

# A 15-year-old Girl with a Lateral Neck Mass Turning Out to Be Papillary Thyroid Carcinoma - Lateral Ectopic Papillary Thyroid Carcinoma or Lymph Node Metastasis?

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## What is already known on this topic?

Lateral neck lesions in children are common and involve various etiologies. A rather unusual cause of a lateral neck mass is the presence of ectopic thyroid tissue. Malignant degeneration of ectopic thyroid tissue located laterally in the neck is very rare and has been sparsely reported. It can be challenging to distinguish a lymph node metastasis from primary thyroid carcinoma located in ectopic thyroid tissue, especially when no primary tumor is located within the thyroid gland.

## What this study adds?

We report on a 15-year-old girl in whom papillary thyroid carcinoma was found in a lateral neck lesion without a primary thyroid tumor. We discuss the diagnostic and therapeutic challenges in this case, and compare our experience with the existing literature, thereby adding knowledge to the very scarce available evidence in pediatric cases.

## Abstract

Lateral neck lesions in children are common and involve various infectious or inflammatory etiologies, as well as embryological remnants such as branchial cleft cysts. Although unusual, ectopic thyroid tissue may also present as a lateral neck mass. Here, we present an unusual case of a 15-year-old girl treated for an asymptomatic lateral neck mass that, after surgical removal, was found to be papillary thyroid carcinoma (PTC). However, after removal of the thyroid gland, no primary thyroid tumor was found. The question arose whether

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the lateral neck lesion was a lymph node metastasis without identifiable primary tumor by histological evaluation, or rather malignant degeneration of ectopic thyroid tissue. Total thyroidectomy was performed with postoperative adjuvant radioactive iodine ablation. Even though PTC in a lateral neck mass without a primary thyroid tumor has been described previously, pediatric cases have not been reported. In this report we share our experience on diagnosis, treatment and follow-up, and review the existing literature.

**Keywords:** Thyroid dysgenesis, thyroid papillary carcinoma, cervical neck mass

## Introduction

Lateral neck lesions in children are common and involve a variety of etiologies, including infectious or inflammatory disease, as well as embryological remnants, such as branchial cleft cysts. A rather unusual cause of a lateral neck mass may be an abnormally formed thyroid gland or a remnant of its embryological development. Ectopic thyroid tissue occurs in approximately seven percent of the adult population, mostly women (75%), based on previous cadaver studies (1,2,3). Ectopic thyroid tissue may be the only thyroid tissue with simultaneous absence of the thyroid gland itself (4). Ectopic thyroid tissue is most likely situated in the midline and is unusual in the lateral neck compartment with an incidence of one in 100,000 (2,5,6). Midline ectopic thyroid tissue is the consequence of an incomplete or aberrant descent of the thyroid anlage in the fetus, that normally migrates from what later becomes the base of the tongue through the thyroglossal duct to its final position at the anterior tracheal wall (7). Failure of duct obliteration may give rise to thyroglossal duct cysts of which up to 45% contain normal-appearing ectopic thyroid tissue (8). Lateral ectopic thyroid tissue seems to be the consequence of inadequate fusion of the medial thyroid anlage, which gives rise to the thyroid parenchyma, and the lateral thyroid anlage, that is part of the fourth branchial cleft, trapping normal thyroid tissue (7,9). Others have reported benign thyroid follicular inclusions in cervical lymph nodes as an underlying etiology of lateral cervical ectopic thyroid tissue (10). Degeneration of ectopic thyroid tissue in any location forms less than one percent of all thyroid carcinomas, with the majority of cases showing degeneration to papillary thyroid carcinoma (PTC) (2,11,12).

Herein, we report on our experience of a 15-year-old girl in whom a PTC was found in a lateral neck lesion without a primary thyroid tumor.

