A Rare Incidence of Metastatic Papillary Thyroid Carcinoma to the Mandible: A Case Report and Review of Literature

Samuel D. Raffaelli (navyomfs@gmail.com)  
Naval Medical Center Portsmouth

Raymond P. Shupak  
Geisinger Health System

Michael Winstead  
John Peter Smith Hospital

Joshua J. Hockaday  
John Peter Smith Hospital

Roderick Y. Kim  
John Peter Smith Hospital

Case Report

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Abstract

Papillary Thyroid Carcinoma (PTC) primarily metastasizes via regional lymphatics making its spread to the oral cavity exceedingly rare. Although this disease remains the most common endocrine malignancy, comprising roughly 85%-90% of all thyroid cancers, its occurrence within the oral cavity is seldom seen. This study identifies a case report involving a 77-year-old male with a past medical history of well-differentiated PTC that was initially treated with a total thyroidectomy and adjuvant radioactive iodine. Approximately five years after his initial treatment, surveillance imaging demonstrated a 3.0 x 1.8 x 2.0 cm expansile mass at the left mandibular body with erosion of the lingual cortex. An incisional biopsy then confirmed the diagnosis of metastatic papillary thyroid carcinoma. The patient was treated with a segmental resection of his mandible and final reconstruction utilizing a fibula free flap. Given the limited number of cases involving metastatic spread of PTC to the head and neck region, a standardized treatment algorithm does not currently exist. Thus, this case serves to provide a documented report of this rare occurrence and to review literature that may help other clinicians treat patients with this malignancy type. There remains a need for future studies to create risk stratification models for patients with metastatic PTC that consider margin analysis, genetic characteristics, and elevated risk factors for metastasis to tailor individual treatment plans.

Introduction

Mandibular metastasis of thyroid cancer is rare and accounts for only 1% of oral malignancies. Typically, metastatic spread of papillary thyroid carcinoma (PTC) is localized to the sternum, vertebrae, skull, pelvis, ribs and femur [1]. Despite PTC being widely considered an indolent tumor with low-grade malignancy and satisfactory prognosis; tumor recurrence and metastases severely deteriorate the patient’s quality of life and may require additional therapies [2].

Papillary thyroid carcinoma comprises roughly 85%-90% of all thyroid cancers and remains the most common endocrine malignancy [2, 3]. According to the American Association of Endocrine Surgeons, PTC metastasizes via the lymphatic system following a stepwise progression. The initial lymph node invasion occurs in the ipsilateral level VI lymph nodes, then proceeds laterally to the level III and IV lymph nodes, and finally spreading to the level II lymph nodes. With some studies reporting equivalent prevalence for the level III and IV lymph nodes [4].

However, localization of the primary tumor within either the superior or inferior poles of the thyroid gland has not been linked to a relationship between the region of occurrence or distribution of metastasis throughout the head and neck [5]. This route of metastasis highlights an important distinction between PTC and follicular thyroid carcinoma, which causes more frequent distant metastasis due to its hematogenous spread via angioinvasion [1, 6].

The treatment algorithm for metastatic spread of PTC to the oral cavity remains unclear. Recently, several studies have documented reports of these occurrences, but none have proposed an algorithm for
classification of disease severity, margin analysis, timeframe for treatment and adjunctive therapy as it pertains to PTC. This paper discusses a case of metastatic spread of PTC to the mandible. Additionally, a review of literature was completed to propose a potential treatment algorithm for PTC metastasis to the oral cavity.

Materials & Methods

Clinical Case:

The patient is a 77-year-old male with a history of pT2NxM0 well-differentiated papillary thyroid carcinoma which showed evidence of capsular and lymphovascular invasion after initial treatment. Primary treatment included a total thyroidectomy and a dose of 107.3 mCi of adjuvant radioactive iodine therapy. Following his initial surgery, surveillance head/neck CT, ultrasound and PET scans were negative for masses or lesions in the thyroid bed or surrounding neck. Roughly two years after his initial treatment his thyroglobulin was at an acceptable level, ranging from 0.1 micrograms/Liter to 15.3 micrograms/Liter. In the subsequent year his thyroglobulin was found to be elevated, ranging from 246.0 micrograms/Liter to 863.0 micrograms/Liter. An additional regimen of 201 mCi radioactive iodine was administered. Following this additional dose, his thyroglobulin decreased without evidence of residual disease on surveillance CT scans or iodine uptake studies.

Nearly five years after his initial diagnosis of papillary thyroid carcinoma, he was referred to our clinic for evaluation of a new large left mandibular lesion (Figure I). His initial symptoms included swelling to the left mandibular vestibule with associated hypoesthesia along his lower left lip. A CT was obtained which revealed a new 3.0 x 1.8 x 2.0 cm expansile mass at the left mandibular body with erosion of the lingual cortex of the mandible (Figure II). The patient was then taken to the operating room for an incisional biopsy where final pathology revealed a new diagnosis of metastatic papillary thyroid carcinoma. Additionally, a PET/CT was obtained thereafter which revealed no evidence of further distant metastatic disease.

Treatment Approach:

A multidisciplinary team including Endocrinology, Radiation Oncology, Medical Oncology and Oral & Maxillofacial Surgery was formed to discuss potential treatment modalities for this patient. Clinical examination and preoperative CT imaging suggested extensive invasion of the mandibular lingual cortex and overall height of the remaining bone stock. It was determined that this invasion would likely require a resection of the lesion including a segmental mandibulectomy approach.

