

Thyroid cancer incidence in simultaneous thyroidectomy with parathyroid surgery

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ABSTRACT

Objective: Primary hyperparathyroidism (PHPT) is often seen in conjunction with an underlying thyroid disorder. Imaging methods that are used to localize the parathyroid adenoma also detect associated thyroid nodules and thyroid cancer. The aim of this study was to detect the rate of thyroid cancer identified while performing parathyroidectomy and thyroidectomy in patients with PHPT.

Material and Methods: Files of all patients who were operated for PHPT and who underwent simultaneous thyroidectomy were analyzed. Data regarding parathyroid pathology, surgical procedures, indications of thyroid surgery, and pathology results were retrospectively recorded. The indications for thyroid surgery included presence of suspicious thyroid nodules in ultrasonography, increase in size of thyroid nodules in follow-up ultrasound, or presence of suspicious thyroid fine needle aspiration biopsy (FNAB) findings. Rates of thyroid cancer detection were investigated according to definite pathology reports.

Results: Eighty-three patients who underwent parathyroidectomy with a diagnosis of PHPT with concurrent thyroidectomy in Department of General Surgery, İstanbul University İstanbul Faculty of Medicine were included in the study. Eighteen patients were male (22%) and 65 were female (78%). The median age was 53 (18-70) years. The primary indication for parathyroidectomy was primary hyperparathyroidism in all patients. The thyroid procedures applied in addition to parathyroidectomy were lobectomy + isthmusectomy in 29 patients (35%), bilateral subtotal thyroidectomy in 20 patients (24%), bilateral total thyroidectomy in 23 patients (28%), and total thyroidectomy on one side and near total thyroidectomy to the other side in 11 patients (13%). The only indication for thyroidectomy was the presence of thyroid nodules until 2000 (20 patients, 24%). Indications in the remaining 63 patients included the presence of multiple nodules that cannot be followed up by ultrasonography in 25 patients (30%), presence of a suspicious nodule on ultrasonography in 33 patients (40%), growth in nodule size in 2 patients (2%), and detection of suspicious findings on FNAB in 3 patients (4%). Five patients (6%) were diagnosed with papillary thyroid cancer, four of whom were micropapillary cancer.

Conclusion: Imaging methods performed to localize the pathological parathyroid gland for a diagnosis of PHPT are useful in estimating other accompanying pathologies. Presence of thyroid nodules should be evaluated before all parathyroid procedures, and if the nodule has an indication for surgery, thyroid surgery should be considered at the same operation with parathyroid surgery.

Keywords: Primary hyperparathyroidism, parathyroid adenoma, thyroid cancer, papillary cancer, ultrasonography

INTRODUCTION

Primary hyperparathyroidism (PHP) is the most common cause of hypercalcemia in the community. In the United States, one out of every 400 women and one in every 2,000 men over the age of 40 are admitted to the hospital for treatment of PHP (1). The etiology of PHP is a single adenoma secreting parathyroid hormone in 80%, multi-gland disease in about 20%, and parathyroid carcinoma in 0.5%.

The curative treatment for PHP due to parathyroid adenoma, hyperplasia and carcinoma is surgery. The standard surgical treatment of PHP includes visualization of all parathyroid glands with bilateral neck exploration and removal of the diseased gland or glands. However, there have been significant changes in the choice of surgical treatment for PHP especially within the last 10 years. While the number of experts proposing routine bilateral neck exploration have decreased, those advocating procedures like unilateral neck exploration or minimally invasive surgery directed to the parathyroid adenoma, both of which have lower morbidity rates and cost, have increased with the widespread use of imaging methods such as sestamibi scan and ultrasound (USG) (2-7).

Thyroid nodules are a common clinical condition, and the rate of cancer detection within these nodules is around 5%. Evaluation of the malignant potential of thyroid nodules is crucial since nodules with suspicion of malignancy require surgery, while benign nodules and those not showing signs of compres-

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sion are being followed-up. Although there are some clinical signs and symptoms of thyroid nodules that raise suspicion for malignancy, the most important diagnostic methods used are thyroid USG and ultrasound guided fine-needle aspiration biopsy (FNAB). The accuracy of ultrasound guided FNAB in the diagnosis of thyroid cancer is over 90%, especially in the presence of an experienced radiologist and cytologist. Currently, FNAB is regarded as the gold standard in the differential diagnosis of thyroid nodules (8).

