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# Metastatic prostate adenocarcinoma presenting with ptosis due to sphenoid sinus metastasis: a rare case report

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## ABSTRACT

In this case report, we present a rare condition of ptosis due to sphenoid sinus metastasis of prostate adenocarcinoma. Malignancies of paranasal sinuses are rare and account for approximately 5% of all head and neck malignancies. Metastasis to the sphenoid sinus is even rarer. Prostate cancer is the most common cancer in men. While bone and lymph node metastases are common, metastasis to the head and neck region is rare. A 67-year-old male patient reported headache, drooping of the left eyelid (ptosis), and painful eye movements. Contrast-enhanced MRI of the brain and orbits showed a solid mass of approximately 3 × 3 cm predominantly occupying the left half of the left sphenoid sinus. The patient's prostate-specific antigen (PSA) levels were elevated (56). Contrast-enhanced pelvic MRI revealed similar masses in the peripheral and transitional zones of the prostate and lymph node metastasis. A prostate biopsy revealed prostate adenocarcinoma (acinar type) with a Gleason score of 4 + 5. Ga-68 PET-PSMA imaging showed increased uptake in the prostate gland and seminal vesicles. Since there was no increased uptake in the mass in the left sphenoid sinus, a biopsy was performed to determine whether the mass was a metastasis; it confirmed that it was a metastasis of prostate adenocarcinoma. The patient was diagnosed with high-risk and high-volume hormone-sensitive metastatic prostate adenocarcinoma and was started on treatment with bicalutamide, LHRH agonist, and abiraterone. Follow-up visits showed significant decreases in PSA levels, and at the 10<sup>th</sup> month, Ga-68 PET-PSMA imaging showed significant regression in the prostate and other metastatic lesions. Significant regression was also observed in the solid component of the mass in the left sphenoid sinus. This case demonstrates that prostate cancer can present with ptosis as an initial symptom due to a rare sphenoid sinus metastasis, and although this symptom represents advanced-stage disease, it can indicate diagnosis. Therefore, prostate cancer should be considered in differential diagnosis for masses and related symptoms occurring in the head and neck region.

**Keywords:** ptosis, sphenoid sinus metastasis, prostate adenocarcinoma

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## Introduction

Malignancies originating in the paranasal sinuses are infrequent, accounting for approximately 5% of all head and neck cancers [1]. Metastatic involvement of the paranasal sinuses is even less common. Primary tumors that metastasize to the paranasal sinuses, in

descending order of frequency, include renal cell carcinoma, lung carcinoma, breast carcinoma, testicular seminoma, gastrointestinal carcinomas, and thyroid carcinoma. The sphenoid sinus is the site most frequently involved, followed by the maxillary sinus [2].

Prostate cancer has the highest incidence and the second-highest mortality rate among cancers affecting

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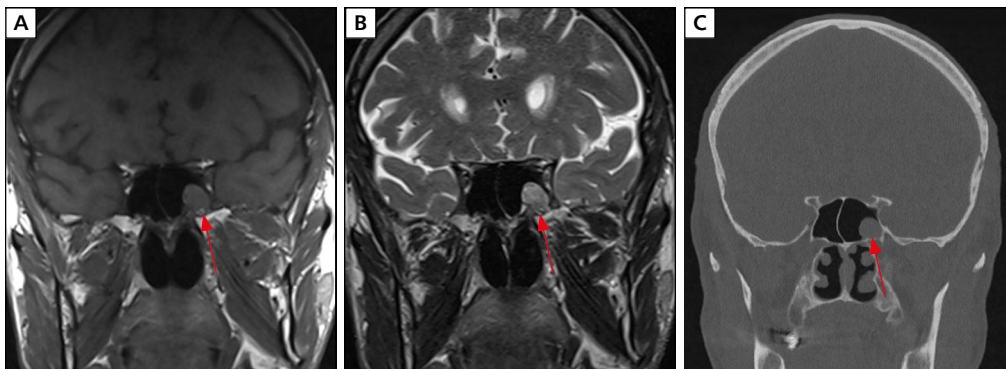
the male population globally [3]. Common metastatic sites include bone and lymph nodes, whereas metastasis to visceral organs is less prevalent. Metastasis to the head and neck region, particularly the paranasal sinuses, is exceptionally rare [4]. A limited number of cases have documented prostate cancer metastasis to maxillary [5], ethmoid [6], and sphenoid [7] sinuses. Metastases to the sphenoid sinus, as with other paranasal sinus metastases, typically occur in the context of advanced disease; however, their presentation as an initial manifestation in undiagnosed patients is exceedingly rare. In previously reported cases of prostate cancer metastasizing to the sphenoid sinus, patients frequently presented with symptoms such as diplopia, epistaxis, headache, and vision loss, often in conjunction with urethral symptoms. The presentation in our patient, as the initial indication of an undiagnosed malignancy rather than of an advanced stage, sets it apart from existing literature.

