

# Papillary thyroid carcinoma presenting with upper respiratory tract obstruction and pulmonary metastases

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**Background:** Thyroid cancer is rare in children especially before the age of 10 years. Upper airway obstruction and pulmonary infiltration are rare manifestations of such tumor.

**Methods:** An 8-year-old school girl was admitted to Mansoura University Children's Hospital for a papillary thyroid carcinoma manifested by severe upper respiratory tract obstruction. CT scan of the chest revealed multiple miliary shadows in both lungs.

**Results:** Total thyroidectomy was performed and pathological examination confirmed the diagnosis of papillary carcinoma of the thyroid gland. The patient received ablative dose of Iodine 131 and replacement therapy of L-thyroxine.

**Conclusion:** Thyroid cancer, although rare, should be considered for differential diagnosis of upper airway obstruction and pulmonary metastases.

*World J Pediatr 2009;5(3):229-231*

**Key words:** pulmonary miliary metastasis; thyroid cancer; upper respiratory tract obstruction

## Introduction

Upper airway disorders in children may be either congenital or acquired. These disorders occur at various anatomic sites, and their presentation and management are significantly influenced by both the level at which the obstruction occurs and its severity.<sup>[1]</sup>

Thyroid cancer is a rare disease in children,

accounting for 1.5% to 3% of all childhood cancers in North America and Europe, with an annual incidence of 0.5 to 1 case per million children.<sup>[2]</sup> It is exceptional before the age of 10 years, and its incidence increases from then on. The sex ratio (female/male) is close to unity before puberty, and reaches 2.5-6.0 to 1 after puberty. In children, most thyroid carcinomas are derived from follicular cells.<sup>[3,4]</sup>

## Case report

An 8-year-old girl with a history of chest tightness and wheezing for a duration of 2 months was diagnosed as having bronchial asthma. She complained of respiratory distress, cough, and chest tightness and was treated with salbutamol nebulization and intravenous steroids with no improvement. The condition worsened up to cyanosis which necessitated endotracheal intubation in ICU for a few days. Extubation failed as the patient developed stridor and respiratory distress. The patient had no family history of cancer.

Fullness of the neck was observed, so neck ultrasonography was done and revealed the presence of a highly vascular mass related to the thyroid gland with tracheal compression. CT scan of the neck and chest revealed tracheal obstruction (Fig. 1) with multiple miliary shadows in both lung fields (Fig. 2). Technetium-99m pertechnetate showed multi-focal functioning thyroid tissue opposite the thyroid bed (residual normal thyroid tissue) and at upper cervical lymph nodes (Fig. 3). Iodine 131 total body scan showed multi-focal ovoid functioning thyroid tissues at thyroid bed, nodal metastases, and bilateral functioning lung metastases (Fig. 4). The results of laboratory investigations of the thyroid hormones regarding T3, T4 and TSH were within normal levels.

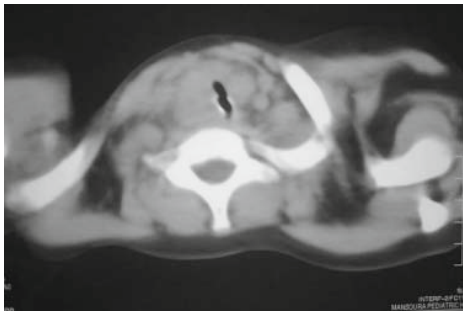
Total thyroidectomy was done to relieve symptoms and save the life of the patient. The excised mass was about 3×2 cm in diameter, grayish white with irregular outer surface. Hematoxylin and eosin staining showed tumor proliferation formed some foci of complex branching papillae with thin central fibrovascular

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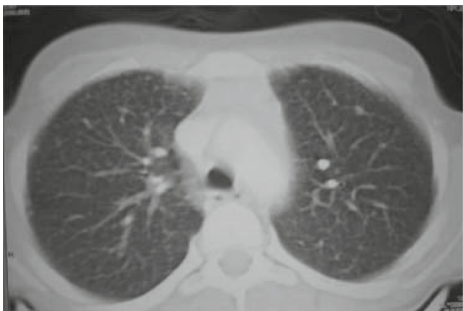
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doi:10.1007/s12519-009-0044-z

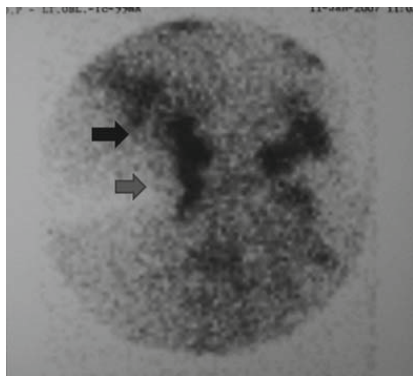
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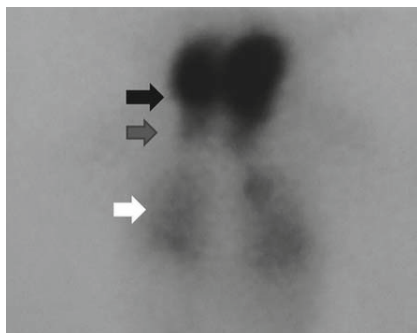
**Fig. 1.** CT scan of the neck and upper chest: compressed, slit-like shape of the trachea.



