

Thyroid Papillary Carcinoma in Paediatric and Adolescent Patients: Evaluation of Surgical Treatment in a Single Centre

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ABSTRACT

Aim: Thyroid cancers are the most commonly determined cancers in the paediatric age group. Although the rates of lymph node and distant metastases are greater at the time of diagnosis in comparison with adult thyroid cancers, with the appropriate treatment protocols, the prognosis is excellent. In this paper, we present the clinical characteristics of thyroid papillary carcinoma determined in children and adolescents in our clinic, the surgical techniques applied and the clinical results evaluated in consideration of the relevant literature.

Methods: A retrospective evaluation of 12 patient records in the paediatric and adolescent age group from a total of 250 who underwent surgery for a diagnosis of thyroid papillary carcinoma at Ankara Oncology Training and Research Hospital between 2000 and 2007.

Results: The prevalence of thyroid and papillary carcinoma in childhood and adolescence was determined as 4.8%. The patients were all female with a mean age of 17.9 years (range, 11–21 years). At the time of diagnosis, lymph node metastases were identified in seven cases (58.3%) and lung metastases in four cases (33.3%). Total thyroidectomy was performed on all patients and for those with lymph node metastasis; a modified radical neck dissection was also applied. Post-operatively, all patients were administered radioactive iodine therapy followed by levothyroxine therapy. During the mean follow-up period of 123 months, apart from persistent tumour in some patients, no recurrence was noted in other patients.

Conclusion: As thyroid papillary carcinoma in childhood and adolescence is characterized by lymph node and distant metastases, even if the tumour is limited to the thyroid, because of frequent recurrence after treatment, total thyroidectomy and, where necessary, modified neck dissection are recommended for all patients rather than more conservative treatment protocols.

Keywords: Adolescent, carcinoma, papillary, thyroid.

INTRODUCTION

Although differentiated thyroid cancer is rarely seen in the thyroid gland in childhood and adolescence, thyroid cancers are one of the most commonly encountered malignancies in the paediatric age group (1). The prevalence of differentiated thyroid cancer in childhood and adolescence is between 2.6% and 1.9% of all patients (2, 3). Just as in adults, papillary carcinoma is seen most frequently (2, 4). In this age group, although lymph node and distance metastases are often present, prognosis is excellent with appropriate treatment protocols. Despite

good prognosis, because of recurrences which develop following surgical intervention, repeated surgical procedures are necessary and this increases morbidity associated with complications.

In the paediatric and adolescent age group, prognostic factors (gender, complete tumour resection, multicentricity, tumour size, distant metastasis) have been determined similar to adults and the most significant prognostic factor, which has been determined in several studies is lymph node involvement (5, 6). If it is considered that lymph node metastasis has been

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determined in literature at rates of 40%–80%, aggressive surgical procedures are at the forefront of treatment in this age group.

The aim this study was to present the clinical characteristics, surgical techniques applied and clinical results of patients with thyroid papillary carcinoma determined in childhood and adolescence together with an evaluation of literature.

SUBJECTS AND METHODS

A retrospective examination was made of the records of 12 patients aged below 21 years from a total of 250 who underwent surgery for thyroid papillary carcinoma at Ankara Oncology Training and Research Hospital, Ankara, Turkey, between 2000 and 2007.

Patient data were recorded as age, gender, lymph node and distant organ metastasis at the time of diagnosis, surgical method, tumour histopathological characteristics, TNM stage, post-operative complications, and adjuvant treatment protocols. The histopathological characteristics of the tumour include size, extra-thyroid invasion, multicentricity, and lymph node involvement with vascular and capsular invasion. Tumour staging was applied according to the seven-stage TNM grading system issued by the American Joint Committee on Cancer.

In patients where cervical lymph node metastasis was suspected clinically or from imaging, a fine needle biopsy was taken from the lymph node. In cases where cervical lymph node metastasis was determined, total thyroidectomy together with modified radical neck dissection was applied in the same session. Radioactive iodine (RI) treatment was started 6 weeks post-operatively in accordance with the American Thyroid Association (ATA) guidelines. After RI therapy, all patients were followed up with thyroid-stimulating hormone (TSH) suppression therapy with levothyroxine, again in accordance with ATA guidelines (7).

Thyroid function and thyroglobulin tests were applied at regular 3-month intervals throughout the follow-up period, and thyroid and neck ultrasonography was applied at 6-month intervals. When necessary, other imaging methods (cervical tomography, positron emission tomography and whole body bone scintigraphy) were applied. Apart from the lesions determined at the time of diagnosis, local involvement and distant organ involvement emerging after the first 6 months were accepted as progression, and lesions and distant organ involvement persisting from the time of diagnosis were accepted as persistent disease.

RESULTS

The study comprised 12 female patients aged below 21 years diagnosed with thyroid papillary cancer. The mean age at diagnosis was 17.9 years (range, 11–21 years). At the time of diagnosis, seven (58.3%) patients had lymph node metastasis and four (33.3%) patients had lung metastasis. Both lung and lymph node metastases were determined together in three patients. Total thyroidectomy was applied to five patients and total thyroidectomy together with modified radical neck dissection to seven patients with a median of 22 lymph nodes removed (min 16, max 45), of which median 6 (min 2, max 22) were determined as metastatic lymph nodes.

