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Thyroid Papillary Carcinoma with Sternum Metastasis: A Case Report

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Abstract

Papillary thyroid carcinoma (PTC) is generally an indolent malignancy with excellent prognosis; however, distant metastasis occurs in approximately 10% of cases, predominantly to the lungs and bones. The following report presents a case of a 56-year-old male patient diagnosed with papillary thyroid carcinoma exhibiting sternal metastasis, a rare site of distant spread. After initial surgical management with total thyroidectomy, imaging and histopathological evaluation confirmed metastatic involvement of the sternum. This report emphasises the diagnostic approach, treatment considerations, and the importance of a multidisciplinary strategy in managing rare metastatic patterns of thyroid carcinoma.

Key Words: Papillary thyroid carcinoma, Distant metastasis, Sternum metastasis, Total thyroidectomy, Nuclear medicine

Sternum Metastazlı Tiroid Papiller Karsinomu: Bir Vaka Raporu

Özet

Papiller tiroid karsinomu (PTK) genellikle iyi prognoza sahip yavaş ilerleyen bir malignitedir; ancak vakaların yaklaşık %10'unda, çoğunlukla akciğerlere ve kemiklere uzak metastaz görülür. Aşağıdaki raporda, nadir görülen bir uzak yayılım yeri olan sternal metastaz gösteren papiller tiroid karsinomu tanısı almış 56 yaşında bir erkek hasta sunulmaktadır. Total tiroidektomi ile yapılan ilk cerrahi müdahalenin ardından, görüntüleme ve histopatolojik değerlendirme sternumun metastatik tutulumunu doğrulamıştır. Bu rapor, nadir görülen tiroid karsinomlarının tedavisinde tanı yaklaşımını, tedavi yaklaşımlarını ve multidisipliner bir stratejinin önemini vurgulamaktadır.

Anahtar kelimeler: Papiller tiroid karsinomu, Hafif metastaz, Sternum metastazı, Total tiroidektomi, Nükleer tıp

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INTRODUCTION

Papillary thyroid carcinoma (PTC) is the most common type of thyroid cancer, typically presenting with slow growth and regional lymph node spread. However, distant metastasis to the

sternum is an extremely rare occurrence and poses significant diagnostic and therapeutic challenges. Patients with sternal metastasis often present with a palpable mass in the anterior chest wall, which may be associated with pain, respiratory symptoms, or systemic symptoms such as weight loss and fatigue (1). The clinical presentation can be nonspecific, and the sternal mass may be mistaken for a primary bone tumor or metastasis from another primary malignancy. In some cases, the sternal metastasis may be synchronous with the primary thyroid tumor, while in others, it may occur metachronously, often years after the initial diagnosis of thyroid cancer (2, 3).

The diagnosis of sternal metastasis from thyroid papillary carcinoma involves a combination of imaging studies and histopathological confirmation. Imaging modalities such as computed tomography (CT) scans, magnetic resonance imaging (MRI), and positron emission tomography (PET)/CT are commonly used to evaluate the extent of the disease and guide biopsy (1). Fine-needle aspiration biopsy (FNAB) or core needle biopsy of the sternal mass is often performed to confirm the diagnosis. Histopathological examination typically reveals features consistent with papillary thyroid carcinoma, such as nuclear grooves, pseudoinclusions, and psammoma bodies. In addition to local staging, whole-body imaging and thyroglobulin levels are used to assess for additional metastases and to monitor disease progression.

This study aims to present and analyze a rare case of PTC with sternal metastasis, aiming to contribute to the limited literature on atypical metastatic patterns of PTC. By detailing the clinical course, diagnostic imaging, histopathological findings, and multidisciplinary patient management, this report highlights the importance of comprehensive evaluation and collaborative care in optimising outcomes for patients with uncommon presentations of thyroid malignancies. The study underscores the necessity for vigilance in follow-up and the integration of advanced imaging and surgical consultations in the management of metastatic thyroid cancer.

CASE REPORT

A 56-year-old male patient, with no significant prior medical history, presented to our clinic in November 2024 with a diagnosis of a thyroid nodule. The patient was admitted for further evaluation and management. A comprehensive preoperative assessment confirmed the presence of bilateral thyroid nodules, and surgical intervention was planned. Etiologically, no predisposing factors were identified. The patient's height was 175 cm, weight 86 kg, and body mass index (BMI) was calculated as 28.1.