In this report, we describe a rare case of prostate adenocarcinoma, initially diagnosed due to ptosis in the left eye, attributable to metastasis to the left sphenoid sinus.

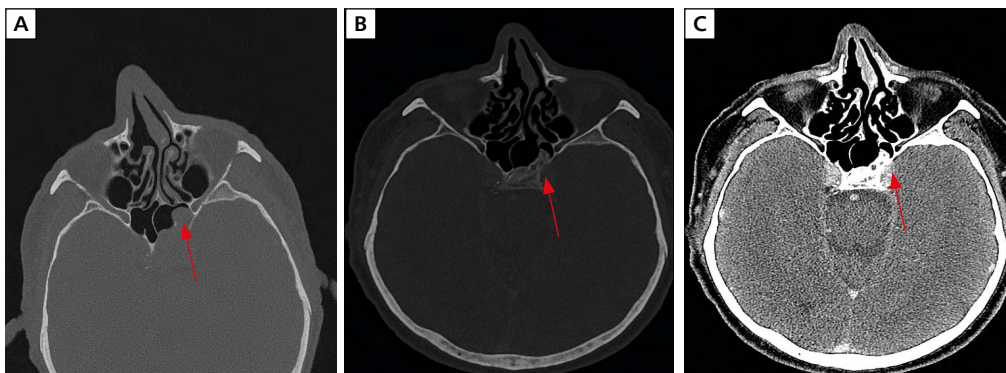
## Case report

A 67-year-old male patient presented to the Neurology outpatient clinic at Necmettin Erbakan University. He reported headache, ptosis of the left eyelid, and painful eye movements lasting two months. The patient had no significant history of chronic illnesses. Neurological examination revealed weak bilateral direct light reflex, normal distance vision, near vision of 20/50 in both eyes, normal visual fields, a pupil diameter of 2 mm in the right eye and 3 mm in the left eye, restricted gaze in all directions in the left eye, presence of ptosis, and normal cranial nerve examination (CN 5, 7, 8, 9, 10, 11, 12). Muscle strength was 5/5 in all extremities, deep tendon reflexes (DTRs) were normal in all extremities, sensory examination was normal, and gait was normal. All other systemic examination findings were within normal limits.

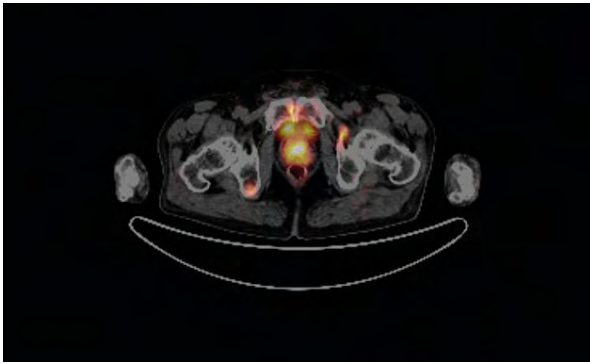
Contrast-enhanced magnetic resonance imaging (MRI) of the brain and orbits (Fig. 1A and B) revealed a heterogeneously enhancing solid mass measuring approximately 3 × 3 cm, predominantly involving the left half of the sphenoid sinus. Subsequently, a paranasal sinus computed tomography (CT) scan (Fig. 1C and 2A)



**Figure 1.** A, B. Magnetic resonance imaging (MRI) demonstrates soft tissue lesion; C. Image of initial paranasal sinus computed tomography (CT) demonstrates soft tissue lesion



**Figure 2.** A. Image of initial paranasal sinus computed tomography (CT) demonstrates soft tissue lesion; B, C. Image of paranasal sinus CT demonstrates soft tissue lesion (follow-up CT)

