Five years of Institutional Experience in the Evaluation and Management of Papillary Thyroid Microcarcinoma: Insights from the NINMAS

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ABSTRACT

Papillary thyroid microcarcinoma (PTMC) is defined by the World Health Organization as a papillary thyroid carcinoma (PTC) with the greatest dimensions ≤1.0 cm. Its incidence is increasing along with the rise of PTC. The purpose of this study was to observe the five-year clinical outcome of PTMC patients who were referred to the Thyroid Division, National Institute of Nuclear Medicine & Allied Sciences (NINMAS) after total thyroidectomy and followed up without radioactive iodine ablation therapy (RAIT). The record files of registered PTMC patients between January 2017 and December 2020 were retrospectively analyzed, and the overall outcome was evaluated. A total of 95 patients (M: F = 3:16), with a mean age of 43 ± 14.14 years, were included in the study. Initial mean thyroglobulin (Tg) was 12.3±0.57 ng/dl, while mean Tg in the last follow-up was 1.72±0.23 ng/dl. Most of the patients (96.84%) had an uneventful follow-up period. But three (3.16%) patients had shown recurrence and underwent revision neck surgery followed by radioiodine ablation. In these patients with recurrence, initial average Tg was 35.02 ng/dl, and last follow-up Tg was 0.20 ng/dl after RAIT. Histopathology of recurrent tissue in the thyroid bed and lymph nodes confirmed PTC. The results of this study reaffirm that papillary microcarcinoma has an excellent prognosis if managed initially by total thyroidectomy. However, appropriate counselling and patient awareness are required considering the small recurrence rate evaluated by this study.

Keywords: Papillary thyroid carcinoma, papillary thyroid micro carcinoma, radioiodine ablation therapy.

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INTRODUCTION

Thyroid cancer is the most common endocrine-related cancer, and its incidence has continuously increased in the last three decades all over the world. The most prevalent form of malignancy among all forms of thyroid cancer is papillary thyroid carcinoma (PTC). In 2014, Davies and Welch reported a rapid increase in the incidence of thyroid cancer in the United States, with a 2.9-fold increase over the past 35 years (1). Papillary microcarcinoma (PTMC) is a specific subgroup of PTC, and it is defined as PTC with a maximum tumor diameter of 10 mm or less. Although it has long been recognized to be present in 6-36% of autopsy studies, these small tumors are being increasingly recognized in vivo (2, 3). With increasing use of high-resolution ultrasound, guided biopsies of nodules as small as 3 mm in diameter are now possible, giving rise to a potential epidemic of microcarcinomas (4-7).

The majority of PTMCs are clinically silent, and sometimes they might be found from histopathological examinations after a thyroidectomy performed due to benign thyroid diseases. The prognosis of PTMC is good and is one of the few cancers that can be cured by surgery (8). A Japanese study reported that observation without surgery was safe for small intra-thyroidal PTM, while several other researchers favored unilateral lobectomy without radioactive remnant ablation (RRA) (9). Few authors also considered total thyroidectomy followed by I-131 therapy and TSH-suppressive hormonal therapy to be the preferable treatment option in PTM (10-12). With this background, the current study was designed to evaluate five years of clinical outcomes of the institutional practice at NINMAS, which is monitoring PTMC patients following total thyroidectomy without radioactive iodine ablation therapy (RAIT).

PATIENTS AND METHODS

The study was conducted using the records of thyroidectomized PTMC patients registered in the thyroid division at NINMAS over a period spanning January 2017 to December 2022. The records included a comprehensive

range of investigations, which were performed post-surgery and during follow-up evaluations: Thyroid-Stimulating Hormone (TSH), Thyroglobulin (Tg), Thyroglobulin Antibodies (TgAb), High-Resolution Ultrasound (HRUS) of the Neck, 99mTc-Thyroid Scan, and Radioactive Iodine Uptake (RAIU). Postoperative parameters were documented 15 days after surgery, ensuring that initial data on thyroid function and tissue status were collected. Patients were monitored for a follow-up period of two years, with evaluations conducted six months apart. This periodic follow-up allowed for consistent monitoring of disease progression or recurrence, as well as the effectiveness of therapy.

