Thyroid carcinoma in children

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Purpose

THYROID CARCINOMA IN CHILDREN

Thyroid carcinoma is uncommon in children under 15 years old. It is 1.5 % of all malignant tumors in children. During pediatric age they are diagnosed in advanced stages with presence of lymph nodes and lung metastases. Despite this, the survival is high, approximately 90%. Up to 10% are familiar, dominant autosomic.

There are three histological varieties: papillary (80%), follicular (18%) and medullary (2%). The latter is presented in MEN Syndrome. Children who have received cervical radiotherapy constitute a group of risk. In these cases of secondary tumors, the papillary variety is also the most common, with outcome similar to the primary outcome.

Clinical presentation is as a palpable, usually painless mass. In 80%, it appears as one nodule, and multicenter in the remaining 20%.

Ultrasound is the method of image required to characterize the injury. CT determines its local extension as locoregional adenopathies and distance illness as lung metastases.

OBJECTIVES:

- Review the different forms of presentation of thyroid carcinomas in children
- Determine the characteristics by image of the same
- Emphasize the importance of the ultrasound as a method of screening in thyroid lesions.
Methods and Materials

Retrospective review, from January 2000 until December 2009, of 7 pediatric patients with histological diagnosis of thyroid carcinoma (6 papillary carcinoma and 1 medullary carcinoma).

4 girls and 3 boys aged between 11 and 14 years old. Five of them made their presentation as a painless neck mass. Two were discovered in ultrasound screening post radiotherapy for previous malignancies (a case of spinal radiation by medulloblastoma and 1 neck radiotherapy for cervical Hodgkin’s Lymphoma).

All undergoing ultrasound doppler study. We analyzed the location, contours, presence or not of halo tumour, microlithiasis and vascularization pattern. All were studied with neck and chest CT with intravenous contrast to determine local extension and distance illness.

The most recent case was studied with RM.
Results

**Fig. 1 on page 7 CASE 1.**

Girl, 12 years old. Painless cervical mass.

Ultrasound showed in the left thyroid lobe and isthmus, an heterogeneous mass, mostly hypoechoic with diffuse internal vascularization (Figure 1,a). CT demostrated highly enhanceemned mass with multiple enhanced lymph nodes (Figure 1,b). Small nodule in posterior segment of left inferior lobe (Figure 1,C).

_Histological diagnosis_: Multicenter infiltrating papillary carcinoma. Positive lymph nodes.

**Fig. 2 on page 7 CASE 2.**

Boy, 11 years old. Cervical mass of 3-4 days of evolution.

Ultrasound detected heterogeneous multinodular thyroid mainly isoechoic with calcifications. (Figure 2,a). CT demostrated hypodense lesion with calcium inside (Figure 2,b) and multiple cervical and supraclavicular adenopathies (Figure 2,c). Lung metastases in right hemithorax (Figure 2,d).

_Histological diagnosis_: Multinodular papillary carcinoma. Positive lymph nodes.

**Fig. 3 on page 8 CASE 3.**

Girl, 12 years old. Painless cervical mass during two months.

Ultrasound showed a nodule in right thyroid lobe, 30x20x12mm, well defined edges, heterogeneous, mainly isoechoic without halo, with microlithiasis inside. (Figure 3,a). RM STIR sequences demostrated hyperintense nodule without locoregional adenopathy. (Figure 3,b).

_Histological diagnosis_: Papillary carcinoma. Left thyroid lobe, normal.

**Fig. 4 on page 9 CASE 4.**
Girl, 12 years old with painless mass in neck.

Ultrasound showed hypoechoic lesion in right thyroid lobe, 25x15mm, poorly defined, without halo, with isthmus extension and microlithiasis. (Figure 4,a). CT delimited worse the nodule with diffuse enhancement and evidence of calcium. (Figure 4,b). Several cervical and supraclavicular lymph nodes. (Figure 4,c)

**Histological diagnosis**: Multifocal papillary carcinoma with multiple nodules in isthmus and left thyroid lobe. Positive lymph nodes.

**Fig. 5 on page 10 CASE 5.**

Girl, 13 years old with mass in neck of 3 weeks of development.

Ultrasound showed a badly defined nodule (30x25mm) in right thyroid lobe. (Figure 5,a). CT demonstrated an irregular enhancement mass. No presence of adenopathy. (Figure 5,b).