Primary hyperparathyroidism is usually accompanied by underlying thyroid pathology. Kissin and Bakst first described this association in 1947 (9). Although the reported rates of concurrent PHP and thyroid nodules vary, it cannot be ignored (20-60%) (10-12). Imaging methods that are used to locate a parathyroid adenoma may also help us to detect an underlying thyroid pathology. Since it will be difficult to determine thyroid pathologies during surgery in minimally invasive parathyroidectomy (MIP), the importance of preoperative patient evaluation for presence of thyroid diseases is obvious. This preoperative evaluation is not only important for verification of parathyroid adenoma location but is also particularly important in detecting synchronous thyroid nodules. The aim of this study was to detect the rate of thyroid cancer identified while performing parathyroidectomy and thyroidectomy in patients with PHP.

MATERIAL AND METHODS

Five hundred and fifty patients were operated on for a diagnosis of PHP in the Department of General Surgery, İstanbul University İstanbul Faculty of Medicine between 1 January 1990 - 1 July 2013. Within this group, thyroidectomy was performed simultaneous with parathyroid adenoma excision in 83 patients. Patient files were reviewed retrospectively and recorded. In the early 2000s, thyroidectomy was performed in all patients who were found to have thyroid nodules on exploration during parathyroid surgery and the standard procedure used at that time was bilateral/unilateral subtotal thyroidectomy. From 2000 on, the indications could be decided preoperatively with the widespread use of routine preoperative ultrasound and with advances in technology. The indications for concurrent thyroid surgery included: presence of suspicious thyroid nodules on ultrasound (border irregularity, loss of peripheral rim, presence of microcalcification), suspicion of malignancy or presence of malignancy on FNAB, increase in the size of thyroid nodules during follow-up (more than 2 mm increase in at least 2 dimensions between 2 follow-up USG), and presence of multiple nodules that cannot be followed-up by USG (risk of malignancy is increased to 10%). Patients with a primary surgical indication due to thyroid pathologies and those who underwent concurrent parathyroidectomy due to an incidental parathyroid adenoma were excluded from the study. Patients with MEN syndrome and familial PHP accompanied by parathyroid and thyroid pathologies were also excluded.

Data of 83 patients regarding imaging methods, if thyroid pathology was detected on USG, if the patient was being followed-up due to previous thyroid pathology, postoperative

Table 1. Type of thyroid surgery performed in addition to parathyroidectomy

Surgical method	Number (%)
Parathyroidectomy + lobectomy + isthmectomy	29 (35)
Parathyroidectomy + bilateral subtotal thyroidectomy	20 (24)
Parathyroidectomy + bilateral total thyroidectomy	23 (28)
Parathyroidectomy + unilateral total contralateral near-total thyroidectomy	11 (13)

Table 2. Patient distribution according to indication for thyroidectomy

Thyroidectomy indication	Number (%)
Presence of thyroid nodule alone	20 (24)
Presence of multiple nodules not suitable for follow-up by USG	25 (30)
Presence of suspicious nodule on USG	33 (40)
Presence of enlarged nodule during follow-up	2 (2)
Presence of suspicious nodule on FNAB	3 (4)

USG: ultrasound; FNAB: fine needle aspiration biopsy

pathology results, if FNAB was performed during follow-up and the type of thyroid surgery were retrospectively recorded. Thyroid cancer detection rate was determined according to definite pathology reports.

RESULTS

Eighty-three patients underwent concurrent thyroidectomy within 550 patients (15%) who were operated on for a diagnosis of PHP in the Department of General Surgery, İstanbul University İstanbul Faculty of Medicine between January 1990-July 2013. Within 83 patients who underwent concurrent thyroidectomy and parathyroidectomy, 18 were male (22%) and 65 (78%) were female. The median age was 53 (18-70) years. Twenty-nine patients (35%) underwent lobectomy+isthmectomy in addition to parathyroidectomy, 20 patients (24%), had bilateral subtotal thyroidectomy, 23 patients (28%) bilateral total thyroidectomy, and 11 patients (13%) near total thyroidectomy to one side and total thyroidectomy to the contralateral side (Table 1). The indication for thyroidectomy was the presence of thyroid nodules alone in the past years (20 patients before the year 2000 -24%). The indication for thyroidectomy in the remaining 63 patients included 25 (30%) patients with multiple nodules that cannot be followed-up by USG, 33 (40%) patients with suspicious nodules on USG, 2 patients (2%) with increase in size of thyroid nodules during follow-up, and 3 (4%) patients with a suspicious nodule on FNAB (Table 2). As a result of detailed pathological examination of all thyroidectomy specimens, papillary thyroid cancer was detected in 5 patients (6%). Four of these patients were diagnosed with micropapillary cancer. Surgical indications for these 5 patients were the presence of suspicious nodules in USG in 3, and suspicious lesions in FNAB in the remaining 2.

