

Prostate Cancer with Osteolytic Sternal Metastasis: A Rare Clinical Presentation

Osteolitik Sternal Metastazlı Prostat Kanseri: Nadir Bir Klinik Sunum

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Abstract

Chest wall malignancies are rare, constituting only 1% of all cancers. Prostate cancer, the second most common in men, typically metastasizes to bones, lymph nodes, and organs. However, sternum involvement is exceptionally rare, particularly with osteolytic metastasis. We report a 75-year-old man, clinically presenting with large anterior chest wall mass, which on further investigation revealed an expansile osteolytic sternal body metastasis from prostate cancer. This rarity poses diagnostic and therapeutic challenges, as documented cases of osteolytic secondaries to the sternum are scarce in medical literature. Diagnostic efforts involved comprehensive imaging and biopsy, confirming prostate cancer metastasis. Management requires a multidisciplinary approach, balancing effective cancer control with preserving the patient's quality of life through systemic therapies, radiation, and surgery. The scarcity of osteolytic sternal body metastasis in reported cases highlights the atypical pattern of metastasis in prostate cancer emphasizing the need for a deeper understanding and contributing to the knowledge of this uncommon manifestation.

Keywords: prostate cancer, sternal metastasis, osteolytic presentation, chest wall tumors, positron emission tomography, multidisciplinary approach

Özet

Göğüs duvarı maligniteleri nadirdir ve tüm kanserlerin yalnızca %1'ini oluşturur. Erkeklerde ikinci sıklıkta görülen prostat kanseri, genellikle kemiklere, lenf nodlarına ve organlara metastaz yapar. Bununla birlikte, özellikle osteolitik metastazlarda sternum tutulumu son derece nadirdir. Klinik olarak göğüs ön duvarında büyük bir kitle ile başvuran ve daha ileri incelemelerde prostat kanserinden kaynaklanan ekspansil osteolitik sternal vücut metastazını ortaya çıkaran 75 yaşında bir erkeği sunuyoruz. Bu nadirlik, tıbbi literatürde sternuma sekonder osteolitik sekonder vakaların az olması nedeniyle teşhis ve tedavi açısından zorluklar doğurmaktadır. Teşhis çabaları, prostat kanseri metastazını doğrulayan kapsamlı görüntüleme ve biyopsiyi içeriyordu. Yönetim, sistemik tedaviler, radyasyon ve cerrahi yoluyla hastanın yaşam kalitesinin korunmasıyla dengeleyen multidisipliner bir yaklaşımla etkili kanser kontrolünü gerektirir. Bildirilen vakalarda osteolitik sternal vücut metastazının azlığı, prostat kanserindeki atipik metastaz paterninin daha derin bir anlayışa ihtiyaç duyulduğunu vurgulayarak, bu nadir görülen tezahürün bilgisine katkıda bulunmaktadır.

Anahtar kelimeler: prostat kanseri, sternal metastaz, osteolitik başvuru, göğüs duvarı tümörleri, pozitron emisyon tomografisi, multidisipliner yaklaşım

Introduction

Chest wall malignancies are considered rare, constituting approximately 1% of all malignancies. These malignancies may originate primarily from bone or soft tissue, result from the infiltration of adjacent organ malignancies, or occur secondary to distant metastasis, with the latter being the predominant cause [1]. Prostate cancer, ranking as the second most diagnosed cancer in men and the fourth most common overall, typically exhibits metastasis to various sites, including bone, lymph nodes, lung, bladder, liver, and adrenal glands [2].

While the literature reports prostatic metastases to almost every organ in the body, involvement of the sternum is notably infrequent in prostate cancer cases [3]. Within sternum involvement, osteosclerotic metastasis have been documented, yet osteolytic metastasis in the sternum due to prostate cancer remains an exceedingly rare occurrence, lacking documented cases in medical literature [4].

This article presents a noteworthy case of metastatic prostate cancer, wherein the clinical presentation manifested as a sizable sternal mass. Further evaluation revealed an expansile osteolytic sternal body metastasis in a 75-year-old gentleman. The peculiarity of this manifestation, along with its diagnostic and therapeutic challenges, underscores the need for a detailed examination of such atypical cases.

Case

A 75-year-old male presented with a painful swelling on the chest wall that gradually increased in size. Upon clinical examination, an 11 cm x 8 cm bony hard, non-mobile, and non-tender mass was identified (**Figure 1**). Vital signs were within normal limits. Computed Tomography of the chest identified an expansile osteolytic lesion in the body of the sternum without any abnormal lesions in the mediastinum or lung parenchyma (**Figure 2**). An 18F-fluorodeoxyglucose positron emission tomography/computed tomography (18F-FDG PET/CT) was performed showing an expansile osteolytic metastatic lesion in the sternum and diffuse osteolytic skeletal metastasis with a non-homogeneously enlarged prostate (**Figure 3,4**). No history of lower urinary tract symptoms was reported, while a digital rectal examination indicated a hard prostate prompting serum prostate-specific antigen (PSA) level which was found to be elevated (1347 ng/mL).