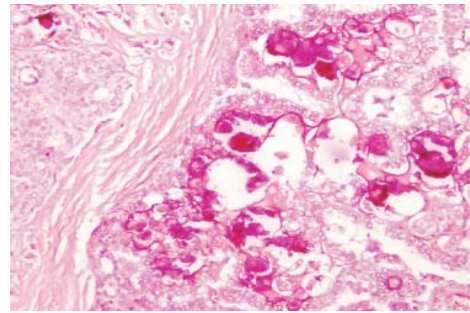
**Fig. 2.** CT scan of the chest: multiple miliary shadows in both lung fields.



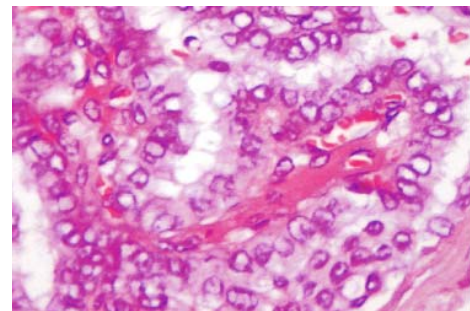
**Fig. 3.** Technetium-99m pertechnetate of the thyroid gland shows multifocal functioning thyroid tissue opposite the thyroid bed (residual normal thyroid tissue) (black arrow) and at upper cervical lymph nodes (grey arrow).



**Fig. 4.** Iodine 131 total body scan shows multifocal ovoid functioning thyroid tissues at thyroid bed (black arrow), nodal metastases (grey arrow) and bilateral functioning lung metastases (white arrow).



**Fig. 5.** Papillary thyroid carcinoma with frequent psammoma bodies (HE, original magnification  $\times 100$ ).



**Fig. 6.** Evident ground glass nuclei and nuclear grooving (HE, original magnification  $\times 400$ ).

cores covered with cuboidal cells having a ground glass pattern and nuclear grooves. The papillae were separated by desmoplastic stroma. Excess psammoma bodies were detected and malignant vascular emboli were seen (Figs. 5, 6), indicating papillary carcinoma of the thyroid gland (classic pattern).

The patient received ablative dose of iodine 131 with replacement therapy of L-thyroxin. She is still alive and well after follow-up of 12 months.

### Discussion

Differentiated thyroid carcinomas mostly present as asymptomatic thyroid nodules, but their sign is occasionally lymph-node metastasis or in rare cases lung or bone metastasis. Hoarseness, dysphagia, cough, and dyspnea suggest advanced disease.<sup>[5]</sup> The clinical presentation of childhood thyroid cancer is mainly a thyroid nodule that is frequently large, either isolated or associated with enlarged cervical lymph nodes. In some children, lymph nodes are present in the lower part of the neck without any detectable thyroid nodule and in some children a diffuse hard goiter is present in the neck. Palpable thyroid nodules are more frequently malignant in children than in adults.<sup>[6]</sup>

In children, the vast majority (>90%) of follicular cells derived thyroid carcinomas are papillary.<sup>[6]</sup> As compared to adult papillary carcinomas, large size

of the thyroid tumor, multifocality and bilaterality, extension beyond thyroid capsule, neck lymph node metastases (in up to 80% of the cases, frequently large with extension beyond the capsule), and lung metastases (in 10-20% of the cases) are more frequently observed in children.<sup>[7]</sup>

The cervical and cervico-thoracic tumor like masses with extension to the antero-superior mediastinum can move and possibly collapse the upper airway. Although lymphoma is the most frequent cause, other conditions as cystic cervical lymphangioma, vascular tumor, congenital or acquired goiter, and teratoma have also been reported.<sup>[8]</sup>

Miliary opacities are a common aspect in pulmonary tuberculosis and have also been described in some extra-thoracic malignancies, including melanoma, renal cell carcinoma, and thyroid neoplasm.<sup>[9]</sup> Papillary thyroid carcinoma presented with miliary pulmonary metastases has been reported.<sup>[10]</sup> The upper airway obstruction and presence of a miliary pulmonary pattern in children suggest one of the following three conditions: tuberculosis, lymphoma and thyroid cancer,<sup>[11,12]</sup> which was found in our patient.

Thyroid tumors presented with upper airway obstruction in children are rare and only few cases of papillary carcinoma of the thyroid, growing out of teratomatous tissue,<sup>[13]</sup> myofibromatosis-like hemangiopericytoma,<sup>[14]</sup> teratoma of the thyroid gland<sup>[15]</sup> and papillary carcinoma<sup>[16]</sup> were reported.

In summary, we report a rare case of upper airway obstruction and pulmonary metastasis caused by thyroid cancer in a young girl, which required multiple imaging modalities to reach an exact diagnosis.

**Funding:** None.

**Ethical approval:** Not needed.

**Competing interest:** None declared.

**Contributors:** Al-Tonbary Y proposed the study. Fouda A wrote the first draft and analyzed the data. All authors contributed to the design and interpretation of the study and to further drafts. Fouda A is the guarantor.

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Received August 25, 2008

Accepted after revision September 16, 2008