DIAGNOSTIC APPROACH TO GOITER IN CHILDREN

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Abstract

Introduction: Common causes of goiter in children include autoimmune disease and iodine deficiency. Purpose: The current study aims to frame goiter according to etiology in the pediatric population. Methods: A retrospective study was conducted over a period of 1 year and 6 months (January 2013-August 2014) in the Emergency Hospital for Children "Louis Ţurcanu" Timisoara. The study group included a total of 36 patients aged between 4 to 18 years with a mean age of 12.3 years. Thyroid volume (Vt) was determined by ultrasound measurements and the diagnosis of goiter was established based on Vt> 97th percentile using diagrams adapted for age, gender. Results and Discussion: We found a high prevalence of Hashimoto thyroiditis, 21 patients (representing 58.33% of total). Of these, 14 patients (66.7%) associated type 1 diabetes, thyroiditis being the second autoimmune disease. Basedow's disease was diagnosed in 2 patients (5.55%), and one showed a solitary thyroid nodule. The other 14 patients (38.9%) with goiter had negative serology for autoimmunity, thus being labeled as diffuse nonimune goiter. The mean age of these patients was 12.2 years with the limits 4.9-18 years, 75% of whom were girls. All patients from this category had euthyroid; most (62%) came from Timisoara. In 5 patients (38%) coming from endemic areas, thyroglobulin was determined. All patients had normal levels of thyroglobulin and iodine deficiency could not be demonstrated. Urine iodine was not determined in the patients included in the present study. Conclusions: The autoimmune pathology is the most common cause of goiter in children. Nonimmune diffuse goiter was found at pubertal age, mostly in girls. Children with goiter, regardless of its etiology, require treatment with thyroxine during puberty even if they are euthyroid. Studies are needed on urine iodine in the West of Romania in the pediatric population.

Key words: diffuse goiter, child, thyroiditis

Introduction

Thyroid disorders are one of the most common endocrine problems in children and adolescents; it affects 3.7% of children between the ages of 11 and 18 years (1). Children with thyroid disorders usually present with an enlargement of the thyroid gland, with or without symptoms of thyroid hormone deficiency or excess. Common causes of goiter in children include autoimmune disease and iodine deficiency. Benign colloid goitre is also a common cause.

Hashimoto thyroiditis is uncommon in children younger than four years of age; the peak age of onset is in early to midpuberty. In adults 90% of cases occurs in females; in children the ratio female: male is 2 to 1 (2). A genetic inheritance has been established (30% of patients have family history of thiroiditis). Also a higher prevalence has been observed in individuals with chromosomal abnormalities: Turner syndrome, Klinefelter syndrome and Down syndrome (3). There is also an increase in association with other autoimmune diseases; thyroid antibodies often are detected in children with type 1 diabetes at onset (4, 5).

An endemic goitre is the most common cause of hypothyroidism. Iodine defficit should be considered in patients with a goitre and negative thyroid antibodies (6). Also high iodine intake has been associated with goiter (7). The pathophysiology of endemic goitre caused by excessive iodine intake is not well defined. By interacting with the immune system, iodine excess may trigger the development of autoimmune thyroid disease such as Hashimoto's thyroiditis (8).

Graves's disease is the most common cause of hyperthyroidism in children and adolescents. Thyromegaly is almost invariably present and the thyroid has a smooth, rubbery texture. Declining school performance and behavioural manifestations often predominate. Exopthalmos occurs in only one-third of children, and it is generally mild (9, 10).

Thyroid enlargement that is not caused by inflammatory, infectious or neoplastic causes is termed a colloid goitre, also referred to as a sporadic or idiopathic simple goitre. Histological findings include enlarged thyroid follicles filled with abundant colloid. The cause remains controversial; although TSH is the principal growth-stimulating factor for the thyroid, TSH levels are normal in patients with colloid goitre (11).

Aim

The current study aims to frame goiter according to etiology in the pediatric population.

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Material and methods

A retrospective study was conducted over a period of 1 year and 6 months (January 2013-August 2014) in the Emergency Hospital for Children "Louis Ţurcanu" Timisoara.

The study group included a total of 36 patients aged between 4 to 18 years with a mean age of 12.3 years. Thyroid volume (Vt) was determined by ultrasound measurements using Brunn formula (12). The diagnosis of goiter was established based on Vt> 97th percentile using diagrams adapted for age, gender (13). The patients were divided into two groups according to presence or absence of thyroid antibodies. Group I- immune goiter consisted of 21 patients (61.1%) and group II nonimmune goiter included 14 patients (38.9%). One case with solitary thyroid nodule was excluded from the group.