RESULT

The study included a total of 95 papillary thyroid microcarcinoma (PTMC) patients, consisting of 15 males (15.78%) and 80 females (84.22%), with a mean age of 43 ± 14.14 years. (Figure 1)

The initial mean Tg level was 12.3 ± 0.57 ng/dL (measured post-thyroidectomy), while the last follow-up mean Tg level was 1.72 ± 0.23 ng/dL, showing a significant reduction and effective disease control in most patients. Most patients (92 out of 95, 96.84%) had an uneventful follow-up period without signs of recurrence or metastasis. However, three patients developed recurrence during the follow-up period. Among them, lymph node metastasis was observed in two patients at 10 months and 1-year post-surgery, while recurrent thyroid tissue in the thyroid bed was detected in one patient two years after surgery. All three patients underwent revision neck surgery to remove the recurrent or metastatic tissue, followed by radioactive iodine (RAI) ablation therapy. In one patient, the post-therapy scan revealed residual radiotracer concentration (RTC) in the thyroid bed (Figure 2).

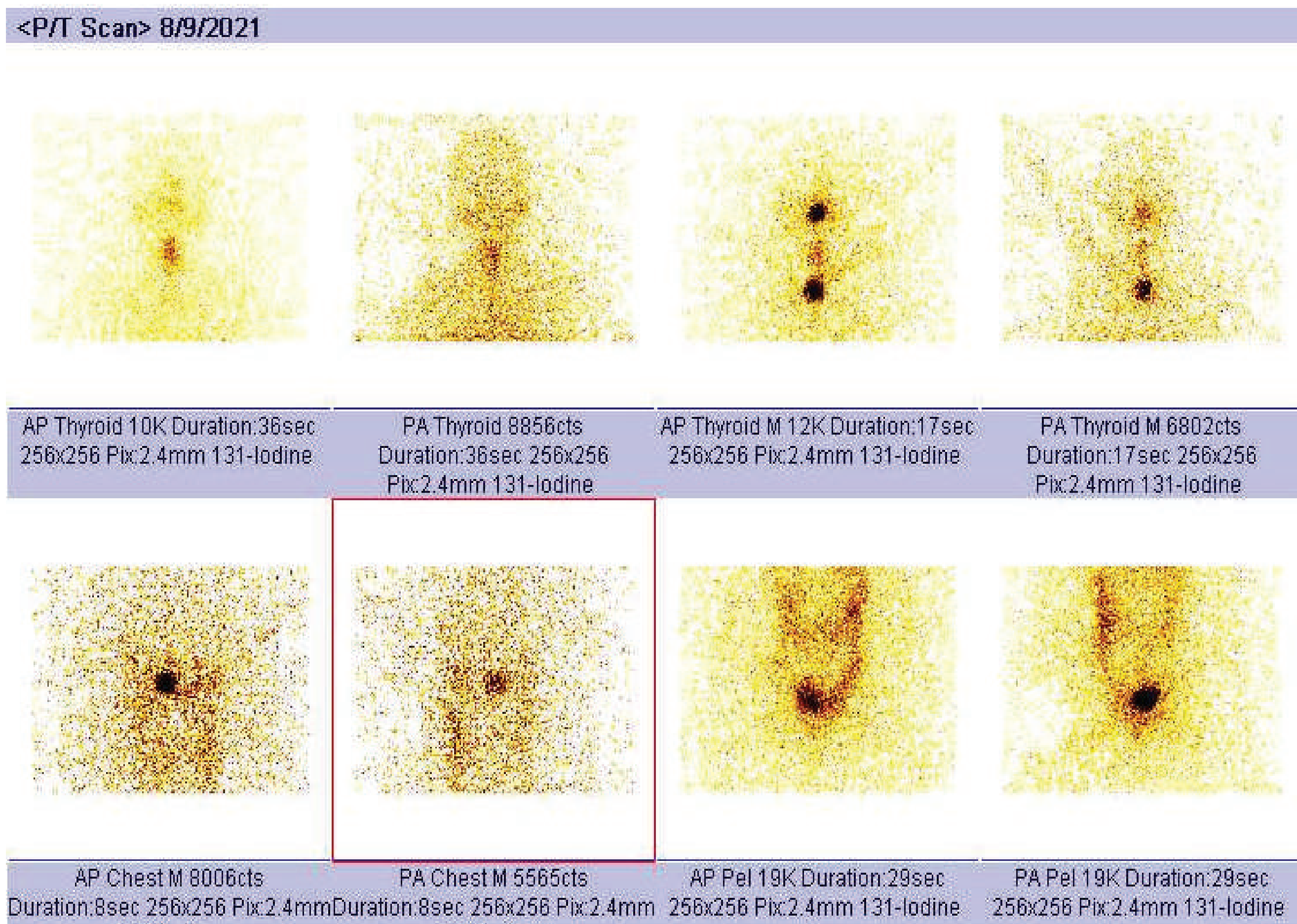

Figure-2: Post therapy scan after revision neck surgery following RAIT showing radiotracer concentration in thyroid bed

In the patients with recurrence, the initial average Tg levels were 35.02 ng/dL, and the last follow-up Tg levels were 0.20 ng/dL. After undergoing RAI therapy, the Tg levels significantly decreased, indicating effective treatment and disease control. The histopathology of the recurrent tissue confirmed the presence of papillary thyroid carcinoma in both the lymph nodes and thyroid bed, reaffirming the diagnosis of recurrence.

DISCUSSION

The study provides critical insights into the management and outcomes of papillary thyroid microcarcinoma in a cohort of thyroidectomized patients. A notable observation was the low recurrence rate (3.16%, 3 out of 95 patients) over the follow-up period, reflecting the generally favorable prognosis of PTMC. However, it was only an observation of a relatively brief span of five years, as opposed to Hey et al., who reported a long-term recurrence rate of 6% at 20 years.

