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Cerebellar Extraventricular Neurocytoma with Spinal Seeding

Serebellar Ekstraventriküler Nörositom: Olgu Sunumu

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Abstract

Central neurocytomas are typically located in lateral or third ventricles. Here, we report a case of neurocytoma located in the middle cerebellar peduncle. A 36-year-old male patient presented with symptoms of ataxic gait and urinary incontinence for one month. Magnetic resonance imaging (MRI) of the brain revealed a slightly enhanced lesion on the left middle cerebellar peduncle with obstructive hydrocephalus. The preoperative diagnosis was a glial tumor and a subtotal surgical removal was performed. Following pathological studies, the final definitive diagnosis was made as central neurocytoma. Six months after surgery, the patient presented with low back pain and bilateral lower extremity weakness. Lumbar MRI studies revealed multiple intradural-extramedulary lesions. The patient was not operated for spinal lesions. He was treated with palliative radiotherapy in the metastatic spinal area. Cerebellar peduncle is an atypical location for a neurocytoma. Neurocytomas in atypical locations may behave more aggressively and make spinal seeding. According to neuroradiological and clinical presentation, these tumors may have been confused with other common cerebellar lesions. Pathological examination is needed for definitive diagnosis. Favorable prognosis is related to total tumor excision.
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Key Words: Extraventricular neurocytoma, Spinal bleeding, Cerebellum

Özet

Nörositomlar tipik olarak lateral ya da 3. ventrikül yerleşimli tümörlerdir. Bu yazıda serebellar pedinkül yerleşimli extraventriküler nörositom olgusu sunulmaktadır.

36 yaşında erkek hasta bir aydır olan idrar inkontinansı ve ataksik yürüyüş ile kliniğe başvurdu. Yapılan magnetik rezonans (MR) görüntülemelerinde sol orta serebellar pedinkül yerleşimli minimal kontrast tutulumu olan lezyon ve obstrüktif hidrosefali saptandı. Hasta opere edildi. Lezyon subtotal rezeke edildi. Lezyonun patoloji sonucu santral nörositom ile uyumlu idi. Operasyondan 6 ay sonra hasta kliniğe bel ve her iki bacak ağrısı ile başvurdu. Yapılan lomber MR görüntülemelerinde çok sayıda intradural ekstramedüller lezyonlar saptandı. Hasta bu lezyonlarına yönelik opere edilmedi. Radyasyon Onkolojisi'nin görüşü üzerine metastatik spinal bögeye palyatif radyoterapi aldı. Serebellar pedinkül santral nörositom için alışılmış bir lokalizasyon değildir. Ventrikül dışında yerleşen nörositomlar daha agresif davranabilir ve spinal metastazlar yapabilirler. Nöroradyolojik görünümleri diğer serebellar lezyonlarla karıştırılabilir. Kesin tanı için patolojik inceleme hayati önem taşımaktadır. Total rezeksiyon prognoza olumlu yönde katkı sağlamaktadır.
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Anahtar Kelimeler: Ekstraventriculer nörositom, Spinal metastaz, Cerebellum

Introduction

Neurocytoma is described as a well-differentiated tumor of neuronal origin and it is distinct from ganglion cell tumors and neuroblastoma[1]. The cells remain rare neoplasms of the central nervous system, accounting for only 0.25-0.5% of all brain tumors[2]. The incidence of neurocytoma is higher in young adults with an average age of 30 years, and both sexes are equally affected[3]. They are usually located in the lateral, third and less often, in the fourth ventricles[2]. Case reports have documented the involvement of cerebral hemispheres (commonly frontal followed by parietal)[4], thalamus[5], cerebellum[6], pons[7], pineal gland[8], retina[9], and spinal cord[10,11].

Neurocytomas arising outside of ventricles have been recently named as extraventricular neurocytomas. These may behave more aggressively. They may cause seeding to other central nervous system

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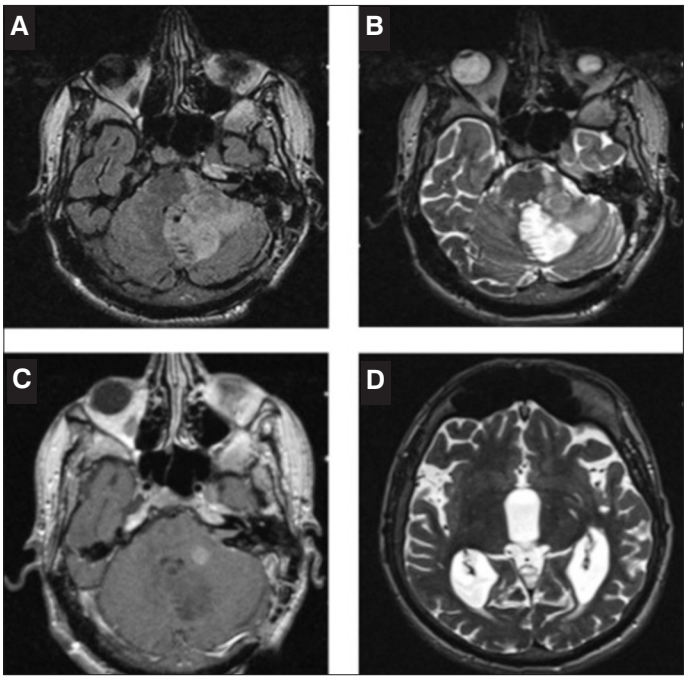

Figure 1. Slightly enhanced tumor after contrast medium injection with multiple cystic components on T1 weighted images (1A). A strong signal was observed on T2 weighted images (1B). A slightly hyperintense signal was observed on FLAIR weighted images (1C). Obstructive hydrocephalus was observed with enlarged lateral, third and fourth ventricles (1D).

