

Benign and Malignant Thyroid Gland Diseases in the Patients with Primary Hyperparathyroidism

Abstract

Introduction: This study aimed to evaluate concurrently detected thyroid pathologies in the patients who underwent surgery for primary hyperparathyroidism (PHPT). **Materials and Methods:** In this study, we retrospectively analyzed the files of the patients who underwent surgery for PHPT between 2012 and 2015. Pre- and post-operative laboratory examination results and preoperative radiological and nuclear medicine findings of the patients were retrospectively recorded. **Results:** A total number of 41 patients with PHPT were divided into two groups as the Group 1 with PHPT and benign thyroid pathology (21 patients) and the Group 2 with PHPT and malignant thyroid pathology (20 patients). In Group 1, 18 and 3 of 21 patients were females and males, respectively. Group 2 included 15 male and 5 female patients. The mean age of the patients was found to be 55.6 and 53.9 years in Group 1 and Group 2, respectively. Both groups were matched for age and gender. In terms of thyroid pathology, 20 of 41 patients (48.7%) who underwent total thyroidectomy for PHPT were found to have thyroid papillary carcinoma while benign pathologic conditions were detected in 21 (51.3%) individuals. **Conclusions:** Cooccurrence of thyroid diseases and PHPT is common. Therefore, all the patients should preoperatively be evaluated for the presence of thyroid pathology to determine the technique of parathyroid surgery.

Keywords: Papillary thyroid carcinoma, parathyroidectomy, primary hyperparathyroidism, thyroidectomy

Introduction

Primary hyperparathyroidism (PHPT) develops secondary to parathyroid gland adenoma, hyperplasia, and less often as a result of parathyroid cancer. Its prevalence in the general population is 0.1% and it is one of the most common causes of hypercalcemia. It may rarely be seen as a component of multiple endocrine neoplasia. Main treatment is surgical resection of parathyroid gland (s).^[1] Recent minimally invasive surgical approaches have minimized some unfavorable aspects such as cosmetic problems, postoperative pain, and long hospital stay.^[2] Pre- and intra-operative cervical ultrasonography and technetium (Tc) 99m sestamibi scan imaging methods are utilized for these purposes.^[3] It was reported that these studies detected thyroid gland pathologies in 17%–84% of the patients with PHPT^[4-6] while well-differentiated thyroid carcinoma was detected in 2%–32%.^[7-10] According to the Surveillance, Epidemiology, and End Results Program of the National Cancer Institute,

the prevalence of thyroid cancer is predicted to be <0.1% despite the high prevalence of thyroid nodules in the general population.^[11] However, higher prevalence of cooccurrence of PHPT and thyroid malignancies, when compared to general population, has made preoperative thyroid gland evaluation more important. By this way, unnecessary thyroid operations may be avoided and the risk of reoperation will be minimized in the patients scheduled for PHPT operation.

This study aimed to analyze the features of thyroid gland pathologies in the patients who underwent concurrent PHPT and thyroid gland operations. In addition, it was aimed to evaluate clinical, laboratory, and imaging features that may be directive in the evaluation of the presence of malignancy in thyroid nodules detected in preoperative period in the patients with PHPT.

Materials and Methods

In this study, we retrospectively evaluated a total number of 41 cases who underwent concurrent PHPT and thyroid gland

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pathology surgery in our hospital between 2012 and 2015. Demographic features, pre- and post-operative laboratory findings, preoperative ultrasonography, and Tc 99m sestamibi scan results of all patients were obtained from database. The results of preoperative thyroid fine-needle aspiration biopsy (TFNAB) and postoperative parathyroid and thyroid gland pathological examination were recorded. None of the patients had a history of radiotherapy to head and neck regions and family history of thyroid malignancy. Local Ethics Committee approval was obtained.

Statistical analysis

Data were analyzed using IBM SPSS Statistics version 22 (IBM Corp., Armonk, New York, USA). Categorical data of the groups were compared by using Chi-square test. Student’s *t*-test and Mann–Whitney U-test were used for the evaluation of continuous variables. Statistical significance level was accepted as $P < 0.05$.

