

# Evaluation of patients who have undergone unintentional parathyroidectomy following thyroidectomy: A retrospective cohort study

Tulay Diken Allahverdi, Harun Bayram, Kenan Binnetoglu, Turgut Anuk, Ugur Bulut

Kafkas University Faculty of Medicine, Department of General Surgery, Kars, Turkey

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## Abstract

**Aim:** We investigated the postoperative parathormone levels and the incidence of hypocalcemia in patients who had inadvertently undergone parathyroidectomy during thyroid surgery in this study.

**Material and Methods:** We retrospectively evaluated a total of 142 patients who had undergone thyroidectomy between January 2011 and March 2017 from their charts. The demographic feature and pathology diagnoses of the thyroidectomy patients were evaluated. The number of excised parathyroid glands in the pathology specimens and their location were determined. The PTH level was checked after surgery. Calcium was measured on the 2nd day.

**Results:** The 142 patients consisted of 23 males (16.2%) and 119 females (83.8%). The mean age was 49.5 years. The surgery performed was bilateral total thyroidectomy in 131, bilateral subtotal thyroidectomy in 3, left total right subtotal thyroidectomy in 3, right total left subtotal thyroidectomy in 2, left thyroid lobectomy in 2, and complementary thyroidectomy in 1. Parathyroid tissue was found to have been excised during surgery in 35 patients, consisting of 33 females (94.2%) and 2 males (5.8%). The parathyroid tissue had been removed incidentally in 31 and not incidentally in 4.

**Conclusion:** We found that some parathyroid glands had been inadvertently removed despite careful thyroid surgery.

**Keywords:** Thyroid; Parathormone; Thyroidectomy.

## INTRODUCTION

Hypocalcemia is one of the most common complications after total thyroidectomy. The reason is usually manipulation, damaged blood supply, or inadvertent removal of the parathyroid glands during thyroid surgery and resection. Despite developments in surgical technique and instruments, transient hypocalcemia continues to occur. The hypocalcemia development rate following routine thyroid surgery is roughly 5-10% (1-3). The transient hypocalcemia rate can increase to 30% in complicated cases such as lymph node dissection during cancer surgery (3,4).

Permanent hypocalcemia is seen at a rate of 0-2% (3,5). Hypocalcemia, whether transient or permanent, prolongs hospitalization. Some surgeons use the postoperative calcium level to determine whether calcium replacement is needed while others use the clinical picture and biochemical PTH (parathormone) parameters in addition to calcium levels. Some studies in the literature have evaluated whether calcium support can be provided by checking the

postoperative PTH value. Other studies have shown that postoperative PTH is a good indicator of symptomatic and biochemical hypocalcemia. We evaluated patients who had inadvertently undergone parathyroidectomy during total thyroidectomy in this study.

## MATERIAL and METHODS

We retrospectively evaluated a total of 142 patients who had undergone thyroidectomy between January 2011 and March 2017 from their charts. The demographic features and pathology diagnoses of the cases that underwent thyroidectomy were evaluated. We also noted how many parathyroid glands had been removed and their location in each specimen sent to pathology. Although we tried to protect the parathyroid gland during surgery, it was inevitable to remove them in cases where wide resection and lymph node dissection were performed for cancer surgery. Postoperatively PTH was checked on day 1, week 1 and month 3 and 6 while calcium was checked on day 1 and 2. Calcium replacement was performed in patients with low

Received: 01.02.2018 Accepted: 16.03.2018 Available online: 28.03.2018

Corresponding Author: Tulay Diken Allahverdi, Kafkas University Faculty of Medicine, Department of General Surgery, Kars, Turkey.  
E-mail: drtulaydiken@hotmail.com

levels of PTH and calcium. However, the calcium replacement requirement was determined according to biochemical values. After the patients were discharged, we determined whether the hypocalcemia was transient or permanent by checking the calcium and PTH levels during outpatient follow-up. The patients' charts revealed that they had been monitored for a period of 6 months to 1 year.