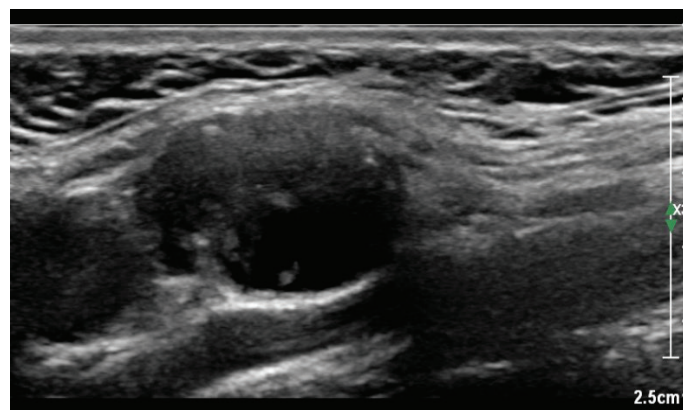
## Case Report

A 15-year-old girl with an unremarkable medical history presented at the outpatient pediatric department with a non-painful, palpable, lateral neck swelling, noticed first one year earlier. Over time, slight enlargement was recognized without any additional symptoms, in particular there were no

B-symptoms, as a sign of a possible underlying malignancy. Her family history was unremarkable concerning thyroid disorders and/or malignancies. An infectious cause was ruled out by serological laboratory testing. No lymphadenopathy was found during physical examination.

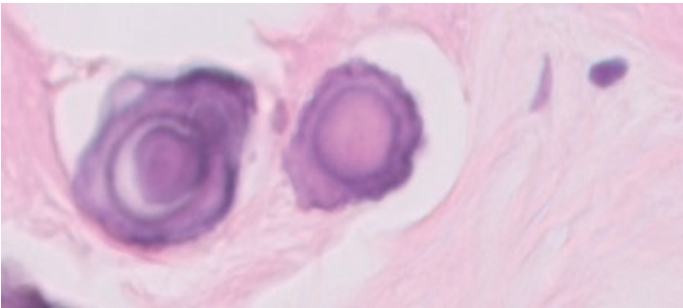
Cervical ultrasound was performed showing a clearly distinguishable, atypical lesion of 1.3 x 2 x 2 cm positioned ventrally of the sternocleidomastoid muscle with several calcifications, a cystic component and slightly enhanced vascular flow (Figure 1). Apart from the calcifications, there were no ultrasound findings associated with malignancy. The thyroid itself was normal-sized and no cervical lymphadenopathy was recognized. As there was no definite radiological diagnosis, surgical excision of the lesion was performed under the presumption of an embryological remnant. During surgery the lesion was located medially from the sternocleidomastoid muscle without any connection to surrounding structures or the skin. On gross examination the appearance of the lesion most closely resembled a lymph node, but during surgery it opened and fluid was exuded.

Histological examination revealed a cystic lesion consisting of papillae lined by follicular epithelium with papillary nuclear features, consistent with PTC (Figure 2, 3). There was lymphoid tissue surrounding the lesion. No other epithelial structures, such as ciliated epithelium or squamous epithelium were seen. Immunohistochemistry (IHC) of the lesion showed positivity for thyroglobulin, paired-box gene-

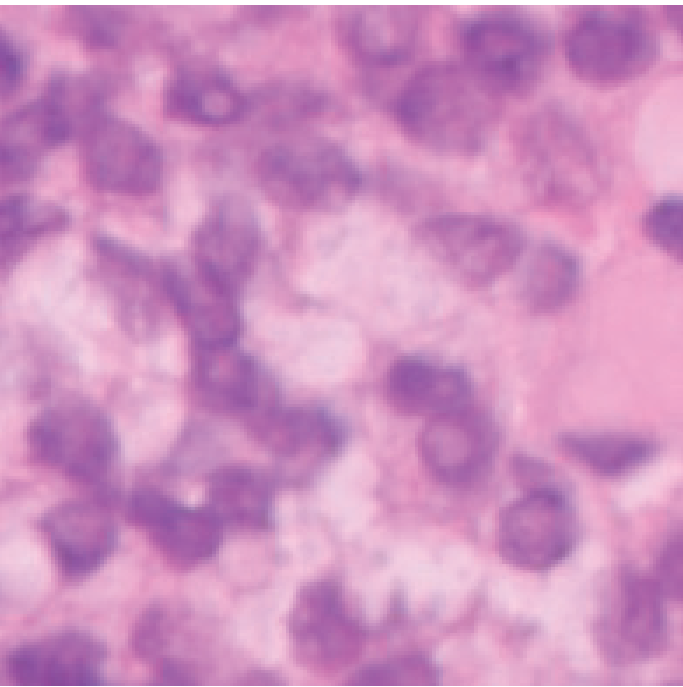


**Figure 1.** Sonography of the lateral neck mass showing calcifications

8 and thyroid transcription factor-1 proteins. *BRAF* mutation was ruled out. Results of IHC confirmed the diagnosis of PTC. However, it was challenging to distinguish if the lesion was a lymphatic metastasis of a primary thyroid carcinoma or if the lesion was primary ectopic PTC, as only a small rim



