Children' thyroid nodules: Diagnosis and Treatment

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Presentation Design

- Scientific bases of presentation
- Epidemiology
- Predisposing factors
- Diagnostic procedures
- Clinical symptoms
- Thyroid nodules and cancer
- Predictive factors of malignancy
- Levothyroxine tratment

Scientific bases of presentation

- Corrias et al, Accuracy of fine needle aspiration biopsy of thyroid nodules in detecting malignany in childhood: comparison with conventional clinical, laboratory and imaging approaches. JCEM 86:4644,2001
- Corrias et al, Thyroid nodules and cancer in children and adolescents affected by autoimmune thyroiditis. Arch Pediatr Adolesc Med 162:526, 2008
- Corrias et al, Diagnostic features of thyroid nodules in Pediatrics. Arch Pediatr Adolesc Med 164:714, 2010
- Corrias et al, Levothyroxine treatment in pediatric benign thyroid nodules. Horm Res Pediatr 74:246, 2011

Epidemiology in childhood

Estimated prevalence	(%)	0.05-2
Female : male ratio		3:1
Median age (and range)	yrs	11.5 (3.2-12.3)
Euthyroid	(%)	95
Hyperthyroid	(%)	5
Benign at cytology	(%)	74
Malignant at cytology	(%)	18.3
Suspicious at cytology	(%)	7.7
Benign at histology	(%)	70.0
Malignant at histology	(%)	30.0

Corrias et al Arch Pediatr Adolesc Med 164:714, 2010

Corrias et al Arch Pediatr Adolesc Med 164:714, 2010

Table 2. Histotypes, Relative Frequency, and Thyroid Function in 63 Pediatric Thyroid Nodules

Histotype	No. (%)	Thyroid Function at Nodule Diagnosis
Goitrous nodule	33 (53.4)	33 Euthyroid
Papillary carcinoma	14 (22.2)	14 Euthyroid
Follicular adenoma	8 (12.7)	5 Hyperthyroid, 3 euthyroid
Follicular carcinoma	3 (4.7)	3 Euthyroid
Hurthle cell adenoma	2 (3.2)	1 Hyperthyroid, 1 euthyroid
Medullary carcinoma	2 (3.2)	2 Euthyroid
Benign teratoma	1 (1.6)	1 Euthyroid

Predisposing factors to nodular disease

- Female sex
- Familial antecedents
- Hashimoto’s thyroiditis
- Endemic iodine insufficiency
- Previous oncological diseases
- Irradiation exposure

Detectable clinical symptoms

- Compression to adjacent structures
- Hyperthyroid symptoms
- Adjacent lymph node hypertrophy

