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Unusual Massive Spinal Metastasis of an Intracranial Oligodendroglioma

İntrakranial Oligodendrogliom Olgusunun Masif Spinal Metastazı

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ABSTRACT

Herein, we present a case of anaplastic oligodendroglioma with massive spinal metastasis in the first post-operative year without any residual tumor or recurrence in the primary tumor site. Along with the reported literature, our case highlights the importance of periodic radiological evaluation of the spinal canal including the pre- and post-treatment period, in patients with intracerebral oligodendroglioma.

KEY WORDS: Spinal seeding, Spinal metastasis, Oligodendroglioma, Anaplastic oligodendroglioma

ÖZ

Bu yazıda intraserebral anaplastik oligodendrogliom nedeniyle opere edilmiş olan 40 yaşındaki erkek hasta sunulmuştur. Post-operatif birinci yılda, primer intrakranial operasyon bölgesinde rezidüe ya da rekürren tümörü olmayan hastanın, tüm spinal kanalı dolduran masif spinal metastazı saptanmıştır. Literatürde spinal kanala metataz yapan ve klinik bulgu veren 16 olgu saptanmıştır. Malign intrakranial tümörlerin büyük kısmının spinal kanala metastaz yaptığı bilinmesine rağmen,oligodendrogliom olguları için spinal kanalın radyolojik görüntülemesi rutin işlem olarak yapılmamaktadır. Yapılan literatür araştırması ile birlikte bu olgu, intrakranial oligodendrogliom vakalarında spinal kanalın periyodik radyolojik görüntüleme ile izleminin önemini vurgulamaktadır.

ANAHTAR SÖZCÜKLER: Spinal metastaz, Oligodendrogliom, Anaplastik oligodendrogliom

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INTRODUCTION

Although the tendency of primitive neuroectodermal tumors (PNETs) to spread via the cerebrospinal fluid (CSF) is well recognized, diffuse spinal metastases from primary central nervous system tumors are generally rare. A careful review of the literature shows that cerebrospinal metastases from gliomas of different types are more common than is realized (5,18). Primary diffuse leptomeningeal oligodendrogliomatosis (24,28) and primary spinal oligodendroglioma (ODG) (13) have also been described. Although cases of glioblastoma multiforme (GBM) with spinal cord metastases and neurological signs due to spinal involvement have been reported (12,15,33), it is difficult to compare the spinal seeding properties of GBM to ODG. GBM is the most common primary malignant tumor of the central nervous system and its tendency to infiltrate and recur locally causing short survival periods in patients is well known. GBM is also the most common cranial tumor that leads to extraneural metastases. The frequency, histopathological findings, genetic determinants, and the prognosis of GBMs and ODGs are different. In this report we present an anaplastic case (ODG) with massive spinal metastasis filling the whole spine at the first post-operative year without any residual tumor or recurrence at the primary tumor site.

CASE REPORT

A 40-year-old man presented with on-and-off headaches for the last few months and weakness on the left side and ataxia for two weeks. When he was admitted to the hospital, his consciousness was blurred, he was sleepy and had severe left-sided hemiparesia. Computerized tomography (CT) scan of the brain showed a calcified mass at the frontal region, causing midline shifting (Figure 1A and B). The patient was operated on urgently and re-operated due to residual tumor two days after the first operation. His magnetic resonance images (MRI) following the first operation had been lost. He made a good postoperative recovery and had no neurological deficit at the time of discharge. He received radiation therapy whereas the histopathological examination result of the tumor was anaplastic ODG showing numerous large cells with abundant cytoplasms and eccentric nuclei with frequent mitotic figures and vascular endothelial proliferation. Immunohistochemical examination showed positivity to MAP-2 in neoplastic cells, while positivity was low to GFAP in reactive astrocytes, and minigemistocytes. The mitotic index was high with Ki-67 labeling.