DISCUSSION

Primary hyperparathyroidism is the most common cause of hypercalcemia in the community. Primary hyperparathyroidism is seen in 0.1% of the general population (13). Thyroid nodules are detected in 5% of the population by palpation and in 50% by USG (14). The prevalence of thyroid nodules combined with PHP ranges from 20-60% (10-12).

Kissin and Bakst first published the association between thyroid and parathyroid diseases in 1947 (9). In 1956, Ogburn and Black (15) reported four patients with well-differentiated thyroid cancer within 230 cases who underwent surgery for PHP. Lever et al. (10) shared their experiences on the co-existence of PHP and thyroid nodules in 1983.

In recent years, management of PHP has evolved with the development of preoperative localization techniques. Both advanced USG techniques and methods like MIBI scintigraphy or intraoperative quick PTH assay allow us to determine the localization of the parathyroid adenoma, and to perform adenoma excision with smaller incisions or even with endoscopic methods (2-7). In our study, surgery for parathyroid adenoma was being performed in the form of bilateral neck exploration until 2000, while minimally invasive surgery is being used with the widespread use of imaging techniques since 2000.

With the extensive recognition of minimally invasive parathyroidectomy, the diagnosis of thyroid nodules and determining the indication for surgery in the preoperative period has gained even more significance, because parathyroid adenoma surgery is being performed preferentially with small incisions in many clinics unless there is associated thyroid disease. However, in the presence of thyroid nodules detected before surgery with an indication for thyroidectomy, the preferred method is performing simultaneous thyroid and parathyroid surgeries. In this study, 83 out of 550 PHP patients underwent simultaneous parathyroid and thyroid surgery. In 63 of these patients, the indication for thyroidectomy was based on pathologies observed in preoperative imaging methods.

In the co-presence of these two diseases, if a diagnosis of thyroid cancer is overlooked then serious problems may be encountered in the management of these patients. The most important complications are the ones that may arise due to a second surgical intervention (increased risk of recurrent nerve injury and hoarseness). Judicious diagnosis and treatment of concomitant thyroid malignancies enable curative resection, reduce morbidity rate that could be caused by second surgery, and reduce the additional cost due to additional surgery (16).

The rate of co-existence of PHP with thyroid disease has been reported in a wide range of 22% and 70% since the early 1950s (17-19). Its association with thyroid cancer is reported between 3.1% and 15% (17-20). The reasons for this wide range reported in the literature may be due to the differences in diagnostic methods, surgical indications and patient selection criteria. In our study, five patients had papillary thyroid cancer (6%), but four of them were micropapillary cancer.

Based on the results of this study and general literature review, it seems appropriate; to decide on the extent of surgery prior to surgery (if thyroidectomy will be performed, incision size, location), to share the surgical plan with the patient in the preoperative period, and to conduct simultaneous surgery with a single neck exploration if there is an indication for thyroid surgery along with parathyroid surgery.

CONCLUSION

Imaging methods that are performed to localize the abnormal parathyroid gland with a diagnosis of PHP are also valuable in estimating other accompanying pathologies. Presence of thyroid nodules should be evaluated before all parathyroid procedures, and if the nodule has an indication for surgery the thyroid surgery should be considered at the same operation with parathyroid surgery.

Ethics Committee Approval: Ethical committee approval was not taken since this is a retrospective study.

Informed Consent: In this study patient's approval was not taken. The results of previous surgeries were collected in this study. There is not any positive or negative effect on patient's treatment.

Peer-review: Externally peer-reviewed.

