Dysembryoplastic Neuroepithelial Tumor: A Case Report

Disembriyoplastik Nöroepitelyol Tümör: Olgu Sunumu

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Abstract: A 14-year-old male patient presented with the chief complaint of tremors in his left arm and leg, and a history of seizures since age 3. The patient had been diagnosed with partial epilepsy, and had been taking anticonvulsant medication for 6 years. He had been having four to five seizures a day in the year prior to presentation at our center. Since the patient's condition had not improved with the drug treatment, he was referred to the Neurosurgery Outpatient Clinic. A neurological examination revealed no pathological findings. Computerized tomography and magnetic resonance imaging showed a 2x1x1cm space-occupying lesion located in the cortical and subcortical regions of the right parietal lobe. The mass did not enhance with contrast injection. Digital subtraction angiography findings were normal. The patient's electroencephalogram showed epileptic discharges that started in the right hemisphere and then rapidly generalized. The preliminary diagnosis was a low-grade glial tumor, and the patient underwent surgery. The mass was easily reached with the stereotactic laser beam. The tumor was gray-white, had minimal blood supply, and its borders were not easily distinguishable from the surrounding normal tissue. The tumor was completely removed. The patient experienced no seizures during 4 years of postoperative follow-up, and his electroencephalogram findings were normal in the fourth year.

Key Words: Brain tumor, congenital tumor, partial complex epilepsy

Özet: 14 yaşında erkek, 3 yaşında başlayan sol kol ve sol bacakta titreme, kasılma tarzında nöbet geçirme yakınması ile başvurdu. 6 yıl süreyle parsiyel epilepsi tanısı ile antiepileptik tedavi görmüş. Bir yıl önce günde 4-5 kez nöbeti olmaya başlamış. Antiepileptik tedaviye rağmen yakınmasının devam etmesi üzerine Nöroşirürji polikliniğine sevk edildi. Nörolojik muayenesinde patolojik bulgu saptanmadı. Radyolojik incelenmesinde CT ve MRI'da sağ parietalde kortikal ve subkortikal bölgede 2x1x1 cm boyutlarında belirgin kontrast tutulumu olmayan, yer kaplayan lezyon saptandı. DSA normaldi. EEG'de sağ hemisferden başlayıp hızla jeneralize olan epileptik bozukluk bulundu. Düşük gradeli glial tümör ön tanısı ile hasta opere edildi. Kitleye stereotaktik lazer önderliğinde kolayca ulaşıldı. Gri beyaz renkli normal dokudan güçlükle ayırdedilen, vaskülaritesi az kitle total çıkarıldı. Postoperatif dört yıllık takipte epileptik nöbeti olmayan hastanın, son 1 yıldır EEG bulguları normaldi.

Anahtar Kelimeler: Beyin tümörü, konjenital tümör, parsiyel kompleks epilepsi

INTRODUCTION

Dysembryoplastic neuroepithelial tumor (DNT) is a very rare neoplasm that was first described in 1988 (1). Only a few cases have been published in the literature. Diagnosis is difficult due to the heterogeneous cellular composition of DNT, and this tumor is often confused with other glial neoplasms.

Affected patients usually have history of partial complex seizures that do not respond to medical treatment. Patient age at onset of epilepsy ranges from 1 to 19 years, the mean age being 9 years. The seizure activity usually occurs for long periods before the diagnosis is made, ranging from 2 to 18 years' duration (mean, 9 years) (1). Since excision of DNT is curative, it is essential that these tumors be distinguished from other neoplasms that are histologically similar but behave differently.

CASE REPORT

A 14-year-old boy presented with tremors of the left arm and leg, and a history of seizures since age 3. He was originally diagnosed with partial complex epilepsy, and had been on anticonvulsant treatment for 6 years. He had been having seizures four to five times daily in the year prior to his presentation at our center. Since the medical treatment had produced no improvement in his condition, the patient was referred to the Neurosurgery Outpatient Clinic at Uludağ University Medical School. A neurological examination revealed no pathological findings. Cranial computerized tomography (CT) and magnetic resonance imaging (MRI) revealed a 2x1x1 cm space-occupying lesion in the cortex and subcortex of the right parietal lobe. The lesion did not enhance with contrast injection (Figure 1). Digital subtraction angiography (DSA) findings were unremarkable. An electroencephalogram (EEG) showed epileptic derangement that started in the right hemisphere and rapidly generalized.

The preliminary diagnosis was glial tumor, and the patient underwent surgery. The mass was easily reached with the stereotactic laser beam (Steiner-Lindquist Stereotactic Guide). At surgery, we found a gray-white mass with minimal blood supply that was not well-delineated from the surrounding normal tissue. The tumor was aspirated easily, and was totally excised.

