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Case Report

Glial transformation of a DNET: About a case ☆

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ABSTRACT

Dysembryoplastic neuroepithelial tumors (DNETs) are benign cortical tumors frequently associated with medically incurable focal epilepsy. These tumors occur most commonly in children. Given the fact that they rarely become malignant, the long-term prognosis in terms of mortality is excellent, however its similar appearance with other tumors of the central nervous system increases the potential for misdiagnosis and the risk of a pejorative clinical evolution. Our patient underwent partial resection of the lesion with a pathology study revealing a WHO grade 2 cortical ependymoma, reflecting the malignant transformation of the tumor.

Introduction

Over the last couple of decades, Hippocampal sclerosis has declined in incidence at epilepsy surgery, while malformation of cortical development (MCD)and other disorders, such as encephaloceles have increased. Since many epileptogenic abnormalities affect the temporal lobe, it is critical to have coronal long TR images for assessment, in order to arrive at the appropriate diagnosis. Detection of FCD requires thin section imaging with high contrast resolution. Awareness of the subtle and unique abnormalities that cause seizures, and use of a systematic checklist when interpreting MR studies, is critical for successful imaging diagnosis.

Dysembryoplastic neuroepithelial tumors or DNETs are benign tumors of young subjects, which constitute a polymorphic group of tumors, first described by Daumas-Duport in 1988, causing an early onset of epilepsy in children and young adults [1]. Their diagnosis is made in the light of a combination of clinical criteria (seizures beginning before the age of 20, partial epilepsy, absence of neurological deficit), histological (appearance of glial tumor) and radiological (cortical lesion in general temporal without mass effect or perilesional edema).

Its similarity to other intra-axial epileptogenic tumors in young people makes the diagnosis of DNET difficult both from a clinico-radiological and histopathological stand point. Misdiagnosis has been reported, especially for some complex histological variants [2].

The International League Against Epilepsy (ILAE) Neuroimaging Task Force has recommended an imaging protocol, referred to as "HARNESS_MRI," consisting of isotropic, millimeter 3D T1 and 3D FLAIR sequences, and high-resolution 2D submillimeter T2 images [3]. Due to relative lack of white matter myelin, proton density and FLAIR sequences are less

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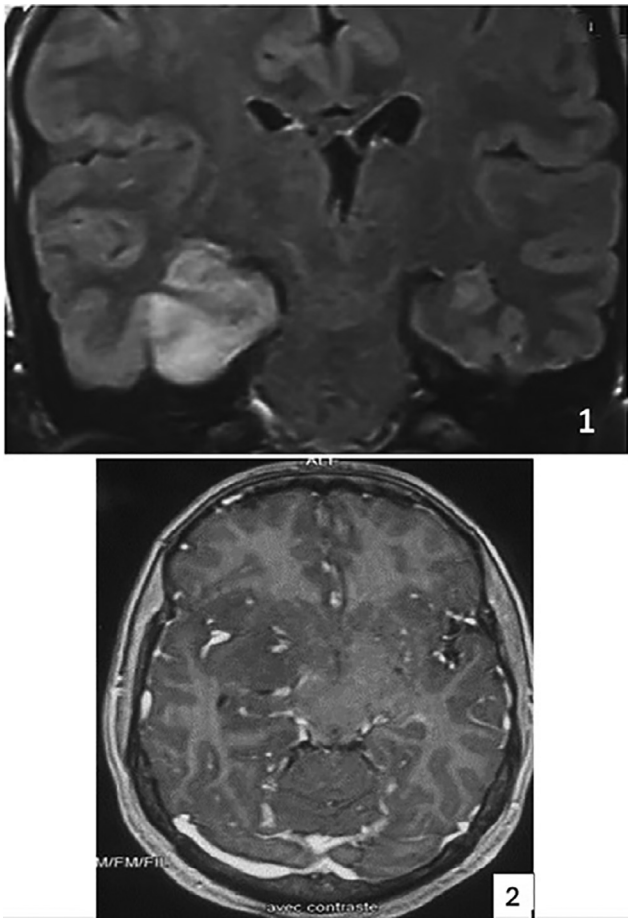


Figs. 1 and 2 – Coronal FLAIR sequence and Axial T1 after injection showing a tumoral right temporal mass height intensity in flair, no enhanced after injection compatible with DNET.

