) resulted in temporary hypocalcaemia in two (2) cases. In eight (8) cases, lobectomies/ FNAC was done initially, but then their histopathological reports turned out as Papillary Ca. Therefore, completion thyroidectomy with central neck dissection was performed in seven (7) cases and total thyroidectomy with modified neck dissection in one (1) case, which resulted in temporary hypocalcaemia in three (3) cases. Three (3) cases of Follicular Ca in which total thyroidectomy was performed, resulted in no cases of temporary hypocalcaemia.

Conclusion: Re-operated surgeries, malignant thyroid pathology with neck dissection (central/ modified neck dissection) are associated with high chances of unintentional parathyroid gland removal leading to hypocalcaemia. The operating surgeon should consider these risk factors during recurrent malignant surgery with neck dissection.

How to cite this article: Khan H, Ramzan S, Mehmood Z, Dogar R, Jamali J. Risk factors and incidence of hypocalcemia in unintentional parathyroid gland removal during thyroid surgical interventions. Ann Jinnah Sindh Med Uni 2019; 5 (1): 35-38

عنوان: تھائیرائینڈ غدد کی جراحی کے دوران بھرا تھائیرائینڈ غدد کی غیر ارادی طور پر تعلق کی وجہ سے خون میں کلسیم کی کمی پیدا ہونے کے واقعات اور خدشات۔

تعارف: اس تحقیق کا مقصد کراچی میں تیس سے درجے کے اعلیٰ اسپتال میں تھائیرائینڈ غدد کی جراحی کے دوران بھرا تھائیرائینڈ غدد کی غیر ارادی طور پر تعلق کی وجہ سے خون میں کلسیم کی کمی پیدا ہونے کے واقعات کے تعدد اور خدشات کی جانچ کرنا ہے۔

طریقہ کار: یہ تحقیق جناح پوسٹ میڈیکل سینٹر (JPMC) کراچی میں گزشتہ 2 سالوں میں اپریل 2016 سے اپریل 2018 کے دوران عمل میں آئی۔ ایک پرفارم کے ذریعے Head and Neck ڈیپارٹمنٹ کے ڈیٹا کی جانچ کی گئی۔

نتیجہ: حاصل ہونے والے نتائج میں 86 کیسز سامنے آئے جن میں سے 24 انتہائی خطرناک صورت میں پائے گئے اور 07 مریض عارضی طور پر خون میں کلسیم کی کمی کا شکار تھے۔ جبکہ 06 کیسز میں گلے کے درمیان میں کیئے گئے آپریشن جن کے رسولتی تھی ان میں سے 02 کو بھی عارضی طور پر خون میں کلسیم کی کمی کی شکایت تھی۔ اور multinodular goiter کے 07 مریضوں میں بھی 02 کو خون میں کلسیم کی کمی تھی۔ 08 مریضوں میں جنکو ابتداء میں lobectomies/ FNAC کیا گیا تھا اور سسٹو پیتھا لوجیکل رپورٹ آنے پر رسولتی کی تشخیص کی وجہ سے 07 مریضوں کے گلے کے درمیان میں آپریشن کیا گیا اور ایک مریض کے thyroidectomy with modified neck dissection کیا گیا جس کے نتیجے میں 03 مریضوں کو خون میں کلسیم کی کمی کی شکایت ملی۔ جبکہ 03 Follicular Ca کے مریضوں کو جن کا total thyroidectomy کیا گیا تھا ان میں سے کسی کو بھی خون میں کلسیم کی کمی کی شکایت نہیں ملی۔

حاصل مطالعہ: دوبارہ کیا گیا جراحی کا عمل اور گلے کے آپریشن (درمیان سے یا موڈیفائیڈ) بھرا تھائیرائینڈ غدد کی غیر ارادی طور پر تعلق کی وجہ سے خون میں کلسیم کی کمی پیدا ہونے سے براہ راست منسلک ہیں۔ سرجن کو چاہیے کہ موجودہ حالات میں ان تمام خدشات کا خیال رکھے۔