Confirmation through CT-guided biopsy demonstrated metastatic deposits originating from the prostate, while a transrectal ultrasound-guided biopsy of the prostate revealed a primary adenocarcinoma with a Gleason score of 5+5. Initiation of treatment with a subcutaneous injection of degarelix (240 mg loading dose), a gonadotropin-releasing hormone (GnRH) receptor antagonist, resulted in a significant reduction in



Figure 1. The anterior (A) and lateral view (B) of a large anterior chest wall mass with bony-hard consistency showing the size and extent of the painful bone mass



Figure 2. Computed Tomography of the chest with a soft tissue window, revealing bony metastasis in the sternum, with no apparent lung or mediastinal lesions evident



Figure 3. A coronal view of a Positron Emission Tomography reveals widespread bony metastasis affecting both the axial and appendicular skeleton

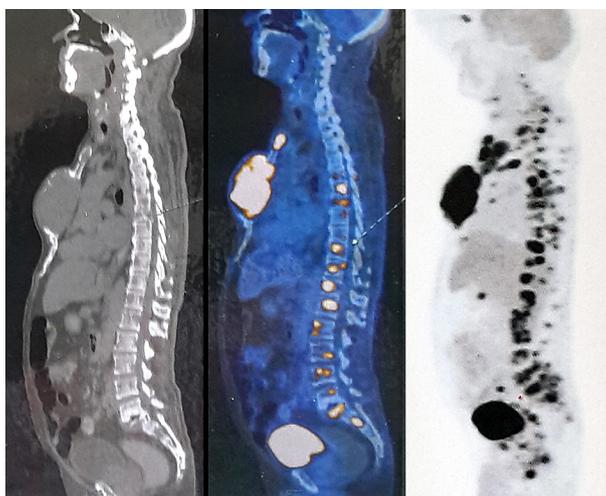


Figure 4. Sagittal view of Computed Tomography/ Positron Emission Tomography reveals an enlarged and non-homogeneously enhancing prostate with hypermetabolic activity noted in mediastinal nodes (retrosternal and both internal mammary regions), an expansile lytic lesion in the sternum (95.5 x 61.3 mm), and multiple lytic lesions in the axial and appendicular skeleton

pain. Following consultations with a multidisciplinary team comprising medical oncologists, radiation oncologists, and pathologists, a consensus was reached. The decision to commence hormonal therapy was made, and based on the treatment response, radiotherapy may or may not be considered for sternal metastasis. Currently, the patient is receiving injection leuprolide (11.25 mg), a gonadotropin-releasing hormone (GnRH) agonist, alendronate (bisphosphonate) and calcium with vitamin D 3. The patient is pain-free at the end of a one-month follow-up.

Discussion

Prostate cancer ranks as the second most frequently diagnosed cancer in men, registering an estimated 1.4 million global diagnoses in 2020 [5]. In the hierarchy of metastatic occurrences, the typical sites include the bone (90%), lung (46%), liver (25%), pleura (21%), and adrenals (13%) [6]. While the spine, pelvis, and ribs are the most common sites of bone metastasis in prostate cancer, sternum involvement is rare [7].

The sternum, comprising the manubrium, corpus, and xiphoid process, exhibits distinct patterns of metastasis. Corpus sternum involvement is more prevalent in lung cancer, whereas prostate cancer may manifest in the manubrium and xiphoid [8]. Adenocarcinomas of prostate cancer demonstrate osteotropism, giving rise to both osteosclerotic and osteolytic lesions, with sclerotic metastasis being a predominant feature [9].

Chest wall tumors can be primary or metastatic with latter being the most common. Metastatic tumors to the chest wall commonly arise from primary cancers in nearby organs such as the breast, lung, kidney, and thyroid, among others. A significant portion, roughly twenty percent, is incidentally discovered through chest radiographs, with sarcomas like chondrosarcomas, osteosarcomas, rhabdomyosarcomas, plasmacytomas, malignant fibrous histiocytomas, and Ewing sarcomas forming the primary malignant chest wall tumors [10].

While there are case reports documenting the metastatic involvement of the chest wall, including the sternum, in the context of prostate cancer, it is noteworthy that there is a scarcity of data specifically addressing osteolytic sternal body metastasis in published literature.

In a comparative study by Wang et al., sternal metastasis in prostate cancer was reported at 1.72% in few bony metastases, 0.62% in moderate metastases, and 3.14% in extensive bony metastases, signifying its rarity in this context [11]. The utility of positron emission tomography in staging, treatment response evaluation, and recurrent disease detection in chest wall tumors is acknowledged [12].

Although an extensive meta-analysis by Carsote et al. reported a staggering 68% involvement of chest wall (ribs + sternum) metastasis in prostate cancer, the specific data on sternal metastasis remains elusive [13]. Noteworthy cases reported by Roxburgh et al. and Matei et al. were predominantly osteoblastic secondaries, setting this case apart as a unique instance of osteolytic sternal secondaries from prostate cancer, clinically presenting as a sternal mass without urinary symptoms [14,15].

The evaluation of serum prostate-specific antigen (PSA), an aspect not routinely included in pre-operative assessments

for chest wall tumors, played a pivotal role in confirming the diagnosis in this distinctive case. After the establishment of sternal metastases, comprehensive medical interventions involving radiotherapy, hormonal therapy, or chemotherapy become imperative, irrespective of the metastatic lesion's location and size.

When confronted with sternal metastases in isolation, a spectrum of therapeutic strategies comes into play. Established modes of treatment include surgical excision of the tumor, accompanied by sternum reconstruction using materials like titanium mesh, locking titanium plates, or allogenic transplants, along with stereotactic radiotherapy [16].

Conclusion

In conclusion, this case, presenting an exceedingly rare manifestation of osteolytic sternal metastasis from prostate cancer, underscores the complexity of metastatic involvement in the chest wall, particularly the sternum. The scarcity of similar cases in the literature calls for enhanced understanding and recognition of such atypical presentations. It underscores the importance of advanced diagnostic tools, like PET scans, for effective evaluation. The treatment of such metastases is characterized by consistent approaches, emphasizing the necessity of individualized and multidisciplinary management strategies. Notably, the positive response to GnRH injection in this case suggests the potential role of hormonal treatments, highlighting an area for further research. This report contributes significantly to the limited existing literature on this topic, underlining the need for continued research and comprehensive management of these unique clinical scenarios.

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