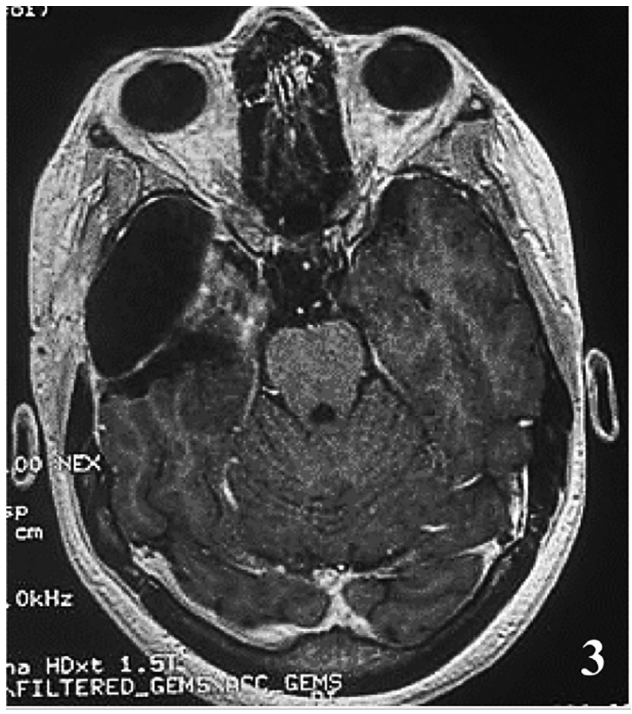


Fig. 3 – Control MRI after 2 years of surgery axial T1 after injection showing a residual cavity postsurgery.

useful in infants than in adults.15 Double inversion recovery pulse sequences can suppress both cerebrospinal fluid (CSF) and white matter signal, increasing the detection of cortically based lesions.

The efficacy of surgery on the outcome of seizures has been established. Rare malignant transformations have been reported, particularly in extratemporal and complex forms.

Case report

We report the case of a 19-year-old girl, consulting since the age of 13 for epileptic seizures, operated in 2019 for a right temporal DNET (Figs. 1 and 2) resected complety. Continuous follow-up imaging during the first two postoperative years demonstrated no recurrence in the temporal tumor site (Fig. 3). Three years later, the patient presents epileptic seizures with loss of consciousness and paresthesia of the right limb put under treatment but the comitialities became pharmacoresistant before her referral to our structure. The computed tomography examination as well as a cerebral MRI showed a right hemispheric intra-axial expansive process of 11 cm in height, with annular temporal enhancement and serpiginous structures of neovascularization. The spectroscopic profile shows a moderate peak of myoinositol, NAA and lactate in favor of an infiltrating glioma with areas of temporal degeneration. The tumor was causing sub-falcorial and temporal engagement (Fig. 4). Preoperative tractography assessment shows an architectural distortion of the arcuate bundle on the right side with rarefaction of the fibers of the white matter, with a repression of the corticospinal fibers inside without destruction of the fibers with absence of lesions of the interhemispheric and pontic fibers (Figs. 5 and 6) . Examination of the initial biopsy showed cortical fragments containing abundant neurons of dystrophic small sizes and multinodular structures typical of the complex form of DNT, in addition to specific glioneuronal elements. The Ki-67 labeling index varied estimated at 3% with positive anti-GFAP, anti-OLIG 2, anti-ATRX, anti-chromogranin and anti-neurofilament Ac. The specimen from the second surgery showed an estimated Ki-67 between 1% and 4% with AC anti NF and positive EMA. This is a documented case of DNET in Ependymoma.

