

# Detection of Thyroid Carcinoma During Surgical Exploration of the Neck for Primary Hyperparathyroidism

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**A**lthough the pathological association of thyroid and parathyroid diseases are common, an association between parathyroid adenoma and thyroid cancer is rare. Concomitant thyroid cancer in patients with pHPT has been reported at varying frequencies.

We report here a case of a 55 year-old man who was diagnosed with primary hyperparathyroidism (pHPT) due to a single parathyroid adenoma, confirmed biochemically and radiologically.

At operation, a nodule in the right thyroid lobe was found incidentally and excised. Histology of the nodule revealed papillary thyroid carcinoma (follicular variant).

**Key Words:** Primary hyperparathyroidism, Thyroid diseases, Papillary thyroid carcinoma

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## Introduction

Association of PTC with parathyroid adenoma is rare, because it is not related to an embryologic origin like Medullary Thyroid Cancer (MTC).

Presented here is the case report of a 55 year old man who had papillary thyroid carcinoma (PTC) which was detected during

surgical exploration of the neck for primary hyperparathyroidism.

## Case Report

A 55 year old man came to the endocrinology clinic with elevated serum calcium (12.3 mg/dL) and low serum phosphate (2 mg/dL), detected in routine.

The patient was asymptomatic without any history of head and neck radiation or hypertension; in the past medical history the only finding was renal calculi in the left kidney. There was no history of thyroid and parathyroid diseases in his family, the only positive finding was renal calculus in his brother, whose physical exam was normal.

Serum calcium and phosphate were rechecked and hypercalcemia and hypophosphatemia were found again along with an elevated PTH (PTH: 173 pg/mL), suggesting primary hyperparathyroidism. In thyroid ultrasonography showed a normal left lobe ; inferolateral to RT lobe and medial to RT carotid and jugular vessels, a solid oval-shaped nodule was found (size = 13×15 mm), and probably two adherent nodules with uncertain origin (thyroid or parathyroid) were noted. Parathyroid adenoma, shown by Sestamibi scan was located corresponding to

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lower pole of the right lobe of thyroid gland. These findings are compatible to pHPT and following this, parathyroid surgery was planned due to serum calcium of 12-13 mg/dl and a Tscore= -1.5 at distal of the radius.

During surgery, a nodule in RT lobe of thyroid was found incidentally and RT lobe frozen section was follicular adenoma vs. papillary carcinoma (follicular variant) vs. medullary carcinoma; total thyroidectomy and resection of parathyroid adenoma were performed.

Microscopic findings support a diagnosis: of papillary carcinoma, follicular variant and parathyroid adenoma.

**Literature review:** We searched pubmed using key words including: primary hyperparathyroidism - thyroid diseases - papillary thyroid carcinoma and the result are as the following:

In the first case, a 45 year old Saudi woman who was diagnosed to have primary hyperparathyroidism due to a single parathyroid adenoma, confirmed biochemically and radiologically. At operation, the adenoma was found to be intra thyroid and therefore a thyroid lobectomy was performed. Histology of the excised lobe revealed in addition to the intrathyroid parathyroid adenoma, a concurrent occult thyroid papillary carcinoma.<sup>1</sup>

In another case, a 61 year old woman with a family history of RET-positive MTC (Medullary Thyroid Carcinoma) presented with a solitary thyroid nodule. Fine-needle aspiration biopsy was suspicious for neoplasm. Biochemical studies revealed basal hypercalcitonemia (116 pq/mL [normal <26]) and primary hyperparathyroidism (Ca=10.9 mg/dL, intact PTH 113.2 pg/mL [10 -65]). Pheochromocytoma screening was negative. A provisional diagnosis of MEN2 was made, but at surgery, a single parathyroid adenoma was resected and frozen sections of several lymph nodes revealed papillary thyroid carcinoma (PTC), total thyroidectomy being therefore performed. Final histological diagnosis was PTC and parathyroid adenoma, with no evidence of MTC. Post operative,

RET mutation testing was positive. The basal calcitonin fell to 25 pg/mL.<sup>2</sup>

In a 5 year period (1985-1989), 163 patients were operated for hyper parathyroidism; of these, 54 patients had concurrent thyroid disease, which was operated simultaneously. In 6 cases (3.7%) thyroid carcinoma was found. Four of 6 patients with thyroid malignancy had asymptomatic occult papillary carcinoma.<sup>3</sup>

In another study, 52.3% of 109 patients with primary hyper parathyroidism had concomitant thyroid disease and 19 (17.4%) had malignant nodules, and majority of them were PTC.<sup>4</sup>

## Discussion

Concomitant thyroid cancer in patients with pHPT has been reported at a frequency ranging between 3.1% and 17%.<sup>5,6</sup> The cause of this association remains controversial. Some authors have described this association as coincidental,<sup>7</sup> whereas other authors have advocated increased endogenous calcium concentrations or possibly growth factors such as epithelial growth factors and insulin like growth factor as goitrogenic factors.<sup>6,8,9</sup>

Since prior to this report the significant thyroid nodule (3\*2.5 cm) has not been detected before parathyroid surgery, this case is worth reporting.

