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Case Report

Occult Metastatic Papillary Thyroid Cancer in an Adolescent

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ABSTRACT

Background/Objective: Occult papillary thyroid carcinoma (PTC) is PTC with metastasis but without identification of primary thyroid cancer on preoperative ultrasonography. Published reports on occult PTC in children are limited.
Case Report: We describe a 16-year-old female with occult PTC who initially presented with a painless left sided cystic neck mass. Diffuse sclerosing variant papillary thyroid cancer was found in the resected neck mass and thyroid ultrasound did not show any nodules or features of carcinoma. After total thyroidectomy, pathological examination of the thyroid revealed papillary thyroid microcarcinoma.
Discussion: We describe a rare case of occult diffuse sclerosing variant papillary thyroid cancer presenting as a cystic neck mass mimicking a second branchial cleft cyst in an adolescent patient. When metastatic PTC is found without evidence of nodule on thyroid imaging, occult PTC of the thyroid is the likely diagnosis.
Conclusion: Total thyroidectomy ± neck dissection followed by TSH suppression and radioactive iodine therapy remains the appropriate diagnostic and therapeutic interventions.
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Introduction

Thyroid cancer occurs in the pediatric population with an annual incidence of 4 to 5 per 100 000 patients and carries a higher risk of metastasis and recurrence compared to adult patients.[1] Papillary thyroid cancer (PTC) accounts for approximately 85% of all thyroid cancers[2] and for 90% of all pediatric thyroid cancers.[1] Diffuse sclerosing variant papillary thyroid cancer (dsvPTC) is an aggressive subtype of PTC that is more common in pediatric than adult patients.[3]

Occult PTC is described as PTC with metastasis but without identification of primary thyroid cancer on preoperative ultrasonography.[4] Papillary thyroid microcarcinoma (PTMC)[5] is defined as PTC ≤1 cm in diameter.[6] Boucek et al[5] categorized occult PTC into 4 groups, (1) an incidental finding of thyroid cancer in a total thyroidectomy performed for benign disease or at autopsy, (2) imaging study with incidental finding of PTMC, which is further evaluated with a fine needle aspiration biopsy, (3) a preoperative diagnosis of metastatic cancer and post-surgical identification of primary tumor site by tissue pathology, or (4) thyroid cancer that presents symptomatically in ectopic tissue with or without the presence of metastases.[5] A fifth category proposed by Liu et al,[7] includes thyroid carcinoma involving a lymph node or distant organ metastases with no detectible primary thyroid malignancy.

Metastatic dsvPTC without identification of a primary thyroid tumor before surgery is extremely rare in the pediatric population. We describe a case of a 16-year-old female found to have occult dsvPTC after evaluation and surgical removal of a cystic left neck mass. Written informed consent was obtained from the patient for publication of this report and images.

Patient consent was obtained for publication.

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Case Report

A healthy 16-year-old female presented to an urgent care facility with a nontender left level II to III neck mass. She had no history of neck radiation. Neck ultrasound demonstrated a thick-walled, cystic lesion measuring 3.9 × 2.1 × 2.8 cm. The thyroid gland was enlarged (right lobe 5.9 × 1.9 × 1.8 cm, left lobe 5.1 × 1.6 × 1.7 cm) and described as "heterogenous hypervascular and somewhat hypoechoic" without a focal nodule. The ultrasound identified a "probable lymph node" inferior to the lesion measuring 2.0 × 1.3 × 0.8 cm. Computed tomography of the neck with intravenous contrast showed a cystic mass with septations, suggestive of a second branchial cleft cyst (BCC). Multiple posterior lymph nodes were noted but did not appear pathologic based on size criteria. The thyroid gland was without abnormalities. Laboratory evaluation showed normal thyroid function and Hashimoto's thyroiditis (elevated thyroglobulin antibody level [363.6 U/mL] and undetectable thyroid peroxidase antibody [<28.0 IU/mL]).

The patient was evaluated by pediatric otolaryngology and underwent resection of the presumed BCC. Intraoperatively, the mass was described as firm, cystic, and darker in appearance than expected for a BCC. Pathology revealed metastatic PTC in lymph node with staining weakly positive for thyroglobulin and thyroid transcription factor-1, and negative for p16. The cystic lesion on the pathology report measured 4.5 × 4.0 × 2.0 cm. The patient was referred to pediatric endocrinology. Repeat thyroid ultrasound showed evidence of thyroiditis with heterogeneous echotexture and lobular contour, fibrous septations, and diffuse increase in blood flow. Thyroid was not enlarged and no nodules were identified. Two lymph nodes suspicious for malignant adenopathy were seen in the lower compartments of the left neck. Thyroid uptake scan with I-123 (1.7 mCi) showed normal distribution of activity throughout the thyroid gland without focal nodules, extrathyroidal foci, or ectopic thyroid tissue. The patient underwent total thyroidectomy with left neck and central compartment lymph node dissection.