The excised specimen consisted of gray-white tissue fragments that measured approximately 2x1.5x1cm when pieced together. Histological examination of sections stained with hematoxylin-eosin (HE) revealed a tumor composed of nodular structures within the gray and the white matter. One nodule contained calcified material (Figure 2). The nodules were comprised of oligodendrocytes, neurons and astrocytes. Some contained predominantly oligodendrocytes (Figure 3), whereas others were rich in astrocytes (Figure 4). Most of the cells in the nodules were uniform in size and shape, but a small minority showed pleomorphism with larger nuclei, and some cells had multiple nuclei. Occasional neurons stained positive for neuron-specific enolase (NSE). Some cells that appeared to be floating within clear spaces in the nodules contained nuclei that were similar to those of neurons; however, since they did not stain with NSE, these cells were considered immature neurons. Pilocytic astrocytes and a few granular eosinophilic

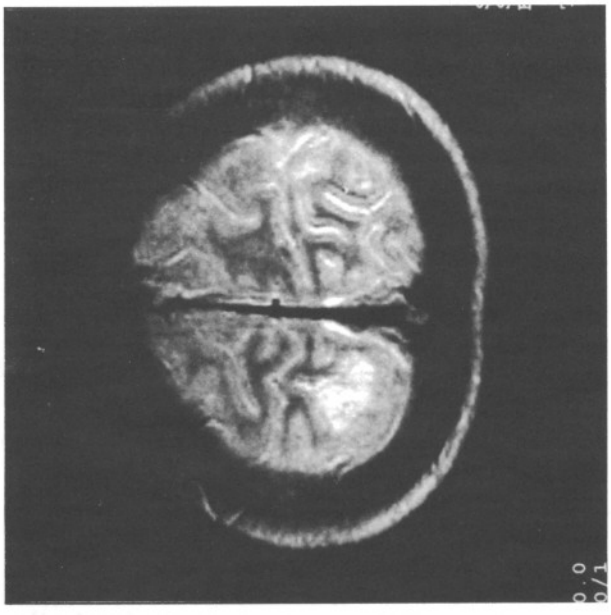

Figure 1: The MRI appearance of the space-occupying lesion located in the cortex and subcortex of the right parietal lobe.

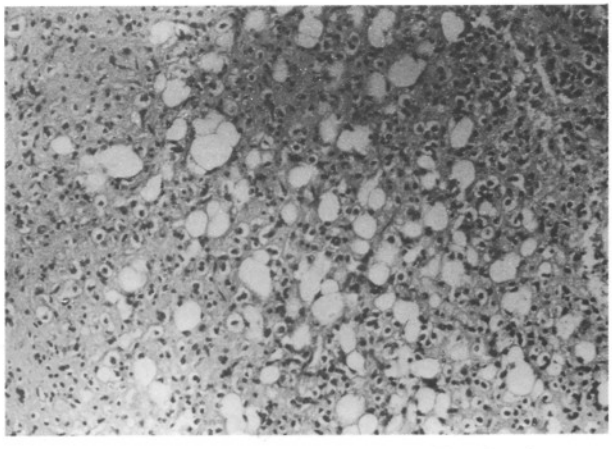

Figure 2: Nodules containing neurons, oligodendrocytes and astrocytes surrounded by abnormal cortex tissue. (HE x100)

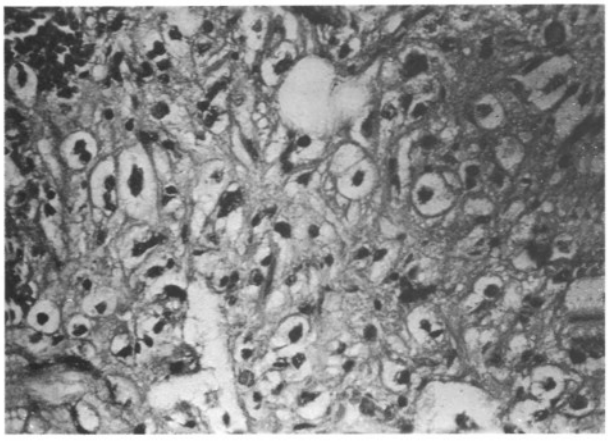

Figure 3: High-magnification examination of the nodules revealed large disordered neurons and lack of perineuronal satellitosis. (HE x200)

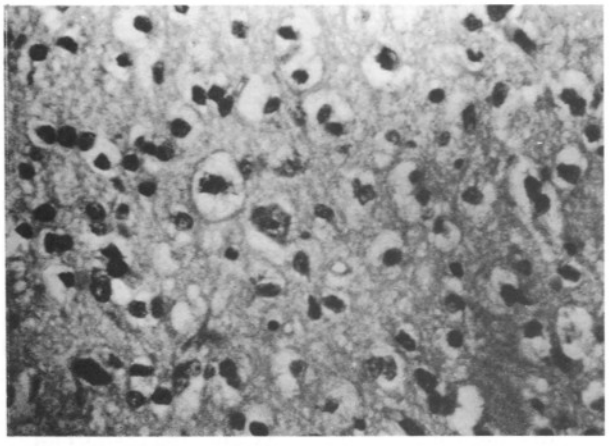

Figure 4: The cortex tissue between the nodules exhibits oligodendroglioma-like hypercellularity, but no perineuronal satellitosis. (HE x200)

bodies were noted surrounding the microcysts within the nodules. These cells stained positively for glial fibrillary acidic protein (GFAP). The cortical tissue between the nodules contained foci of cortical dysplasia characterized by distortion of normal tissue structure and lamination. Compiling all these findings led to the diagnosis of DNT.