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REFERENCES

1. Wang TS, Roman SA, Cox H, Air M, Sosa JA. The management of thyroid nodules in patients with primary hyperparathyroidism. *J Surg Res* 2009; 154: 317-323. [\[CrossRef\]](#)
2. Thompson GB, Mullan BP, Grant CS, Gorman CA, van Heerden JA, O'Connor MK, et al. Parathyroid imaging with technetium-99m-sestamibi: an initial institutional experience. *Surgery* 1994; 116: 966-973.
3. Caixàs A, Bernà L, Piera J, Rigla M, Matías-Guiu X, Farrerons J, et al. Utility of 99mTc-sestamibi scintigraphy as a first-line imaging procedure in the preoperative evaluation of hyperparathyroidism. *Clin Endocrinol (Oxf)* 1995; 43: 525-530. [\[CrossRef\]](#)
4. Garner SC, Leight GS Jr. Initial experience with intraoperative PTH determinations in the surgical management of 130 consecutive cases of primary hyperparathyroidism. *Surgery* 1999; 126: 1132-1138. [\[CrossRef\]](#)
5. Yamashita H, Noguchi S, Futata T, Mizukoshi T, Uchino S, Watanabe S, et al. Usefulness of quick intraoperative measurements of intact parathyroid hormone in the surgical management of hyperparathyroidism. *Biomed Pharmacother* 2000; 54(Suppl 1): 108s-111s. [\[CrossRef\]](#)
6. Udelsman R, Donovan PI, Sokoll LJ. One hundred consecutive minimally invasive parathyroid explorations. *Ann Surg* 2000; 232: 331-339. [\[CrossRef\]](#)
7. Yamashita H, Ohshima A, Uchino S, Watanabe S, Yamashita H, Noguchi S. Endoscopic parathyroidectomy using quick intraoperative intact parathyroid hormone assay. *J Clin Surg* 2000; 55: 767-769.

8. Adler JT, Chen H, Schaefer S, Sippel RS. Does routine use of ultrasound result in additional thyroid procedures in patients with primary hyperparathyroidism? *J Am Coll Surg* 2010; 211: 536-539. [\[CrossRef\]](#)
9. Kissin M, Bakst H. Coexisting myxedema and hyperparathyroidism. *J Clin Endocrinol Metab* 1947; 7: 152-156. [\[CrossRef\]](#)
10. Lever EG, Refetoff S, Straus FH 2nd, Nguyen M, Kaplan EL. Coexisting thyroid and parathyroid disease-are they related? *Surgery* 1983; 94: 893-900.
11. Strichartz SD, Giuliano AE. The operative management of coexisting thyroid and parathyroid disease. *Arch Surg* 1990; 125: 1327-1331. [\[CrossRef\]](#)
12. Friedrich J, Krause U, Olbricht T, Eigler FW. Simultaneous interventions of the thyroid gland in primary hyperparathyroidism (pHPT). *Zentralbl Chir* 1995; 120: 43-46.
13. Silverberg SJ, Bilezikian JP. Asymptomatic primary hyperparathyroidism: a medical perspective. *Surg Clin North Am* 2004; 84: 787-801. [\[CrossRef\]](#)
14. Gharib H, Papini E. Thyroid nodules: clinical importance, assessment, and treatment. *Endocrin Metab Clin North Am* 2007; 36: 707-735. [\[CrossRef\]](#)
15. Ogburn PL, Black BM. Primary hyperparathyroidism and papillary adenocarcinoma of the thyroid; report of four cases. *Proc Staff Meet Mayo Clin* 1956; 31: 295-298.
16. Gates JD, Benavides LC, Shriver CD, Peoples GE, Stojadinovic A. Preoperative thyroid ultrasound in all patients undergoing parathyroidectomy? *J Surg Res* 2009; 155: 254-260. [\[CrossRef\]](#)
17. Regal M, Páramo C, Luna Cano R, Pérez Méndez LF, Sierra JM, Rodríguez I, et al. Coexistence of primary hyperparathyroidism and thyroid disease. *J Endocrinol Invest* 1999; 22: 191-197. [\[CrossRef\]](#)
18. Sidhu S, Campbell P. Thyroid pathology associated with primary hyperparathyroidism. *Aust NZ J Surg* 2000; 70: 285-287. [\[CrossRef\]](#)
19. dell'Erba L, Baldari S, Borsato N, Bruno G, Calò-Gabrieli G, Carletto M, et al. Retrospective analysis of the association of nodular goiter with primary and secondary hyperparathyroidism. *Eur J Endocrinol* 2001; 145: 429-434. [\[CrossRef\]](#)
20. Prinz RA, Paloyan E, Lawrence AM, Pickleman JR, Braithwaite S, Brooks MH. Radiation-associated hyperparathyroidism: a new syndrome? *Surgery* 1977; 82: 296-302.