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Case Report

Lhermitte-Duclos disease in a 51-year old patient☆,☆☆

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ABSTRACT

Lhermitte-Duclos disease (LDD) is a rare, slow-growing neoplasm that develops in the brain's posterior fossa. It can appear as a single lesion or as part of Cowden's syndrome.

We report the case of a 51-year-old female with a history of diabetes, hypertension, and a previously treated neuroendocrine tumor, who presented to the hospital after experiencing a generalized tonic-clonic seizure. Except for a tongue laceration, the neurological examination was unremarkable. Brain magnetic resonance imaging (MRI) showed a T2 left cerebellar hemisphere pseudomass lesion with iso-hyperintense signals suggestive of Lhermitte-Duclos disease. This case describes a unique presentation of LDD and its various radiological manifestations, emphasizing the importance of neuroimaging in its diagnosis. Additionally, it contributes to the expanding literature on the varied manifestations of LDD.

Introduction

Lhermitte-Duclos disease (LDD), or dysplastic cerebellar gangliocytoma, is a rare cerebellar condition that is slowly progressive and is known to be a part of the multiple hamartoma-neoplasia complex (Cowden's syndrome) [1]. The pathogenesis of LDD remains unknown, and it is uncertain whether it represents hamartoma, neoplasm, or dysplasia [2]. It manifests with cerebellar mass effects of ataxia, headache, visual disturbance, cranial nerve palsies, hypertension, and obstructive hydrocephalus [1].

Since its first description in 1920, a number of conditions associated with it have been described [3]. It's crucial to look for Cowden's disease, which is termed Lhermitte-Duclos-Cowden syndrome, and malignant lesions in the breast, thyroid, genito-urinary, and gastrointestinal tract [4]. Approximately 6% of patients with this syndrome have LDD. On the

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other hand, about 50% of LDD patients have CS [5]. Conventional and functional Magnetic resonance imaging (MRI) has been shown to be helpful in diagnosing LDD [2].

Here we describe a 51-year old female patient who presented with seizure and was diagnosed as a case of LDD after a thorough radiological assessment.

Case presentation

A 51-year-old female with a past medical history of diabetes, hypertension, and a history of neuroendocrine malignancy of the rectum treated with chemotherapy and radiotherapy, was brought by her son to the emergency department (ED) because of a first-time episode of generalized tonic-clonic seizure associated with tongue-biting and eye-rolling. According to the family member who witnessed the event, the patient was confused after the episode for more than 20 minutes before returning to her baseline.

In the emergency department (ED), her vital signs were within normal limits. Aside from the tongue laceration, her neurological examination was unremarkable. Cranial nerves, along with sensation and motor functions in both upper and lower extremities, were all intact. Kernig's and Brudzinski's signs were negative. The examination of other systems was unremarkable.

The results of the lab workup, including electrolytes and glucose levels, were all within normal ranges. The patient received levetiracetam, and a non-contrast computed tomography (CT) was done, which showed no acute intracranial lesions or bleeding. The neurologist on call requested to admit the patient and do an MRI scan and EEG studies for further evaluation, and he advised stopping levetiracetam.

The results of the magnetic resonance imaging (MRI) image showed a T2 left cerebellar hemisphere pseudomass lesion with iso-hyperintense signals associated with mild distortion of the adjacent cerebellar folia with asymmetry (Fig. 1).

Assessment of diffusion-weighted images (DWI) and diffusion coefficient (ADC) mapping, showed no diffusion restriction. (Fig. 2).

The results of magnetic resonance spectroscopy findings were nonspecific (Fig. 3).

Additionally, the lesion showed no contrast enhancement (Fig. 4).

Perfusion studies showed no significant increase in cerebral blood flow (CBF) (Fig. 5).

No epileptiform waves were detected in EEG studies. Based on these findings, the patient was diagnosed as a case of Lhermitte-Duclos disease. The hospital course of the patient was uneventful, and she was discharged after 2 days with future follow-up in the neurology clinic. However, the patient lost follow-up.

