



A Patient with Isolated Sixth Nerve Palsy as the Only Presenting Sign of Prostate Cancer Metastasis

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Abstract

A 72-year-old man complaining of sudden-onset diplopia in the right eye presented to our Ophthalmology department. He provided a previous history of prostate cancer and was tumor-free for 10 years. The diplopia was binocular, worse in distance. The ocular movement of the right eye showed moderate limitation in the right gaze. The examination of all other cranial nerves was normal. The patient underwent neuroimaging with the diagnosis of isolated cranial nerve (CN) VI palsy which revealed abnormal bone marrow signal and expansion of clivus, sphenoid, and an orbital plate of frontal bone at the right orbital roof. The patient underwent a bone scan that confirmed generalized bone metastasis. Here we present the case of a 72-year-old man with isolated CN VI palsy as the only presenting sign of bone metastasis secondary to prostate cancer. Systemic cancer history is an important risk factor that should not be overlooked in patients with isolated CN VI palsy nerve palsy.

Keywords: Cranial Nerve VI; Isolated Nerve Palsy; Metastasis; Prostate Cancer

Introduction

The Clivus that means slope in Latin is a bony part of the skull base forming a slope between the basilar part of the occipital bone and its junction with the sphenoid bone. Cranial nerve VI (CN VI) courses along the Clivus in the brain stem. Various pathologies affect the CN VI in its path along the Clivus including the increased cranial pressure as the most common pathology and tumors as the rarer causes [1].

The bony tumors affecting the Clivus could be primary or most commonly secondary like metastasis and may present with cranial

nerve palsies. Isolated CN palsies secondary to bone metastasis seem to be rare, however, prostate cancer commonly metastasizes to the bone including the skull base [2].

Herein we report a case of isolated CN VI palsy secondary to clivus metastasis by prostate cancer. To our knowledge, this cause of CN VI palsy has been previously reported, however, our case emphasizes that the presence of microvascular risk factors should not postpone the thorough workup in elder patients with sixth nerve palsy and history of cancer.

Case Presentation

A 72-year-old man presented to our clinic complaining of sudden-onset diplopia in the right eye started 10 days prior. The diplopia was binocular and was worse in distance than near. The patient reported no pain or any other ocular symptom except a mild concomitant blurred vision in the right eye. The patient had a history of prostate cancer started 10 years ago. In his documents the cancer type was adenocarcinoma. He was treated by surgical resection and adjuvant chemotherapy. He was disease-free for 10 years.

The patient’s corrected distance visual acuity (CDVA) was 20/30 in both eyes using the Snellen chart. There was no Marcus-Gunn present in pupillary examinations. On external examination, Esotropia was evident in the alternate cover and prism test which was corrected using 40 prism diopters in the right eye. Examining ocular movements, the right eye was partially restricted to move to the right side and did not pass from the midline (Figure 1). Other ocular movements were within normal limits. The slit-lamp biomicroscopy of the patient revealed no pathologic findings except a moderate nuclear cataract in both eyes. Intraocular pressure measurement by Goldmann applanation tonometry was within normal limits in both eyes. moreover, all cranial nerves were examined thoroughly and were normal.



Figure 1: The right gaze reveals right lateral rectus underaction and globe did not pass from the midline which is consistent with Cranial nerve VI palsies in the right eye.

The patient was diagnosed to have a sudden-onset isolated sixth nerve paresis. Due to the positive history of prostate cancer, the patient was requested for a brain and orbital magnetic resonance imaging (MRI) and subsequently a brain and orbital com-

puted tomography (CT) scan. He refused to do a subsequent CT-scan. However, his MRI revealed abnormal bone marrow signal and expansion of clivus, sphenoid, and an orbital plate of frontal bone at the right orbital roof suggestive of metastasis (Figure 2a). With the first impression of bone metastasis, the whole-body scan was requested for the patient which revealed generalized metastasis to the bone secondary to the primary prostate cancer (Figure 2b).

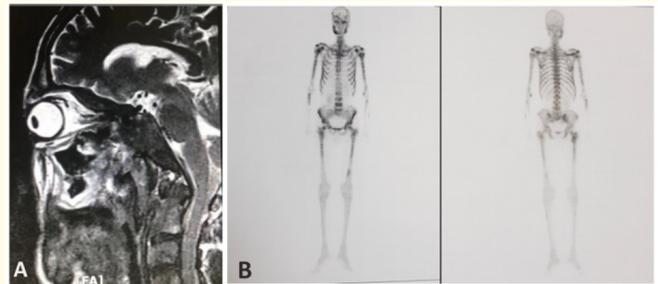


Figure 2: A. Orbital T2 sagittal image shows abnormal bone marrow signal and expansion of clivus, sphenoid, and an orbital plate of frontal bone at the right orbital roof due to metastasis. B. Whole-body scan by Tc99m-MDP. High and inhomogeneous uptake of entire skeleton associated with decreased radiotracer uptake in the soft tissue and kidneys demonstrated as a super scan due to widespread bone metastasis.

