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Differentiated Thyroid Cancer in Children: The Contribution of Radioiodine Therapy

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Abstract

Differentiated thyroid carcinoma (DTC) is rare in children but has a relatively good prognosis. We report 10 pediatric thyroid carcinomas, addressed to our department for additional radioiodine therapy. Lung metastases were detected in all of them by the post therapeutic Iodine131-Whole body scan. Also, all of them under went serum thyroglobulin, chest radiography and / or cervico-thoracic computed tomography (CT). Therapeutic efficacy was observed in the all cases after radioiodine treatment. According to our results, we recommend radioactive iodine therapy for remnant ablation or residual disease for most children with DTC and a long-term follow-up because disease can recur decades after initial diagnosis and therapy.

Keywords: Differentiated thyroid carcinoma; Children; Miliary pulmonary

Introduction

Differentiated thyroid carcinoma(DTC) in children is rare as reported by Schlumberger [1]. Papillary thyroid carcinoma (PTC) is the most common subtype of DTC in pediatric as well as in adult patients followed by its follicular variant [1,2]. Radiation exposure in infancy has been reported to be associated with the possible occurrence of PTC. However, irradiation does not seem to be the only factor favoring its appearance like in our series. Advanced tumor manifestations, such as large or extensive tumor, multicentricity, lymphadenopathy, and synchronous lung metastasis at diagnosis, are more frequent and important risk factors in pediatric patients. In addition, young children have aworse prognosis compared to young adult or adolescent patients.

Treatment of DTC consists on thyroidectomy and radioiodine ablation in the vast majority of patients [2], especially in patients with high risk of recurrence or death by thyroid cancer.

The aim of our studyis to evaluate pediatric patients with DTC and to analyzefactorsthatcan influence the success of initial therapy.

Patients and Methods

This was a retrospective unicentric study of a cohort of patients diagnosed with DTC under 16 years old. The data was gathered in the files in nuclear medicine department of at Salah Azaiez Institute.

Between January of 2000 and December of 2009, 10 pediatric patients (< 16 years) with DTC were initially treated in our institution. They were 6 girls and 4 boys. No history of exposure to ionizing radiation or family history of CDT has been noted. Revealing signs of their cancer were: thyroid nodule in 7 cases and cervical lymph node in 3 cases; most often detected by family and confirmed by thyroid scintigraphy in 6 cases showing a cold nodule isolated or by cervical ultrasound in 4 cases showing cystic nodules.

All patients were under went total thyroidectomy and initial radioiodine therapy with I-131 within 2-6 months after surgery. Therapeutic neck dissection was performed only in patients with enlarged and suspicious lymphadenopathy or if biopsy proved lymph node metastases. No prophylactic neck dissection was made. Pre-operative neck ultrasounds were not routinely performed in all our patients. The age ranged from 8 to 16 years old (mean age: 13,4 years) and the mean follow-up was 9 years (ranging from 5-14 years). Patients with positive thyroglobulin antibodies, medullary thyroid carcinoma or anaplastic thyroid carcinoma were excluded.

Serum thyroglobulin was quantified by immunometric assay with analytical sensitivity of 0.2 ng/ml, functional sensitivity of 0.9 ng/ml and interassay variation up to 8.8%.

Clinico pathological features, treatments, and outcomes, such as gender, histology, specific variant, tumor size, extrathyroidal extension, tumor stage, presence of pathological node metastases, extension of thyroid resection and node dissection, surgical complications, and data from radioiodine therapy were obtained. These factors were compared among patients, independently from their responses to initial therapy.

Patients were stratified in the TNM (Tumor, Node, Metastasis) system of risk: employed by the American Joint Committee on Cancer (AJCC)/ International Union against Cancer (UICC), which is widely used for all types of cancers.

This study was approved by the Ethical boards of our institution.

Patient follow-up was performed every 6-12 months after initial treatment with surgery and radioiodine therapy. The success of initial therapy was defined as a negative whole body scan associated with undetectable thyroglobulin levels in hypothyroid patients and negative thyroglobulin antibodies after 6 to 12 months and no evidence of structural disease in cross-sectional images when performed. In case of partial response at the beginning such as shrinkage in structural

disease and decrease of thyroglobulin levels, patients were retreated with I131 with at least 6 months interval between two cures.