Discussion

Lhermitte–Duclos disease, or dysplastic cerebellar gangliocytoma, is an uncommon and controversial condition characterized by an enlargement of the cerebellar folia. Regarding the nature of the disease, Lhermitte and Duclos first believed that the tumor was a combination of a congenital malformation and a neoplasm developing from ganglion cells. Due to the novelty of the condition, various presentations have been documented [1].

A study described a case of LDD in a middle-aged woman who presented with left facial tics and an occipital headache [6]. Another study described a patient who initially presented with depressive symptoms and was found to have LDD [7]. A previous retrospective analysis described a patient who had a tumor recurrence, which suggests that LDD may also evolve into a malignant lesion [8]. However, in this case, our patient presented with a first-episode of a generalized tonic-clonic seizure.

LDD often presents within one of the cerebellar hemispheres that is localized and well-circumscribed. MRI is superior to CT when examining the posterior fossa. On the other hand, an MRI of the brain can reveal substantial cerebellar folia hypertrophy as a result of molecular layer thickening and dysplastic ganglionic cell infiltration of the granule cell layer [9]. Along with the loss of the Purkinje cell layer, there is also thinning of the medullary white matter [10]. On T2-weighted images, the lesion shows a pattern alternating between high and low signals with a distinctive striated appearance resembling "tiger stripes," while on T1-weighted images, it often exhibits a hypointense signal [11] or isointense signal [12]. Although tiger stripe appearance is highly specific, it has been observed in other lesions [13]. In addition, the absence of significant enhancement is characteristic of LDD, which suggests no significant blood-brain barrier damage and no extracellular edema [14]. However, enhancement has been reported [15].

In this patient, MRI showed a T2 left cerebellar hemisphere pseudomass lesion showing an iso-hyperintense signal and distortion of the cerebellar folia with no enhancement.

Moreover, a recent study suggested that tiger stripes tend to be present in cases of LDD accompanied by other CS neoplasms, while in cases where LDD is present alone, atypical radiological imaging is more common [14].

LDD can exhibit variable diffusivity on DWI [14]. DWI and ADC images in our patient showed no diffusion restriction. Some LDD cases showed diffusion restriction, likely due to hypercellularity and dense collection of axons [16]. While cases of LDD showing increased cerebral blood flow on perfusion studies have been reported [11], our patient perfusion studies showed no significant elevation in cerebral blood flow. This discrepancy may be attributed to the atypical nature of the lesion or its small size.

Furthermore, magnetic resonance spectroscopy (MRS) plays a significant role in diagnosing LDD through the assessment of various metabolites. Low Cho levels indicate low cellular membrane turnover, and low NAA levels indicate loss of neuronal cells. The low Cho/NAA ratio has been linked to the diagnosis of LDD [6]. However, non-significant MRS findings in LDD have been reported [16], just as in our patient.

Possible differential diagnoses for LDD could be Sonic hedgehog activated medulloblastoma and acute cerebellitis, as both can present as cerebellar lesions. Unlike LDD, both conditions show perilesional edema, contrast enhancement, and diffusion restriction [17].