**Figure 2.** Psammoma bodies found in the resected lateral neck mass characteristic for papillary thyroid carcinoma

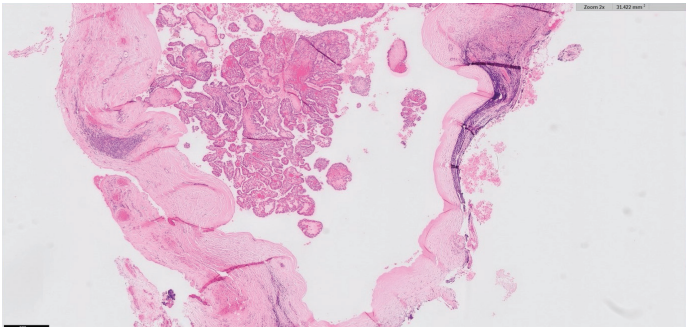


**Figure 3.** Nuclear pseudo-inclusion confirming papillary thyroid carcinoma

of lymphoid tissue was found at the edge of the histological specimen (Figure 4).

After the unexpected histological diagnosis of PTC, the pediatric endocrinologist was consulted. The patient did not report any symptoms of thyroid dysfunction and biochemical evaluation showed euthyroid status (Table 1). In a search for the primary thyroid tumor ultrasound was repeated and there was a suspicion of a four-millimeter node in the left thyroid lobe with benign appearance. There were no findings suspicious of metastatic disease. A cervical magnetic resonance imaging scan was also unable to identify a primary thyroid tumor or lymphatic metastases, nor a connection between the thyroid and the area of the previously resected PTC. Although additional diagnostic work-up showed no primary thyroid tumor, the presence of a primary thyroid microcarcinoma could not be ruled out. Therefore, the multidisciplinary team advised a total thyroidectomy as treatment for pediatric PTC. During surgery close to the thyroid, a single lymph node overlying the thyroid gland was resected. Histological examination of the complete thyroid showed no evidence of a primary tumor and examination of the resected lymph node showed no PTC.

Based on the pathology findings of the lateral lesion and the thyroid gland it was difficult to distinguish between a primary PTC in ectopic lateral thyroid tissue, or a lymphatic



**Figure 4.** Histological presentation of a part of the resected lesion showing the papillary architecture characteristic for papillary thyroid carcinoma with some lymphoid tissue at the outer edge

**Table 1. Laboratory findings and anthropometric data preoperative to thyroidectomy**

	Patient values	Local reference values and units
Anti-thyroglobulin	< 4.1 IU/mL	< 10 IU/mL
Free T4 (thyroxine)	14.8 pmol/	12.0-22.0 pmol/L
Tg	61.7 pmol/L	0-60 pmol/L
TSH	1.6 mU/L	0.5-5 mU/L
Height	172.5 cm (+ 0.66 SDS)	
Weight	81.55 kg (+ 2.10 SDS for height)	

IU/mL: international units per milliliter, pmol/L: picomoles per liter, mU/L: milliunits per liter, SDS: standard deviation score, Tg: thyroglobulin, TSH: thyroid stimulating hormone

neck metastasis of a primary thyroid tumor, since no primary tumor was found and the lesion showed only a small edge of lymphoid tissue. To specify further treatment, it was decided to classify the lateral neck lesion as an extra-thyroidal localization of the thyroid tumor (T3bN0Mx) instead of classifying it as a nodular lesion (pT0N1bMx), based on both the absence of any signs of a primary tumor within the normally located thyroid gland on histological evaluation, and the absence of additional signs of other lymphatic metastases.

