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REVIEW

Vertebral fragility fractures mimicking metastases in patients with hormone-sensitive cancers: A clinical highlight

Anıl Köktürk, MD[1], Erdem Aras Sezgin, MD[2], O. Şahap Atik, MD[3]

[1]Department of Orthopedics and Traumatology, Zonguldak Devrek State Hospital, Zonguldak, Türkiye
[2]Department of Orthopedics and Traumatology, Gazi University Faculty of Medicine, Ankara, Türkiye
[3]President, Turkish Joint Diseases Foundation, Ankara, Türkiye

Prostate and breast cancers are classified as hormone-sensitive malignancies, as the survival and proliferation of their tumor cells are closely dependent on the binding of steroid hormones to their respective receptors, notably the androgen receptor.[1] Hormonal ablation therapies used in patients with hormone-sensitive cancers, accelerate bone loss via estrogen and androgen suppression, thereby leading to secondary osteoporosis and an increased risk of fractures.[2-6] According to the International Osteoporosis Foundation (IOF) review, women with non-metastatic breast cancer exhibit an approximately five-fold increased risk of vertebral fracture compared to the general population.[3] The American Society of Clinical Oncology (ASCO) guidelines also state that men with prostate cancer undergoing androgen deprivation therapy experience an approximately nine-fold greater loss in bone mineral density during the first year compared to normal aging.[4]

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Correspondence: O. Şahap Atik, MD. Turkish Joint Diseases Foundation, Mustafa Kemal Mah., Dumlupınar Bul., 274/2, C2 Blok, Ofis 5, 06900 Çankaya, Ankara, Türkiye.
E-mail: satikmd@gmail.com

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A key diagnostic challenge in these patients lies in the radiographic indistinguishability between vertebral fractures caused by metastatic involvement and those resulting from therapy-induced bone fragility.[7-10] The most confusing aspect of this overlap is the presence of bone marrow edema on magnetic resonance imaging (MRI) images in both acute osteoporotic fractures and early metastatic infiltration.[9] To overcome this issue, diffusion-weighted imaging (DWI) using low b-values (<500 s/mm²) has been shown to effectively distinguish benign from malignant lesions.[9] However, current literature reports an unexpected malignancy rate of up to 6 to 7% in routine transpedicular biopsies, even when preoperative MRI shows no evidence of metastasis.[8,10] Considering these findings, vertebral biopsy should be primarily considered in patients with a history of cancer and in those exhibiting imaging features suspicious for malignancy on MRI, such as convexity of the posterior vertebral border, epidural or paravertebral soft-tissue masses, and involvement of the posterior vertebral elements.[10]

It is of utmost importance to assess the risk of fracture before treatment in patients planning to receive aromatase inhibitors, gonadotropin-releasing hormone (GnRH) analogs, or androgen deprivation therapy, and to initiate preventive measures in at-risk individuals.[2-6] Cancer treatment–induced bone loss differs from postmenopausal or age-related osteoporosis, progressing approximately seven times more rapidly and representing a significant cause of secondary osteoporosis.[4] Consequently, preventing vertebral fractures through prophylactic treatments such as bisphosphonates and denosumab can be considered in patients with hormone-sensitive cancers.[2-6] A multi-center randomized-controlled trial involving patients with painful

vertebral compression fractures demonstrated that minimally invasive interventions such as balloon kyphoplasty provide rapid and sustained analgesic relief.[11] Furthermore, compared to non-surgical management, these procedures significantly improve back-specific functional status and overall quality of life.[11]

In conclusion, osteoporosis associated with hormone ablation therapy progresses rapidly; therefore, ensuring high patient compliance and implementing appropriate preventive measures to manage the risk is essential. Although MRI demonstrates high accuracy in differentiating osteoporotic fractures from metastatic involvement, a targeted biopsy should be considered in patients with a history of cancer.

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