## RESULTS

The 142 patients in total consisted of 23 males (16.2%) and 119 females (83.8%). The mean age was 49.5 years. Bilateral total thyroidectomy was performed in 131 (92.2%) patients, bilateral subtotal thyroidectomy in 3 (2.1%), left total right subtotal thyroidectomy in 3 (2.1%), right total left subtotal thyroidectomy in 2 (1.4%), left thyroid lobectomy in 2 (1.4%), and complementary thyroidectomy in 1 (0.8%). Unilateral neck dissection (level II, III, IV, V) was required for 2 (1.4%) patients and central lymph node dissection for 82 (57.7%) patients. These patients had undergone fine needle aspiration biopsy and received a diagnosis of thyroid cancer before surgery. The parathyroid tissue was removed in 35 (24.6%) patients consisting of 33 females (94.2%) and 2 males (5.8%) during surgery.

The parathyroid tissue removal was incidental in 31 (21.8%) and non-incidental in 4 (2.8%) patients. The 4 non-incidentally removed parathyroid tissues were due to parathyroid adenoma in 3 cases and thyroid cancer infiltration of the parathyroid tissue in 1 case. The number of parathyroid tissues removed was 4 in 1 patient, 3 in 2 patients, 2 in 6 patients, and 1 in 26 patients among the total of 35 patients. Five (3.5%) of the removed parathyroid tissues were intrathyroidal, 15 (10.6%) were within or along thymus tissue, and 5 (3.5%) were within the central lymphatic fat tissue.

The parathyroid tissues were removed during lymph node dissection for cancer surgery in 22 (15.5%). A calcium level below 8 mg/dl was accepted as consistent with hypocalcemia. The mean calcium levels in the thyroidectomy patients were 8.1+/-2.3 mg/dl for the first day and 7.9+/-1.3 mg/dl for the second day. We found hypocalcemia findings to develop when the PTH level was below 15 pg/dl in our patients. The mean PTH level in the thyroidectomy patients was 16.8+/-2.1 pg/dl at the first hour, 32.45+/-7.2 pg/dl at the first week, 38.59+/-6.5 pg/dl at the third month and 32.65+/-7.6 pg/dl at the sixth month. The mean PTH levels in the parathyroidectomy patients were 7.06+/-1.3 pg/dl at the first hour, 13.02+/-3.2 pg/dl at the first week, 28.09 +/-12.6pg/dl at the third month and 25.76+/-11.7 pg/dl at the sixth month. Transient hypocalcemia was found in 42 (29.6%) patients and permanent hypocalcemia in 2 (1.4%) patients.

Transient hypocalcemia developed in 17 of the patients who underwent inadvertent parathyroidectomy. A total of 4 parathyroid glands were removed inadvertently in 4 patients. Permanent hypocalcemia developed in 2 of these patients. Intraoperative parathyroid autotransplantation had been performed in the other 2 patients and these patients developed transient hypocalcemia. Hypocalcemia persisting for more than 6 months was accepted as permanent.

## DISCUSSION

We evaluated patients who had undergone parathyroidectomy during total thyroidectomy in this study. There are some previous studies reporting that postoperative PTH checks can protect patients from the symptoms and risk of hypocalcemia. Manourras et al. (6) have reported parathyroidectomy also being performed in 19.7% of patients undergoing total thyroidectomy. Central neck dissection had been performed in 30% of the patients in the same study. Although autopsy reports indicate a 2% rate for intrathyroidal parathyroid localization, Wei Du et al. (7) have reported that this rate can be as high as 42.1% and that it may be necessary to remove parathyroid tissue even if it is noticed during the surgery. The same study found that 39% of the patients had transient hypocalcemia and 0.3% permanent hypocalcemia. Sasson et al. (8) reported that there was no difference in the rate of transient hypocalcemia between patients where the parathyroid glands were preserved during surgery and those where the glands were unintentionally removed. Sippel et al. (9) have reported that it is difficult to preserve the parathyroid glands in patients undergoing total thyroidectomy and especially in those requiring lateral neck dissection for cancer. Lin et al. have reported a parathyroidectomy rate of 19% in patients undergoing central neck lymph node dissection while this rate was 7% in patients undergoing total thyroidectomy (10). We found our parathyroidectomy rate to be 24.6% in this study. Transient hypocalcemia developed in 42 (29.6%) patients and permanent hypocalcemia in 2 (1.4%) patients.