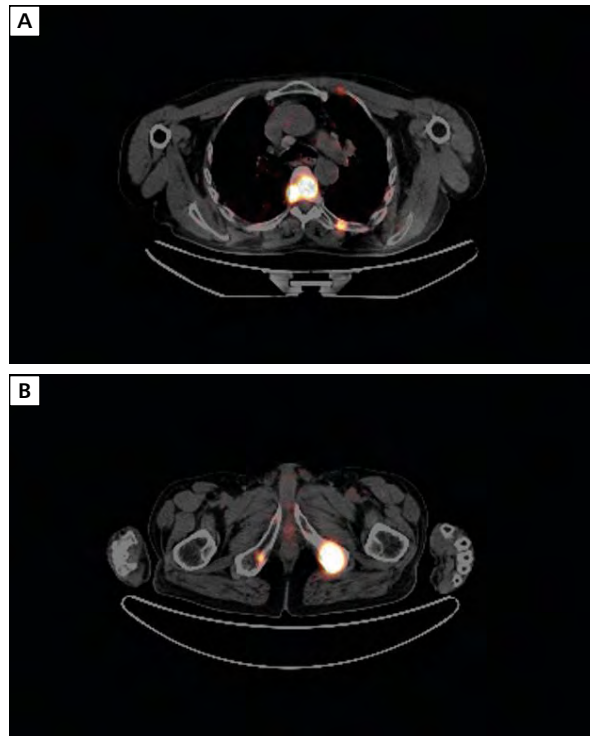


**Figure 3.** Positron emission tomography (PET) scan shows involvement in the prostate gland

was performed, and the patient was referred to the medical oncology outpatient clinic. Elevated levels of prostate-specific antigen [prostate-specific antigen (PSA): 56] were detected, prompting further search for the primary tumor. Contrast-enhanced pelvic MRI demonstrated a T2-weighted hypointense lesion measuring approximately  $2 \times 1$  cm in the peripheral zone of the prostate, with diffusion restriction and dynamic enhancement consistent with a Prostate Imaging Reporting and Data System (PIRADS) 5 lesion. Similar malignant lesions were observed in the peripheral and transitional zones of the prostate, invading the seminal vesicles, neurovascular bundle, and capsule. Additionally, lesions consistent with widespread metastases were identified in the abdomen and bilateral pelvic area, including lymph nodes measuring up to 1.5 cm in diameter, and bones.

A transrectal ultrasound-guided biopsy of the prostate was performed, revealing prostatic adenocarcinoma (acinar type) in all 12 cores sampled. The Gleason score was 4 + 5 in all cores. Gallium 68 positron emission tomography-prostate specific membrane antigen (PET-PSMA) imaging revealed showed radiopharmaceutical uptake in the prostate gland [maksimum standardize uptake value ( $SUV_{max}$ ): 14.42] and seminal vesicles ( $SUV_{max}$ : right — 8.96, left — 6.06), consistent with malignancy (Fig. 3). Additionally, metastatic lymph nodes with increased radiopharmaceutical uptake were identified in the para-aortic, aortocaval, bilateral common iliac and left internal iliac regions ( $SUV_{max}$ : 6.35–12.46), along with multiple sclerotic metastases in the skeletal system ( $SUV_{max}$ : 51). However, no increased radiopharmaceutical uptake was observed in the mass within the sphenoid sinus (Fig. 4).

Given the lack of radiopharmaceutical uptake in the sphenoid sinus mass, multiple punch biopsies were performed via endoscopic sinus surgery by the Otolaryngology department to investigate the possibility of a second primary tumor. Biopsy results revealed carcinoma metastasis. Immunohistochemical staining



**Figure 4.** Diffuse bone metastases of prostate adenocarcinoma on positron emission tomography (PET) scan

showed positivity for pan-cytokeratin and NK 3 homeobox gene (NKX 3.1) in tumor cells, while leucocyte common antigen (LCA), synaptophysin, and (cyclin dependent kinase 56 (CD56) were negative, consistent with prostatic adenocarcinoma.

