Papillary thyroid adenocarcinoma with occipital lobe metastasis 48 years after original diagnosis: Case report

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To the Editor,

Papillary thyroid carcinoma generally follows an indolent course, and distant metastases are rare [1–3]. Distant metastases to the brain are extremely rare, and typically occur secondary to previously existing metastases [4]. Even more extraordinary is the development of brain metastases nearly five decades after the original diagnosis. To our knowledge, this is the longest known interval between original diagnosis and intracranial spread in patients with this disease. We describe a 74-year-old male who presented with occipital lobe metastases and suspected lung and mediastinal metastases 48 years after the original diagnosis of papillary thyroid

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carcinoma. The diagnostic workup, clinical course, and pathogenesis of this lesion are discussed.

Case history

History and exam

A 26-year-old man presented originally to an outside facility with an 18-month history of a painless, non-tender mass in the right neck. Radiologic findings were interpreted as an infectious process. His medical history at that time was significant for a diagnosis of histoplasmosis following a military pre-induction examination at age 18 years.

A thyroidectomy was performed, with removal of right cervical lymph nodes. Histologic examination revealed papillary carcinoma of the thyroid with lymph node metastasis. Three months later he was admitted to our facility for iodine uptake studies and Iodine-131 ablation. Iodine studies showed 10% uptake over thyroid in 24 hours and 45% retention at 48 hours. He was given 90 mcg ^{131}I orally and discharged two days later following an uncomplicated hospital course. Over the next two years, the patient was followed with serial chest x-rays to monitor the suspected metastatic disease; minimal change was seen during that time and the patient was lost to follow-up.

At age 45 the patient was contacted by the Follow-Up Registry at our facility. He responded that his health condition had not interfered with his life or ability to work, which is why he had not returned to clinic; he then agreed to follow-up iodine uptake scans. The next month his uptake scan showed accumulation in both lungs (presumably metastases) with an absence of uptake in the neck. His T3 was 26 mcg/dl (normal range 25–35) and his T4 was 4 mcg/dl (normal range 4.5–11). Six months later, a repeat scan showed no uptake in the lungs with T3 of 30.8 mcg/dl and T4 of 10.2 mcg/dl.

At age 74, five decades after his original presentation with an enlarged thyroid, the same patient was referred to us from an outside facility with visual changes and hemoptysis. The patient complained of headache, blurred vision on the right side, unsteady gait, and unsteady hands of two weeks' duration. Examination revealed right homonymous hemianopia and an unsteady gait, but the neurologic exam was otherwise within normal limits. Diagnostic workup revealed abnormal focal iodine uptake in the mediastinum,

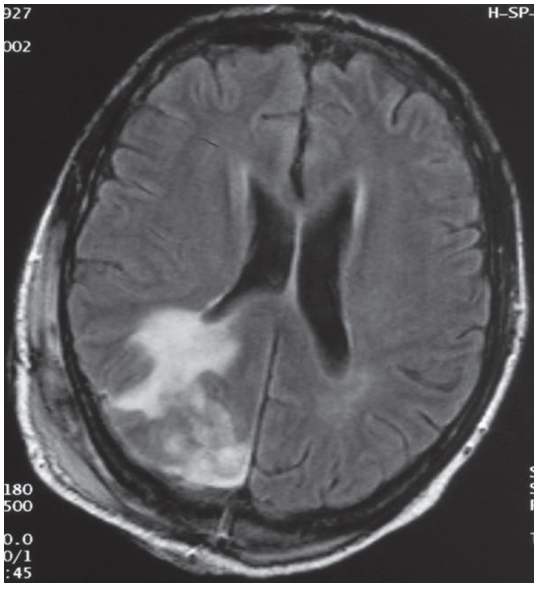

Figure 1. Brain MRI revealed a contrast-enhancing lesion in the right posteroparietal region. Increased signal in both T1- and T2-weighted images suggested hemorrhage within the region. Extrinsic pressure defect was observed in the ipsilateral ventricular system. Effacement of sulci was visible in the right parietal hemisphere secondary to edema.