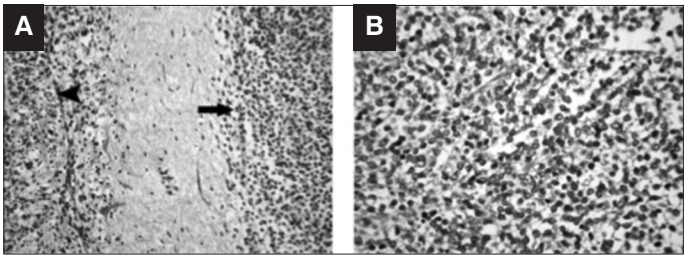

Figure 2. Monotonous round small tumor cells(arrow) were seen adjacent to the molecular layer of the cerebellum(Arrowhead showing the granular layer of the cerebellum) (Hematoxylin and Eosin, x200) (2A). Tumoral cells showing cytoplasmic immunoreactivity for synaptophysin immunostaining(x 400) (2B).

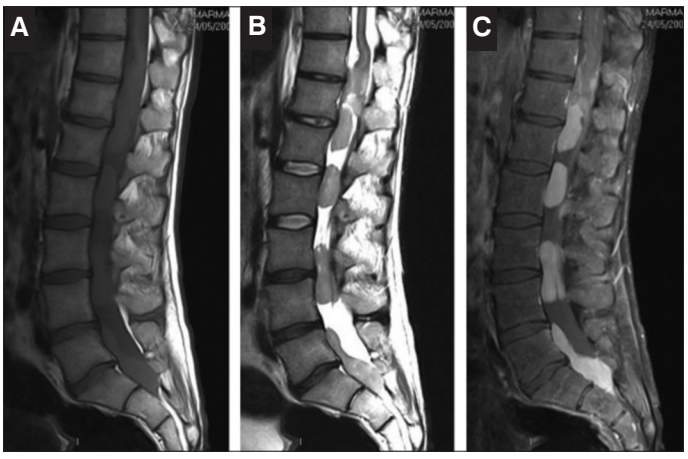

Figure 3. Lesions are located between T12-S2 vertebra segments. They are hypointense on T1 (3A) and T2 weighted images (3B) and homogeneously enhancing after intravenous contrast medium injection (3C).

regions. In histopathologic specimens, atypia, necrosis and mitosis may be seen. In neuroradiologic studies, they do not have any distinct features in comparison with neurocytomas[12,13].

In this study, we presented a case of extraventricular neurocytoma arising in the cerebellar peduncle that also caused seeding to the spinal canal at the level of T12 to S2.

Case Report

A 36-year-old male patient was admitted to the hospital with symptoms of ataxia and urinary incontinence for one month. On neurological examination, the patient had gait ataxia, dismetria and disdiadokokinesia on the left side. He had blurred vision and fundoscopic examination revealed papilledema on admission.

MRI revealed a heterogeneous, slightly enhanced tumor after contrast medium injection with cystic components, located in the left middle cerebellar peduncle and extending to the pons. A weak signal was observed with T1-weighted sequences (Figure 1A), and a strong signal was observed with T2-weighted sequences (Figure 1B). It is typically iso- to somewhat hyperintense compared to a brain with cystic area (bubbly appearance), which completely attenuates on FLAIR (Figure 1C). Obstructive hydrocephalus was also noted (Figure 1D).

On the basis of these findings, the tumor was prediagnosed as a cerebellar peduncle glioma. The patient underwent a suboccipital paramedian craniotomy. The tumor was reached through the roof of the fourth ventricle. A grayish and soft mass originating from the left cerebellar peduncle and expanding into the fourth ventricle, was subtotally removed.

Microscopic evaluation for pathological diagnosis revealed the homogeneous, small uniform neoplastic cells in the cerebellum. The tumor cells had a round nucleus with finely granular chromatin with occasional nucleolus. There was a fibrillary background with capillary-sized blood vessels surrounding these cells. There was no mitosis or necrosis in the tumor (Figure 2A). Immunohistochemical stains showed that the tumor cells were positive for synaptophysin, neuron-specific enolase (NSE) and negative for gliofibrillary acidic protein(GFAP), leucocyte common antigen (LCA), CD20, CD3,epithelial membrane antigene (EMA).The Ki-67 proliferation index was very low (<1%) (Figure 2B).