Pathological examination of the thyroid gland showed dsvPTC. The largest focus measured 6 mm within the left midinferior pole. Within this focus there were psammomatous calcifications with at least 1 area highly suspicious for lymphovascular invasion (Fig. 1). Numerous fibrotic scars measuring up to 10 mm were seen. Lymph node dissection revealed 7 (4 left neck, 3 central neck) of 57 nodes with metastatic PTC with similar psammomatous calcifications and lymphovascular invasion (Fig. 2). The largest metastatic focus (18 mm) was present in a left neck lymph node. Only focal microscopic extrathyroidal extension was noted, without gross extension. Extranodal extension was noted to be present in both the left and central lymph nodes. The largest lymph node was measured at 1.9 cm. Pathological stage was reported by AJCC (eighth edition) criteria as consistent with pT1a pN1b pMx. The pathology report did have additional findings of chronic lymphocytic thyroiditis. Levothyroxine was initiated and titrated to an initial goal of TSH <0.1 uIU/mL.[8]

Three months post-thyroidectomy, thyroid uptake scan after levothyroxine withdrawal showed no uptake in the thyroid bed nor evidence of iodine-avid metastatic disease. The patient received 50 mCi of I-131 RAI as indicated per American Thyroid Association guidelines on pediatric thyroid cancer for nodal involvement and risk of recurrence.[9,10] Neck ultrasounds were performed every 6 months and showed surgically absent thyroid without concerning lymphadenopathy. The thyroglobulin antibody level, which prior to total thyroidectomy had been elevated, trended down, and was undetectable by 14 months post-thyroidectomy. At 2.5 years after thyroidectomy, levothyroxine compliance was suboptimal, and TSH increased to 119.152 uIU/mL, at which time thyroglobulin was undetectable. At 3.5 years after total thyroidectomy, suppressed thyroglobulin remains undetectable and ultrasound showed no sonographic evidence of recurrent disease.

Highlights

- Occult papillary thyroid carcinoma (PTC) presenting as a branchial cleft cyst has been reported in adults, but our case is the first description of this presentation in a pediatric patient.
- Occult PTC is PTC with metastasis but without identification of primary thyroid cancer on preoperative ultrasonography. Published reports on occult PTC in children are limited.
- When metastatic PTC is found without evidence of nodule on thyroid imaging, occult PTC of the thyroid is the likely diagnosis. Total thyroidectomy ± neck dissection followed by TSH suppression and radioactive iodine therapy remains the appropriate diagnostic and therapeutic interventions.

Clinical Relevance

Pediatric thyroid cancer is relatively rare, but when present, it has a higher risk of metastasis and recurrence compared to adult patients, therefore timely and accurate detection is imperative. Papillary thyroid cancer (PTC) is the most common type of thyroid cancer, accounting for approximately 90% of all pediatric thyroid cancers which typically presents as a thyroid nodule. Occult PTC is PTC with metastasis but without identification of primary thyroid cancer on preoperative ultrasonography. This original manuscript describes a case of a 16-year-old girl who was found to have occult PTC after presenting with a unilateral cystic neck mass initially thought to be a second branchial cleft cyst on ultrasound. This case report is clinically relevant because it highlights an atypical presentation for a serious disease process and increased recognition can lead to earlier diagnosis and treatment.

Discussion

We describe occult dsvPTC presenting as a cystic neck mass mimicking a second BCC in an adolescent. Imaging studies and I123 uptake and scan did not reveal evidence of primary thyroid cancer or ectopic thyroid tissue. Microcarcinoma was identified by pathological examination after thyroidectomy, consistent with prior reports that in the majority of occult PTC, the primary lesions are ≤10 mm in diameter and are only identified after pathologic examination of the thyroid.[4,11]

Occult dsvPTC presenting as a BCC has been reported in adults[12] but is rare in pediatric patients. The differential for neck masses in children are classified as congenital, inflammatory, or neoplastic. Imaging is indicated for masses that are not consistent with benign lymph nodes or adenopathy that does not improve within 3 to 4 weeks.[13] BCCs account for approximately 20% to 30% of all pediatric neck masses.[13] Cysts of the second branchial arch appear on imaging as masses with a thin enhancing capsule with cystic fluid. In contrast, metastatic cystic lymph nodes typically exhibit thick, irregularly enhancing solid walls with an irregular appearance of the central necrotic nonenhancing area.[14] Surgical histopathological examination or cytology from FNAB will differentiate BCC's from metastatic lymph nodes.