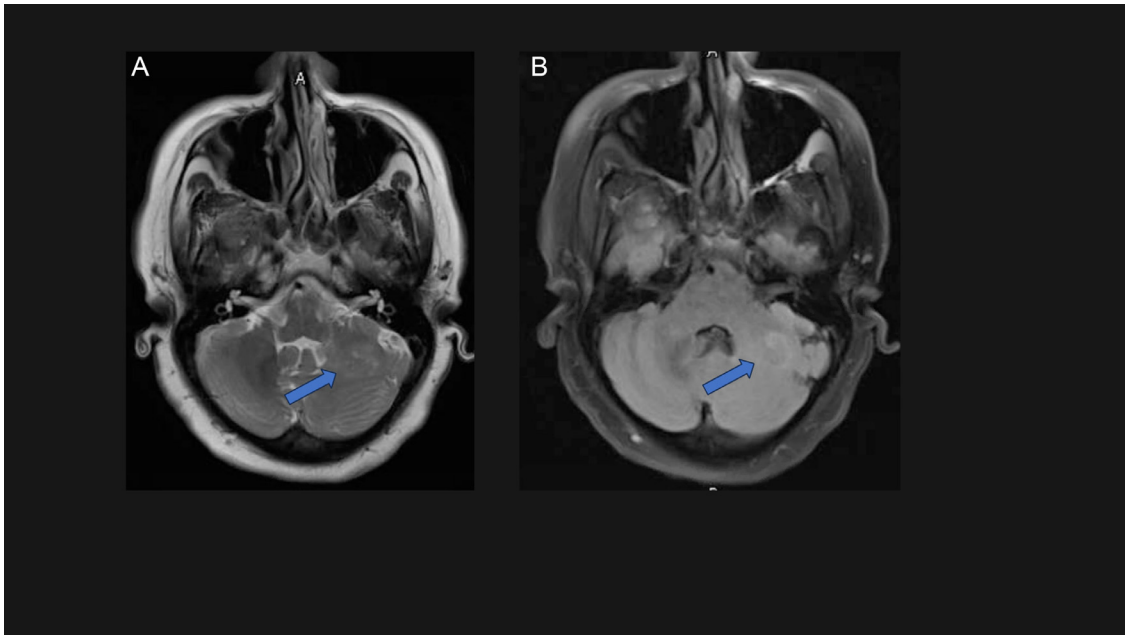

Fig. 1 – (A) and (B) Axial T2 and FLAIR images showing left cerebellar hemisphere pseudomass T2 heterogenous with iso/hyperintense signal with mild distortion of adjacent folia and no mass effect.

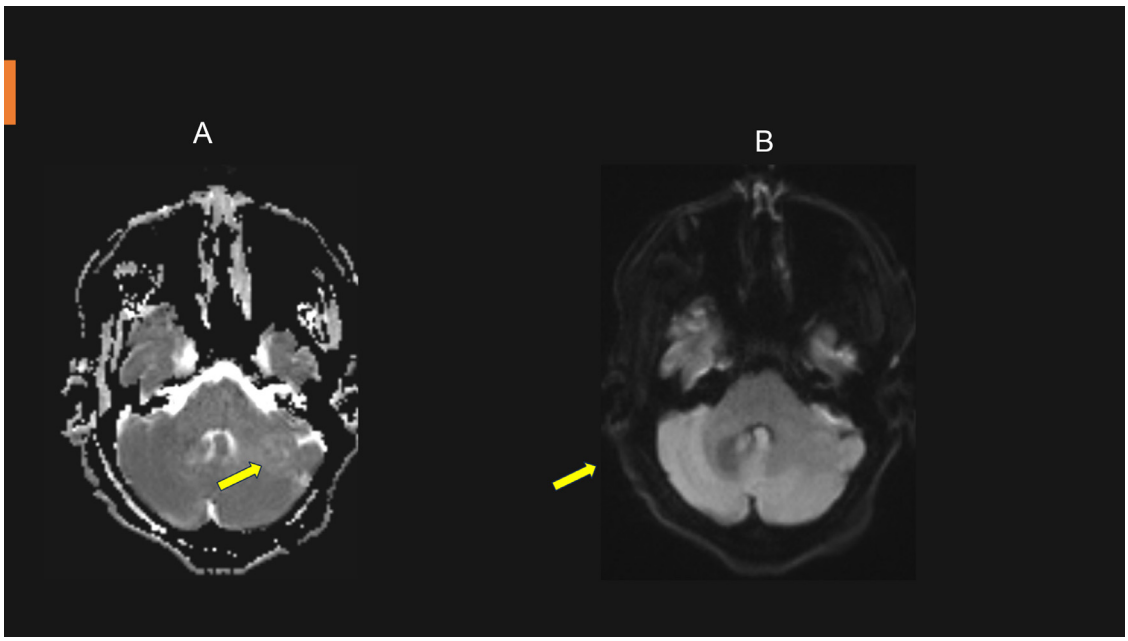

Fig. 2 – (A) and (B) Axial DWI and ADC map showing no diffusion restriction.

