Risk Factors of Incidental Parathyroidectomy and its Relationship with Hypocalcemia after Thyroidectomy: A Retrospective Study

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Abstract

Background: The aim of this study was to determine the incidence of incidental parathyroidectomy, the relationship between incidental parathyroidectomy and postoperative hypocalcemia, and risk factors for incidental parathyroidectomy in patients undergoing thyroid surgery.

Methods: The study was conducted by analyzing the records of patients who underwent thyroid surgery in a tertiary university hospital between January 2012 and December 2017 retrospectively. The risk factors of postoperative hypocalcemia were determined by comparing postoperative Ca values with age, sex, preoperative Ca value, dominant nodule diameter, type of surgery, and histopathological examination of the thyroidectomy material. According to the final pathology results, the patients were divided into two groups - the ones with and without incidental parathyroidectomy. The risk factors for incidental parathyroidectomy were determined by comparing the two groups in terms of age, sex, dominant nodule diameter, type of surgery, and histopathological results (malign/benign).

Results: When the risk factors of postoperative hypocalcemia were examined, female gender, age <28.5 years old, low level of preoperative mean Ca value, and total thyroidectomy were found to be critical risk factors (p<0.05). When the risk factors of incidental parathyroidectomy were examined, total thyroidectomy and thyroid malignancy were found to be important risk factors (p<0.05).

Conclusion: Female gender, age<28.5 years old, low level of preoperative Ca value, and total thyroidectomy were associated with postoperative hypocalcemia, but no relationship was found between incidental parathyroidectomy and postoperative hypocalcemia.

Introduction

Thyroid surgeries are considered to be secure operations when they are conducted by practiced hands. Serious complications may be seen in less than 5% of the patients [1]; the frequent ones being hypocalcemia, recurrent laryngeal nerve injury, and hematoma [2]. The transient hypocalcemia rate after thyroid surgery is 27% (19-38) while permanent hypocalcemia is about 1% (0-3). Symptoms related to hypocalcemia occur in the first 24-48 hours after the surgery [3]. Hypoparathyroidism is caused by direct injury of the parathyroid gland, devascularisation, venous drainage obstruction, and accidental extraction of the parathyroid gland [4]. Although careful dissections are performed in thyroid surgery, accidental extraction of the parathyroid gland happens frequently. It is stated that the incidental parathyroidectomy rate of thyroid surgeries is between 5.2% and 21.6% [5-6].

The aim of this study was to determine the incidence of incidental parathyroidectomy, the relationship between incidental parathyroidectomy, postoperative hypocalcemia, and risk factors for incidental parathyroidectomy in patients undergoing thyroid surgery in our clinic.

Materials And Methods

The study was conducted by analysing the records of patients who underwent thyroid surgery in a tertiary university hospital between January 2012 and December 2017 retrospectively. Patients who had relapsed and had experienced central neck dissection were excluded from the study. Postoperative Ca values with age, sex, preoperative Ca value, dominant nodule diameter in ultrasonography (USG), type of surgery (total/lobectomy), and the results of histopathological examination of the thyroidectomy material (malign/benign, existence of incidental parathyroidectomy) were recorded. Evaluated serum calcium level under 8 mg/dL after the first 24 hours of surgery is indicated as postoperative hypocalcemia. Hypocalcemia lasting less than six months was accepted as transient hypocalcemia and hypocalcemia lasting longer than six months was accepted as permanent hypocalcemia. Vocal cord paralysis lasting less than six months was...
accepted as transient and vocal cord paralysis lasting longer than six months was accepted as permanent. Postoperative Ca values were compared with age, sex, preoperative Ca value, dominant nodule diameter in USG, type of surgery (total/lobectomy), and histopathological examination of the thyroidectomy material (malign/benign, existence of incidental parathyroidectomy) to determine the risk factors for postoperative hypocalcemia. In addition, according to the final pathology results, patients were divided into two groups - the ones with and without incidental parathyroidectomy. The risk factors for incidental parathyroidectomy were determined.

All collected data were analyzed using the Statistical Package for the Social Sciences software, version 20 (SPSS; IBM Corp, Armonk, NY). Data were presented as mean, standard deviation, median, minimum and maximum, percentage, and counts. When the sample size of continuous variables was <50, the Shapiro-Wilk W test was conducted; when the values were >50, the Kolmogorov-Smirnov test was conducted. When normal distribution was provided between the two independent groups, independent-samples t-test was applied; when normal distribution was not provided, the Mann-Whitney U test was performed. When the value of 2 x 2 comparisons between categorical variables were >5, the Pearson Chi-square test was applied; when the expected value was between 5 and 5, the Yates test was performed. However, when the expected value was <5, Fisher’s exact test was conducted. In the multivariable analysis estimator, the risk factors between the groups were indicated through logistic regression analysis with the possible risk factors found in the previous analysis. P< 0.05 was considered statistically significant.