Results

There were 6 patients (60%) with classic papillary thyroid cancer, 2 with follicular variant types (20%), 1 with follicular thyroid carcinoma (10%) and 1 with Hurthle cell carcinoma (10%). Extrathyroidal extension was found in 20%, metastatic lymphadenopathy in 60%, multicentricity in 26% and distant metastasisin 30%, all of them in the lungs.

Overall, permanent surgical complications such as hypoparathyroidism were observed in 2 patients. There was no patient with damage to laryngeal nerves, neither recurrent laryngeal nerve nor superior laryngeal lesions. All patients under went total thyroidectomy, 50% lateral neck dissection as their first surgery and at least one initial therapeutic dose of radioiodine (I-131). The mean activity of I-131 administered was 75 millicuries (mCi) wich corresponds to 2775 Mégabecquerels (MBq), ranging from 50 to 100 mCi (1,85 to 3,7 GigaBq). The post therapeutic scan showed iodine uptake outside the thyroid bedin 30% of the patients while 70% had uptake only in the thyroid bed. However, the post therapeutic scan uptake pattern was not statistically significant in predicting the success of the initial therapy in this specific population.

Regarding the staging, 7 patients were TNM stage I and 3 patients stage II. For the ATA classification, 3 were considered low risk, 5 intermediate, and 2 high risk.

Factors that affected the success of the initial therapy in our patients were the presence of lymph node metastasis and distant metastasis. Neither age nor gender nor tumor size influenced in this outcome as shown.

For a minimum follow of 5 years, the rate of the initial Tg was more than 80 ng/ml in 6 cases, between 30 and 80 ng/ml in 3 cases and less than 30 ng/ml in 1 case.

Discussion

Data regarding the management of DTC in pediatric patients is scarce in the literature. This present study had the aim to determine prognostic factors that may predict which children with DTC will become free of disease after initial therapy with radioiodine. The findings of the study demonstrated that a large number of children are not free of disease after initial therapy (even when considered "low risk" by conventional staging systems) and that clinical factor such as extent of initial disease presentation, especially lymph node metastasis, seemed to be important to predict outcomes after initial therapy in this population. In addition, most of the patients either are free of disease in some point in the follow up or they had persistent stable disease in this present study. The overall survival was very good as previously shown in other studies.

DTC is rare in children and it represents less than 1% of childhood cancers, as mentioned by travagli [2]. It is a well-differentiated papillary carcinomain 90% of cases, according to Busnardo [3]. This form of thyroid cancer occurs in cells that produce thyroid hormones containing iodine and grows very slowly in children and can also spread to the lymph nodes via lymphatics in the neck and occasionally spreads to more distant sites.

The follicular form also develops in cells that produce thyroid hormones containing iodine but afflicts a slightly older age group and is less common in children. This type of thyroid cancer is more likely to spread to the neck via blood vessels, causing the cancer to spread to other parts of the body, making the disease more difficult to control.

Harrach in his study, noted a female predominance with a marked increase in incidence after 10 years [4]. Its only known cause, is exposure to radiation during childhood, whether external or internal radiation contamination. In living in Belarus and Ukraine that have been heavily contaminated in 1986 by the fallout from Chernobyl children, a dramatic increase in the number of thyroid cancer was observed in the study of Broquère [5]. Schlumberger reports, among the genetic abnormalities , gene rearrangements RET / PTC are presentin 60-80% of papillary cancers following irradiation and only 10 to 20% of DTC occurred in his absence [6]. In our 10 cases, no history of exposure to ionizing radiation has been reported.

In children with papillary or follicular thyroid cancer, total or near-total thyroidectomy is currently the standard of practice, as children typically have more extensive disease at presentation, have higher rates of spread, and to reduce the risk of recurrence. Also, lymph nodes in the neck may need to be removed as part of the treatment for thyroid cancer if there is suspicion of spread of cancer to the lymph nodes.