Moreover, a previous paper described a patient with CS and LDD who later developed a pulmonary neuroendocrine tumor [18].

Although our patient hadn't tested for genetic mutation, her clinical history was significant for a previous gastrointestinal neuroendocrine tumor. It remains uncertain whether there's an association between neuroendocrine tumors, LDD and CS.

CS is a rare autosomal dominant syndrome, characterized by multiple neoplastic lesions and it's caused by a mutation of a tumor suppressor gene, phosphatase and tensin homolog (PTEN) gene, which regulates cellular growth and apoptosis [13].

According to The National Comprehensive Cancer Network (NCCN) diagnostic criteria for CS, adult-onset LDD is considered a major criterion in CS [5] (Table 1).

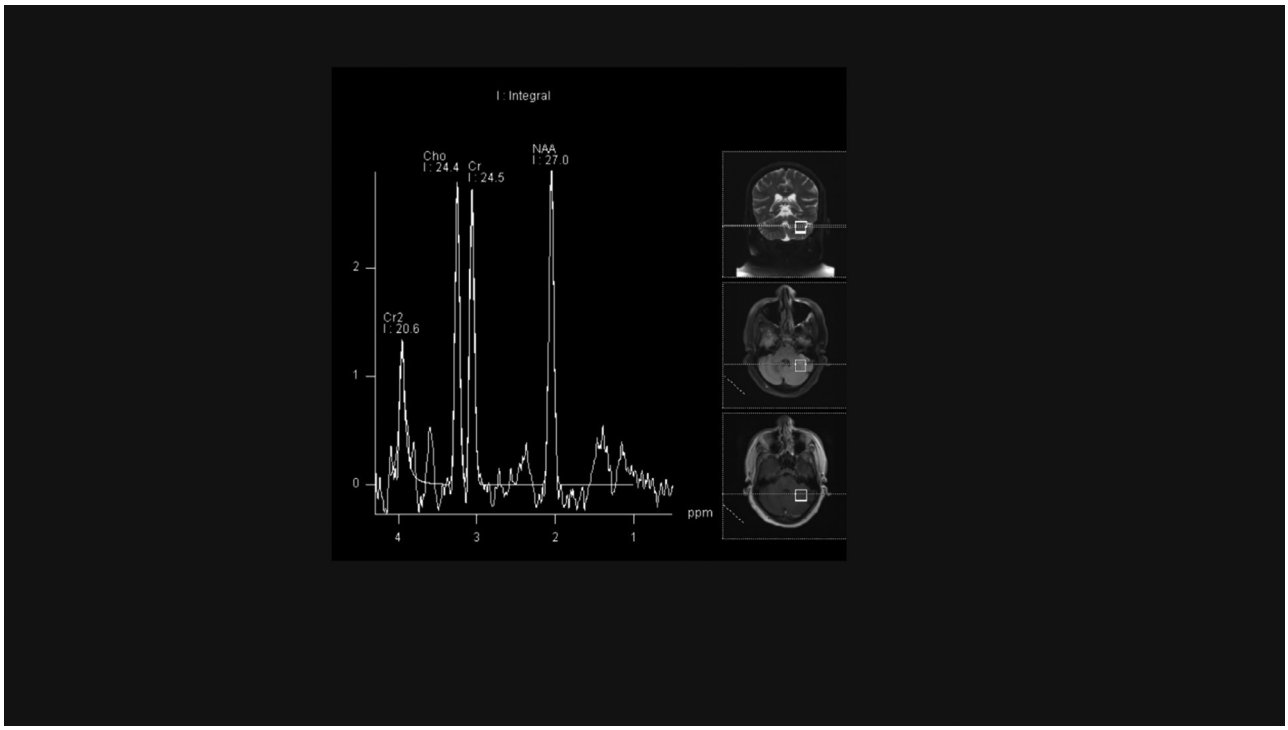

Fig. 3 – Spectroscopy images showing nonspecific findings at the lesion.