Independent risk factors for lymph node metastasis in PTMC are tumor size exceeding 5 mm, multifocal lesions, and extrathyroidal extension. Sometimes, palpable metastatic neck lymph nodes are diagnosed as the first sign of PTMC, also known as occult papillary thyroid microcarcinoma. Clinical management should be individualized based on risk stratification.

Among the three patients in the current study, two developed lymph node metastases, detected 10 months and one year after surgery. This underscores the importance of meticulous lymph node surveillance in PTMC patients, even when the primary disease appears low risk. One patient showed recurrent thyroid tissue in the thyroid bed for two years post-surgery, highlighting the need for long-term follow-up in detecting late recurrences. In this study two patients had multifocal lesions and tumor size >5 mm, and there was no extrathyroidal extension in the recurrence group. The histopathological evaluation of the recurrent tissue confirmed the presence of PTC in both the lymph nodes and the thyroid bed. This definitive diagnosis validated the clinical and imaging findings and highlighted the importance of histopathology in confirming the nature of recurrence.

Serum Tg remains a critical biomarker for disease monitoring, particularly in detecting recurrence or residual disease. The patients with recurrence had significantly higher initial Tg levels (35.02 ng/dL) compared to the average cohort Tg levels (12.3 ng/dL). This suggests that high Tg levels post-thyroidectomy could be an indicator of residual disease or increased risk of recurrence. The significant reduction in Tg levels to an average of 0.20 ng/dL after RAI therapy demonstrates the effectiveness of the treatment and provides reassurance of disease control. All three patients with recurrence underwent revision neck surgery, followed by RAI ablation therapy. The individualized doses of RAI (53 mCi, 100 mCi, and 150 mCi) helped achieve disease control, as evidenced by reduced Tg levels and good clinical outcomes. Recurrence can occur even years after surgery, as seen in the patient with recurrent thyroid tissue in the thyroid bed two years post-surgery. This necessitates prolonged follow-up intervals for PTMC patients.