The patient experienced no seizures postoperatively, and was discharged on a regimen of Carbamazepin (Tegretol, CIBA) 200 mg four times daily and Fenitoin (Epdantoin, EMBİL) 100 mg twice daily. During 4 years of follow-up, he experienced no seizures. The anticonvulsant medication was discontinued in the fourth year postsurgery because the patient's EEG findings were normal.

DISCUSSION

In 1988, it was recognized that 20 cases of a distinct brain tumor diagnosed at Sainte Anne Hospital in France and retrospectively examined by Doumas-Douport, and 19 cases from the archives of the Mayo Clinic in the United States had similar characteristics (2). The neoplasm was named "dysembryoplastic neuroepithelial tumor", highlighting its possible dysembryogenic origin.

Almost all patients with this form of neoplasia suffer partial complex seizures, with onset early in childhood. At the time of DNT diagnosis, affected individuals generally have a long history of seizure activity that has not responded to medical therapy. One-third of DNT patients have a focal cranial lesion. CT generally reveals a solitary, well-circumscribed, pseudocystic, low-density lesion. Some DNTs show focal contrast enhancement (18%) or hyperdense areas of calcification (23%). The tumor is usually located in the temporal (62%), frontal (31%), or parietooccipital lobe (7%). It also frequently affects the caudate nucleus (1).

The findings common to all DNT cases are the tumor's cortical location, multinodular pattern, and heterogeneous cellular composition. Histologically, the tumor nodules are clearly delineated from the cerebral cortex, and their expansion distorts the cortical tissue, causing cytoarchitectural disorganization. Each nodule is typically comprised of oligodendrocyte-like cells with perinuclear halos, and groups of neuron-like cells floating within microcysts of basophilic myxoid matrix. Oligodendroglial cells tend to predominate, and these cells form linear patterns parallel to the capillaries that are present in the mass (1,2). Any glial cells that are observed generally show nuclear atypia. Capillary vessel proliferation is common, although no endothelial proliferation is seen. Mitotic figures are rare, and necrosis is not a feature of this neoplasm. DNTs are clinically and histopathologically benign, and do not appear similar to, or behave like, gliomas.

Immunohistochemical techniques are useful in the diagnosis of DNTs. Astrocytes can be identified using GFAP, and neurons using NSE immunohistochemical stain. There are generally few GFAP-positive astroglial elements; however, some DNTs contain pilocytic astrocytes. Negative GFAP staining does not rule out astrocytic differentiation. Likewise, neurofilament protein (NF) and NSE negativity do not exclude the possibility of neuronal

differentiation.

The characteristic location of DNTs can be explained by the histogenic origin of this tumor, which is the embryonic subglial granular layer that persists in the frontotemporal region in normal infants (1,2). Other evidence for the dysembryoplastic origin of DNTs includes the observed focal cortical dysplasia and cellular differentiation with multiple distinct lines in the tumor tissue, the early onset of symptoms, and the presence of cortical dysplasia adjacent to the tumor.

Concerning diagnosis, DNTs are often confused with oligodendrogliomas. Nodular structures are found in both these tumors, but oligodendrogliomas have conspicuous cellular atypia, whereas DNTs contain larger neurons and can also be distinguished by cortical dysplasia and the lack of, or inconspicuousness of, perineuronal satellitosis. DNTs that contain large populations of astrocytes may easily be confused with mixed oligoastrocytomas, but the distinguishing feature here is the lack of larger neurons in the latter. To date, no reports in the literature have documented confusion of DNT with ganglioglioma. The distinction between these two tumors is of academic interest only, ganglioglioma being characterized by a background rich in reticulum, inflammatory cells, and atypical neurons (1,2,3,4).

The treatment for DNT is surgical excision. Interestingly, even in cases where tumor excision has been incomplete, long-term follow-up (1-18 years) has revealed no clinical or radiological recurrence (1,2). Thirteen of 39 patients underwent radiation treatment, but 26 received no additional therapy postsurgery. Radiation treatment and chemotherapy have not proven to be beneficial in the clinical management and treatment of patients with this type of tumor.

Patients with DNT present with intractable partial complex seizures that can be cured with surgical excision of the tumor. As stated earlier, since no additional treatment is required to achieve a highly successful outcome, it is extremely important that DNTs be distinguished from other histologically similar lesions (1,2,3,4). We present the clinical, radiological and histopathological findings in this case of DNT as the first account of this neoplasm in our archives.

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