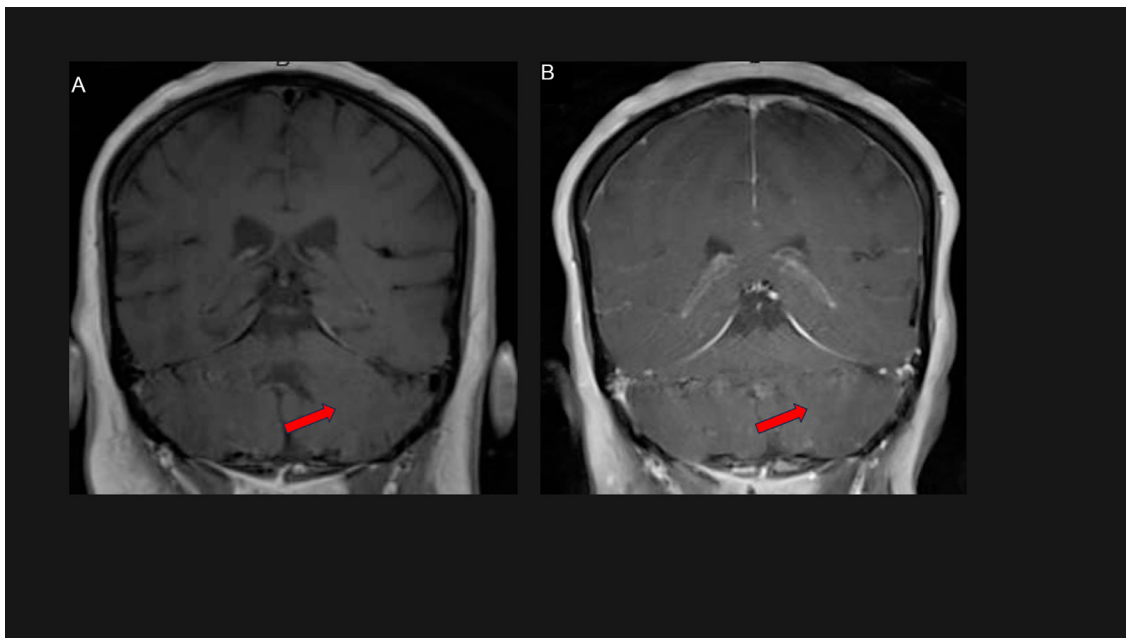

Fig. 4 – (A) and (B) Coronal T1 and T1 postcontrast images showing no contrast enhancement of the lesion.

Surgical excision of the lesion is usually reserved for cases with severe neurological symptoms, young people with a well-circumscribed lesion, or lesions with a mass effect [7]. Low rates of postoperative recurrence are associated with complete surgical resection [10]. A previous study reported a 31-year-old patient with LDD who presented with symptoms of increased intracranial cranial pressure and was managed surgically [19]. However, our patient improved symptomatically with antiepileptic medication in the emergency department, and her admission course was uneventful. She was discharged after 2 days with a follow-up at a neurology clinic in the future; however, the patient lost follow-up.

