

Case Report**Pathological Fracture of the Femoral Shaft Following Metastatic Follicular Thyroid Cancer****J.P.M. Kumarasinghe¹, R.P. Abeywickrama¹, R.W. Seneviratne¹, D.S. Kommalage¹**¹ *Department of Surgery, Faculty of Medicine, University of Ruhuna, Sri Lanka***Abstract**

Follicular thyroid carcinoma (FTC) is characterized by hematogenous spread, most commonly to the lungs and axial skeleton. Metastasis to long bones, particularly the femoral shaft, is rare. We report a case of a 57-year-old man who presented with a pathological fracture of the right femoral shaft 17 years after total thyroidectomy and radioactive iodine therapy for FTC. Imaging revealed a lytic femoral lesion consistent with metastatic disease. The fracture was managed surgically with internal fixation. This case highlights the potential for very late skeletal metastasis in FTC and underscores the importance of lifelong oncological surveillance in thyroid cancer survivors.

Key words

Follicular thyroid carcinoma, Pathological fracture, Bone metastasis.

Introduction

Thyroid cancer is the most common endocrine malignancy in Sri Lanka (1). Follicular thyroid cancer (FTC) is the second most common type of differentiated thyroid carcinoma (DTC), accounting for 15–20% of cases (2). FTC has a 6–20% incidence of metastasis, predominantly via the bloodstream (3). Bone metastasis carries a poor prognosis, with a median survival of only four years after detection (2). Bone metastasis is most frequently reported in the axial skeleton and less commonly in long bones (4). This case highlights a pathological femoral fracture occurring 17 years after a total thyroidectomy for FTC, emphasizing the need for lifelong surveillance in thyroid cancer survivors.

Case Presentation

A 57-year-old male presented with a sudden onset of severe pain in his right thigh while attempting to stand from his wheelchair. He had undergone a left above-knee amputation five days prior to this presentation for the management of a giant cell tumor of the left tibia.

His comorbidities included hypertension and dyslipidemia. He was diagnosed with follicular thyroid carcinoma 17 years earlier. The cancer was initially managed with a total thyroidectomy without neck lymph node dissection. This was followed by a whole-body radioiodine scan, which revealed residual thyroid tissue in the neck. He was treated with high-dose radioactive iodine therapy. Nine years after the initial surgery, his condition was complicated by the development of bilateral pulmonary metastases, after which he defaulted on oncology follow-up.

Physical examination of the right lower extremity revealed no open wounds. Distal neurovascular status was intact, with palpable distal pulses. X-ray imaging revealed lytic changes with pathological fracture of the right proximal femoral shaft (Figure 1). Radiographic imaging and clinical presentation collectively supported the diagnosis of bone metastasis secondary to FTC.

Blood investigations showed a reduced hemoglobin level of 8.5 g/dL (reference range: 13.5–17.5 g/dL for males), a white blood cell count of 9,550/mm³ (reference range: 4,000–11,000/mm³), and a platelet count of 216,000/mm³ (reference range: 150,000–450,000/mm³). C-reactive protein (CRP) was 48.6 mg/L (reference range: 0.0–5.0 mg/L). Serum total calcium was low at 2.0 mmol/L (reference range: 2.15–2.50).

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mmol/L); however, the corrected calcium was within normal limits. Renal function tests, liver function tests, and serum electrolytes were normal.

Initial management consisted of skin traction and a multimodal analgesic regimen for pain control. Following preoperative optimization, the patient underwent definitive surgical management with internal fixation using a long Proximal Femoral Nail Antirotation (PFNA).



Figure 1 – X-ray image of the right femoral fracture

Discussion

Unlike papillary thyroid carcinoma, which predominantly spreads via the lymphatic system, FTC exhibits a strong tendency for hematogenous dissemination (5). The lungs and bones are the most common sites of distant FTC metastasis. Because FTC spreads hematogenously, bones with a rich blood supply are most affected, such as vertebral bodies and pelvis, and less commonly long bones such as the femur (4). While thyroid metastasis to the proximal femur is well-documented, involvement of the femoral shaft remains exceedingly rare, with few previously reported cases in the literature. (2,6).

Recurrences and distant progression of thyroid cancer can occur even decades after the initial diagnosis. Even

after definitive management with total thyroidectomy and high-dose radioactive iodine (RAI) therapy, as seen in this patient, the risk of late-onset metastasis remains a significant concern (7). This highlights the necessity of lifelong oncological monitoring, typically using serum thyroglobulin levels as a highly sensitive biomarker for recurrent or residual disease, alongside imaging in high-risk patient cohorts (7).

Bone metastases can occasionally remain clinically silent until manifesting as a pathological fracture. Imaging modalities such as whole-body magnetic resonance imaging (MRI) and computed tomography (CT) provide anatomical evaluation of bone and marrow, helping to identify the extent of metastasis and the risk of impending fracture. Whole-body radioiodine scanning is a more specific and sensitive investigation for detecting well-differentiated thyroid cancers (6).

Bone metastatic deposits compromise structural integrity and become highly susceptible to fracturing under physiological loads, such as those exerted during wheelchair transfers (5). In addition to fractures, metastatic bone disease can precipitate severe skeletal-related events, including hypercalcemia, spinal cord compression, bone marrow failure, and anemia (5). The low hemoglobin level observed in this patient is likely attributable to this phenomenon.

Conclusion

This case highlights the importance of lifelong oncological surveillance following total thyroidectomy for FTC due to the persistent risk of delayed recurrence. The rare metastasis to the femoral shaft seen in this patient demonstrates that FTC can present decades later and at atypical anatomical sites. Such metastasis can cause pathological fractures that may impair the patient's quality of life. Clinicians must maintain a high index of suspicion for late-onset metastasis in FTC survivors.

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