Surgery may be followed by radioactive iodine therapy, to destroy cancer cells that are left after surgery. 131I provides a cleaning thyroid remnants and fixating lung metastases. It is seven more effective than these metastases are smaller in size and not visualized by imaging studies.

The response to treatment with 131, age, histological type and differences in the mode of appearance affect the prognosis of these metastases. In fact an early diagnosis of the whole body scans to I -131 with negative radiological examinations are providers of a good prognosis, from studies of Cooper and Pacini [7,8]. Pulmonary fibrosisis prevented by administering activities at spacedintervals of several months, but with supervision by pulmonary function testing is required.

Also, thyroid hormone therapy may need to be administered throughout the child's life to replace normal hormones and slow the growth of any residual cancer cells.

In general, treatment outcomes for this type of cancer in children tend to be excellent. The best outcomes are seen in teenage girls, papillary type cancer, and tumors localized to the thyroid gland.

Conclusion

According to the literature data and the results of our study, we conclude that young patients with DTC have a more aggressive clinical presentation with more frequent lymph node and distant metastasis comparing to what is usually seen in adults. Those seem to be the most important prognostic factors for the good response to initial therapy in these patients [9-11]. Unfortunately, most of the risk stratification systems do not give enough emphasis to the presence of lymph node metastasis in this population which might decrease the ability to identify "real low-risk patients'. Since DTC has a very long overall survival, this fact might leads to under treatment with a less aggressive initial therapy

Finally, we think that in pediatric DTC, multidisciplinary specialized teams should be delivered in this case including both

pediatricians and thyroid cancer specialists to minimize possible complications and ensure competent follow-up.

References

1. Schlumberger M (2007) [Papillary and follicular thyroid carcinoma]. Ann Endocrinol (Paris) 68: 120-128.
2. Travagli JP, De Vathaire F, Caillou B, Schlumberger M (1997) Traitement des cancers différenciés de la thyroïde de l'enfant. Etude d'une série de 130 cas suivis à l'institut Gustave Roussy. Ann Endocrinol (Paris) 58 : 254-256.
3. Busnardo B, De Vido D (2000) The epidemiology and etiology of differentiated thyroid carcinoma. Biomed Pharmaco ther 54: 322-326.
4. Harach HR, Williams ED (1995) Childhood thyroid cancer in England and Wales. Br J Cancer 72: 777-783.
5. Broquère S, Tenenbaum F, Toublanc JE (2002) Prise en charge d'un nodule thyroïdien de l'enfant. Médecine Thérapeutique Endocrinologie & Reproduction 4: 105-108.
6. Schlumberger MJ, FilettiS, Hay ID (2003) Non toxicgoiter and thyroidneoplasia. In: Larsen RP, Kronenberg HM, Melmed S, Polonsky KS, editors. Williams' Textbook of Endocrinology. 10th edition. Philadelphia: WB Saunders Company 457–490.
7. Cooper DS, Doherty GM, Haugen BR (2006) Management guidelines for patients with thyroid nodules and differentiated thyroid cancer. Thyroid 16: 109–142.
8. Pacini F, Schlumberger M, Dralle H, Elisei R, Smit JW, et al. (2006) European consensus for the management of patients with differentiated thyroid carcinoma of the follicular epithelium. Eur J Endocrinol 154: 787-803.
9. Zimmerman D, Hay ID, Gough IR (1988) Papillary thyroid carcinoma in children and adults: long-termfollow-up of 1039 patients conservatively treated at one institution during three decades," Surgery 104 : 1157–1166.
10. Dottorini ME, Vignati A, Mazzucchelli L, Lomuscio G, Colombo L (1997) Differentiated thyroid carcinoma in children and adolescents: a 37-year experience in 85 patients. J Nucl Med 38: 669-675.
11. Chow SM, Law SC, Mendenhall WM, Au SK, Yau S, et al. (2004) Differentiated thyroid carcinoma in childhood and adolescence-clinical course and role of radioiodine. Pediatr Blood Cancer 42: 176-183.