The patient, diagnosed with high-risk and high-volume hormone-sensitive metastatic prostate adenocarcinoma presenting with ptosis, was initiated on bicalutamide 50 mg, luteinizing hormone-releasing hormone (LHRH) agonist (leuprolide acetate 22.5 mg every three months), and abiraterone 1000 mg, which blocks extragonadal and intratumoral androgen synthesis. Bicalutamide was discontinued after one month, and the patient continued treatment with dual LHRH agonist and abiraterone. Significant decreases in PSA levels were observed on follow-up. The total testosterone level remained below 2.5, indicating castrate levels. At the tenth month of treatment, significant regression was observed in the prostate and other findings on Ga-68 PET-PSMA imaging. Remarkable regression was also noted in the solid component of the mass in the sphenoid sinus, where there was no radiopharmaceutical uptake in the follow-up paranasal sinus CT scan (Fig. 2B and C). The patient's PSA level decreased to 0.041 at the ten-month follow-up (Fig. 5). The patient was observed for ten months during which he had no progression or treatment-related adverse effects.

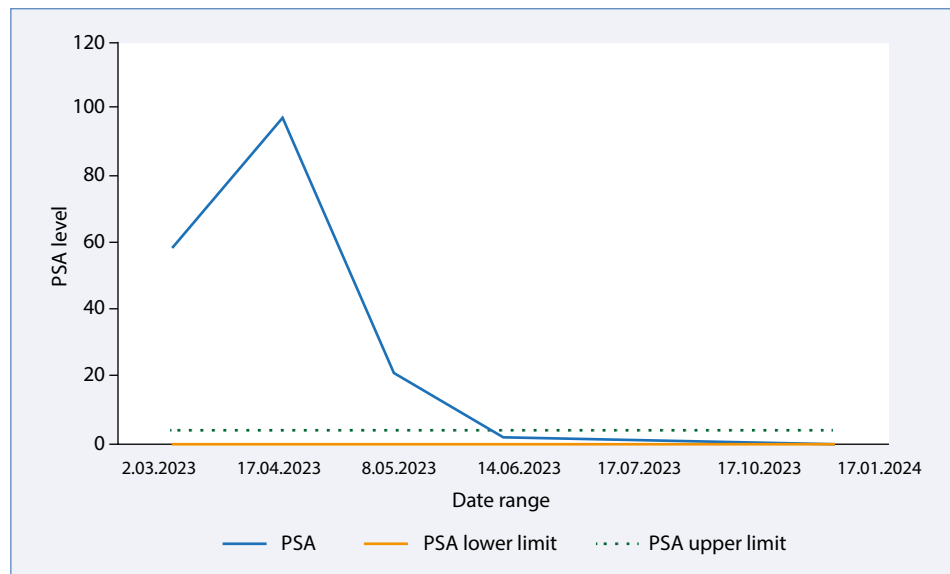


Figure 5. Prostate-specific antigen (PSA) value chart

## Discussion

The anatomy of the paranasal sinuses is notably complex due to their proximity to critical structures such as the eyes and the base of the skull. The sphenoid sinus, in particular, is closely associated with several significant anatomical structures. Therefore, pathologies of the sphenoid sinus should be considered in cases where symptoms arise due to compression of these structures. These structures include the optic nerve and chiasm, cavernous sinus, dura mater, pituitary gland, internal carotid artery, cranial nerves III, IV, V1, V2, and VI, sphenopalatine ganglion, sphenopalatine artery, and pterygoid canal [8].

The most common histological subtypes of primary paranasal sinus tumors are squamous cell carcinoma, adenocarcinoma, and adenoid cystic carcinoma [9]. Metastatic tumors of the paranasal sinuses are rare. The spread of metastases to the paranasal sinuses is thought to occur through blood vessels, the lymphatic system, or via the vertebral venous plexus; however, the exact pathophysiology remains undetermined. It has been suggested that metastasis occurs via retrograde flow from the prevertebral plexus [7].

The primary symptoms of metastasis to the paranasal sinuses are nosebleeds, nasal congestion, and pain while orbital symptoms such as diplopia, vision loss, exophthalmos, and ptosis are also often observed. However, as these symptoms frequently occur in non-malignant conditions, a detailed investigation is necessary for differential diagnosis. Diagnosis of the primary tumor or metastasis is confirmed through biopsy.

Early-stage prostate cancers are often asymptomatic due to their slow progression and formation of small

foci in the peripheral zone. Symptomatic presentation typically indicates locally advanced or metastatic disease. While metastases to cranial areas such as the brain, dura mater, and lymph nodes are more common in prostate cancer, metastasis to the head and neck region is rare [10]. Symptoms related to intracranial metastases of prostate cancer generally occur after diagnosis of prostate cancer and mostly involve patients already being followed for advanced disease [11].