The differential diagnosis for this tumor was cerebellar liponeurocytoma, oligodendroglioma, epenymoma and medulloblastoma. The absence of lipidized neoplastic cells resembling adipose cells exluded the diagnosis of cerebellar liponeurocytoma. Therefore, according to pathological and immunohistochemical studies, the pathological diagnosis was made as extraventricular neurocytoma

Postoperative radiotherapy (RT) was recommended, but the patient refused to have it.

Six months after surgery the patient came to the clinic because of low back pain and bilateral lower extremity weakness. On physical examination, the patient had moderate bilateral lower extremity weakness and hypoactive lower extremity deep tendon reflexes (DTR). On cranial MRI there was no progression of the residual tumor site. However, lumbar MRI studies revealed multiple intradural extramedullary lesions between the T12 to S2 vertebra segments. The lesions were hypointense on T1 and T2 weighted images (Figure 3A, 3B) and they were homogeneously enhanced after intravenous

contrast medium injection (Figure 3C). Surgery for the spinal lesions was not performed. The patient was refered to the Radiation Oncology Department and he received palliative radiotherapy for the T11-S3 metastatic spinal area. The patient is under follow-up for every 6 months. There is neither regression nor progression in cranial and spinal lesions.

Discussion

Neurocytoma was first described by Hassoun et al, in 1982 as a well-differentiated neuronal tumor[1]. He described a neuronal tumor with pathological features distinct from cerebral neuroblastomas, occurring in lateral and third ventricles, and histologically mimicking oligodendrogliomas. Subsequently, tumors mimicking neurocytomas but occurring within the cerebral hemispheres (cerebral neurocytomas)[14], or the spinal cord[10,11,15-17] were documented. The term "extraventricular neurocytoma" is now applied to neoplasms that share histological features with the neurocytomas but arise outside the ventricular system[18].

The main features of neurocytomas conventionally include: 1. Lateral ventricular location[2,19,20]; 2. Occurrence in young adults at an average age of 30[2,3]; 3. Characteristic radiological findings such as iso to hyperintense and bubbly appearance on T1 and T2 weighted MR images[21,22], 4. Resemblance to oligodendroglioma or ependymoma on light microscopy[2,23]; 5. Neuronal origin seen on immunohistochemical (synaptophysin)[2] or electron microscopic[24] examination; and 6. Favorable prognosis with benign biological behavior[2,21]. In our case, the last five conditions were fulfilled with the exception of the tumor location.

It is hypothesized that the usual location of neurocytoma may be anywhere within the ventricular confines (called central neurocytoma), possibly because the tumor derives from remnants of the subependimal matrix that retains prenatal proliferative capacity[25-28]. This may be because of the embryological development of the cerebellum, which originates from the dorsolateral part of the alar lamina of the metencephalon. The developing cerebellum can be divided into an intraventricular part and an extraventricular part. During the later stage of embryonic development, the extra ventricular part becomes much larger then the intraventricular part[29] and thus subependimal remnants being retained in the cerebellum is a possibility. This theory may explain the unusual location of the neurocytoma in our case.

Central neurocytomas which are located in extraventricular regions may behave more aggressively, may cause spinal seeding, and histopathologically may show mitosis or necrosis, and it is MIB-1 labeling index (Ki-67) may be more than 2%[12,13]. In our case the neurocytoma was in an unusual location and caused spinal seeding (although we do not have pathological confirmation for the spinal lesions), but histopathologically, no mitosis or necrosis was seen and also the MIB-1 labeling index was less than[1].

Histologically, the positivity for synaptophysin and neuron specific enolase, the negativity for neurofilament protein and glial fibrillary acid protein and the finding of elements of neuronal differentiation on electron microscopy, are the main pathological features of these tumors[30]. Positive synaptophysin and neuronspecific enolase staining results reveal a neuroepithelial cell origin, and negative glial fibrillary acidic protein staining results argue against glial differentiation. These findings confirmed our diagnosis of extraventricular neurocytoma for this patient.

In neuroradiology images, extraventricular neurocytomas, choroid plexus papillomas, meningiomas and ependimomas resemble each other. Extraventricular neurocytomas normally present with a heterogeneous signal on T1- weighted magnetic resonance images; the signal on T2-weighted images is variable. Magnetic resonance imaging findings for this case corresponded to those in previous reports[12,27]. In pathological studies, oligodendrogliomas have morphological findings similar to central neurocytomas[14].

For most patients with central neurocytoma, the first choice of treatment is surgery. The goals of surgery are to re-establish CSF pathways, to maximize a safe resection, and to provide tissue for accurate diagnosis. Since extraventricular neurocytomas are usually benign with low proliferative potential, radiotherapy is not theoretically necessary. However, there are several reports claiming that postoperative radiotherapy for neurocytoma leads to the disappearance or shrinkage of residual tumors[31,33]. Reports on chemotherapy for central neurocytoma have been limited[32].

Conclusion

Neurocytomas are neuronal tumors which are more frequently seen in young adults and located in lateral ventricles. They are exceptionally located in extraventricular regions and called as extraventricular neurocytomas. Extraventricular neurocytomas may behave more aggressively and cause spinal seedings. The first choice of treatment is surgery.

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