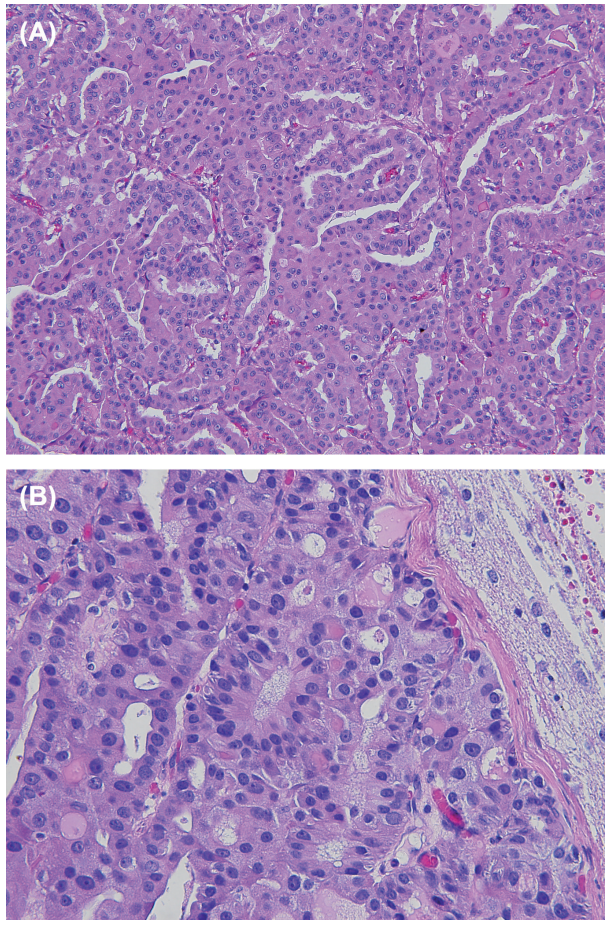

Figure 2. (A, B) Thyroid carcinoma metastatic to occipital lobe. Hematoxylin and eosin-stained sections show lobules of crowded, well-formed follicular and papillary glands lined by cuboidal to columnar epithelium with abundant eosinophilic colloid material (A, B). The tumor is sharply circumscribed from the surrounding thin rim of gliotic brain parenchyma by a thin fibrous capsule (A). The magnifications for Figure 2A and B are 20× and 40×, respectively.

an unchanged chest x-ray, and moderately differentiated adenocarcinoma of the lung on needle biopsy. Magnetic resonance imaging (MRI) of the brain with and without contrast revealed a contrast-enhancing lesion in the right posteroparietal region measuring $6.3 \times 2.9 \times 4.5$ cm; increased signal in both T1- and T2- weighted images suggested hemorrhage within the region. Extrinsic pressure defect was observed in the ipsilateral ventricular system and effacement of sulci was visible in the right parietal hemisphere secondary to edema (Figure 1).

Intervention

Given the patient's history of primary thyroid carcinoma with known metastasis to the lung and mediastinum, metastasis to the brain was considered the most likely cause of the lesion in the right posteroparietal region. Based on MRI findings and the development of significant neurologic and visual impairment, the patient underwent a right occipital craniotomy with resection of the mass. A clear plane allowed for complete resection as confirmed by postoperative MRI.

Pathologic findings

The gross specimen was a firm ovoid mass, measuring $3.6 \times 3.2 \times 2.0$ cm, with a slightly nodular surface and a firm, tan cut surface with areas of dark red hemorrhage. Histologic examination showed lobules of crowded, well-formed follicular and papillary glands lined by cuboidal to columnar epithelium with abundant eosinophilic colloid material. A thin rim of gliotic brain parenchyma was present around the tumor. Immunohistochemistry using anti-thyroglobulin showed positive staining in the colloid material, confirming the diagnosis of metastatic thyroid carcinoma (Figure 2A, B).

Postoperative course

The patient's postoperative course was uneventful. He demonstrated slight improvement in his right homonymous hemianopia but no improvement in his unsteady gait. The patient declined physical therapy and was discharged to home. The patient died three months later due to progression of disease.

Discussion

Differentiated thyroid cancer (DTC) consists of papillary and follicular thyroid carcinoma. Treatment typically involves thyroidectomy followed by ablative therapy with ^{131}I and lifelong supplementation of thyroid hormone [5,6]. Papillary thyroid carcinoma has been shown to metastasize to the brain [7–9], though it occurs with a very low frequency, reported to be less than 1% of cases of DTC [10,11]. The most common locations of metastatic disease are lung and bone [6,12]; however, more rarely, metastases have been reported in the breast, liver, kidney, muscle, and skin [12]. Only 4–15% of patients will develop metastases beyond regional lymph nodes [1–3,12]. DTC is generally amenable to treatment, with 10-year survival rates reported as high as 95%; however, recurrence rates are also high, with recurrence occurring in 5–20% of patients [6]. Patients with metastasis beyond regional lymph nodes have a much poorer prognosis, with 10-year survival rates reported to be less than 50% [1–3]. This poorer prognosis may be partially due to the rare metastases, such as those to the brain, often occurring as secondary metastases during the course of DTC [4,12].

Brain metastases in DTC often result in nonspecific symptoms, including headache, visual disturbance, and ocular motor weakness [12,13]. Brain metastases have been reported to occur in the cerebellum [14], pituitary gland [15,16], occipital lobes [17], and cerebrum, among others [4]. These lesions appeared between four and 25 years after the original diagnosis, a much shorter time frame than in our patient.

Due to the rarity of these metastases and the relative lack of data regarding their management, there is not a clearly defined treatment algorithm for patients with intracranial metastases. Surgical resection is considered the mainstay of treatment for solitary intracranial lesions [14]. Radiotherapy is typically reserved for patients with multiple metastases or unresectable metastases and is used less frequently than surgical resection [18]. Surgical resection has been shown to have an improved prognosis; however, disease-specific mortality is still significant at 78%, with a median survival of 4.7 months from diagnosis of brain metastases [19].

In our case, metastases were confirmed in the lungs and mediastinum, and later in the brain. Not only was the presence of brain metastases a rarity in itself, but the survival of 48 years with distant metastases in both lungs is remarkable as well. When he presented with brain metastases, the visual disturbances were consistent with an occipital lobe mass; however, the additional symptoms of unsteady gait and headache were much more subtle and less specific. The patient's death due to disease progression three months postoperatively is similar to results shown previously [19]. DTC presenting with metastases to any location show higher rates of recurrence compared to DTC isolated to the thyroid; therefore, serial imaging and routine follow-up are useful. Further data on current treatment regimens and molecular pathogenesis will be required for improved outcomes in DTC patients with distant metastases.

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