Discussion

Epilepsy arising from the temporal lobes is the most common location for medically refractory epilepsy, reflecting, in part, the importance of the hippocampus in seizure generation. Approximately 70% of patients with drug-resistant temporal lobe epilepsy (TLE) will have a visually identifiable MRI

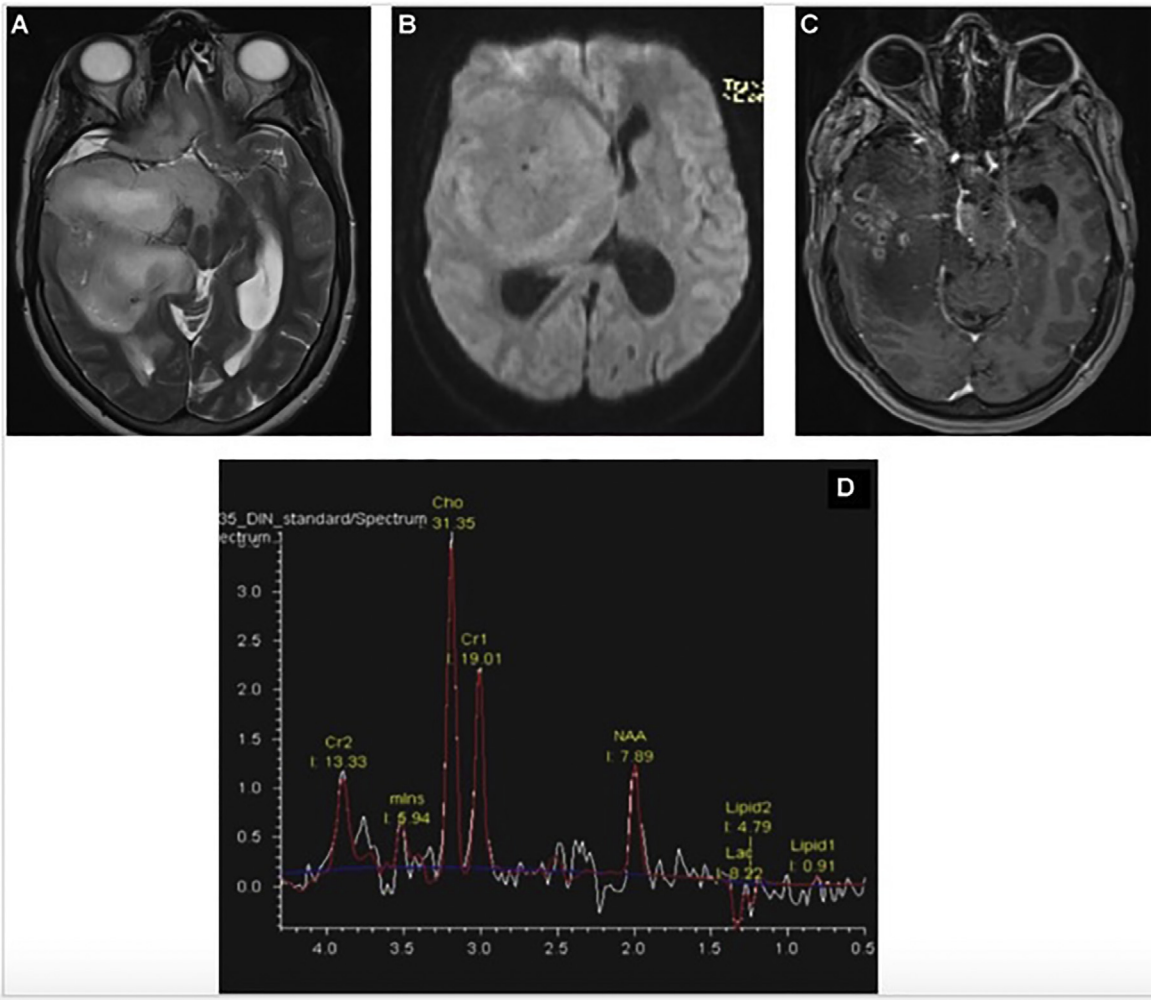


Fig. 4 – Follow-up cerebral MRI after 3 years (A) a right hemispheric intra-axial expansive process 11cm high, tissue (A), no restrictif in diffusion sequence (B) with annular enhancement temporally and serpiginous structures of neovascularization and hemorrhage (C). The spectroscopic profile (D) shows a moderate peak of myoinositol, NAA and lactate in favor of an infiltrating glioma with areas of temporal degeneration, engagement under falcoriel and temporal.