Results

Ethiology of goiter: We found a high prevalence of Hashimoto thyroiditis, 21 patients (representing 58.33% of total). Of these, 14 patients (66.7%) associated type 1 diabetes, thyroiditis being the second autoimmune disease. Basedow's disease was diagnosed in 2 patients (5.55%), and one showed a solitary thyroid nodule, which was excluded from the group. The other 14 patients (38.9%) with goiter had negative serology for autoimmunity, thus being labeled as diffuse nonimune goiter (Figure 1).

Group II which included patients with nonimmune goiter was older than group I: mean age in group I was 8.9 years, group II 12.2 years (Figure 2).

Most patients came from urban areas than from rural areas, 41% of patients with immune goiter repsectivly 50% patients diagnosed with nonimmune goiter lives in area with medium iodine deficiency (Figure 3 a, b). Most of the patients were females (Figure 4 a, b). Based on thyroid hormone values, we noticed in the immune group all the possible thyroid manifestations (from subclinical hypothyroidism to hyperthyroidism). All patients from the nonimmune goiter category were in a euthyroid status (Figure 5). In 5 patients (38%) coming from endemic areas, thyroglobulin was determined (Figure 6). All patients had normal levels of thyroglobulin and iodine deficiency could not be demonstrated. Urine iodine was not determined in the patients included in the present study.

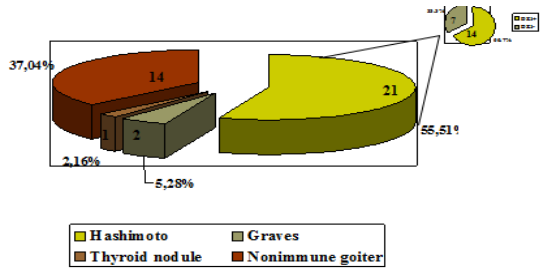

Fig. 1 Causes of goiter

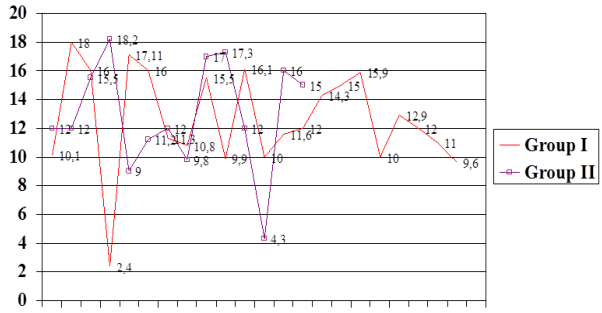

Fig. 2 Age in both groups

Discussion

Hashimoto's thyroiditis is the most common cause of thyroid disease in children and adolescents (14). In our study, autoimmnuity was also the most common cause of goiter in children (61.1%).

Nonimmune diffuse goiter was found at pubertal age, mostly in girls. From the nonimmune group we will discuss one case. Female at puberty, coming from an endemic area, thyroid ultrasound suggested Hashimoto thyroiditis (Figure 7). Antibodies were negative (TPO antibodies =0.3 N.V. <5.6 and remained negative during her multiple exams. Thyroglobulin was also normal (thyroglobulin = 34.5 ng/ml N.V. 1-78ng/ml). Hormone levels TSH, FT3 and FT4 normal (TSH=1.73 uUi/ml (N.V. 1.24-5.6) FT3=4.2 pg/ul (N.V. 2.2-4.7), FT4=1.2 ug/dl (N.V. 0.92-6.8)). Urine iodine was not determined. First she received iodide supplement with no improvement in goiter size, after that thyroxine plus iodide medication with normalisation of thyroid size (thyroid volume at the age 11 years= 7.8 cm3 > percentile 97 and after 2 years 7.9 cm3- between percentile 50 and 90).

The ethiology of simple goiter remains not known, although TSH is the principal growth-stimulating factor for the thyroid, TSH levels are normal in patients with colloid goitre ans some other mechanism can be involved in the development of goiter(15).Thyroxine treatment may improve thyroid size especially during puberty as seen in our case (16,17). A prospective study of 11- to 18-year-old school children found simple goitres in 1.9% of students. On re-examination 20 years later, 60% of patients were normal, 20% were unchanged and a few (10%) developed thyroiditis (18).