The rate of intrathyroidal parathyroid localization was 3.5% and the intrathymus localization rate was 10.6%. We saw that patients undergoing lymph node dissection for cancer had a parathyroidectomy rate of 15.5%. Our study also showed the consistency of such rates with the literature. We believe that the hypocalcemia that developed in our patients postoperatively could be due to parathyroidectomy or vitamin D deficiencies (dietary deficiency, not being exposed to sunshine) and the hungry bone syndrome.

Montana et al. found postoperative parathormone level checks to be the most suitable method in determining hypocalcemia and to protect the patients from the unwanted effects of this condition (11). We similarly found that checking postoperative parathormone and calcium levels detected which patients would develop hypocalcemia so that calcium replacement could be used accordingly. We therefore prevented the risks of symptomatic hypocalcemia in our patients and enabled earlier discharge. We also believe we prevented the anxiety created by hypocalcemia symptoms in our patients.

## CONCLUSION

In conclusion, the parathyroid vascular supply can be disturbed in cases where adhesions are present during surgery and central lymph node dissection is performed, and it may sometimes be impossible to avoid removing parathyroid tissue depending on the parathyroid localization, for example when there is parathyroid tissue with an intrathyroidal location, even when one is very careful during thyroid surgery.

It is possible to remove the parathyroid glands intentionally or unintentionally during the surgery, leading to hypocalcemia. It is also possible to prevent hypocalcemia symptoms by checking postoperative parathormone and calcium levels.

*Competing interests: The authors declare that they have no competing interest.*

*Financial Disclosure: There are no financial supports .*

*Ethical approval: This work has been approved by the Institutional Review Board.*

## REFERENCES

1. Cayo AK, Yen TW, Misustin SM, Wall K, Wilson SD, Evans DB, et al. Predicting the need for calcium and calcitriol supplementation after total thyroidectomy: results of a prospective, randomized study. *Surgery* 2012;152(6):1059-67.
2. Carter Y, Chen H, Sippel RS. An intact parathyroid hormone-based protocol for the pre-vention and treatment of symptomatic hypocalcemia after thyroidectomy. *J Surg Res* 2014;186(1):23-8.
3. White MG, James BC, Nocon C, Nagar S, Kaplan EL, Angelos P, et al. One-hour PTH after thyroidectomy predicts symptomatic hypocalcemia. *J Surg Res* 2016;201(2):473-9.
4. Oltmann SC, Brekke AV, Schneider DF, Schaefer SC, Chen H, Sippel RS. Preventing postoperative hypocalcemia in patients with graves disease: a prospective study. *Ann Surg Oncol* 2015;22(3):952-8.
5. Herranz Gonzalez-Botas J, Lourido Piedrahita D. Hypocalcaemia after total thyroidectomy: incidence, control and treatment *Acta Otorrinolaringol Esp* 2013;64(2):102-7.
6. Manouras A, Markogiannakis H, Lagoudianakis E, Antonakis P, Genetzakis M, Papadi-ma A. et al. Unintentional parathyroidectomy during total thyroidectomy. *Head Neck* 2008;30(4):497-502.
7. Wei Du, Qigen Fang, Xu Zhang, Meng Cui, Ming Zhao, Weihua Lou, Unintentional para-thyroidectomy during total thyroidectomy surgery: a single surgeon's experience. *Medicine (Baltimore)* 2017;96(11):e6411.
8. Sasson AR, Pingpank JF Jr, Wetherington RW, Hanlon AI, Ridge JA. Incidental parathyroidectomy during thyroid surgery does not cause transient symptomatic hypocalcemia. *Arch Otolaryngol Head Neck Surg* 2001;127(3):304-8.
9. Sippel RS, Ozgöl O, Hartig GK, Mack EA, Chen H. Risks and consequences of incidental parathyroidectomy during thyroid resection. *ANZ J Surg* 2007;77(1-2):33-6.
10. Lin DT, Patel SG, Shaha AR, Singh B, Shah JP. Incidence of inadvertent parathyroid removal during thyroidectomy. *Laryngoscope* 2002;112(4):608-11.
11. Suwannasarn M, Jongjaroenprasert W, Chayangsu P, Suvikapakornkul R, Sriphrapradang C. Single measurement of intact parathyroid hormone after thyroidectomy can predict transient and permanent hypoparathyroidism: a prospective study. *Asian J Surg* 2017;40(5):350-6.