Results

Forty-one patients with PHPT were divided into two groups in terms of the results of pathological examination of thyroid gland (Group 1 [$n = 21$]: patients with PHPT and benign thyroid gland disease, Group 2 [$n = 20$]: patients with PHPT and malignant thyroid gland disease). There was no difference between two groups with regard to age and gender. Pre- and post-operative serum intact parathyroid hormone, calcium, phosphorus, and thyroid hormone levels of the groups were similar. No difference was detected between the groups in terms of 25-OH-vitamin D level, creatinine clearance, and 24 h urinary calcium. The numbers of the patients with autoimmune thyroid disease, osteoporosis, and the history of renal stone disease were similar in both groups [Table 1].

Table 2 shows preoperative ultrasonography and Tc 99m sestamibi scan findings of the patients. There was no statistically significant difference between two groups in terms of the findings of preoperative imaging studies ($P > 0.05$).

TFNAB results obtained from 9 patients in Group 1 and 11 patients in Group 2 were compared [Table 3]. No difference was detected between two groups in terms of TFNAB findings ($P > 0.05$).

Postoperative histopathologic evaluation also revealed no difference between the groups in terms of parathyroid diseases ($P > 0.05$) [Table 4, Figure 1]. Benign thyroid diseases detected in Group 1 were nodular hyperplasia, follicular adenoma, diffuse goiter, and lymphocytic thyroiditis with nodular hyperplasia. All patients in Group 2 had papillary thyroid carcinoma [Table 4], 15 of them being microcarcinoma.

Discussion

Ogburn and Black were first to report cooccurrence of PHPT and papillary thyroid cancers in 1956.^[12] Adler *et al.*^[13]

Table 1: Pre- and post-operative demographic, clinical, and laboratory features of the cases

	Group 1* (n=21)	Group 2* (n=20)	P
Age (year)	55.6±12.8	53.9±12.4	NS**
Gender (female/male)	18/3	15/5	NS
Preoperative iPTH* (normal: 14-72 pg/ml)	842.5±981.1	332.4±366.5	NS
Preoperative adjusted calcium (normal: 8.4-10.2 mg/dl)	11.3±1.1	11.1±0.8	NS
Preoperative phosphorus (normal: 2.3-4.7 mg/dl)	2.8±1.6	2.6±0.8	NS
25-OH-vitamin D (normal: 24-50 ng/mL)	41.5±35.3	21.7±10.6	NS
24 h urine calcium	319±186.9	350±190.1	NS
Euthyroidism (n)	10	19	
Hypothyroidism (n)	3	1	
Hyperthyroidism (n)	8	0	
Anti-Tg (+) (n)	5	1	NS
Anti-TPO (+) (n)	6	1	NS
Osteoporosis (+) (n)	11	7	NS
Renal stone (+) (n)	3	2	NS

*Group 1: Primary hyperparathyroidism and benign thyroid pathology (21 patients); Group 2: Primary hyperparathyroidism and malignant thyroid pathology (20 patients); †Intact parathyroid hormone; **Not significant. n: Number; TPO: Thyroid peroxidase; Tg: Thyroglobulin

Table 2: Preoperative ultrasonographic and technetium 99m sestamibi results of the patients

	Group 1 (n=21)	Group 2 (n=20)	P
Ultrasonography (%)			
Normal thyroid gland	1 (4.7)	2 (10)	NS
Diffuse goiter	1 (4.7)	-	
Solitary nodule	6 (28.5)	5 (25)	
Multinodular goiter	13 (61.9)	13 (65)	
Parathyroid adenoma (+)	16 (76.1)	13 (65)	
Tc 99m sestamibi (%)			
Parathyroid adenoma (+)	17 (80.9)	11 (55)	NS

Tc: Technetium; NS: Not significant

and Bentrem *et al.*^[5] found the prevalence of thyroid gland pathologies detected by ultrasonography in the patients with PHPT as 29% and 18%, respectively. In both studies, malignant thyroid disease was detected in 2% of the patients. Masatsugu *et al.*^[10] reported that 55.4% of the patients with PHPT had thyroid gland disease while 32.8% had nonmedullary thyroid cancer. Another study from our country detected the prevalence of papillary microcarcinoma as 17.6% in 51 patients with PHPT.^[14] In this study, we detected thyroid malignancy in 48.7% of the patients who underwent concurrent PHPT and thyroid gland disease. The incidence of malignant diseases of thyroid gland differs among geographic regions. No community scan is available in our country. We think that the high rate of thyroid malignancy that we