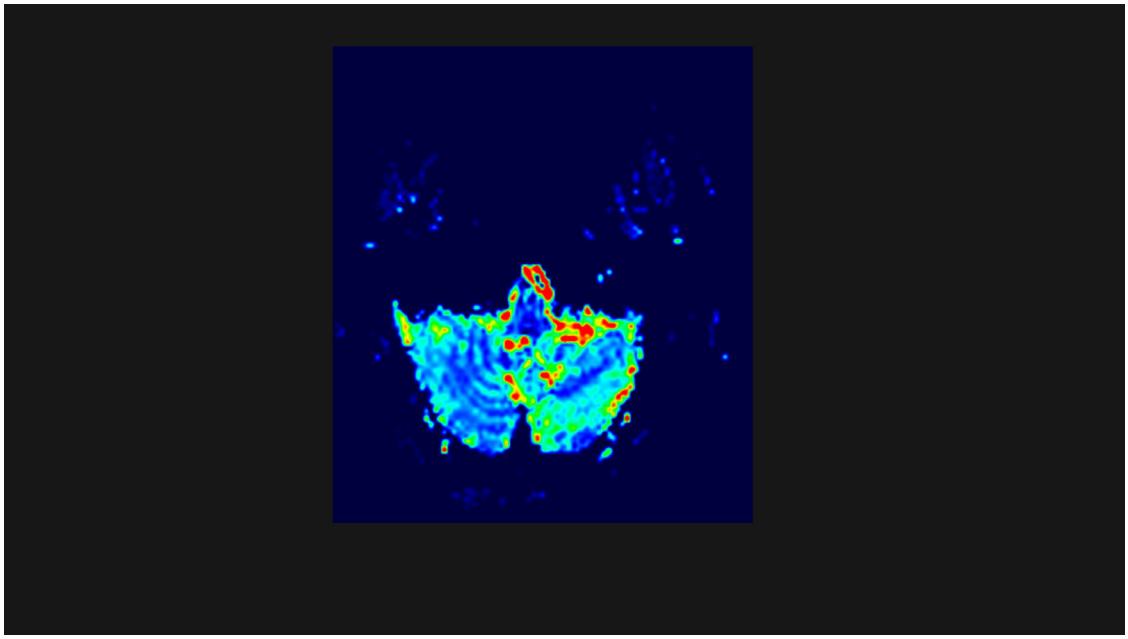

Fig. 5 – Perfusion image (CBF) showing no significant increase in the cerebral blood flow (CBF).

Table 1 – Clinical diagnostic criteria for Cowden syndrome/PTEN Hamartoma tumor syndrome.

Major Criteria	Minor Criteria
Breast cancer	Autism spectrum disorder
Endometrial cancer	Colorectal cancer
Follicular carcinoma of the thyroid gland	Esophageal glycogenic acanthosis (≥3)
Gastrointestinal hamartomas (including ganglioneuromas, but excluding hyperplastic polyps; ≥3)	Lipoma (≥3)
Adult-onset Lhermitte-Duclos disease	Intellectual disability (IQ ≤75)
Macrocephaly (>97th percentile: 58 cm in women and 60 cm in men)	Renal cell carcinoma
	Thyroid cancer (papillary carcinoma or follicular variant of papillary)
Multiple mucocutaneous lesions (any of the following):	Thyroid structural lesions (adenoma, adenomatous goiter, etc.)
- Multiple trichilemmomas (≥3, at least one biopsy proven).	Vascular anomalies (e.g., multiple developmental venous anomalies)
- Acral keratoses (≥3, palmoplantar keratotic pits and/or acral hyperkeratotic papules).	
- Mucocutaneous neuroma (≥3).	
- Oral papillomas (≥3, particularly on gingiva and tongue).	

Limitations

Genetic testing was not done to exclude Cowden syndrome.

Conclusions

This case highlights the diverse presentations of LDD, with the classical radiological appearance of tiger stripes in the posterior fossa often aiding diagnosis. However, given the complexity and variability of radiological findings, thorough neuroimaging evaluation is essential. It is crucial for physicians to be aware of associated conditions like Cowden syndrome, and genetic testing should be considered for appropriate screening and prevention referral.

Patient consent

Informed consent for publication of this case was obtained from the patient.

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