In the histopathological examination, the tumour was observed to have made capsular invasion at the rate of 41.7% and vascular invasion at 16.7%. While multicentricity was determined in five (41.7%) patients, it was noticeable that there was lymph node metastasis in four and lung metastasis in three at the time of diagnosis. Tumour size was determined as T3 in 41.7%, T1 in 33.3%, T2 in 11.7% and T4 in 8.3%. Lymph node metastasis alone was determined in two, lymph node and lung metastases together in two of the five T3 patients and in one of the T4 patients. Although statistical analysis could not be made because of the low number of patients, it was noticeable that with an increase in tumour size, so there was an increase in the rates of lymph node and lung metastasis.

In the post-operative period, temporary hypocalcaemia was determined in the three patients to whom total thyroidectomy with neck dissection was applied and no other complications were encountered which could have developed following thyroid surgery. At post-operative mean 6.5 weeks, the first RI treatment was initiated. Thyroid-stimulating hormone suppression therapy with levothyroxin was administered in the follow-up period. Within the mean follow-up period of 123 months, apart from persistent tumour in some patients, no recurrence was noted in other patients.

DISCUSSION

The current study was consistent with literature in that the prevalence of thyroid papillary carcinoma was determined as 4.8% in childhood and adolescence from all the age groups (2). Cervical region lymph node metastasis was investigated with imaging methods preoperatively in all patients, and fine needle biopsies were taken with cytology from suspicious lymph nodes. In several studies, lymph node metastasis in this age group has been reported at rates between 40% and 80% and in the patients

of the current study, lymph node metastasis was determined at 58.3% at the time of diagnosis (8, 9). Distant organ metastasis has been reported by several authors at the rate of up to 20% in the lungs and at less than 5% in bone, and in the patients of the current study, lung involvement was observed in a third of the group and no bone metastasis was determined (10, 11). However, even though the lymph and distant organ involvement rates are high in the current study, the 10-year survival rate was 100%, which is consistent with literature (1, 8).

Just as in all age groups, thyroid papillary carcinoma in childhood and adolescence has an excellent prognosis with the appropriate treatment protocols. Although primary treatment of the disease is surgery, no consensus has been reached on surgical procedure. Several researchers have shown the optimal treatment to be total thyroidectomy followed by RI therapy and TSH suppression (2–4, 6, 12, 13). In contrast, some researchers recommend conservative treatment in cases of non-advanced disease and have reported that extended thyroid resection is not related to disease outcome (14–16). The Society of Surgical Oncology recommends lobectomy in T1N0M0 patients limited to the thyroid (17), whereas for tumours with the same characteristics, total or near total thyroidectomy is recommended by the ATA and the American Association of Clinical Endocrinologist (18). In addition, all three associations recommend total thyroidectomy in cases of multicentricity, local or surrounding tissue invasion or lymph node or distant organ metastasis.

Those recommending conservative treatment have reported that there is a lower risk of the development of complications associated with lobectomy with thyroid surgery, the recurrence rate is less than 5% and more than half of these patients could be cured with surgery (19, 20). However, in a study by Bingöl-Koloğlu *et al*, it was reported that because of recurrence after lobectomy, there was a high complication rate in re-operations (13). One of the disadvantages of lobectomy is that in the post-operative follow-up of patients, serum thyroglobulin cannot be monitored.

In patients to whom thyroid ablation has been applied, serum thyroglobulin level has high sensitivity in indicating recurrence and distant metastasis. Another disadvantage is that radioactive iodine (I-131), which is used in scanning or the treatment of residual thyroid tissue, distant metastasis and recurrence, cannot be applied to these patients (1). To increase the efficacy of RI therapy in these patients where distant metastasis develops, especially in the lungs, excision of the

residual thyroid tissue is necessary and this increases the risk of complications. In contrast to all of these, the most important advantage of total thyroidectomy is that the risk is removed of recurrence which could develop in the contralateral thyroid tissue or microscopic tumour foci in the contralateral thyroid tissue not determined at the time of diagnosis.

Kebebew and Clark showed that in up to 85% of papillary thyroid carcinoma, microscopic tumour foci could be determined in the contralateral thyroid lobe (20). In line with this information, total thyroidectomy was applied to all the patients in the current study including two T1N0M0 patients. Although the number of patients was not sufficient for statistical analysis and the follow-up period was short, no post-operative distant metastasis or recurrence was determined in any patient who underwent total thyroidectomy and neck dissection because of lymph node metastasis.

CONCLUSION

Papillary thyroid carcinoma is seen rarely in childhood and adolescence but compared to adults, higher rates of local recurrence and distant metastasis are encountered. Rather than conservative treatment in these patients who have an excellent prognosis with the appropriate treatment, total thyroidectomy can be recommended to both increase the efficacy of post-operative RI therapy and avoid recurrences which could develop in the contralateral lobe, and when there is lymph node metastasis, modified radical neck dissection can be added to the total thyroidectomy.

