Metastasis of Papillary Thyroid Cancer to the Soft Tissue of the Back in the Setting of Recurrent Disease

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ABSTRACT

Papillary thyroid cancer is the most common thyroid malignancy, and although metastatic spread is typically confined to regional lymph nodes, there are rare documented cases of distant spread of disease. Here we present an unusual case of metastatic papillary thyroid cancer that has spread to the subcutaneous tissue and muscle of the back.

We report a case of an 89-year-old female presenting with a painful mass on her back. A positron emission tomography (PET) scan demonstrated a hypermetabolic lesion corresponding to the palpable mass, with a subsequent core needle biopsy confirming the diagnosis of metastatic papillary thyroid carcinoma (PTC). The patient underwent radical excision of the malignant soft tissue mass, removing subcutaneous tissue, superficial fascia, and underlying muscle.

This case emphasizes that grade 1 papillary thyroid carcinoma, while typically following an indolent course, can result in distant metastases to unusual locations like the soft tissue. This case is particularly unique because PTC rarely metastasizes to soft tissue, even in the setting of recurrent disease. Physicians should be aware of the possibility of metastases of PTC to any location, even after successful resection and treatment of the primary tumor.

INTRODUCTION

Papillary thyroid cancer is the most common thyroid malignancy and carries the best long-term prognosis and survival. Metastases typically disseminate via lymphatic spread to regional nodes. However, distant metastases do occur and are present at diagnosis in 3-5% of cases.¹ Distant metastases from thyroid cancer are more commonly associated with the follicular histologic type because of its tendency to spread hematogenously. When present, PTC metastases beyond regional nodes are generally found in the lung and bone.² Almost 50% of cases of metastatic PTC at presentation are to the lung, whereas 24% are to bone.² Less common sites of distant metastases include the brain, liver, kidney, and ovaries.²⁻⁵ Extrathyroidal extension into the soft tissue can occur, but distant soft tissue and skeletal muscle metastases are rare.

A literature search on the PubMed database yielded few reports of metastatic PTC to skeletal muscle or soft tissue, with documented cases of symptomatic solitary metastases to the trapez-
ius, biceps, and vastus medialis muscles. There are additional reports of soft tissue metastases discovered on PET-CT in the setting of widespread disseminated disease and found incidentally on routine follow-up. Here, we present an unusual case of metastatic papillary thyroid cancer to the subcutaneous tissue and muscle of the back in the setting of prior recurrent disease.

**CASE PRESENTATION**

An 89-year-old female with a history of follicular lymphoma and known recurrent metastatic papillary thyroid cancer presented for evaluation of a painful soft tissue mass of several months' duration. In 1998, she was diagnosed with papillary thyroid cancer and underwent a total thyroidectomy with seven positive lymph nodes subsequently identified on pathological examination of the specimen. At the time, she received external beam radiation and radioactive iodine therapy. There was no evidence of recurrence until 2009, when a follow-up PET scan demonstrated uptake in the right lung. She underwent a right lung video-assisted thorascoscopic surgery (VATS) and resection of a one cm nodule that was positive for metastatic papillary thyroid cancer. She was subsequently treated with 109 mCi of 131-iodine. In 2011, a five mm right neck lymph node demonstrated uptake on PET, with biopsy consistent with papillary thyroid cancer refractory to radioactive iodine therapy. A follow-up CT noted an irregular pleural density in the right upper lobe. A PET scan in 2013 showed stable lesions in the thoracic spine, right lung, and right latissimus dorsi. She was subsequently started on sorafenib, a tyrosine kinase inhibitor used in the treatment of radioactive iodine resistant thyroid cancer. She failed to respond to sorafenib, as her upper back pain began to worsen. In addition, she has no known family history of thyroid malignancies, no known risk factors such as radiation exposure, and no smoking history.

Recently, she was referred to our clinic because of worsening pain in her upper back. She described the pain as localized to her upper back and right shoulder, now more consistent, and now moderate in severity. On examination, the soft tissue mass was three cm in diameter, located in the right middle portion of the back, and tender to palpation. There was no tenderness to palpation of her vertebral column. There were no palpable cervical or axillary lymph nodes. A core needle biopsy was performed in the office, which yielded pathology consistent with metastatic papillary thyroid cancer. Surgical removal of the mass for palliation was presented to the patient. She agreed to undergo elective excision of the mass.

Radical excision of the malignant soft tissue mass was performed under local anesthesia, removing subcutaneous tissue, superficial fascia, and underlying muscle (5.4 x 2.0 x 3.1 cm). The procedure was well tolerated, and the patient did not require an overnight hospital stay or rehabilitation. Histopathological examination revealed an epithelial neoplasm with papillary architecture involving subcutaneous and muscular tissue (Figure 1). The tumor cells had large nuclei, rare intranuclear inclusions, prominent nucleoli, and nuclear grooves (Figure 2), which are all features consistent with metastatic papillary thyroid carcinoma.

**DISCUSSION**

Papillary thyroid carcinoma (PTC) is the most common differentiated thyroid carcinoma and typically carries a good prognosis after treatment, with a ten-year survival rate greater than 95% for patients with good prognostic factors
Figure 1. Histopathological examination of back skin excision: Thin sections were cut and stained with hematoxylin and eosin. A) Low magnification (4x) and B) high magnification (10x) images demonstrating papillary thyroid carcinoma involving subcutaneous and muscular tissue.