Subsequently to the surgical resection, postoperative adjuvant ablative radioactive iodine treatment (3667 MBq) was given according to the current national pediatric guideline on thyroid cancer (13). After finishing this course, thyroxine hormone supplementation was started. Scintigraphy post radioactive iodine therapy showed no signs of radioactive iodine avid metastases. Further follow-up was uneventful.

## Discussion

PTC is the most common subtype of thyroid cancer in children, even though its incidence is low with approximately three cases per million people below the age of 14 years increasing to eleven cases in the 15-17 years old age group (14).

Several cases of PTC arising in a thyroglossal cyst or in lateral branchial cleft cysts have been reported, but only a few cases report the finding of PTC in a lateral neck mass, and to the best of our knowledge, none have been reported in pediatric patients.

In a case comparable to ours, but in a 53-year-old man, an ectopic PTC was found in the clavicular head of the sternocleidomastoid muscle, without evidence of a primary thyroid tumor. No evidence of branchial cleft tissue or lymphatic tissue could be found. Clinically there were no signs of lymph node involvement (15). In this patient a total thyroidectomy was performed along with central and selective neck dissection. No malignancy was found in the thyroid gland nor in the lymph nodes, histologically. The patient received ablative radioactive iodine treatment postoperatively (15).

Another case report of a 30-year-old woman, diagnosed with Hashimoto's thyroiditis three years before and who subsequently presented with a lateral neck mass that turned out to be PTC has been published (16). After the initial removal of the lateral neck mass she was treated with total thyroidectomy and partial neck dissection. The histopathological examination reported thyroid

gland with no tumor, but with tissue around the thyroid showing carcinomatous infiltration. The resected neck mass contained neoplastic PTC cells within lymph node parenchyma with extra capsular invasion. In two of the resected neck lymph nodes metastatic PTC was found. The findings in this patient were interpreted as ectopic PTC with metastatic disease. El Bouhmadi et al. (17) reported on their experience with a 36-year-old female treated for hypothyroidism for one year. She presented with PTC of the thyroid with extracapsular extension and with a lateral neck mass revealing PTC in lateral ectopic thyroid tissue. No lymph node tissue and no lymph node metastasis were found and the patient received ablative radioactive iodine treatment after total thyroidectomy.

In the present case the question was whether the lateral neck mass could represent a lymph node metastasis, even if the primary thyroid tumor could not be found. The finding of a lymph node metastasis in absence of a thyroid tumor has been reported previously. Yamashita et al. (18) shared the case of a 66-year-old woman who presented with a swelling of the right upper neck, just below the parotid in the absence of a primary thyroid tumor. Fine-needle aspiration revealed a PTC that was treated with total thyroidectomy, excision of the neck mass together with the superficial lobe of parotid gland along with extended lymph node dissection. Pathological examination revealed that the neck mass was a fusion of two lateral lymph nodes with metastasis of PTC. No papillary carcinoma was found in the five-millimeter slices of the thyroid. Based on a hyalinized image, the possibility of spontaneous disappearance of the papillary thyroid microcarcinoma was postulated. She was diagnosed with lymph node metastasis of a micro-PTC, supported by histopathological report. Adjuvant ablative radioactive iodine treatment was given and no recurrence or metastasis was reported 24-month after surgery. Li et al. (19) also found lymph node metastasis of a PTC without a primary thyroid tumor. They reported on a 27-year-old woman who underwent left thyroidectomy and lymph node resection for suspected malignancy in a thyroid node and enlarged cervical lymph nodes. Intraoperative frozen section examination, as well as the final histopathological examination of the suspected nodule in the left thyroid, only showed benign thyroid, whereas two of the 15 resected lymph nodes showed PTC metastasis. Subsequent right thyroidectomy was refused, and the reported follow-up of two years duration was uneventful.

There are reports of tumor regression in PTC, which may explain the missing primary thyroid tumor in metastasized PTC. Shim et al. (20) confirmed the hypothesis of spontaneous remission of PTC, even in lymphatic metastasis. These



authors reported a 58-year old woman already treated with total thyroidectomy along with adjuvant ablative radioactive iodine for PTC without lymph node involvement. During her follow-up she presented with enlarged cervical lymph nodes and fine-needle aspiration confirmed metastatic PTC. As she refused to undergo surgery she was followed-up. One year later no abnormal lymph nodes could be identified. During the next nine years no abnormalities were identified and the follow-up was uneventful.