INTRODUCTION

Parathyroid glands were first identified in humans by Ivar Sandstorm¹. These glands are closely associated with lateral lobes of thyroid and have a short line of embryologic descent but function independently of

thyroid gland². Lobectomies and thyroidectomies are the most frequent operations for patients with benign and malignant pathology of thyroid gland/glands^{3,4}. Parathyroid injury during unilateral lobectomy is unlikely to result in hypocalcaemia⁵. The operating surgeon should also keep in mind the anatomical variations of the parathyroid glands⁶⁻⁸. During thyroidectomies, preservation of the parathyroid glands can be achieved by careful dissection directly on the thyroid capsule separating the parathyroid glands gently from the thyroid capsule⁴. In the 21st century, thyroidectomy has become safe and effective with improved outcomes and minimal morbidity^{9,10}.

1 Jinnah Postgraduate Medical Centre, Karachi, Pakistan

2 Dow University of Health Sciences, Karachi, Pakistan

Correspondence: Hurtamina Khan, Jinnah Postgraduate Medical Centre, Karachi, Pakistan

Email: drhurtamina@hotmail.com

METHODOLOGY

All 86 patients who underwent surgical procedure were retrospectively included. Out of these, 62 cases were operated for lobectomy and 24 cases were operated for malignant and multinodular goiter. All specimens were sent for histopathology post-operatively, between April 2016 and April 2018 in Head and Neck Department of Jinnah Postgraduate Medical Centre, Karachi.

Proforma was made including age, gender, investigations including ultrasound of the neck, FNAC, CT-Scan contrast, neck/lymph node status, surgical procedure, post-operative histopathological report, serum calcium levels, and follow up.

RESULTS

In our study, 86 patients were included, all of whom had undergone thyroid surgical intervention. Females were 53 (61.62%) and males comprised (38.37%) of the total. Table no. 1 shows more females underwent thyroid pathology than males.

Table No. 1

Gender	Total no. of patients / % of patients
Male	33 (38.37%)
Female	53 (61.62%)

Table no. 2 shows that the pathology of thyroid was benign in sixty-two (62) cases in the two years of the study. In the first year (2016-2017), the number of benign cases was 28 (45.16%) and in the second year of study (2017-2018), 34 benign cases (54.83%) were reported. The rest were malignant thyroid cases which numbered 24 in the two years of study duration: in the first year (2016-2017), 10 cases (41.66%) and in the second year, 14 (58.33%) malignant cases were reported.

Table No. 2

Duration of study	Benign pathology/ Total cases	Duration of study	Malignant pathology/ Total cases
1 st year (2016-2017)	28 cases (45.16%)	1 st year (2016-2017)	10-cases (41.66%)
2 nd year (2017-2018)	34 cases (54.83%)	2 nd year (2017-2018)	14 cases (58.33%)

Table no. 3 shows the total surgical procedures performed in both benign and malignant cases of thyroid gland. In 62 cases, lobectomies were performed for benign pathology. In the 24 MNG (multinodular goiter) and malignant cases, total thyroidectomy/ completion thyroidectomy with or without central compartment neck dissection or modified neck dissection was performed. After thyroid surgery, specimens were sent for histopathology conclusion report.

Table No. 5 showed that in total 86 patients, parathyroid gland was unintentionally removed in 09 cases (10.4%) and reported in the histopathological specimen conclusion report. In 77 cases (89.53%), no parathyroid gland was reported to be removed. In 7 patients, hypocalcaemia was clinically positive and was reported.

DISCUSSION



Thyroid surgery is one of the most frequent operations performed in thyroid benign and malignant pathology. Hypocalcaemia is an important complication following thyroid surgical intervention with reports varying from 0.5% to 75%^{11,12}. In our study, 9

patients (10.9%) reported with parathyroid gland/tissues in histopathological conclusion report but clinically hypocalcaemia was only positive in 7 patients (8.13%) after post-operative assessment performing Chvostek's sign/ Trousseau's sign.



In our two years of retrospective study, the risk factors identified for unintentional parathyroidectomy are most likely to be the re-operated cases of thyroid which were probably results of fibrosis formation; the malignant thyroid pathology especially

in papillary carcinoma of thyroid gland in which completion of thyroidectomy/total thyroidectomy with central neck dissection/modified neck dissection was performed; and the size of thyroid gland in two cases of multinodular goiter in which hypocalcaemia was reported.