A composite resection of the tumor was then performed through combined transoral and transcervical incisions. Surgical margins of 1cm were utilized based on known local tumor invasion patterns. During the mandibular resection the lingual nerve was found to be encased by tumor (Figure III). The nerve was sacrificed and reconstructed with an allogeneic nerve graft. Final pathology demonstrated a positive
posterior mandibular en face resection margin and peri-mandibular soft tissues margin. No perineural invasion was found.

The patient then returned to the operating room for further resection to obtain negative margins and provide definitive reconstruction. Due to the lack of remaining native ramus to allow for plate application following re-resection of the mandible, the patient underwent disarticulation resection of the mandible and reconstruction with an osteocutaneous fibula free flap. The skin paddle of the flap provided soft tissue lining for the oral cavity.

(Figure IV).

Results

Immediately following the patient's fibula free flap reconstruction, he was transferred to the ICU for post-operative flap monitoring. As he continued to progress without signs of flap compromise, his level of care was downgraded on postoperative day two. He was later discharged home on hospital day nine once meeting institutional criteria. The patient denied issues with ambulation following his procedure and tolerated a pneumatic boot after surgery for six weeks.

All pathological specimens submitted during the patient's second surgery resulted in negative margins. Afterwards, his case was further discussed with his Radiation Oncologist and Endocrinologist who recommended adjuvant head & neck radiation. He received adjuvant radiation to 60 Gray that was completed about 3 months after surgery.

Discussion

The incidence of thyroid cancer has continued to rise over recent years. This rise can be partially attributed to the increasing use of diagnostic imaging modalities and fine-needle aspiration biopsies [6, 10]. The role of individual molecular characteristics may also contribute to the increased incidence of disease. Along with that rise, the identification of the individual molecular characteristics of thyroid malignancies has also increased not only our understanding of their behaviors and prognosis but allowed the use of novel therapeutics for treatment. Specifically, genetic mutations such as BRAF, RAS and RET are known to be prognostic markers in thyroid cancer and have been associated with higher risks of both recurrence and death [7].

Currently, there lacks a standardized classification system for papillary thyroid carcinoma regarding differentiating patients with low-risk characteristics vs high risk factors for recurrence, prognosis and death [8]. Histologic features of disease and recent developments in biochemistry and molecular genetics involving oncogene, anti-oncogene activation and chromosomal abnormalities may help solve this issue. However, these analyses have yet to receive widespread acceptance in practice given that they require additional time, expense, equipment and special expertise or personnel [8]. With additional refinement, these various analyses may help risk stratify patients with metastatic PTC.
Criteria that may help to initially risk stratify patients with PTC include age (as patients younger than 40 years have a better prognosis), familial history of thyroid cancer and exposure to environmental toxinogens/radiation [9]. In addition to these risk factors and the molecular makeup of an individual patient, it remains important to obtain proper imaging modalities when developing a surgical plan. Currently, bilateral ultrasound evaluation of lymph node compartments II-VI should be routinely performed preoperatively in patients with cytological evidence of thyroid carcinoma [4]. Computerized tomography or MRI serve a supplemental role in planning and are recommended with intravenous contrast as an adjunct to ultrasound for patients with a clinical suspicion of advanced disease including an invasive primarily tumor, or clinically apparent lymphadenopathy [4].

Regional lymph node metastasis remains one of the most predictive early manifestations in the progression of PTC to distant metastasis [2, 3]. Several studies have recommended a central neck lymph node dissection during the initial thyroid surgery to help reduce local recurrence and prevent distant metastasis [2]. Although limited research currently exists regarding the effectiveness of central neck dissections in the elimination of distant metastasis, one should consider the utility of this procedure upon initial diagnosis of PTC for the prevention of more widespread disease.

Given the relatively slow-growing nature of PTC and long-term survival rates, goals should be set for providing patients with a treatment plan that will allow functionality and longevity [1]. Intensive follow up is recommended for all patients with distant metastasis as their risk of recurrence is much higher and overall survival is much lower than those without [2]. We recommend following a generalized high risk oral malignancy surveillance interval which includes a follow up every 3 months for the first year, every 3–6 months throughout the second year and every 6 months from year three onward. Additional imaging modalities should be obtained on a case by case basis, with a baseline imaging study being obtained within 3–6 months following treatment completion.

In conclusion, metastatic papillary thyroid carcinoma to the oral cavity remains difficult to treat given the limited amount of case reports and protocols available. Therefore, it is important to develop risk stratification models to classify patients with high or low risk factors for recurrence and prognosis. Further studies should focus on methods of early detection, surgical margins and outline frequency of surveillance imaging and follow-ups.

**Declarations**

**Ethics approval and consent to participate:** It was institutionally determined that the project activities were not subject to human research regulations. Written patient consent was obtained from the patient for this study.

**Consent for publication:** All authors confirm and agree to the submission of this paper.

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References


Supplementary File

Supplementary file is not available with this version

Figures
Figure 1

Left mandibular expansile mass involving the ascending ramus and lingual cortex.
Figure 2

(a, b) CT Head & Neck imaging, with 3D reconstruction, demonstrating the presence of a large metastatic papillary thyroid carcinoma of the left mandible.
Figure 3

(a, b) Perioperative segmental mandibular resection specimen with tumor involving the left lingual nerve.
Figure 4

Post-operative panoramic image showing fibula inset into resection defect site.