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CASE REPORT

Beyond the Norm: Unraveling Sphenoidal Metastasis in Prostate Cancer – A Rare Encounter

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Abstract

We present a rare case of sphenoidal metastasis in a 58-year-old patient with metastatic prostate cancer, initially presenting with low-volume disease. Despite multimodal treatment, including local and systemic therapies, the patient developed sphenoidal metastasis, an exceptionally uncommon occurrence in prostate cancer. Treatment with local radiotherapy provided significant symptomatic relief. However, subsequently, the disease progressed, and the patient was managed with the best supportive care. This case highlights the importance of considering rare metastatic sites in prostate cancer patients presenting with suggestive symptoms. While mechanisms of bone metastasis are well understood, factors contributing to site-specific metastasis remain elusive. Further research is warranted to elucidate optimal management strategies for such rare metastatic sites and to improve outcomes in advanced prostate cancer patients.

Keywords: Prostate Cancer- Sphenoid- Metastasis

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Case Report

A 58-year-old patient presented to our hospital in June 2020 with complaints suggestive of lower urinary tract symptoms persisting for a year, along with severe lower back and right shoulder pain for two months. Examination revealed an Eastern Cooperative Oncology Group Performance Status (ECOG PS) of 2, with a digital rectal examination indicating an enlarged and indurated prostate. MRI of the pelvis revealed a PIRADS 5 lesion in the prostate with suspicious pelvic bony metastasis. A subsequent whole-body bone scan confirmed bony metastasis in the pelvis and right shoulder, with a baseline PSA (Prostate Specific Antigen) level of 1105 ng/ml. Trans Rectal Ultrasound (TRUS) guided biopsy showed prostate adenocarcinoma with a Gleason score of 5+4=9. Germline testing for BRCA 1 and BRCA 2 was negative. Palliative radiotherapy (RT) was initiated to painful sites (20 Gy/5#), followed by Androgen Deprivation Therapy (ADT) and Tab Abiraterone 1000mg once a day along with Tab Prednisone, stabilizing the disease from October 2020 to September 2021. In September 2021, the patient developed upper back pain, with a doubling of PSA levels to 150 ng/ml. PSMA PET CT revealed new metastatic sites in various bones. Palliative RT (20 Gy/5# EBRT) was administered to the cervical and lumbar vertebrae.

Cytotoxic chemotherapy with injection Docetaxel (75mg/m^2, q 21 days) was initiated, leading to symptomatic improvement and PSA decline to 90 ng/ml by April 2022 after ten cycles. Subsequently, Cap Enzalutamide was started due to the patient's preference for a chemotherapy-free interval. However, in May 2022, the patient presented with severe pain above the left eye and third cranial nerve palsy, with a rise in PSA to 125 ng/ml within a month. Repeat PSMA PET revealed new onset sphenoidal and cricoid metastasis (Figure 1). Palliative RT (30GY/10 # EBRT) was administered to the left orbit, resulting in symptomatic relief. The patient was planned for Cabazitaxel-based systemic chemotherapy. Still, subsequently, the disease progressed, and the patient was managed with the best supportive care, which was opted for by the patient and family.

Discussion

It is a well-known fact that prostate cancer often metastasizes to the bone, particularly the axial skeleton, due to its higher vasculature and the preferential binding of

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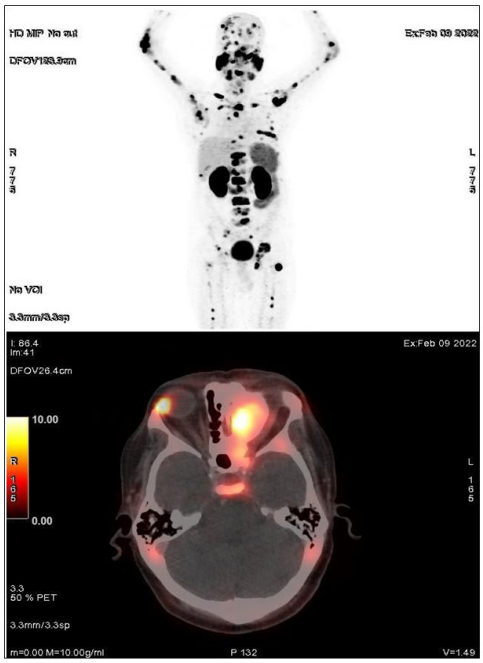

Figure 1. PSMA-PET Showing Sphenoidal Bone Metastasis and Metastatic Disease Burden Elsewhere.

prostate cancer cells to the endothelium of bone marrow vasculature [1].

The "seed and soil" theory, proposed over a century ago, elucidates organ- specific patterns of metastases in various cancers. This theory remains relevant today as we uncover factors driving the attraction and proliferation of prostate cancer cells in bone. These factors encompass the accumulation of genetic alterations within cancer cells and the release of chemoattractants from bone elements, perpetuating the metastatic cascade [2]. A recent four-step mechanism for bone metastasis has been proposed, encompassing cancer cell colonization, dormancy, reactivation and development, and bone reconstruction. Upon metastasis to the bone marrow vasculature, the hematopoietic stem cell niche serves as a crucial foothold for prostate cancer cells, playing a pivotal role in bone metastases. Additionally, mesenchymal stem cells within the bone marrow contribute to the metastatic ability of prostate cancer cells by suppressing Androgen Receptor signaling and influencing their homing to the bone marrow [3, 4].

There are more theories that implicate cancer stem cells, hypoxia, and bone- derived growth factors in bone metastasis [5]. These theories only partially explain the rarity of the sphenoid and other skull bones as site for bony metastasis in cancer patients. Metastasis from prostate cancer to the head and neck region is very uncommon. Reportedly, the most commonly involved sites are the brain, dura, and cervical (including left supraclavicular) lymph nodes.

In addition, cases of prostate cancer with spread to the parotid, pituitary gland, optic canal, and skin of the head and neck region are on record [6]. Metastasis to the sphenoid sinus is thus a rare event.

Upon reviewing data on Sphenoidal metastasis, Mickel et al. published the largest series to date, comprising 26 cases. The prostate and lung were identified as the most common primary tumor sites. The authors concluded that while metastasis to the sphenoid sinus is uncommon, signs and symptoms related to this metastasis often represent the initial disease presentation. This contrasts our case, where sphenoidal metastasis developed during treatment. It was also noted that although a cure in patients with sphenoid metastasis has not been reported, significant palliation with a resolution of morbidity is achievable in many cases through radiation therapy [7].

Thus, we conclude by mentioning that although rare, sphenoidal metastasis should be kept in the differential diagnosis of patients with prostate adenocarcinoma who present with suggestive symptoms. Although never curable, symptom palliation in such cases can be achieved by local radiotherapy.

The prognosis of this rare metastasis and response to newer treatment modalities need to be established.

Learning Points

1.) Rare sphenoid bone metastasis is to be kept in the differential diagnosis of patients with suggestive symptoms.

2.) Radiation therapy may provide palliative relief in cases of sphenoidal metastasis.

3.) Further research is needed to elucidate mechanisms of bone metastasis and optimize systemic therapy for rare metastatic sites.

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Statement of Transparency and Principals:

Conflict of interest

The authors declare that they have no conflict of interest.

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