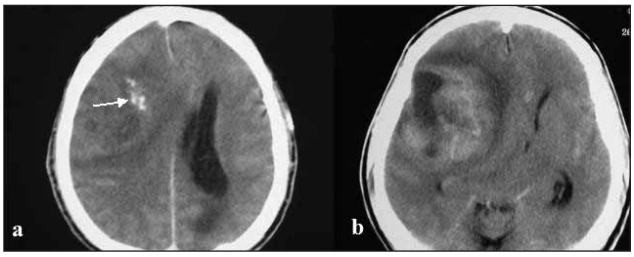

Figure 1: *Computerized tomography of the patient (**A** and **B**) showing calcified mass at the frontal region (arrow), midline shifting, depression and closure of the right lateral ventricle and brain edema around the mass lesion.*

The patient remained asymptomatic until about 1 year after the operation when he started to complain of progressive weakness in his legs and occasional urinary incontinence. Spinal MRI of the patient demonstrated an intradural tumor filling whole spinal canal (Figure 2A and B), causing severe paraparesis, and sphincter dysfunction. MRI of his brain showed no residue or recurrent tumor at the primary tumor site or any other drop metastasis inside the calvarium (Figure 3A and B). The diffuse enhancement around the region of tumor excision was evaluated as reactive arachnoidal enhancement as the recurrences and the metastases are mostly in nodular fashion in intracranial tumors. The enhancement in the temporal region in coronal MRI sections (Figure 3B) was also evaluated as flow artefact by radiologists.

He was given radiation therapy to the spinal axis, and chemotherapy for this spinal metastasis. He was also started on a rehabilitation programme. The patient became more or less bed-ridden and died 2 years after the first operation.

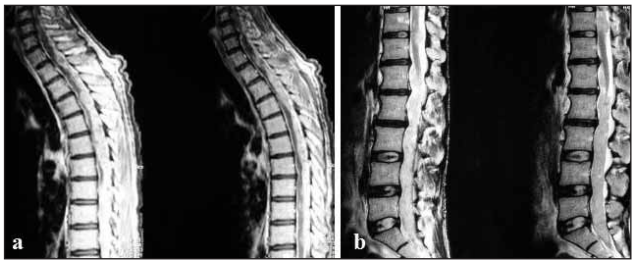

Figure 2: *Sagittal cervicothoracal (**A**) and, thoracolumbar (**B**) MRI of the spine revealing massive intradural tumor metastasis along the whole spinal canal at the first post-operative year.*

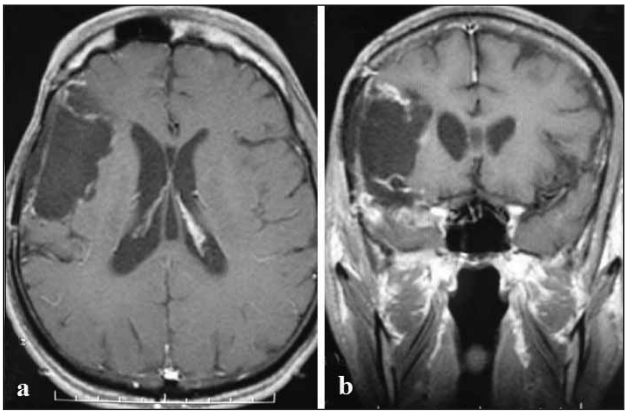

Figure 3: *Axial (**A**) and coronal (**B**) magnetic resonance images with gadolinium enhancement of the patient one year after the operation demonstrating no recurrence or residual tumor at the primary tumor site.*