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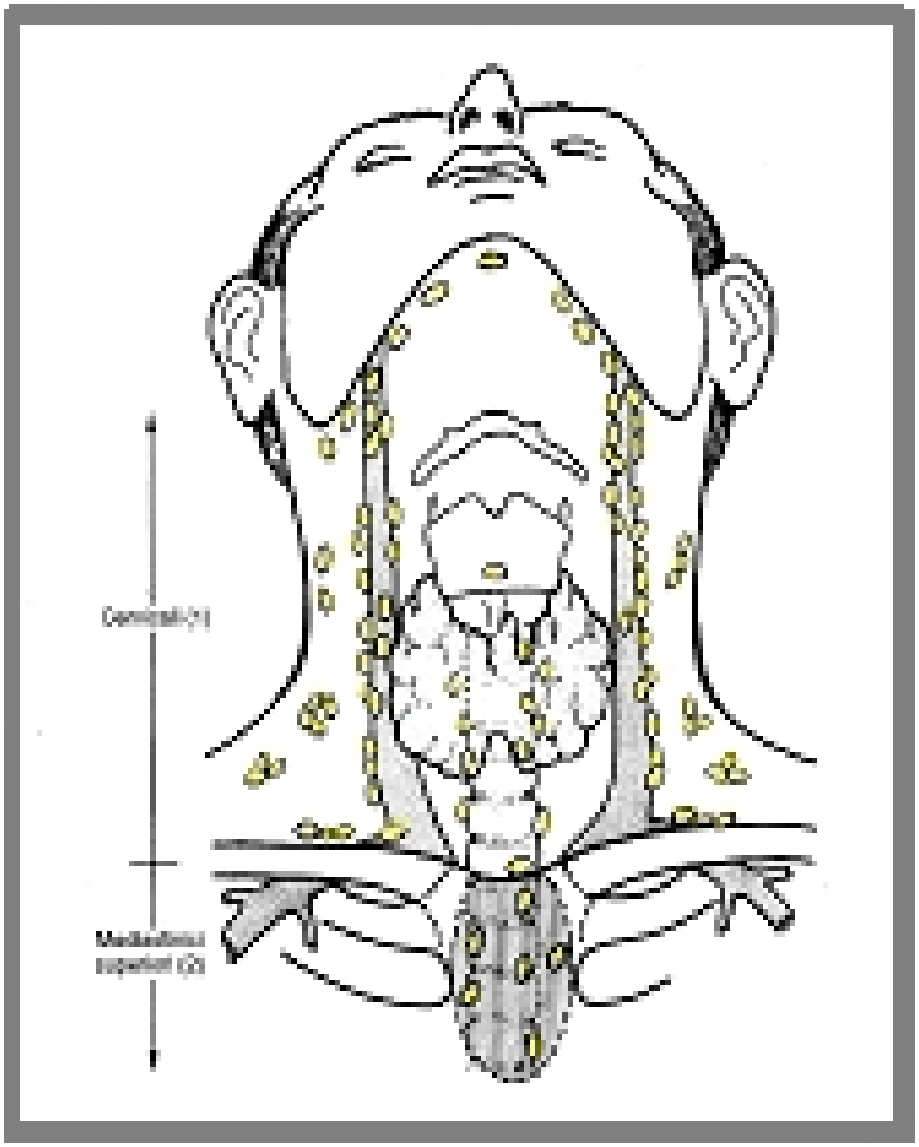
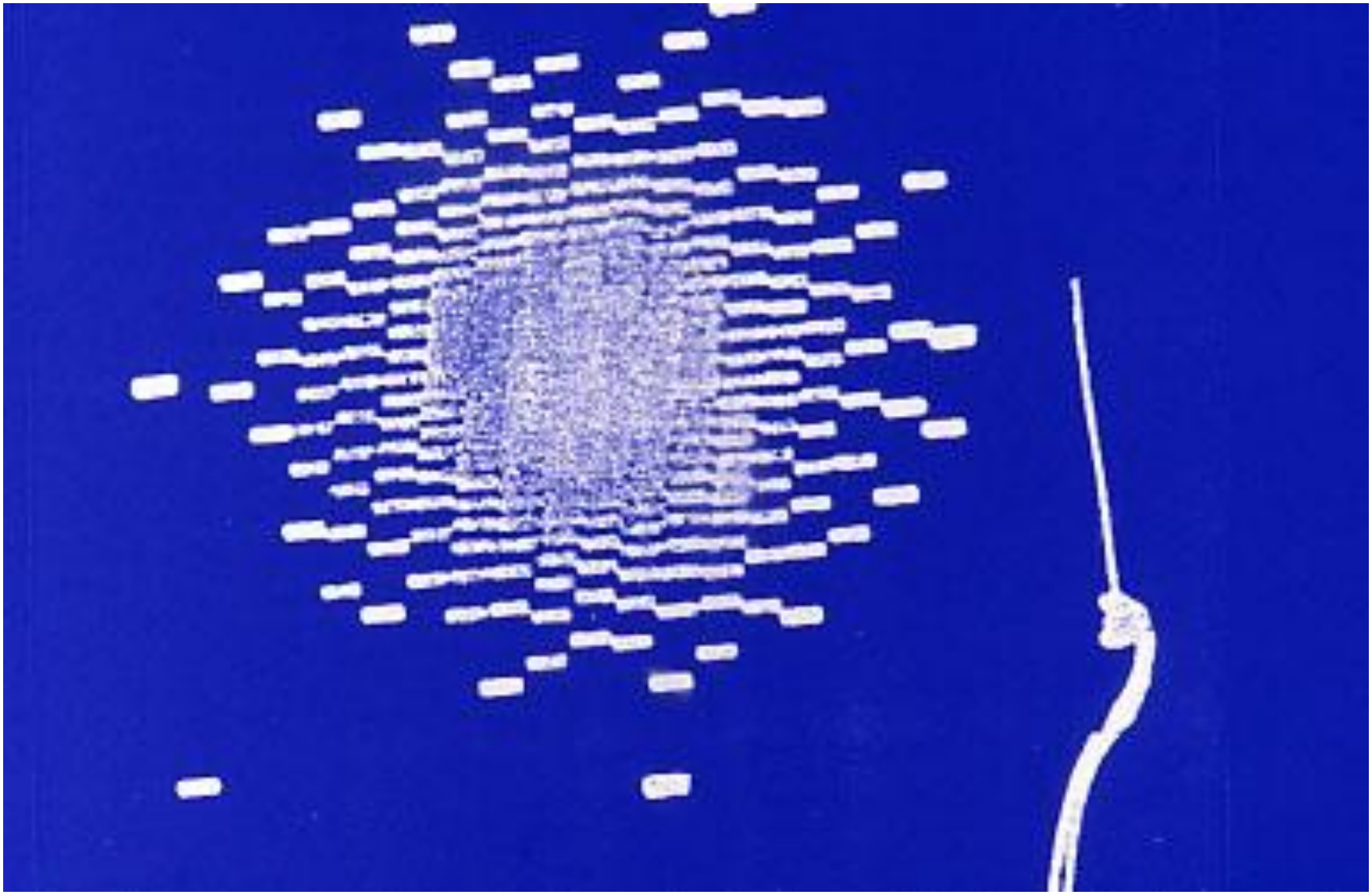