**Histological diagnosis**: Medullary carcinoma without capsule infiltration. No extension lymph nodes.

**Fig. 6 on page 11 CASE 6.**

Boy, 14 years old with a history of cervical Hodgkin Lymphoma 10 years earlier, with radiation level up to 40 Gy over the neck.

In screening on thyroid, ultrasound detected a nodule inside right thyroid lobe, 25x15mm, hypoechoic, well delimited, with halo and internal vascularization with Doppler. (Figure 6,a). CT showed poor enhancement after intravenous contrast. (Figure 6,b).

**Histological diagnosis**: Multicenter papillary carcinoma in both lobes and isthmus. No extension nodular.

**Fig. 7 on page 12 CASE 7.**
Boy, 13 years old, with a history of medulloblastoma for six years, treated with spinal radiotherapy up to 77 Gy.

In screening on thyroid, ultrasound saw multinodular affectation of the right thyroid lobe, with microlithiasis and internal vascularization. (7,a). CT showed heterogeneous enhanced right lobe and enhanced lymph nodes. (Figure 7,b).

**Histological diagnosis:** Multifocal papillary carcinoma with involvement of both lobes and isthmus. Positive adenopathies.
Images for this section:

CASE 1. Figure 1

a) Cervical ultrasonography: multinodular mass in left lobe and isthmus, doppler shows internal diffuse vascularization

b) Contrast CT: Nodular, enhancement mass with enhancement lymphadenopathies

c) Chest CT lung: Subpleural metastasis in posterior segment of the inferior left lobe.

Fig. 1

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CASE 2. Figure 2.

a) Cervical ultrasound: Multinodular thyroid with microcalcifications. Normal left thyroid lobe (LL)

b) Contrast cervical CT: nonenhanced nodules with calcifications

c) CT evaluation: Several cervical and supraclavicular lymph nodes.

d) Chest CT lung: metastatic nodule (arrow) in lung parenchyma.

Fig. 2

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CASE 3. Figure 3.

a) Cervical ultrasonography: single heterogeneous nodule without halo around in right thyroid lobe with diffuse microlithiasis.

(b) RM: Axial and coronal STIR shows hiperintense nodule in right thyroid lobe. No cervical adenopathies.

Fig. 3

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CASE 4. Figure 4.

(a) Cervical ultrasonography: Hypoechoic no-halo nodule (arrows) in right thyroid lobe with microlithiasis.

(b) (c). Cervical contrast CT: TC delimits worse the nodule which enhancement. Small calcifications (thick arrow). Multiple cervical and supraclaviculars lymph nodes.

Fig. 4

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CASE 5. Figure 5.

a) Cervical Ultrasound: Bad defined nodule in right thyroid lobe.

b) Neck CT: Irregular enhancement mass in right thyroid lobe. No lymph nodes.
CASE 6. Figure 6

a) Cervical ultrasound: Well defined nodule, hypoechoic, without extern halo in right thyroid lobe. Doppler shows internal vessels.

b) Cervical TC: Poorly enhanced nodule. No lymph nodes.

Fig. 6

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a) Cervical ultrasound: Multinodular lesion in right thyroid lobe with microlithiasis inside, hypervascular with doppler color

b) Cervical TC: Heterogeneous enhancement in right thyroid lobe. Enhanced lymph nodes.

Fig. 7

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Conclusion

- Thyroid carcinoma is uncommon in pediatric age. The most frequent histological variety is papillary carcinoma.
- There is a group of risk in children undergoing cervical radiotherapy. They must be followed with regular periodic controls of thyroid ultrasound and thyroglobulin levels.
- The prognosis is favourable despite debuting with advanced stages (lymph nodes and lung metastases)
- Ultrasound is the imaging method for guiding the thyroid lesions, ruling out other causes for cervical lesions, establishing the nature of them and selecting susceptible patients for biopsy.
- The presence of hypoechoic nodule with microlithiasis, absence of halo and internal vascularization, are seen in malignant lesions with ultrasound.
- CT defines worse the lesions, but establishes its local and distance extension.
- Multifocal involvement sees better with ultrasound than with CT.
- Histological findings show diffuse infiltration in both lobes in most of papillary carcinoma.
- Papillary carcinoma is the most frequent histological type.
References


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