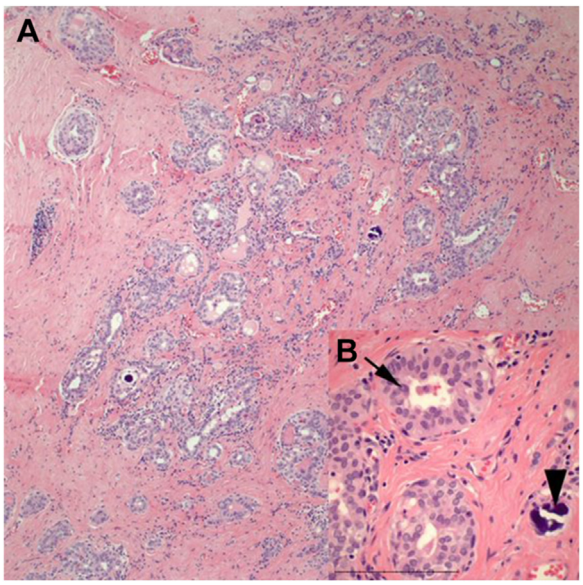

Fig. 1. *A*, Largest focus of papillary thyroid carcinoma (6 mm) set in a fibrous stroma (Mag × 40). *B*, Inset shows characteristic nuclear features of papillary thyroid carcinoma with pseudonuclear inclusions (black arrow), nuclear grooves, overlapping and psammomatous calcification (arrowhead) (Mag × 400).

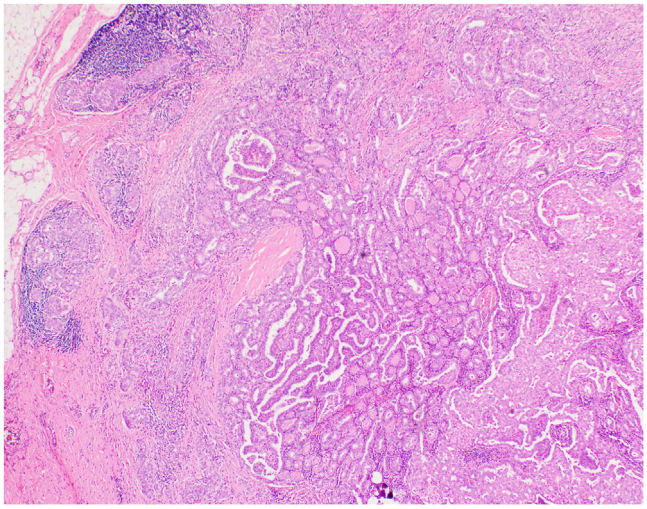

Fig. 2. Lymph node metastasis of classic papillary thyroid carcinoma with residual lymph node tissue at upper left-hand corner.

Occult PTC has been infrequently reported in pediatrics. We identified 2 case series of patients with occult PTC and each included 1 adolescent: a 17-year-old male[15] and 17-year-old female,[4] who presented with a cervical cystic lymph node metastasis and palpable metastatic nodes with nodules in the thyroid, respectively. [4,15] PTMC has been described previously in the pediatric literature. Huang et al[16] reported 11 cases of PTMC among 65 children diagnosed with thyroid cancer (16.9%). Lerner and Goldfarb[17] described 1825 cases of differentiated thyroid cancer in patients younger than 19 years and found that 1.9% were diagnosed with PTMC on pathologic evaluation.

Data on outcomes of occult PTC/PTMC in pediatrics are limited given their low incidence. In a case series of 16 adults and 1 adolescent with occult PTC, none died of carcinoma during the follow up period (median 85 months); 2 patients (including the 17 year old female) did not receive RAI and had recurrence of disease in lymph nodes after total thyroidectomy.[4] As seen with our patient who had metastatic disease in 7 lymph nodes, the small area of PTC in the thyroid does not preclude metastatic disease. In a case series of 190 adult patients with PTMC, 34 had lymph node metastasis at diagnosis.[18]

While dsvPTC is less common in adults, accounting for 0.7% to 6.6% of all PTCs in adults, this more aggressive form of PTC is a major subtype of PTC in youth.[3,19] In one study, dsvPTC was identified in up to 41.2% of PTC diagnoses in patients <20 years old.[19] In the pediatric population dsvPTC can present with metastatic disease including angioinvasion, lymph node, extrathyroidal, and distant metastases. Brady et al[20] reported that pediatric patients (<20 years) with dsvPTC were more likely to have progression of their disease and more advanced disease at the time of diagnosis. Of the 9 patients in this study that had dsvPTC, 4 (44.4%) had a history of Hashimoto's thyroiditis. They reported patients with dsvPTC were more likely to have recurrence of disease compared to patients with classic PTC. Given the higher risk of recurrence with dsvPTC, our patient received RAI treatment.

To our knowledge, this is the first reported case of occult PTC presenting as a suspected BCC in a pediatric patient. When metastatic PTC is found without evidence of nodule on thyroid imaging, occult PTC of the thyroid is the likely diagnosis. Total thyroidectomy ± neck dissection followed by TSH suppression and RAI remain the appropriate interventions.

Author Contributions

A.C. wrote the manuscript. L.S.T. and R.R. critically reviewed and edited the manuscript. J.C.G. and J.M.T. provided review and edits to the manuscript. S.C. performed initial biopsy and specimen pathology review, generated pathology images, and drafted figure legend. All authors provided final approval of the manuscript prior to submission.

Disclosure

The authors have no multiplicity of interest to disclose.

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