Diagnostic procedures

- Ultrasonography (US)
- FT4 and TSH
- Doppler US
- Fine needle aspiration biopsy (FNAB)
- Tc99 scintiscan



Role of fine needle aspiration biopsy in detecting malignancy in children

- FNAB is a safe tecnique even in childhood, offering the best sensitivity (95%), specificity (86%) and accuracy (90%) in detecting malignancy, compared with conventional approaches
- Neither US nor scintigraphic findings significantly contribute to detecting malignancy
- Among clinical findings only limphadenopathy significantly correlates with malignant lesions

Corrias et al, JCEM 86:4644,2001

Thyroid nodules and cancer risk

- Cancer estimated risk in adulthood (%) 5
- Cancer estimated risk in childhood (%) 20-25
- According to our data (%) 16
- In children with associated TH (%) 10
- Papillary histotype relative prevalence (%) 74
- Follicular histotype relative prevalence (%) 16
- Medullary histotype relative prevalence (%) 10

Corrias et al Arch Pediatr Adolesc Med 164:714, 2010

Significant predictive factors of cancer in children with thyroid nodules

- Compression symptoms 0.004
- Microcalcifications at US 0.001
- Palpable lymph nodes <0.001
- Lymph node alterations at US <0.001
- Vascularization central pattern at Doppler US 0.01

Corrias et al Arch Pediatr Adolesc Med 164:714, 2010

No significant value for cancer prediction

- Age and sex
- Nodule size
- Uninodular (vs multinodular)
- Echoic pattern
- Scintiscan uptake
- Thyroid function

Corrias et al Arch Pediatr Adolesc Med 164:714, 2010

Thyroid nodules and Hashimoto's thyroiditis

- Thyroid nodule prevalence 31.5% (vs 1%)
- Malignancy prevalence 3.0%
- Relative malignancy risk 9.5% (vs 30%)

- **Papillary carcinoma as the only detected histotype**

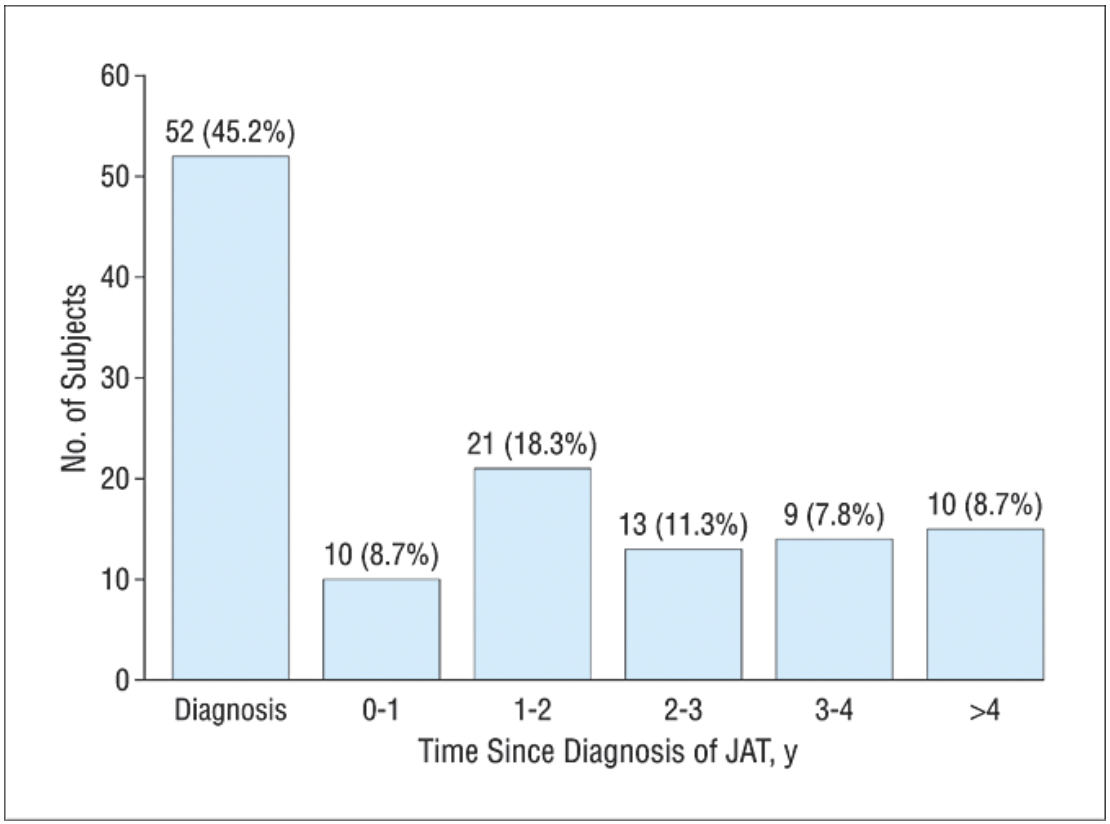
Corrias et al Arch Pediatr Adolesc Med 162:526, 2008

