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Case Report

Long-term recurrence of dysembryoplastic neuroepithelial tumor: Clinical case report

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Abstract

Background: Dysembryoplastic neuroepithelial tumors (DNETs) are rare, benign brain neoplasms that typically arise in children and adolescents and classically present with intractable, partial complex seizures. DNETs are classically associated with a favorable prognosis after complete surgical resection.

Case Description: We describe a case of long-term recurrence of a DNET, which initially resected and diagnosed as an oligodendroglioma prior to the recognition of DNETs. This patient was seizure-free for 12 years and had no signs of radiologic progression until 24 years after initial resection. On repeat surgical resection, 31 years after the initial surgery, histopathologic evaluation identified the characteristic features of DNET in both specimens.

Conclusions: This patient's 24-year disease-free interval prior to radiologic recurrence demonstrates the longest interval to relapse in the literature for a DNET. This case illustrates the possibility of late recurrence of DNETs decades after radiographical complete resection to emphasize the necessity of thoughtful clinical judgment in adult survivors of low grade pediatric neoplasms who present with seizures after a prolonged seizure-free interval.

Key Words: Dysembryoplastic neuroepithelial tumor, low-grade glioma, recurrence

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INTRODUCTION

First described in 1988,[3] dysembryoplastic neuroepithelial tumors (DNETs) are rare, benign brain neoplasms that typically arise in children and adolescents and classically present with intractable, partial complex seizures.[1,3] These well-circumscribed glial-neuronal neoplasms commonly arise within the supratentorial cortical gray matter, have a predilection for the temporal lobe, and usually do not demonstrate significant peritumoral edema, mass effect, or contrast enhancement on magnetic resonance imaging (MRI).[6,17] DNETs are histopathologically characterized as glial-neuronal neoplasms with intracortical, multinodular architecture and special glioneuronal elements including oligodendroglia-like cells, astrocytes, and well-differentiated "floating neurons."[1,3]

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DNETs are slow-growing benign neoplasms associated with a favorable prognosis after complete resection without subsequent radiation or adjuvant chemotherapy. In contrast to subtotal resection, gross total resection of DNETs appears to correlate with low recurrence rates and improved seizure control,[9,12,14,15] However, despite characterization as benign lesions, there have been reports of radiologically progressive lesions after gross total resection,[2,8,10,13] with recurrences after as long as 125 months.[6] We report a case of long-term recurrence of DNET, initially resected and misdiagnosed as an oligodendroglioma prior to the recognition of DNETs, and discuss its neuro-oncologic relevance. This case extends the reported time to recurrence.

CASE REPORT

In 1982, a 9-year-old right-handed Caucasian boy with no past neurologic history experienced a first-time grand-mal seizure and underwent neuroimaging, which demonstrated a mass lesion involving the right posterior parieto-occipital region. He subsequently underwent a reported gross surgical resection, which led to a diagnosis of low-grade oligodendroglioma. Postoperatively, the patient remained seizure-free for 12 years until age 21, when he began experiencing both simple and complex partial seizures 1–2 times monthly. He was placed on carbamazepine and gabapentin, and an MRI at that time was unrevealing for recurrent tumor.

From age 21 to 31, the patient underwent serial MRI scans every other year, each of which demonstrated a stable resection cavity with no disease recurrence when compared to prior examinations. In 2006, at age 33, the patient's surveillance MRI demonstrated a nonenhancing mass spanning the right parieto-occipital junction without peritumoral edema or mass effect, concerning for tumor recurrence in the resection cavity of the surgery 24 years prior. The patient elected to defer surgery and continue medical management of his epilepsy. Over the next several years, he continued to develop worsening seizures refractory to three antiepileptic medications. Surveillance MRIs demonstrated progressive nodular enhancement of the lesion [Figure 1a]. In 2013, at age 40, the patient was recommended intracranial monitoring to delineate his seizure focus, prior to tumor resection. He underwent stereo-electroencephalography, which revealed a seizure onset zone in cortex anterior and inferomedial to the recurrent lesion. The patient subsequently underwent gross total resection of the mass and adjacent seizure onset zone [Figure 1b].

Histopathological evaluation identified the characteristic features of DNET in both specimens [Figure 2]. Although identical in many respects to the 1982 lesion, the 2013 lesion had areas with numerous granular eosinophilic bodies and scattered pleomorphic nuclei, features seen in other slow-growing gliomas such as pilocytic astrocytomas. There were no Rosenthal fibers. Areas of associated cortex were not normal appearing but were too fragmented to determine if there was cortical dysplasia. In the 2013 case, a Ki67 immunostain showed only rare positive cells. Fluorescence *in situ* hybridization studies were negative for 1p19q co-deletion. There were no mutations in *IDH1*, *IDH2*, or *BRAF*. MGMT promoter methylation was reported to be low. At the time of this report, the patient has been entirely seizure-free (ILAE Class I) for 24 months.