The prognoses for patients in thyroidectomy due to PTMC series are excellent. Some reports revealed zero mortality. In this study 96.8% of patients were disease-free. The mortality rate could not be evaluated due to the very short period of surveillance.

CONCLUSION

Papillary thyroid microcarcinoma (PTMC) generally has an excellent prognosis when managed with total thyroidectomy. However, this study's observed recurrence rate of 3.2% highlights the importance of individualized patient counseling. Patients should be informed about the potential for recurrence and the role of low-dose radioactive iodine ablation (RAI) as an additional treatment option. While RAI may not be necessary for all PTMC cases, it can provide an added layer of protection against recurrence, particularly for high-risk patients. Shared decision-making should balance the risks, benefits, and patient preferences to ensure optimal outcomes.

REFERENCE

1. Davies L, Welch HG. Current thyroid cancer trends in the United States. JAMA otolaryngology–head & neck surgery. 2014 Apr;140(4):317-22.
2. Mazzaferri EL. Managing thyroid microcarcinomas. Yonsei medical journal. 2012 Jan 1;53(1):1-4.

3. Baudin E, Travagli JP, Ropers J, Mancusi F, Bruno-Bossio G, Caillou B, Cailleux AF, Lumbroso JD, Parmentier C, Schlumberger M. Microcarcinoma of the thyroid gland: the Gustave-Roussy Institute experience. Cancer: Interdisciplinary international journal of the american cancer society. 1998 Aug 1;83(3):553-9.

4. Pazaitou-Panayiotou K, Capezzone M, Pacini F. Clinical features and therapeutic implication of papillary thyroid microcarcinoma. Thyroid. 2007 Nov;17(11):1085-92.

5. Davies L, Welch HG. Increasing incidence of thyroid cancer in the United States, 1973-2002. Jama. 2006 May 10;295(18):2164-7.

6. Ito Y, Miyauchi A. Therapeutic strategy for incidentally detected papillary microcarcinoma of the thyroid. Nature clinical practice Endocrinology & metabolism. 2007 Mar;3(3):240-8.

7. Leenhardt L, Grosclaude P, Chérié-Challine L. Increased incidence of thyroid carcinoma in France: a true epidemic or thyroid nodule management effects? Report from the French Thyroid Cancer Committee. Thyroid. 2004 Dec;14(12):1056-60.

8. Pelizzo MR, Boschin IM, Toniato A, Piotto A, Bernante P, Pagetta C, Rampin L, Rubello D. Papillary thyroid microcarcinoma (PTMC): prognostic factors, management and outcome in 403 patients. European Journal of Surgical Oncology (EJSO). 2006 Dec 1;32(10):1144-8.

9. Ds C. Management guidelines for patients with thyroid nodules and differentiated thyroid cancer. Thyroid. 2006; 16:109-42.

10. Ds C. Management guidelines for patients with thyroid nodules and differentiated thyroid cancer. Thyroid. 2006; 16:109-42.

11. Ito Y, Uruno T, Nakano K, Takamura Y, Miya A, Kobayashi K, Yokozawa T, Matsuzuka F, Kuma S, Kuma K, Miyauchi A. An observation trial without surgical treatment in patients with papillary microcarcinoma of the thyroid. Thyroid. 2003 Apr;13(4):381-7.

12. McDougall IR, Camargo CA. Treatment of micropapillary carcinoma of the thyroid: where do we draw the line? Thyroid. 2007 Nov;17(11):1093-6.

13. Küçük NÖ, Tari P, Tokmak E, Aras G. Treatment for microcarcinoma of the thyroid—clinical experience. Clinical nuclear medicine. 2007 Apr 1;32(4):279-81.