In the literature, there are 18 reported cases of prostate cancer metastasizing to the sphenoid sinus. However, only four of these cases initially presented with symptoms related to sphenoidal sinus metastasis, while diagnosis of prostate cancer had already been established in others. Only one case involved the diagnosis of prostate cancer following presentation with ptosis. In this case, the patient had experienced symptoms of prostatism for several years. Barbosa and colleagues reported 12 cases of prostate cancer metastasizing to the sphenoid sinus in a case report published in 2017. Full-text reports of cases that occurred between 2018 and 2024, which are accessible online, are summarized in Table 1 [12–16].

In a case reported in 2023, Joseph et al. [17] diagnosed metastatic prostate carcinoma in a 71-year-old male patient presenting with headaches and diplopia. This patient did not exhibit ptosis, and aside from chronic illnesses, had no history of malignant disease [17].

Similarly, Ostrowska et al. [18] reported in 2021 a case of an 83-year-old patient presenting with rhinorrhea. In this case, cerebrospinal fluid rhinorrhea was the initial sign of prostate cancer metastasis; however, the patient had previously been diagnosed with locally advanced-stage prostate adenocarcinoma [18].

**Table 1. Reported cases of metastatic prostate carcinoma into the sphenoid sinus (2018–2024)**

Author	Age	Symptoms	Prostate cancer history	Treatment	Course of disease
George et al. [12], 2018	79	Bleeding from nose and nasopharynx	Yes	Unknown	Patient died
Risbud et al. [13], 2020	65	Unilateral retro-orbital pain, cranial deficits and new onset seizure	No	Unknown	Alive at time of article publication (No clear timeline identified)
Ibrahim D et al. [14], 2021	70	Left sided epiphora, proptosis and declining vision	No	Chemotherapy and hormonal therapy	Unknown
Ostrowska et al. [15], 2021	83	Clear watery nasal discharge, persistent headache	Yes	Hormonal therapy	Patient alive 6 months after presentation
Ba'th et al. [16], 2021	58	Presyncope with worsening condition, left eye pain with discharge and headache	Yes	Unknown	Unknown
Joseph et al. [17], 2023	71	Diplopia and headache	No	GnRH antagonist and antiandrogen	Alive at time of article publication (No clear timeline identified)
Present case 2024	67	Ptosis of the left eye and headache	No	GnRH antagonist and antiandrogen	Alive

GnRH — gonadotropin-releasing hormone

In cases without a history of diagnosed malignancy, newly occurring symptoms such as headaches and ptosis primarily suggest ocular and intracranial benign conditions, with malignancies being considered less frequently. The notable aspect of our case is that the diagnosis of metastatic prostate adenocarcinoma was made following the presentation of ptosis. Additionally, while there was significant involvement of other metastatic lesions on Gallium 68 PSMA PET-CT, no involvement was detected in the sphenoidal sinus metastasis alone. Therefore, a biopsy was necessary to learn whether it was a metastasis or a primary second tumor. Biopsy confirmed that the sphenoid sinus metastasis was indeed from prostate cancer, and treatment led to a reduction in the mass in the sphenoid sinus. Although the presence of ptosis due to sphenoid sinus metastasis may indicate an advanced stage of cancer, it provided crucial guidance in reaching the diagnosis.

The relationship between prostate cancer metastasis to the paranasal sinuses and prognosis has not been fully documented, but it is generally considered unfavorable [19]. In our case, at the 10-month follow-up, despite sphenoid sinus metastasis, widespread sclerotic bone metastases, and intra-abdominal metastatic lymphadenopathies, our patient was under continuous observation and showed no progression under dual combination therapy.

## Conclusions

Patients with metastatic prostate cancer may infrequently present with clinical manifestations attributed to sphenoid sinus metastasis. Consequently, it is imperative to include prostate cancer in differential diagnosis of masses occurring in the head and neck region.

## Article Information and Declarations

### Ethics statement

Informed consent was obtained from the patient.

### Author contributions

B.K.: concept, design, supervision, data collection and/or processing, analysis and/or interpretation, literature search, writing, critical reviews; M.A.: concept, design, supervision, data collection and/or processing, analysis and/or interpretation, writing, critical reviews; M.K.E., M.A.: supervision, data collection and/or processing, critical reviews.

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## Conflict of interest

Authors declare no conflicts of interests.

## Supplementary material

None.

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