Dissection of neck (central neck dissection/ lateral compartments) especially in cases of reoperation is complicated by scarring, fibrosis, and bleeding, making it more prone to injure important structures. Increased awareness when dissecting the central compartment may reduce the risk of unintentional parathyroidectomy¹³. Two recent studies have reported a significant association between inadvertent parathyroidectomy and neck dissection (central compartment clearance and modified neck dissection)^{14,15}.

Table No. 3: Surgical Procedures Performed in 86 Cases

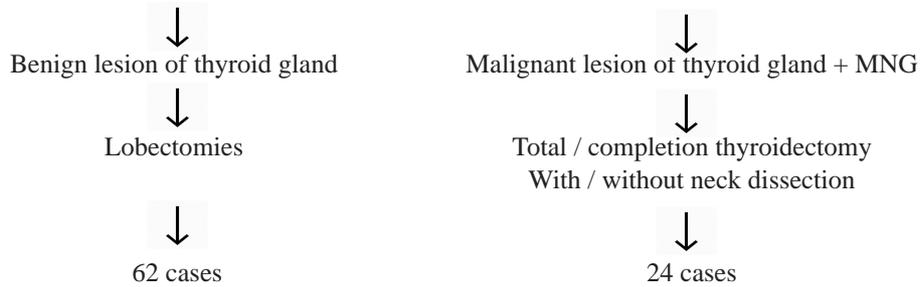


Table No: 4

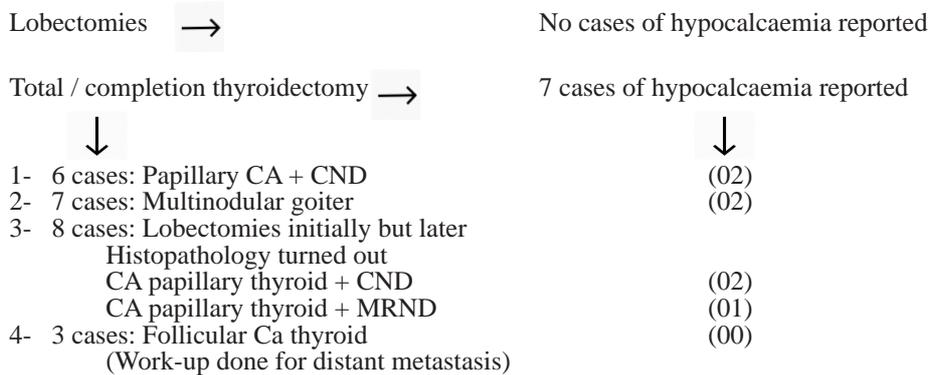
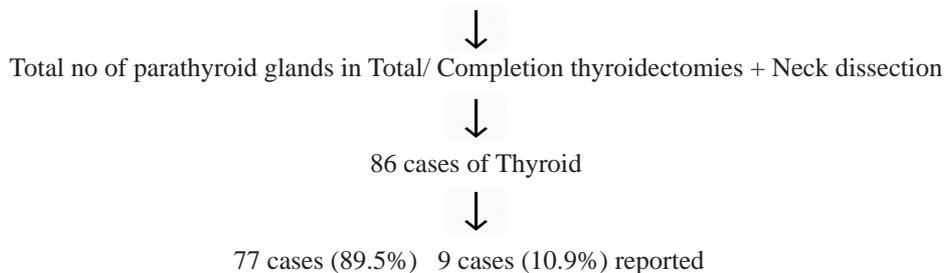


Table No. 5

Histopathological Conclusion Report after Lobectomies/ Total-completion Thyroidectomy/Neck Dissection



However, in our cross-sectional descriptive study, age and sex were found to be irrelevant in carrying any risk for inadvertent removal of parathyroid gland which leads to hypocalcaemia.

Postoperative hypocalcaemia is a major concern after thyroid surgery. The overall incidence of temporary hypocalcaemia among our patients was 8.13%, which reverses spontaneously in most patients after conservative treatment.

The surgeon should keep in mind the anatomical variations of the parathyroid glands to avoid inadvertent injury, revascularization, or resection of parathyroid glands. By knowing the anatomical principles and surgical guidelines, the complication rate of unintentional removal of parathyroid glands during thyroid surgical intervention minimizes.