Additionally, there was no family history of thyroid disease and no history of radiation exposure. The patient underwent a bilateral total thyroidectomy along with laryngostroboscopy under general anaesthesia. The operation was completed without any intraoperative complications.

The histopathological analysis of the thyroidectomy specimen, reported in December 2024, revealed the following findings:

Right thyroid lobe: Poorly differentiated thyroid carcinoma was identified in two distinct foci measuring 5 cm and 0.4 cm, with evidence of capsular invasion and necrosis (Figure 1). Extrathyroidal extension was not observed.

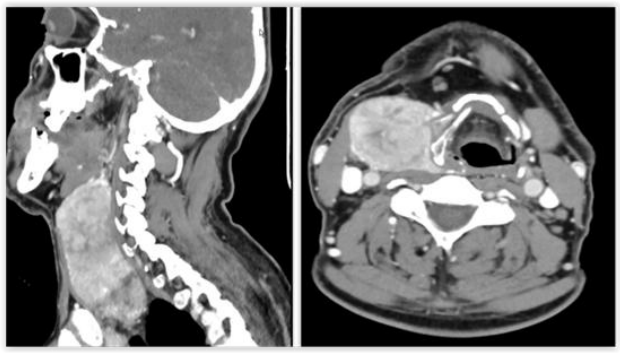


Figure 1. Thyroid mass images in the patient's neck CT

The papillary microcarcinoma (follicular variant) measured 0.3 cm, was encapsulated. Postoperative imaging, including a contrast enhanced neck MRI in January 2025, which showed no residual thyroid tissue or suspicious lesions suggestive of recurrence. A small lymph node (approximately 6 mm) was noted in the thyroid bed region, interpreted as reactive.

A contrast-enhanced neck CT performed in March 2025 confirmed the absence of any residual thyroid tissue or pathological lymphadenopathy. However, thoracic CT on the same date identified bilateral pleural thickening, minor fibrotic parenchymal changes, and bilateral pulmonary nodules up to 5 mm in size. Of particular note were mixed lytic-sclerotic lesions in the manubrium sterni, raising suspicion for metastatic involvement.

A subsequent PET-CT performed in March 2025 demonstrated significant FDG uptake in the manubrium sterni (SUV max: 5.32), consistent with metastatic disease(Figure 2). Additionally, marked FDG uptake was seen in the distal rectum (SUV max: 18.46), for which colonoscopic evaluation was conducted. The colonoscopy revealed normal colonic and rectal mucosa, except for grade 1 internal hemorrhoids, effectively ruling out rectal malignancy.

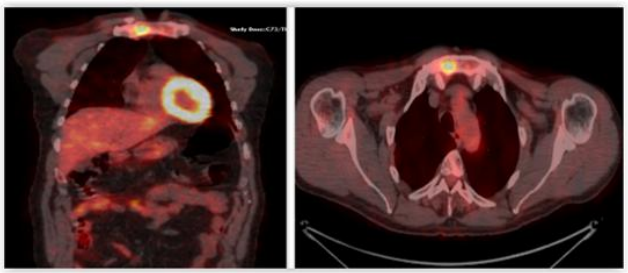


Figure 2. Patient's PET CT images of manubrium sterni involvement

Laboratory investigations revealed suppressed TSH (0.05 μIU/mL), with thyroglobulin (Tg) levels decreasing from 17 ng/mL to 7.71 ng/mL and anti-thyroglobulin antibodies dropping from

77 IU/mL to 17.2 IU/mL under levothyroxine therapy. Due to biochemical monitoring, the patient's levothyroxine dosage was tapered from 150 mcg/day to 125 mcg/day during follow-up.

The patient remained clinically stable, afebrile, and hemodynamically stable, with no new complaints. Following multidisciplinary team evaluation, the patient was referred to the nuclear medicine department for planning radioactive iodine (RAI) therapy, and 200 mCi of radioactive iodine was administered. Additionally, a thoracic surgery consultation was recommended for further assessment of the sternal lesion.