The present case, along with these case reports illustrates the dilemma of diagnosing a thyroid malignancy without a primary thyroid tumor as it is difficult to distinguish between ectopic malignancy and metastatic disease. However, this distinction is important because metastatic disease necessitates additional treatment.

In the present case, a total thyroidectomy was performed, as this is the cornerstone of the treatment of pediatric PTC. In addition, histopathological examination may show the presence of a thyroid microcarcinoma that was missed during the diagnostic process. In our opinion total thyroidectomy is necessary in the case of histological confirmed PTC, regardless of location, as imaging modalities may miss microcarcinoma within the thyroid gland. Furthermore, additional thyroid stimulating hormone suppression therapy and follow-up with serum thyroglobulin measurements will only be therapeutically reasonable if a total thyroidectomy has been performed. In the present case we did not perform a lymph node dissection. In some adult cases of ectopic PTC in thyroglossal or branchial cleft cysts, cervical lymph node dissections were performed, to various extents (7,12,21). In these cases clinical examination was not suspicious for lymph node involvement and histological analysis of the resected lymph nodes could not detect any lymphatic spread. Lymphatic spread of ectopic PTC is possible, but in our opinion, a preventive neck dissection without any clinical or radiological indication of lymph node involvement should not be performed, and especially not in children, as additional lymph node dissection is a known risk factor for permanent post-operative hypoparathyroidism (22). The decision not to perform a lymph node dissection in our patient was supported by post radioactive iodine therapy scintigraphy did not show any signs of (lymphatic) metastases. However, ultrasound to follow-up lymph node status and measurement of thyroglobulin levels should be included in the follow-up of these patients (13).

Even though the current Dutch guideline for the treatment of differentiated thyroid cancer in children clearly states the indication for post-surgery adjuvant ablative radioactive

iodine treatment in all patients, its application in the present case is arguable (13). In thyroid carcinomas of less than one centimeter limited to the gland without signs of lymphatic metastasis, postoperative radioactive iodine ablation can be omitted in close consultation with the multidisciplinary team (13). However, no matter whether the papillary carcinoma in the lateral neck lesion is classified as a thyroid tumor extending outside the thyroid gland or as lymphatic metastasis, in both cases there would be an indication for post-surgery adjuvant ablative radioactive iodine treatment.

## Conclusion

We report a 15-year-old girl in whom an asymptomatic lateral neck mass turned out to be a PTC without (histological) evidence of a primary carcinoma in the thyroid gland. In the absence of a primary tumor, we hypothesized that the PTC found in the lateral neck mass emerged from lateral ectopic thyroid tissue or alternatively could be a lymph node metastasis of a now completely remitting primary thyroid tumor. The treatment consisted of a total thyroidectomy followed by postoperative adjuvant ablative radioactive iodine treatment. Cases presenting with an inconclusive lateral neck mass should be discussed in a multidisciplinary consultation and should be treated with caution taking the possibility of thyroid related etiologies into account.

## Ethics

**Informed Consent:** Informed consent was obtained from the patient and their family member.

## Footnotes

### Authorship Contributions

Surgical and Medical Practices: Marijke E.B. Kremer, A. S. Paul van Trotsenburg, Anton F. Engelsman, Esther Edelenbos, Arantza Farina-Sarasqueta, Joost van Schuppen, José C.C. Koppes, Joep P.M. Derikx, Christiaan F. Mooij, Concept: Marijke E.B. Kremer, Koppes, Joep P.M. Derikx, Christiaan F. Mooij, Data Collection or Processing: Marijke E.B. Kremer, Analysis or Interpretation: Marijke E.B. Kremer, A. S. Paul van Trotsenburg, Anton F. Engelsman, Esther Edelenbos, Arantza Farina-Sarasqueta, Joost van Schuppen, José C.C. Koppes, Joep P.M. Derikx, Christiaan F. Mooij, Literature Search: Marijke E.B. Kremer, Christiaan F. Mooij, Writing: Marijke E.B. Kremer, A. S. Paul van Trotsenburg, Joep P.M. Derikx, Christiaan F. Mooij.

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