Thyroid nodules and cancer risk in children with HT

- Cancer risk is lower than in general pediatric population
- Thyroid function has no predictive value for cancer risk
- Lymphadenopathy and increase in thyroid nodules under LT-4 therapy are the only two significant predictive factors for cancer risk

Corrias et al Arch Pediatr Adolesc Med 162:526, 2008

Timing of nodule discovery relative to diagnosis of juvenile autoimmune thyroiditis



Corrias et al Arch Pediatr Adolesc Med 162:526, 2008

Effects of LT-4 treatment on children' benign thyroid nodules

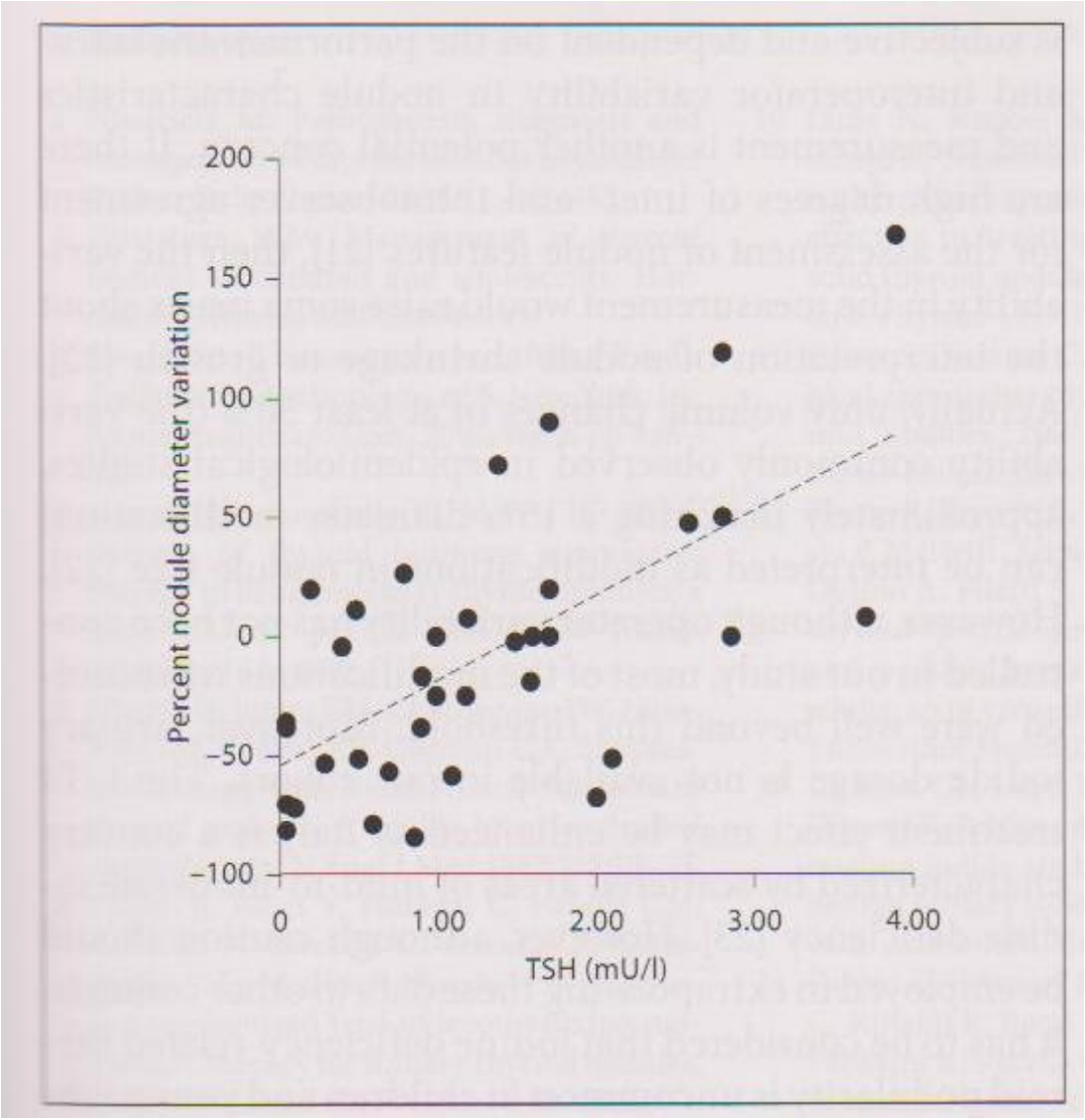
- In adulthood, medical treatment effectiveness is still very controversial
- In pediatrics no randomized and controlled studies on LT-4 therapy have been available until recently
- In a very recent trial we have compared LT-4 treatment vs no treatment in a large series of children with benign thyroid nodules