Results

Out of 864 patients, 193 were males and 671 were females. Dominant nodule diameter in USG was 2.9 cm (range 0.5 - 10.5 cm). Total thyroidectomy was performed in 743 of the patients and lobectomy was performed in 121 of them. Transient postoperative hypocalcemia was seen on 268 patients (31.01%) and no persistent hypocalcemia was observed during follow-up. Transient vocal cord paralysis was seen in 15 patients (1.7%) and permanent vocal cord paralysis was observed in four patients (0.46%). Postoperative bleeding was seen in 18 patients (2%). Twelve of them underwent reoperation and bleeding control was made. Six patients were followed with drain. There was no postoperative mortality (Table 1).
According to postoperative histopathology results, 307 patients (35.5%) were in the malign group while 557 of them (64.5%) were placed in the benign group. Histopathologic types of malign group: 265 patients had papillary carcinoma, 17 patients had hurtle cell carcinoma, 15 patients had follicular carcinoma, five patients had medullary carcinoma, and five patients had anaplastic carcinoma. Incidental parathyroidectomy was observed in 80 (9.2%) patients in the histopathologic examination, whereas 784 (90.8%) patients did not. Six patients who experienced incidental parathyroidectomy had two parathyroid glands and 74 patients who experienced incidental parathyroidectomy had only one. Five patients (6.2%) underwent incidental parathyroidectomy in the intrathyroid gland.

In the comparison between the female and male groups, it was seen that hypocalcemia rate of females was higher than males and this difference was statistically significant (p=0.003). The evaluation of postoperative hypocalcemia in terms of age indicated that the age average of the group which suffered hypocalcemia was lower this difference was statistically significant (p=0.016). According to ROC analysis; It was found to be risky for hypocalcemia under the age of 28.5 years with %90 sensitivity. The evaluation of hypocalcemia in terms of preoperative Ca values demonstrated that transient hypocalcemia was lower in the group with higher preoperative Ca rate and this difference was statistically significant (p=0.000). In terms of the type of surgery, the transient hypocalcemia rate was higher in the group which experienced total thyroidectomy than the group which had experienced lobectomy and this difference was statistically significant (p=0.006). There was no relation between the dominant nodule diameter and hypocalcemia. When the patients were divided into malign and benign groups, no significant difference was found between these groups in terms of postoperative hypocalcemia. When the patients were divided into groups with and without incidental parathyroidectomy, no significant difference was found between these groups in terms of postoperative hypocalcemia (Table 2).
In terms of incidental parathyroidectomy risk factors, the incidental parathyroidectomy rate was higher in the group which experienced total thyroidectomy than the group which had experienced lobectomy (p=0.037). The incidental parathyroidectomy rate was higher in the malign group than in the benign group (p=0.01) (Table 3).

Discussion

Thyroid diseases have an important place among endocrine diseases. Thyroid surgeries are the most common endocrine operations that are performed [7]. The most common complication of thyroidectomy is hypocalcemia; the incidence of transient hypocalcemia is between 0.3%-49% and the incidence of permanent hypocalcemia is reported to be 0%-13% [8]. Many biochemical and harmonic tests are done due to hypocalcemia and it causes an increase in the duration of hospital stay. Hypocalcemia spontaneously resolves in many patients, but hypocalcemia can be persistent if irreversible damage occurs in the parathyroid gland. As a result of this complication, the overall cost of thyroidectomy also increases [9].

In our study, the rate of postoperative transient hypocalcemia was 31.01%. It was seen that this rate was a bit...
higher by comparison with meta-analysis of the literature (27% (19-38)) [10]. Our permanent hypocalcemia rate was lower than the rate in the literature (1%).

In terms of gender comparison, it was indicated that the hypocalcemia rate was higher in females than males. In a meta-analysis involving 10 studies and 3,443 patients, the female gender was reported as an independent risk factor for postoperative hypocalcemia [10]. In light of our study and literature information, the female gender has been seen as an independent risk factor. Recent studies on the size and anatomical localization of the parathyroid gland between men and women may explain this situation.

In our study, when the age was compared with postoperative hypocalcemia, the mean age was lower in the group with hypocalcemia. In our study; it was found that age under 28.5 years old was risky for hypocalcemia. Contrary to our study, in the literature, there are studies reporting that the mean age of the group with hypocalcemia is higher than the group without hypocalcemia [11-12]. In a meta-analysis involving five studies and 2,576 patients, age was reported as a non-risk factor for postoperative hypocalcemia [10].

In our study, female gender, age<28.5 years old, preoperative low Ca values, and total thyroidectomy were indicated as risk factors for postoperative hypocalcemia. Although there is no relationship between incidental parathyroidectomy and postoperative hypocalcemia, this complication can be avoided by careful dissection and revealing glands, especially in patients undergoing malignant and total thyroidectomy.

Conclusions
In our study, female gender, age<28.5 years old, preoperative low Ca values, and total thyroidectomy were indicated as risk factors for postoperative hypocalcemia. Although there is no relationship between incidental parathyroidectomy and postoperative hypocalcemia, this complication can be avoided by careful dissection and revealing glands, especially in patients undergoing malignant and total thyroidectomy.

Additional Information
Disclosures

Human subjects: Consent was obtained by all participants in this study. Ataturk University Ethical Board issued approval 26.09.2019:06-37. Animal subjects: All authors have confirmed that this study did not involve animal subjects or tissue. Conflicts of interest: In compliance with the ICMJE uniform disclosure form, all authors declare the following: Payment/services info: All authors have declared that no financial support was received from any organization for the submitted work. Financial relationships: All authors have declared that they have no financial relationships at present or within the previous three years with any organizations that might have an interest in the submitted work. Other relationships: All authors have declared that there are no other relationships or activities that could appear to have influenced the submitted work.

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