Figure 2. Histopathological examination of back skin excision: Thin sections were cut and stained with hematoxylin and eosin. A) 40x magnification and B) 60x magnification demonstrating nuclear features of papillary thyroid carcinoma.
(age ≤45, no extra-thyroidal involvement, and tumor <4 cm). Metastatic disease in PTC has a more favorable course compared to other thyroid malignancies, with a 10-year survival rate of 50%. Metastatic disease is often secondary to lymphatic spread to regional lymph nodes, but rare cases of intramuscular and soft tissue involvement have been observed. Because of the scarcity of these reports, it is difficult to determine the true incidence of metastases to the soft tissues.

Prior case reports have described solitary, symptomatic skeletal muscle metastases to the biceps, trapezius, and vastus medialis muscles. In addition, there are documented cases where soft tissue and skeletal muscle metastases were discovered on routine follow-up imaging in patients with a history of PTC. Whole body scanning is often part of the follow-up for PTC, although up to 20% of differentiated thyroid carcinomas can be negative on scanning. In our review of the patients with soft tissue metastases from PTC, only the case of PTC metastasis to the trapezius muscle showed no uptake on imaging. Therefore, it is important to recognize that a negative whole body scan does not rule out PTC with metastatic spread to soft tissue sites.

Here, we present a case of soft tissue metastasis to the back in the setting of recurrent disease. Metastases at unusual sites such as the soft tissue often occur years after initial presentation and can be associated with dedifferentiation. This is especially true in elderly patients (age > 65), as seen in the study by Vini et al. The investigators studied the clinical and pathological characteristics of differentiated carcinomas in the elderly. Compared to all patients with differentiated thyroid cancer, elderly patients had higher rates of locally advanced disease (70% vs. 18%), local lymph node disease (44% vs. 35%), and distant metastases (23% vs. 10%). The tumors in elderly patients were more likely to be poorly differentiated on histologic examination. In comparison with their previous study, age was the most important prognostic factor. Any 10-year difference in age carried nearly double the risk of mortality. Thyroid cancer in the elderly has a more aggressive biological behavior, is less iodine avid, and should raise concern for distant metastases.

The standard of care in the treatment of PTC in elderly patients is total thyroidectomy, selective lymph node dissection, and ablative radioiodine therapy. This treatment enhances survival and should be performed as long as there are no pre-existing cardiopulmonary contraindications to surgery. External radiotherapy is used in the setting of recurrent or metastatic disease, which is more commonly seen in elderly patients. Radiotherapy achieves local control of recurrent disease in 81% of patients with microscopic recurrence and 37% of patients with macroscopic recurrence. Radiotherapy is also an effective tool in palliative care of patients with distressing local symptoms. This case presents a unique situation in which the surgical team believed that excision of the soft tissue metastasis would achieve a greater palliative response compared to external radiotherapy. We believed that the procedure would be well tolerated by the patient under local anesthesia and would provide immediate relief. If complete surgical removal is not possible or unable to be tolerated by the patient, then external radiotherapy is an effective means for treating recurrent and metastatic PTC in elderly patients.

When soft tissue masses are identified, it is important to establish histology, as primary cancers of the lung, kidney, and colon are the most commonly reported malignancies with soft tissue metastases. The well-differentiated glandular architecture seen in PTC also raises the possibility of the primary site being the ovary, stomach, or lung. In addition, it is critical to distinguish between a metastatic neoplasm and a
primary soft tissue sarcoma. The usual histological feature of papillary thyroid carcinoma is a branching, tree-like pattern formed by a papilliform fibrovascular stroma, lined by epithelial cells that have crowded oval nuclei containing distinctive "ground glass" chromatin or “Orphan Annie eyes.” Calcified clumps of cells, known as psammoma bodies, are diagnostic of papillary thyroid carcinoma; however, they are observed in only about 25% of cases.\textsuperscript{19}

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**CONCLUSION**

This review highlights an unusual case of metastatic papillary thyroid carcinoma spread to the soft tissue of the back in the presence of recurrent disease. In a thorough search of the literature, there are rare cases of metastatic PTC to the soft tissue and skeletal muscle, both isolated and in the setting of disseminated disease. Even though soft tissue and skeletal muscles metastases are rare manifestations of PTC, one should be aware of the possibility of metastases to any location during follow-up of patients who have undergone resection of the primary tumor, especially in elderly patients and those with aggressive primary tumors. Although rare, distant metastases can also be the first manifestation of distant disease.\textsuperscript{6,20} Iodine-131 whole body scan is a sensitive and non-invasive test to evaluate patients with a known diagnosis of PTC and possible metastatic disease. However, physicians should be aware that almost one-fourth of tumors will be negative on scanning, especially in older patients. Sundram\textsuperscript{21} suggests a role for PET-CT in the setting of iodine negative disease. However, a confirmed histological diagnosis is a necessity in order to guide appropriate further management. In the setting of recurrent or metastatic disease, external radiotherapy is a safe and effective treatment option when complete surgical removal is not possible or unable to be tolerated.

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**LEARNING POINTS**

1. Even though papillary thyroid carcinoma typically metastasizes to regional lymph nodes, distant metastases of the primary tumor do occur.

2. While distant metastases are most commonly found in the lung and bone, case reports have documented metastases to soft tissue and muscles.

3. Iodine-131 whole body scan is negative in 20% of cases, and a histological diagnosis is a necessity in diagnosis of metastatic PTC.

4. Elderly patients are more likely to present with locally recurrent or distant metastatic disease.

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**REFERENCES**


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