Over the past 10 years, the management of primary hyperparathyroidism (pHPT) has changed significantly because of improved preoperative localization techniques<sup>10,11,12</sup> and the traditional operative approach has changed to more limited neck exploration in patients with sporadic pHPT.<sup>13,14</sup>

Ultra sonography can improve localization of thyroid nodules and the accurate diagnosis of thyroid nodules is performed by combining US and US-FNAB (ultra sonographic guided fine needle aspiration) with sensitivity 89% - specificity 91% and accuracy 90%.<sup>14</sup>

It is true that intra operative evaluation of the thyroid gland during neck surgery is important; sensitivity and specificity of surgeon criteria was 100% and 96% respectively. To

establish thyroid disease during neck exploration for other purposes,<sup>15</sup> however the trend towards minimally invasive parathyroidectomy makes this practice impractical.

Today MIBI is considered as the localization tool with greatest sensitivity and there are advantages including the detection of ectopic glands; however, MIBI is inaccurate in patients with multiglandular disease, small parathyroid adenoma or concomitant thyroid nodules. Meanwhile, ultrasonography is less costly, available at almost all institutions, and can provide more precise localization of parathyroid glands as well as indications of

possible concomitant thyroid diseases.<sup>16,17</sup> Thyroid malignancy occurs frequently in patients with sporadic pHPT. In conclusion, since preoperative US is useful for evaluation of possible concomitant thyroid disease, especially for prediction of malignancy, to achieve the most appropriate surgical management of patients with pHPT.

The combination of MIBI and US and US-FNAB, if needed, as the best diagnostic tool for parathyroid localization of pHPT and concomitant thyroid disease, is recommended.

## References

- Meshikhes AW, Butt SA, Al-Saihati BA. combined parathyroid adenoma and an occult papillary carcinoma. *Saudi Med J* 2004; 25: 1707-10.
- Rone JK, Lane AG, Grinkemeyer MD. Papillary thyroid carcinoma, parathyroid adenoma, and unexplained hypercalcitoninemia: an unusual presentation of multiple endocrine neoplasia type 2A? *Thyroid* 1998; 8: 781-5.
- Krause U, Olbricht T, Metz K, Rudy T, Benker G. Coincidence of non-medullary thyroid cancer and hyperparathyroidism. *Chirurg* 1991; 62: 536-9.
- Masatsugu T, Yamashita H, Noguchi S, Nishii R, Koga Y, Watanabe S, et al. Thyroid evaluation in patients with primary hyperparathyroidism. *Endocr J* 2005; 52: 177-82.
- Regal M, Paramo C, Luna Cano R, Perez Mendez LF, Sierra JM, Rodriguez I, et al. Coexistence of primary hyperparathyroidism and thyroid disease. *J Endocrinol Invest* 1999; 22: 191-7.
- ell'Erba L, Baldari S, Borsato N, Bruno G, Calo-Gabrieli G, Carletto M, et al. Retrospective analysis of the association of nodular goiter with primary and secondary hyperparathyroidism. *Eur J Endocrinol* 2001; 145: 429-34.
- Burmeister LA, Sandberg M, Carty SE, Watson CG. Thyroid carcinoma found at parathyroidectomy: association with primary, secondary, and tertiary hyperparathyroidism. *Cancer* 1997; 79: 1611-6.
- Maiorano E, Ambrosi A, Giorgino R, Fersini M, Pollice L, Ciampolillo A. Insulin-like growth factor 1 (IGF-1) in multinodular goiters: a possible pathogenetic factor. *Pathol Res Pract* 1994; 190: 1012-6.
- McCarty MF. Parathyroid hormone may be a cancer promoter - an explanation for the decrease in cancer risk associated with ultraviolet light, calcium, and vitamin D. *Med Hypotheses* 2000;54: 475-82.
- 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: 966-72.
- Caixas A, Berna L, Piera J, Rigla M, Matias-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: 525-30.
- Udelsman R, Donovan PI, Sokoll LJ. One hundred consecutive minimally invasive parathyroid explorations. *Ann Surg* 2000; 232: 331-9.
- Yamashita H, ohshima A, et al. Endoscopic parathyroidectomy using quick intraoperative intanc parathyroid hormone assay. *J clin Surge* 2000; 55: 767-9.
- Koike E, Yamashita H, Noguchi S, Murakami T, Ohshima A, Maruta J, et al. Effect of combining ultrasonography and ultrasound-guided fine-needle aspiration biopsy findings for the diagnosis of thyroid nodules. *Eur J Surg* 2001; 167: 656-61.
- Hatada T, Okada K, Ishii H, Ichii S, Utsunomiya J. Evaluation of ultrasound-guided fine-needle aspiration biopsy for thyroid nodules. *Am J Surg* 1998; 175: 133-6.
- De Feo ML, Colagrande S, Biagini C, Tonarelli A, Bisi G, Vaggelli L, et al. Parathyroid glands: combination of (99m)Tc MIBI scintigraphy and US for demonstration of parathyroid glands and nodules. *Radiology* 2000; 214: 393-402.
- Lumachi F, Ermani M, Basso S, Zucchetta P, Borsato N, Favia G. Localization of parathyroid tumours in the minimally invasive era: which technique should be chosen? Population-based analysis of 253 patients undergoing parathyroidectomy and factors affecting parathyroid gland detection. *Endocr Relat Cancer* 2001; 8: 63-9.