REFERENCES

1. Parisi MT, Mankoff D. Differentiated pediatric thyroid cancer: correlates with adult disease, controversies in treatment. *Semin Nucl Med* 2007; **37**: 340–56.
2. Popovtzer A, Shpitzer T, Bahar G, Feinmesser R, Segal K. Thyroid cancer in children: management and outcome experience of a referral center. *Otolaryngol Head Neck Surg* 2006; **135**: 581–4.
3. Lee YM, Lo CY, Lam KY, Wan KY, Tam PK. Well-differentiated thyroid carcinoma in Hong Kong Chinese patients under 21 years of age: a 35-year experience. *J Am Coll Surg* 2002; **194**: 711–6.
4. Wada N, Masudo K, Nakayama H, Suganuma N, Matsuzaki K, Hirakawa S *et al*. Clinical outcomes in older or younger patients with papillary thyroid carcinoma: impact of lymphadenopathy and patient age. *Eur J Surg Oncol* 2008; **34**: 202–7.
5. Wada N, Sugino K, Mimura T, Nagahama M, Kitagawa W, Shibuya H *et al*. Treatment strategy of papillary thyroid carcinoma in children and adolescents: clinical significance of the initial nodal manifestation. *Ann Surg Oncol* 2009; **16**: 3442–9.
6. Palmer BA, Zarroug AE, Poley RN, Kollars JP, Moir CR. Papillary thyroid carcinoma in children: risk factors and complications of disease recurrence. *J Pediatr Surg* 2005; **40**: 1284–8.
7. Cooper DS, Doherty GM, Haugen BR, Kloos RT, Lee SL, Mandel SJ *et al*. Revised American Thyroid Association management guidelines for

- patients with thyroid nodules and differentiated thyroid cancer. *Thyroid* 2009; **19**: 1167–214.
8. Demidchik YE, Demidchik EP, Reiners C, Biko J, Mine M, Saenko VA et al. Comprehensive clinical assessment of 740 cases of surgically treated thyroid cancer in children of Belarus. *Ann Surg* 2006; **243**: 525–32.
 9. Dinauer, CA, Breuer C, Rivkees SA. Differentiated thyroid cancer in children: diagnosis and management. *Curr Opin Oncol* 2008; **20**: 59–65.
 10. Bauer AJ, Tuttle RM, Francis GL. Differentiated thyroid carcinoma of children and adolescents. *Endocrinologist* 2002; **12**: 135–42.
 11. Arici C, Erdogan O, Altunbas H, Boz A, Melikoglu M, Karayalcin B et al. Differentiated thyroid carcinoma in children and adolescents. Clinical characteristics, treatment and outcome of 15 patients. *Horm Res* 2002; **57**: 153–6.
 12. Ji QH, Zhang L, Zhu YX, Huang CP. Long-term impact of initial surgical and medical therapy on young patients with papillary thyroid cancer and bilateral cervical metastases. *Chin Med J* 2008; **121**: 63–6.
 13. Bingöl-Koloğlu M, Tanyel FC, Senocak ME, Büyükpamukçu N, Hiçsönmez A. Surgical treatment of differentiated thyroid carcinoma in children. *Eur J Pediatr Surg* 2000; **10**: 347–52.
 14. Collini P, Mattavelli F, Pellegrinelli A, Barisella M, Ferrari A, Massimino M. Papillary carcinoma of the thyroid gland of childhood and adolescence: morphologic subtypes, biologic behavior and prognosis: a clinicopathologic study of 42 sporadic cases treated at a single institution during a 30-year period. *Am J Surg Pathol* 2006; **30**: 1420–6.
 15. Astl J, Dvorakova M, Vlcek P, Veselý D, Matucha P, Betka J. Thyroid surgery in children and adolescents. *Int J Pediatr Otorhinolaryngol* 2004; **68**: 1273–8.
 16. Massimino M, Collini P, Leite SF, Spreafico F, Zucchini N, Ferrari A et al. Conservative surgical approach for thyroid and lymph-node involvement in papillary thyroid carcinoma of childhood and adolescence. *Pediatr Blood Cancer* 2006; **46**: 307–13.
 17. Shaha AR, Byers RM, Terz JJ. Society of Surgical Oncology Practice Guidelines. Thyroid cancer surgical practice guidelines. *Oncology* 1997; **11**: 1228–32.
 18. Singer PA, Cooper DS, Daniels GH, Ladenson PW, Greenspan FS, Levy EG et al. Treatment guidelines for patients with thyroid nodules and well-differentiate thyroid cancer. American Thyroid Association. *Arch Intern Med* 1996; **156**: 2165–72.
 19. Allen E, Owens SE, Waller ML. Differentiated thyroid cancer: lobectomy and radioiodine, a suitable treatment for all cases? *Nucl Med Commun* 1999; **20**: 983–9.
 20. Kebebew E, Clark OH. Differentiated thyroid cancer: “complete” rational approach. *World J Surg* 2000; **24**: 942–51.

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