Conclusions

The autoimmune pathology is the most common cause of goiter in children. Nonimmune diffuse goiter was found at pubertal age, mostly in girls. Children with goiter, regardless of its etiology, require treatment with thyroxine during puberty even if they are euthyroid. Studies are needed on urine iodine in the West of Romania in the pediatric population.

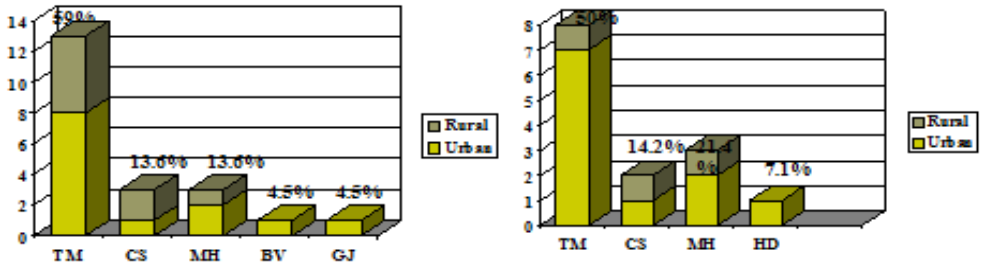

Fig. 3 a. Geographic area distribution group I **b.** Geographic area distribution group II

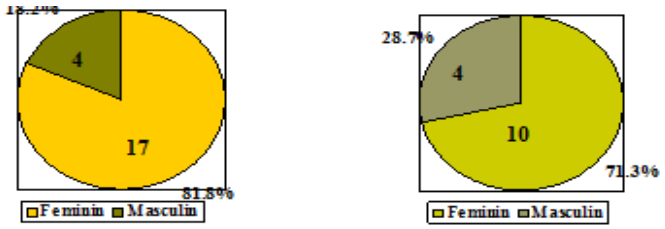

Fig. 4 a. Sex distribution group I **b.** Sex distribution group II

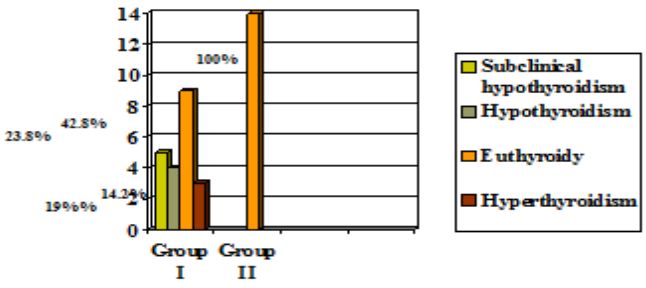

Fig. 5. Thyroid status in both group

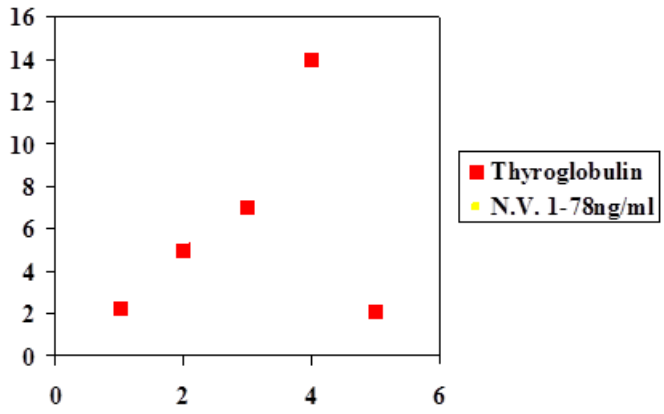

Fig. 6. Thyroglobulin values in 5 patients

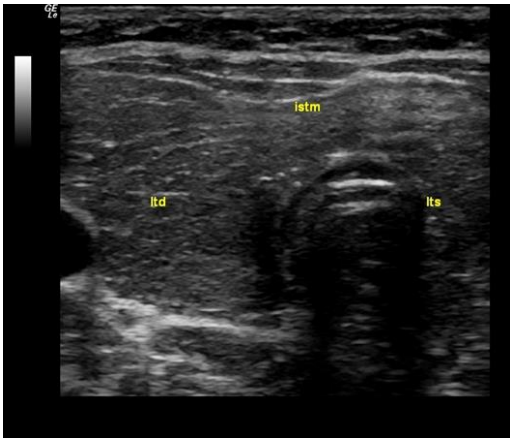

Fig. 7. Thyroid ultrasound revealing enlarged thyroid with inhomogenoues structure, echogenic septum within the gland, normal vascularisation.

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