Corrias et al Horm Res 75: 246,2011

Effects of LT-4 treatment on children' benign thyroid nodules

- According to our results LT4 therapy is able to induce a significant reduction in mean nodule diameter, whereas the natural history of untreated nodules was consistent with size progression
- Nodule diameter reduction, albeit modest, was observed in 50% of treated children and in only 5% of the untreated ones
- In 30% of the treated cases final nodule diameter was less than 50% of the baseline measurement

Corrias et al Horm Res 75: 246,2011



Corrias et al Horm Res 75: 246,2011

Take home messages (1)

- Thyroid nodules in children are less common but more dangerous than in adults, due to the relative more frequent association with cancer
- Cancer risk is not significantly associated with either nodule size, or echoic pattern, or scintiscan uptake, or thyroid function
- Cancer risk may be significantly associated with lymphadenopathy, microcalcifications, compression symptoms and vascularization central pattern at Doppler US
- Cancer risk is to be taken into account even in the cases with Hashimoto's thyroiditis

Take home messages (2)

- LT-4 therapy is rather effective in inducing a significant reduction of benign nodules, whereas the natural history of the untreated ones is consistent with size progression
- FNAB is a safe and highly sensitive, specific and accurate technique, that should be employed in the evaluation of all the suspicious nodules
- Papillary cancer is the most common thyroid malignancy in childhood and its longterm prognosis is frequently very satisfactory, provided that diagnosis and treatment are not too late

AGOBIOPSIA

Esame citologico indicativo di K papillare della tiroide

TC COLLO E TORACE

"Plurimi linfonodi con struttura alterata si rilevano lungo l'asse vascolare carotido-giugulare bilateralmente. *Al torace*, nei due lati si rileva la presenza di *numerosi elementi nodulari parenchimali a carattere ripetitivo di diametro variabile dai 2 ai 5mm*".

Conclusione diagnostica: **CARCINOMA PAPILLARE DELLA TIROIDE CON METASTASI LINFONODALI E POLMONARI**

La diagnosi è stata confermata dall'esame istologico dopo tiroidectomia. Il ragazzo pratica tuttora terapia radiometabolica

Crisafulli G, Wasniewska M, Ascenti G, Rulli I, Zirilli G, Aversa T, De Luca F Acute suppurative thyroiditis disclosing diagnosis of thyroid cancer in a boy. J Endocrinol Invest. 2008 Dec;31(12):1137-8.

Evoluzione e programma

21/12/07 → tiroidectomia totale

22/12/07 → terapia soppressiva con tiroxina

17/03/08 → ablazione con radioiodio

05/02/09 → secondo ciclo con radioiodio

14/12/09 → terzo ciclo con radioiodio

14/07/10 → Tg indosabile anche dopo test di stimolazione con TSH

↓

Remissione completa

Thank you for your attention!