Re-exploration cases after lobectomy/FNAC conclusion histopathological reports and in recurrence cases,

malignant thyroid pathology with neck dissection, has a strong correlation with unintentional removal of parathyroid glands.

CONCLUSION

Re-operated surgeries after lobectomy and for malignant thyroid pathology with neck dissection are strongly associated with high risk for unintentional removal of parathyroid glands during thyroid surgical interventions which may cause hypocalcaemia in patients. Surgeon should be fully aware and must consider these risk factors during reoperative surgery of thyroid and malignant pathology with central/modified neck dissection.

Authors' contributions: Dr Hurtamina Khan conceived the idea, worked on literature search, data collection, data analysis and review, and the introduction. Dr Shireen Ramzan and Dr Zahid Mehmood worked on literature search, results, and discussion. Dr Razzaq Dogar reviewed the literature, worked on discussion, and edited the manuscript. Dr Javed Jamali reviewed the article. All authors discussed the results and contributed to the final manuscript.

References

1. Sandstorm, I. On a new gland in man and several mammals (glandulaeparathyriodea). Upps Lak Forh. 1880;15:441-471
2. Bliss RD, Gauger PG, Delbridge LW. Surgeons approach to the thyroid gland surgical anatomy and the importance of technique. World J Surg. 2000;24:891-897
3. Bellatone R, Lombardi CP, Bossola M, Boscherini M, Alesina P, Traini, et al. Total thyroidectomy for management for benign thyroid disease. World J Surg. 2002; 26 (12):1468-71
4. Giles Y, Boztepe H, Terzioglu T, Tezelman S. The advantage of total thyroidectomy to avoid reoperation for incidental thyroid cancer in multinodular goiter. Arch Surg. 2004; 139(2):179-82.
5. Bhattacharya N, Fried MP. Assessment of the morbidity and complications of total thyroidectomy. Arch Otolaryngol Head Neck Surg. 2002;128(4):389-392. doi:10.1001/archotol.128.4.389
6. Khairy GA, Al-Saif A. Incidental parathyroidectomy during thyroid resection: incidence, risk factors, and outcome. Ann Saudi Med. 2011;31(3):274-278
7. Akerstrom G, Malamaeus J, Bergstrom R. Surgical anatomy of human parathyroid glands. Surgery. 1984; 95(1):14-21
8. Abboud B. Topographic anatomy and arterial vascularization of the parathyroid glands: Practical application. Presse Med. 1996; 25(25):1156-61.
9. Koyuncu A, Dokmetas HS, Turan M, Aydin C, Karadayi K, Budak E, et al. Comparison of thyroidectomy techniques for benign thyroid disease. Endocr J. 2003; 50(6):723-7
10. Friguglietti CU, Lin CS, Kulesar MA. Total thyroidectomy for benign thyroid disease. Laryngoscope. 2003; 113(10):1820-6.
11. Fahmy FF, Gillet D, Lolen Y, Shotton JC. Management of serum calcium levels in post-thyroidectomy patients. Clin Otolaryngol Allied Sci. 2004;29(6):735-9.
12. Sturniolo G, Lo Schiavo MG, Tonante A, D'Alia C, Bonano L. Hypocalcemia and hypoparathyroidism after total thyroidectomy: a clinical biological study and surgical considerations. Int J Surg Investig. 2000;2(2):99-105
13. Yousuf T, Gaballah G, Abd-Elaad E, EL-Dosky E. Assessment of risk factors of incidental parathyroidectomy during thyroid surgery: A prospective study. Inter J surg. 2010;8(3):207-211
14. Sasson AR, Pinpank JF, JR, Wetherington RW, Hanlon AL, Ridge JA. Incidental parathyroidectomy during thyroid surgery does not cause transient symptomatic hypocalcemia. Arch Otolaryngol Head Neck Surg. 2001; 127(3):304-8
15. Lin DT, Patel SG, Shah AR, Singh B, Shah JP. Incidence of inadvertent parathyroid removal during thyroidectomy. Laryngoscope. 2002;112(4):608-11