The patient was discharged at the end of March, with a prescription for levothyroxine on weekdays and 125 mcg/day on weekends, and a prescription for monthly intramuscular vitamin B12 (Dodex). Routine follow-ups with endocrinology, oncology, nuclear medicine, and thoracic surgery were to ensure coordination of care.

DISCUSSION

PTC, the most prevalent form of thyroid malignancy, typically follows an indolent course with a predilection for regional lymphatic spread. The etiology of PTC involves genetic predisposition, imbalances in iodine intake, childhood radiation exposure, and certain environmental factors. Nonetheless, though infrequent, distant metastases pose considerable clinical challenges, particularly when involving the skeletal system. Sternal metastasis, while rare, constitutes a significant therapeutic dilemma due to its anatomical complexity and association with local and systemic symptoms. Patients often present with an enlarging neck mass, cervical lymphadenopathy, dyspnea, cough, and chest or sternal pain, while advanced cases may exhibit systemic features such as fatigue, weight loss, and hoarseness secondary to recurrent laryngeal nerve involvement (2, 4, 5, 6). Imaging modalities, including chest radiography, computed tomography (CT), and positron emission tomography/computed tomography (PET/CT), are indispensable in diagnosing sternal involvement and assessing metastatic dissemination (7).

The current evidence underscores the necessity of a multidisciplinary approach, incorporating surgical resection, radioactive iodine (RAI) therapy, and adjunctive modalities to achieve optimal disease control. Despite the generally poor prognosis (illustrated by 5-year survival rates of approximately 39.5% to 42.4% and 10-year survival rates near 20.4%), aggressive intervention has demonstrated potential for improved outcomes in selected patients (6, 8). The prognosis is influenced by factors such as the histopathological subtype, with classic papillary variants conferring a survival advantage over follicular types, and by disease extent, with

isolated osseous metastases showing better prognostic profiles than those with visceral involvement. Additionally, responsiveness to RAI remains a critical determinant, as iodine-avid lesions are associated with more favorable outcomes (6, 9). Epidemiological analyses reveal that bone metastases occur in 4–13% cases of differentiated thyroid carcinoma (DTC) cases, with sternal metastases accounting for approximately 18.3% of thoracic skeletal involvement, predominantly affecting patients between 57 and 70 years of age (7, 10).

Case studies further illuminate the complexity and efficacy of multimodal management strategies. For instance, Paspala et al.(2) described a 60-year-old male patient with a sternal mass and thyroid nodule who achieved disease-free survival at 8 months following total thyroidectomy, en-bloc sternal resection, and adjuvant RAI therapy. Murakawa et al.(11) reported on a 68-year-old male requiring extensive resection of the manubrium sterni and adjacent structures, with chest wall reconstruction using Marlex Mesh and subsequent multimodal therapy, resulting in favorable outcomes.

The literature is limited to case reports and small case series, consistently advocating complete surgical excision when feasible, emphasising its critical role in local disease control and survival benefit (1, 3, 12). Adjunctive RAI therapy and external beam radiotherapy (EBRT) are essential in managing residual disease and minimizing recurrence risk (2). Advances in reconstructive techniques, including the use of prosthetic materials such as polypropylene mesh, titanium plates, and muscle flaps, have enhanced the safety and efficacy of chest wall reconstruction post-resection, facilitating restoration of structural integrity and functionality. It is expected that these techniques will develop in the future (13).

CONCLUSION

This case underscores PTC's clinical complexity and rarity with sternal metastasis, highlighting the importance of a vigilant, multidisciplinary approach to diagnosis and management. The early identification of atypical metastatic patterns through advanced imaging and timely histopathological evaluation is crucial for optimizing therapeutic outcomes. Although the prognosis of PTC with distant skeletal involvement remains guarded, aggressive surgical intervention, combined with adjuvant therapies such as radioactive iodine and external beam radiotherapy, offers potential for extended survival and improved quality of life. Further research, including larger cohort studies, is needed to elucidate prognostic factors further and refine management strategies for this uncommon but challenging clinical entity.

Informed Consent: Written informed consent was obtained from the patient for the publication of the case report and the accompanying images.

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