DISCUSSION

Since the initial study of a recurrent case in 2000,[7] there have been dozens of reports of DNET recurrence.[2] However, the great majority of these were initially incompletely resected.[2,10,13] Our patient's case represents an initial gross total resection, as verified by multiple surveillance MRIs, with *in situ* radiographic recurrence and ongoing progression after 24 years.

Seizure recurrence after gross total resection for DNET is not uncommon, and our patient developed seizures 12 years after his initial resection. Although complete resection of the tumor is sufficient to cure epilepsy related to DNET in many cases,[5] previous reports[6] of recurrence have suggested that seizures may begin postoperatively after a seizure-free interval without any evidence of radiographic progression, as initially occurred in our case. Indeed, neuroglial tumors frequently present with medically-refractory epilepsy associated with cortical dysplasia that may not be apparent on MRI,[16] indicating that surgical planning in the setting of tumor-related epilepsy should include not only consideration of the tumor but also the suspected seizure onset zone. In many cases, such as the one reported here, intracranial monitoring is indicated to define the seizure onset for inclusion in the resection

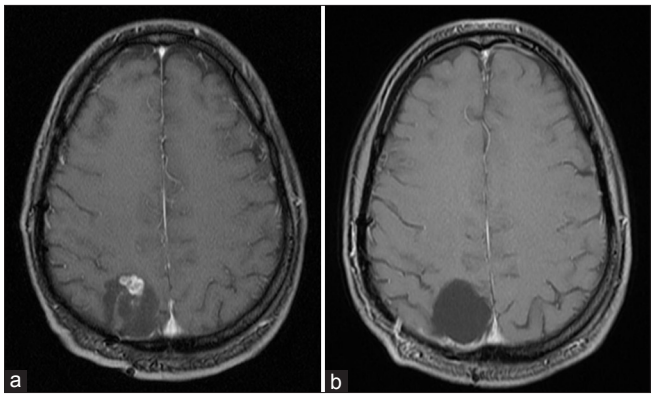

Figure 1: Preoperative (a) and postoperative (b) T1-contrasted magnetic resonance imaging demonstrates nodular enhancement and subsequent complete resection of the nodule

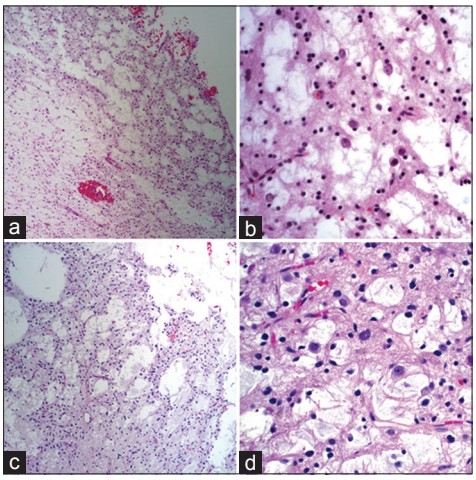

Figure 2: Hematoxylin and eosin (H and E) stained sections from 1982 at ×100 (a) show a round-cell glial lesion with microcystic features and myxoid change consistent with an oligodendroglioma. At ×400 (b), there are neurons floating in mucinous pools, a distinctive feature of dysembryoplastic neuroepithelial tumor (DNET) that was not identified until 1988. H and E stained sections from 2013 show almost identical features, now widely recognized as characterizing a DNET (c, ×100; d, ×400)

in order to optimize chances for surgical cure of the patient's epilepsy.

Radiologic features of DNETs include hypointensity on T1-weighted MR images and hyperintensities on T2-weighted MR images whereas edema and mass effect are commonly absent.[4,11] These features can also be shared by diffuse astrocytomas and WHO grade II oligodendrogliomas. In our case, the patient's initial diagnosis was low-grade oligodendroglioma. Fortunately, we were able to obtain the original resection material from 31 years prior in an effort to compare the present histopathology with the initial resection. To the best of the authors' knowledge, this patient's 24-year disease-free interval prior to radiologic recurrence represents the longest interval to relapse in the literature for a DNET.