The patient underwent chemotherapy by an oncologist and was doing well 3-months after the diagnosis of metastasis. Despite the patient was recommended to receive botulinum toxin type A (Dysport®, Ipsen Biopharm Ltd.) injection in the right medial rectus muscle one month after the start of diplopia, he was managed conservatively with prism glasses and patching the eye. Three months after the start of the paresis, we considered again injecting Dysport in the right medial rectus to prevent future contracture but the patient refused the treatment again, and his ocular management was continued conservatively.

Discussion and Conclusion

We presented a 72-year-old man with isolated CN VI palsy as the only presenting sign of bone metastasis secondary to prostate cancer. CN VI is the most frequently involved nerve among CNs in the elderly populations with sudden-onset of binocular horizontal diplopia as the bothersome symptom [1]. The two most common

etiologies of CN VI nerve palsy include being vascular (18-37%) and undetermined (21-30%) [2]. Due to its long course through the brain, the abducens nerve is also vulnerable to both traumatic disruption and metastatic disease to clivus, the next two most common causes of isolated sixth nerve palsy [2].

The clivus is the sloping midline surface of the skull base anterior to the foramen magnum and posterior to the dorsum sellae [3]. Clival masses implicated in approximately 1% of intracranial tumors can compress the abducens nerve in the Dorello's canal, which channels this nerve from the pontine cistern to the cavernous sinus [4]. Bone marrow signal of the clivus changes predictably with age from red to yellow (fatty) marrow. thereby a clivus with a uniformly low signal intensity that is hypointense relative to the pons should be considered abnormal in elderly patients and warrants comment and review of additional imaging and clinical information. The uniformly low signal intensity is attributable to diffuse tumor invasion of the clivus or marrow reconversion [5]. A relatively broad spectrum of differential diagnoses should be suspected in clival neoplasms, such as meningioma, chordoma, lymphoma, pituitary adenoma, nasopharyngeal carcinomas, bone marrow reconversion, and metastatic lesions [5].

Metastatic lesions to the clivus most commonly arise from prostate, breast, lung, thyroid, melanoma, or hepatocellular carcinoma [5,6]. Notably, Dekker, *et al.* reported more than 40% of patients with clivus metastasis presented with isolated CN VI nerve palsy [4]. Kapoor, *et al.* reported abducens nerve palsy secondary to isolated clival metastasis from breast cancer [7]. Dekker, *et al.* reported bilateral CN VI nerve palsies two years after treatment of a duodenal adenocarcinoma [4]. Cathel, *et al.* reported Clivus metastasis of hepatocellular carcinoma causing complete ophthalmoplegia of the right eye [8].

Prostate cancer is the most common cause of calvarial metastasis. Prostate carcinoma metastasis is considered to spread in the brain, calvarium, and orbit in two ways [9]. First, it spreads directly through paravertebral venous plexus. Second, it spreads initially to the areas such as lung and bone where prostate cancer frequently metastasizes, and then it spreads secondarily by seeding from here [9]. In our case, diffuse bone involvement in bone scintigraphy has suggested that metastasis does not occur directly through paravertebral venous plexus. Clinical signs develop with nerve infiltration or direct compression of a nerve in prostate metastases causing CN involvement.

The interval between the diagnosis of a primary tumor to the subsequent metastasis to the clivus varies extensively [4]. Pallini, *et al.* previously found a mean interval of 46 months from primary tumor diagnosis to clivus lesion [10]. In contrast, Tsunoda, *et al.* Reported metastasis to the clivus 33 years after the diagnosis of breast carcinoma [11]. In our case, clivus metastasis occurred 10 years after the diagnosis of prostate adenocarcinoma.

Approaching the isolated CN VI nerve palsy, neuroimaging is reserved for the patients without vascular risk factors and younger patients. However, systemic cancer history is an important risk factor that should not be overlooked and necessitate further workups.

In conclusion, CN VI nerve palsy is uncommon but not rare in patients with clival metastasis and it should be considered in the differential diagnosis of known prostate cancer patients presenting with abducens nerve palsy.

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