DISCUSSION

ODGs make up 2-4% of primary brain tumors. The percentage of anaplastic tumors among ODGs varies between 20 and 51% (9,26). ODGs have been reported to show local infiltration of the meninges (6) and rarely dissemination through the CSF (4,6). The newest reports indicate that metastatic involvement of the CSF pathway in ODG is not uncommon, occurring up to 14% of cases (11); however, symptomatic involvement of the spinal cord is very rare. To the best of our knowledge, there were 16 cases of primary intracranial ODGs metastasizing into the medulla spinalis and producing symptoms in the literature (3,4,16,20,23,25,26,27,32,35,36,37). Most of them were drop metastases. However, some previously reported cases of intracranial OGDs include tumor seeding to the surface of pons and medulla, and ventricles as spinal cord drop metastasis (6,17,34) that should have actually been named as CSF dissemination into the brain stem. Although the majority of ODGs that produce CSF dissemination are histologically anaplastic, a few appear to be grade II (4,27). The duration between diagnosis of tumor and spinal metastases can be 3 months to 6 years. In all of these cases, spinal cord metastases occurred after surgical excision indicating that surgical intervention may precipitate or accelerate the spread of tumor cells into the subarachnoid space, with the help of gravity (36). Thus, it is supposed that the surgery opens vascular structures, and tumor cells can reach the meningeal surface as a result (2,29,30), or the negative pressure in the lumen of the cerebral veins can absorb tumor cells into blood circulation (1). There are no data on the number of surgeries related to frequency of metastasis. However the frequency of spinal metastasis should be much higher, taking into account of the incidence of ODGs, the percentage of anaplastic cases among them and the frequency of surgical cases.

The conditions required for development of subarachnoid dissemination from an intracranial neoplasm are malignant potential of the tumor and the surgical procedure. Traditionally the classification and grading system of glial tumors is based on histopathological findings, such as type of the cells, nuclear pleomorphism, mitotic activity, necrosis, etc. ODGs are characterized by loss of heterozygosity (LOH) in chromosome 1p and 19q (19), found in 50-80% of patients. Although 1p/19q codeletions define "genetically favorable" ODGs associated with a favorable response to chemotherapy (7) and a long survival (31), eventual tumor progression and patient death remain constant. Merrell et al (21) reported two cases with ODG showing extracranial metastasis. They suggest that oligodendroglial tumors with 1p/19q deletions may be more prone to metastasis as they progress. Although chromosomal studies were not conducted in our patient, histopathologically the case was diagnosed as an anaplastic ODG with a high proliferation rate, as shown by high Ki-67 labeling, and the patient underwent surgery twice due to a tumor located on the fronto-parietal convexity coming in contact with the subarachnoid space extensively after surgery to debulk and remove the tumor damaged the pial barrier. It is still not clear whether the subclassification of patients according to specific chromosomal aberrations in tumor cells may be a prognostic indicator for spinal or distant metastasis of ODG.

Primary ODGs of the spinal cord are extremely rare; they account for the 0.8-4.7% of spinal cord tumors and 1.6% of all ODGs. A total of 50 cases have been reported, including anaplastic ODGs in 12% (13,14,22). Primary spinal cord ODGs usually arise inside the spinal cord, with a predilection for the cervical and thoracic regions, and have a high tendency to infiltrate the spinal and intracranial meninges (13). An intraparenchymal metastasis in the brain that spread from spinal ODGs has never been reported. The MRI images of our patient is

different from the primary spinal ODGs and showed more extensive involvement of the leptomeninges and filling of the spinal canal than developing nodules on the roots of the cauda, epidural deposits or intramedullary tumor (20,35) as seen with drop metastasis of ODGs (3,4,8,10,32,36).

Although it is commonly said that it is well-known among neurosurgeons that anaplastic ODGs and GBMs metastasize frequently along the spinal axis, there is no institution that evaluates the spinal column preoperatively in these cases as a routine examination. This case adds to the few cases of spinal metastasis from intracranial ODGs but the important issue is the lack of histological confirmation of the diagnosis of the spinal tumor. Laminectomy for obtaining a tissue sample was proposed to the patient and his family, after explaining that it was not a curative option and just for planning the treatment, but the family refused another operation. A careful review of the literature indicates that the management of ODGs should include pre- and post-operative spinal radiological examination and must be repeated periodically during follow-up. This can help us to identify the real seeding/metastasis rates to spinal cord, and the relation between seeding, surgical technique, histological grade, and other predisposing factors. The consequences of the spinal metastasis can be a very negative prognostic factor and lead to death despite combined therapy (radiotherapy and chemotherapy). Multicentric evaluation of these data may give us the opportunity to decide whether earlier usage of treatment modalities such as prophylactic spinal radiation therapy is justified in suitable cases.

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