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A Bone Lesion of Message: Dismasking Metastatic Follicular Thyroid Carcinoma

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Abstract **Case Report**

Follicular thyroid carcinoma is a differentiated thyroid malignancy that may remain clinically silent until distant spread occurs. Skeletal involvement, although uncommon, can represent the initial manifestation. We describe a 67-year-old man whose diagnosis was established following a pathological fracture of the femoral neck. Radiological assessment revealed an aggressive lytic bone lesion with additional skeletal deposits. Histological examination confirmed metastatic thyroid carcinoma through characteristic follicular architecture and thyroid-specific immunohistochemical markers. Subsequent evaluation identified a suspicious thyroid nodule. This case emphasizes the need to consider thyroid carcinoma in patients presenting with unexplained lytic bone lesions and highlights the importance of multidisciplinary management in advanced disease.

Keywords: Follicular Thyroid Carcinoma, Bone Metastasis, Pathological Fracture, Lytic Bone Lesion, Immunohistochemistry, Thyroglobulin, Case, Multidisciplinary Management.

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INTRODUCTION

Globally, thyroid cancer is the most common endocrine malignancy and affects individuals across all age groups, with a marked predominance among women [1, 2]. Although it accounts for approximately 3% of all cancers, its incidence has been steadily rising worldwide, particularly in Asian populations [2, 3]. Histologically, thyroid cancers are classified into differentiated, medullary, and anaplastic types, with papillary and vesicular (formerly follicular) carcinomas constituting the differentiated subgroup [3, 4]. The vesicular subtype is known for its propensity to develop distant metastases most notably to bone sometimes even before the primary thyroid tumor becomes clinically apparent [5–7]. Although bone metastases are relatively uncommon, their presentation can be misleading, frequently mimicking benign musculoskeletal disorders and contributing to diagnostic delay [8, 9]. we report an illustrative case of metastatic vesicular thyroid carcinoma revealed by a pathological fracture of the femoral neck, emphasizing the importance of careful evaluation of atypical bone lesions and the need for a coordinated multidisciplinary approach.

CLINICAL PRESENTATION

A 67-year-old man had experienced a gradually worsening pain in the left hip for nearly 3 years, attributed to a mechanical phenomenon. In this painful experience a fall from Standing Height resulted in a fracture of the left femoral neck that necessitated total hip arthroplasty in November 2025. Preoperative imaging showed a 33 × 25 mm lytic lesion of the femoral neck without marginal sclerosis or periosteal reaction and several other lytic lesions; two paravertebral masses at D9–D10 (each 5 × 4 cm; transverse processes destroyed), diffuse vertebral involvement, rib lesions, and lytic focus in left scapula very suggestive of widespread secondary bone disease. CT imaging provided additional evidence for a Lodwick 1B femoral neck defect, indicative of a disease-caused fracture of neoplastic origin. Histopathological examination of resected femoral head revealed vesicular structures consistent with a thyroid origin, confirmed by strong and diffuse thyroglobulin staining and moderate TTF1 expression, leading to a diagnosis of a metastatic vesicular thyroid carcinoma previously missed. The patient had been presenting with right sided costal pain and persistent episodic constipation with gradual

regression of his general condition in the last seven months. Physical examination revealed localized tenderness over the right 10th rib, a heterogeneous WHO grade 1 goiter, and no significant lymphadenopathy. After the clinical exam, tests for Thyroid Function was conducted, and it was identified as subclinical hyperthyroidism. Additionally, a complementary cervical ultrasound showed a nodular goiter with a notably suspicious TIRADS 5 nodule. A specialist workup was commenced, which included referral to otolaryngology for surgical management consult and coordinated multidisciplinary follow-up with endocrinology and oncology to optimize therapeutic decisions.

DISCUSSION

Thyroid cancer is the most prevalent endocrine malignancy and affects individuals of all ages, with a significant predominance among women [1]. Worldwide, it represents around 3% of cancer diagnoses, with significantly higher incidence in several Asian regions [2]. Over the past decades, incidence rates have continued to rise in both men and women [3]. Differentiated thyroid carcinomas which include papillary and vesicular subtypes constitute the majority of cases, with vesicular carcinoma being the second most frequent form [3, 4].

Vesicular thyroid carcinoma typically occurs in individuals aged 50–60 years and is often clinically silent at onset [4]. It is commonly identified during ultrasound requested for a palpable goiter or, more rarely, during evaluation of distant metastases that may serve as the initial disease manifestation [5]. Two major morphological variants are described: the minimally invasive type, defined by limited capsular involvement without vascular invasion and associated with a favorable prognosis; and the invasive type, characterized by extensive capsular penetration and/or angioinvasion, which confers a higher likelihood of metastatic spread and a poorer prognosis [5, 6].

Unlike papillary carcinoma, which spreads predominantly via lymphatic routes, vesicular carcinoma shows a strong hematogenous metastatic pattern. Distant metastases occur in 6–20% of cases, most commonly to bone, followed by the lungs and, more rarely, the central nervous system [6, 7]. This metastatic behavior results in a more aggressive clinical course and increased mortality compared with papillary carcinoma [7].

Bone metastases as an initial presentation of vesicular thyroid carcinoma are uncommon but well documented [8]. When present, the skeleton is the principal metastatic site, with predilection for the femur, spine, ribs, and pelvis [8, 9]. Because these lesions frequently mimic benign musculoskeletal disorders, they often lead to an initial misdiagnosis and delay appropriate management [9].

Histopathologically, these inaugural metastases nearly always correspond to invasive variants marked by prominent angioinvasion, consistent with their hematogenous spread [10]. In most reported cases, the diagnosis of the thyroid primary is established via bone biopsy, with immunohistochemistry revealing strong thyroglobulin positivity and TTF-1 expression highly suggestive of thyroid origin [11].

Radiologic evaluation typically shows purely lytic lesions, without marginal sclerosis or periosteal reaction, often large and destructive, predisposing to pathological fractures [12]. Several case series describe pathological fractures especially at the femoral neck or thoracolumbar junction as the presenting feature [13].

After the detection of bone metastasis, thyroid ultrasound frequently identifies a TIRADS 4–5 nodule, although this alone does not confirm malignancy or angioinvasion [14]. Nevertheless, experts advocate for systematic thyroid evaluation in all patients with bone metastases of unknown origin [15].

Finally, the literature strongly highlights the importance of a multidisciplinary management strategy involving endocrinology, otolaryngology, oncology, radiology, and orthopedic surgery [16–20]. Such integrated care improves therapeutic precision and optimizes outcomes through combined approaches including thyroidectomy when feasible, radioactive iodine therapy, orthopedic stabilization, and appropriate analgesic treatment [17–20].

CONCLUSION

This case illustrates a rare but clinically meaningful presentation of vesicular thyroid carcinoma revealed by a pathological fracture due to bone metastasis. The multiplicity of lytic lesions and the identification of the primary tumor through bone biopsy underscore the insidious nature of this malignancy, whose hematogenous spread may precede overt thyroid symptoms [7-10].

Histopathological and immunohistochemical assessment remains essential for diagnosing bone lesions with suspicious secondary features [10, 11]. This case reinforces the importance of systematic thyroid evaluation in patients with bone metastases of unknown origin [15]. Ultimately, it highlights the need for a coordinated multidisciplinary approach to ensure appropriate therapeutic planning and improved outcomes in advanced stages of thyroid cancer [17–20].

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