This case highlights the necessity of thoughtful clinical judgment in patients who present with epilepsy after a prolonged seizure-free interval. DNET should be considered in the differential diagnosis for patients with long-standing epilepsy and tumor recurrence, particularly if they underwent surgical resections of neoplasms prior to the recognition of DNETs in 1988.

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Conflicts of interest
There are no conflicts of interest.

REFERENCES

1. Bilginer B, Yalnizoglu D, Soylemezoglu F, Turanli G, Cila A, Topçu M, *et al.* Surgery for epilepsy in children with dysembryoplastic neuroepithelial tumor: Clinical spectrum, seizure outcome, neuroradiology, and pathology. Childs Nerv Syst 2009;25:485-91.
2. Chao L, Tao XB, Jun YK, Xia HH, Wan WK, Tao QS. Recurrence and histological evolution of dysembryoplastic neuroepithelial tumor: A case report and review of the literature. Oncol Lett 2013;6:907-14.
3. Daumas-Duport C, Scheithauer BW, Chodkiewicz JP, Laws ER Jr, Vedrenne C. Dysembryoplastic neuroepithelial tumor: A surgically curable tumor of young patients with intractable partial seizures. Report of 39 cases. Neurosurgery 1988;23:545-56.
4. Daumas-Duport C, Varlet P, Bacha S, Beuvon F, Cervera-Pierot, Chodkiewicz JP. Dysembryoplastic neuroepithelial tumors: Nonspecific histological forms – A study of 40 cases. J Neurooncol 1999;41:267-80.
5. Englot DJ, Berger MS, Barbaro NM, Chang EF. Factors associated with seizure freedom in the surgical resection of glioneuronal tumors. Epilepsia 2012;53:51-7.
6. Fernandez C, Girard N, Paredes AP, Bouvier-Labit C, Lena G, Figarella-Branger D. The usefulness of MR imaging in the diagnosis of dysembryoplastic neuroepithelial tumor in children: A study of 14 cases. AJNR Am J Neuroradiol 2003;24:829-34.
7. Hammond RR, Duggal N, Woulfe JM and Girvin JP: Malignant transformation of a dysembryoplastic neuroepithelial tumor. Case report. J Neurosurg 2000;92:722-5.
8. Jensen RL, Caamano E, Jensen EM, Couldwell WT. Development of contrast enhancement after long-term observation of a dysembryoplastic neuroepithelial tumor. J Neurooncol 2006;78:59-62.
9. Khajavi K, Comair YH, Wyllie E, Palmer J, Morris HH, Hahn JF. Surgical Management of pediatric tumor-associated epilepsy. J Child Neurol 1999;14:15-25.
10. Kim AH, Thompson EA, Governale LS, Santa C, Cahill K, Kieran MW, *et al.* Recurrence after gross-total resection of low-grade pediatric brain tumors: The frequency and timing of postoperative imaging. J Neurosurg Pediatr 2014;14:356-64.
11. Kuroiwa T, Bergey GK, Rothman MI, Zoarski GH, Wolf A, Zagardo MT, *et al.* Radiologic appearance of the dysembryoplastic neuroepithelial tumor. Radiology 1995;197:233-8.
12. Luyken C, Blümcke I, Fimmers R, Urbach H, Elger CE, Wiestler OD, *et al.* The spectrum of long-term epilepsy-associated tumors: Long-term seizure and tumor outcome and neurosurgical aspects. Epilepsia 2003:44:822-30.
13. Maher CO, White JB, Scheithauer BW, Raffel C. Recurrence of dysembryoplastic Neuroepithelial tumor following resection. Pediatr Neurosurg 2008;44:333-6.
14. Nolan MA, Sakuta R, Chuang N, Otsubo H, Rutka JT, Snead OC III, *et al.* Dysembrytoplastic neuroepithelial tumors in childhood: Long-term outcome and prognostic features. Neurology 2004;62:2270-6.
15. Paudel K, Borofsky S, Jones RV, Levy LM. Dysembryoplastic neuroepithelial tumor atypical presentation: MRI and diffusion tensor characteristics. J Radiol Case Rep 2013;7:7-14.
16. Santos MV, de Oliveira RS, Machado HR. Approach to cortical dysplasia associated with glial and glioneuronal tumors (FCD type IIIb). Childs Nerv Syst 2014;30:1869-74.
17. Yu AH, Chen L, Li YJ, Zhang GJ, Li KC, Wang YP. Dysembryoplastic neuroepithelial tumors: Magnetic resonance imaging and magnetic resonance spectroscopy evaluation. Chin Med J 2009;122:2433-7.