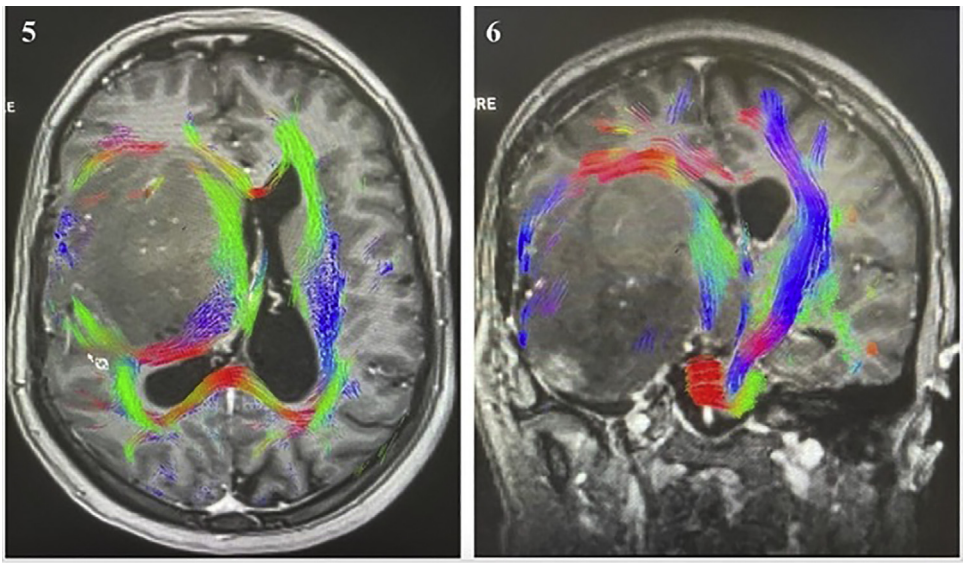
abnormality. Recent interest has focused on the role of hippocampal malrotation (also known as HIMAL), autoimmune encephalopathy, temporal lobe networks, and temporal lobe encephaloceles as causes of temporal lobe epilepsy.

In about 30% of patients with long-term pharmacoresistant epilepsy, neuroepithelial neoplasms such as gangliogliomas are encountered (long-term epilepsy-associated tumors, LEATs). Approximately 70% of LEATs are WHO grade I tumors, most commonly gangliogliomas (57%), followed by pilocytic astrocytomas (23%) and dysembryoplastic neuroepithelial tumors (20%).WHO grade II and III tumors are less-frequent, encountered approximately in 29% and 1%, respectively, based on a series of 207 patients with intractable epilepsy [4].

Dysembryoplastic neuroepithelial tumors are rare benign cerebral tumors, of recent individualization, which develop during embryogenesis. Imaging, especially MRI, allows a reliable diagnostic approach with a cortical site, the absence of perilesional edema and the absence of mass effect on adjacent structures, enhancement is generally absent [5], rarely annular or focal which could be explained either by the existence of vascular arcades in the histological preparations, or by the existence of a localized rupture of the blood-brain barrier caused by the frequency of the convulsions.

Their frequency is probably underestimated due to their histological resemblance to other glial tumors. They associate to varying degrees a specific glioneuronal component, glial nodules and cortical dysplasia. Schematically, 3 histological forms are described [4]: 1) the simple form containing only one specific glioneuronal component, 2) the complex form associating the 3 basic constituents mentioned above; 3) the nonspecific form which does not contain a glioneuronal component. In this form, the presence of glial nodules explains the similarity with gliomas. The treatment is based on surgical excision alone, effectively palliating epileptic seizures.