Table 3: Thyroid nodule fine-needle aspiration biopsy results of both groups

	Group 1 (n=9)	Group 2 (n=11)
Nondiagnostic, n (%)	2 (22.2)	3 (27.2)
Benign, n (%)	1 (11.1)	2 (18.1)
AUS, n (%)	1 (11.1)	-
Follicular neoplasm, n (%)	5 (55.5)	2 (18.1)
Suspicious for malignancy, n (%)	-	4 (36.3)

AUS: Atypia of undetermined significance

Table 4: Postoperative parathyroid and thyroid gland histopathology results

	Group 1 (n=21)	Group 2 (n=20)
Parathyroid gland histopathology (figure), n (%)		
Adenoma	14 (66.6)	12 (60)
Hyperplasia	4 (19)	3 (15)
Atypical adenoma	2 (9.5)	2 (10)
Carcinoma	1 (4.7)	3 (15)
Thyroid gland histopathology, n (%)		
Nodular hyperplasia	13 (61.9)	-
Follicular adenoma	1 (4.7)	-
Diffuse hyperplasia	4 (19)	-
Lymphocytic thyroiditis	1 (4.7)	-
Lymphocytic thyroiditis + nodular hyperplasia	2 (9.5)	-
Papillary thyroid carcinoma	-	20 (100)

detected among our patients who underwent concurrent PHPT and thyroid gland diseases is related to characteristics of our region. It was reported that thyroid cancers coexist with PHPT where usually papillary thyroid cancer, thyroid follicular cancer, and thyroid lymphoma are encountered less commonly.^[15] In this study, we also detected papillary thyroid cancer in all cases, being consistent with this result.

The relationship between PHPT and papillary thyroid cancer is still unclear. It is known that the prevalence of thyroid and parathyroid cancer is higher in the patients with the history of head-neck region radiation therapy during childhood and adolescent period.^[16] None of the cases evaluated in this study had the history of radiotherapy. Although the literature data suggest increased levels of growth factors and endogenous calcium as the causes of increased prevalence of nonmedullary thyroid cancer coexisting with PHPT, this relationship is still unclear.^[16,17] Kutlutürk *et al.*^[18] suggested that high phosphorus levels in the patients with PHPT increased the probability of detecting thyroid papillary microcarcinoma. Masatsugu *et al.*^[10] found that bone disease and the history of nephrolithiasis were more common and the level of serum calcium was higher among the patients with PHPT without thyroid gland disease while the mean age, female

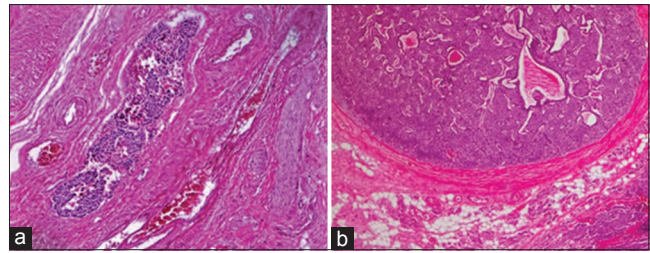


Figure 1: (a) Parathyroid cancer (H and E, x200), (b) parathyroid adenoma (H and E, x40)

to male ratio, and serum phosphorus levels were higher in the group with thyroid gland disease. In this study, clinical and laboratory findings of the group with thyroid malignancy were not analyzed. In this study, we evaluated preoperative data predictive for the presence of thyroid malignancy in the patients with PHPT. Evaluations revealed no statistically significant difference in terms of demographic, clinical, and laboratory data providing information on the differentiation of benign and malignant thyroid diseases detected in the patients with PHPT.

The American Thyroid Association proposed clinical, ultrasonographic, and TFNAB evaluation criteria for thyroid nodules.^[19] In this study, we also detected no difference between PHPT patients with and without thyroid malignancy in terms of preoperative thyroid ultrasonography features and TFNAB results.

Conclusions

We suggest that since the probability of detecting thyroid malignancy coexisting with PHPT is high in our region and there are no demographic, clinical, and laboratory parameters predicting thyroid malignancy during preoperative period, all cases with PHPT should carefully be evaluated for the presence of thyroid pathologies and when required, the potential of malignancy should be evaluated by needle biopsy considering the approach to general thyroid pathologies.

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Conflicts of interest

There are no conflicts of interest.

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