According to Chassou, the malignant transformation of the DNET is unlikely and poses a problem of differential diagnosis with ischemic or hemorrhagic intratumoral changes [6], on



Figs. 5 and 6 – Tractography shows an architectural distortion of the arcuate bundle on the right side with rarefaction of the fibers of the white matter, with a repression of the corticospinal fibers inside without destruction sof the fibers with absence of lesions of the interhemispheric and pontic fibers.

the other hand, according to the literature, cases found or followed have revealed a postoperative recurrence for which the second excision was in favour; pilocytic, fibrillar, anaplastic astrocytoma, glioblastoma or mixed glioneuronal anaplastic tumor [7]. Gangliogliomas constitute the most important differential diagnosis to evoke [8] mainly because of their frequent localization at the temporal level and their imaging characteristics sometimes close to those of a DNET, Gangliogliomas, characteristically cortically based enhancing cystic nodules on imaging, are associated with cortical disorganization in above 80% of cases. Presence of cortical thickening and transmantle sign is important to differentiate FCD from low-grade tumors [9]. In addition, mixed lesions, associating a DNET with another tumor type are reported, in particular with a ganglioglioma, an oligodendroglioma or a pleomorphic xanthoastrocytoma [10].

A variety of surgical approaches are available for patients with treatment-resistant intractable epilepsy. These include surgical resection or invasive neuromodulation. In well-defined focal lesions that are concordant with electroclinical data, lesionectomy is the procedure of choice. In patients with extensive burden of lesions and less-favorable clinical outcome, functional lobectomy or tailored hemispherectomy can be performed [11].

Ependymomas are rare neuroectodermal tumors arising from the ventricular system, choroid plexus, filum terminale, or central canal of the spinal canal. accounting for approximately 1.8% of all primary central nervous system (CNS) tumors and 6.8% of glial neoplasms [12]. About 90% of ependymomas are intracranial and of these, about a third arise in the supratentorial compartment.

The clinical presentation is variable depending on the location of the lesion and its size, neuroimaging, in particular MRI, allows the diagnosis by showing iso or hypointense lesions on T1-weighted images and hyperintense lesions on T2-weighted images. The lesion may be a solid tumor with calcification necrosis or cystic changes. The lesions are usually well-circumscribed massive lesions. Calcification can be better appreciated on CT. MRI spectroscopy can show high levels of choline and low levels of N-acetyl aspartate [13].

Ependymomas are classified according to the WHO classification system (updated in 2021). The WHO grading of ependymomas is based on features including: pleomorphism, number of mitoses, cellularity, vascularization, necrosis, molecular and genetic features. Histologically, classic cellular features of ependymomas include round to oval nuclei with evenly dispersed dotted chromatin, perivascular pseudo rosettes or true ependymal rosettes. Unusual morphological features such as clear cells, spindle cells and giant cells can also be observed [14], thus Grade 1 is a slow growing myxopapillary and subependymal ependymoma, Grade 2 is a conventional ependymoma which is the most common form in the young age group, and Grade 3 is an anaplastic ependymoma with tumorous growth aggressive [15]. Ependymoma cells react positively to glial fibrillary acidic protein and S100 protein.

Surgical resection followed by radiation therapy has been the standard treatment recommendation, but recently chemotherapy has been suggested in very young children to prevent radiation damage.

A recently published study by Cuoco et al. based on a systematic review of published cases of supratentorial ependymomas showed that the mean age of presentation was 21.2 years in a reported number of 153 cases similar to the age of our patient. The most common symptom was seizure activity occurring in 44.4% of the cohort (68/153) like our case, with 95.5% of cases reporting molecular characterization. World Health Organization grades 2 and 3 were reported in 52.3% and 47.7% of cases, respectively. The frontal lobe was affected in

the majority of cases (54.9%, 84/153). Gross total resection was obtained in 80.4% of cases (123/153). Tumor recurrence was identified in 27.7% of cases (39/141) [16].

Conclusion

DNETs are a well-known fairly common benign tumors that rarely evolve to behave aggressively. Our case highlights the importance of radiographic monitoring, as recurrence may require more than one procedure. Clinicians should be wary of DNETs and other low-grade glial tumors when treating patients recognizing their predisposition to atypical presentations and their rare and unfortunate malignant transformation capacity.

Patient consent

The patient certified that author was informed and was taken a consent for reporting this case.

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