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Finnish Variant of Late Infantile Ceroid Neuronal Lipofuscinosis (fvLINCL); Atypical Finding on Magnetic Resonance Imaging

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Abstract
Ceroid neuronal lipofuscinosis (CLN) is a rare group of autosomal recessive neurodegenerative diseases that cause developmental delay and seizures. Herein, we present a case of a 7-year-old girl who referred for magnetic resonance imaging (MRI) following cognitive impairment and seizures. MRI was performed demonstrating some usual findings, and, surprisingly, a normal-sized cerebellum. This case draws attention to not hold to just the classical imaging presentation in order to suspect some leukodystrophy.

Keywords: Magnetic resonance imaging; Ceroid neuronal lipofuscinosis; Neurodegenerative diseases.

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Introduction

Ceroid neuronal lipofuscinosis (CLN) is a group of autosomal recessive leukodystrophies, characterized by the lysosomal accumulation of an autofluorescent lipopigment with lipofuscin properties. Varied forms of the disease are caused by mutations in CLN genes, resulting in significant clinical variation, including symptoms and age of onset.[1,2]

More specifically, mutations in CLN5 gene cause variant late-infantile neuronal ceroid lipofuscinosis (vLINCL); a reported Finnish variant of late infantile NCL (fvLINCL) is highlighted as having signs and symptoms usually developing between the ages of 4.5 and 7 years, although cases of late onset have been reported.[1] Symptoms range from visual loss, ataxia, myoclonus and cognitive impairment.[1,2]

The classical neuroradiological findings in CLN's magnetic resonance imaging (MRI) are atrophy of the cerebellum, in addition to increased T2-weighted signal intensity of the periventricular white substance.[3-5] In this paper we describe the clinical presentation and unusual set of imaging findings of a patient with CLN5.

Case Presentation

The patient started presenting at age five with cognitive impairment accompanied by refractory tonic-clonic seizures (~4 daily), chorea and repetitive lower urinary tract infections; she was undergoing treatment with high-doses of clobazam, sodium valproate, and lamotrigine). She also presented with acute urinary retention during an inpatient treatment.

At age seven, she underwent an MRI (Figures 1 to 3), which displayed T2-weighted reduced fibers and commissures of the corpus callosum accompanied by a reduction in the mantle of the periventricular white substance in its posterior aspect. No cerebellar atrophy was appreciated.

From age seven to twelve, she persisted with ~4 daily tonic clonic seizures and no acute urinary retention or chorea. She is twelve years-old now and has tonic clonic seizures (~4 daily), despite having increased doses of lamotrigine and sodium valproate; her last chorea happened in March 2021. In May 2021, she was admitted for inpatient treatment for persistent seizures, fever and acute urinary retention; clobazam was added to her treatment plan and she was also treated with clindamycin. She was discharged at the end of the month with no seizures.

Genetic testing confirmed CLN type 5 disease. There is no family history of neurodegenerative disorders or

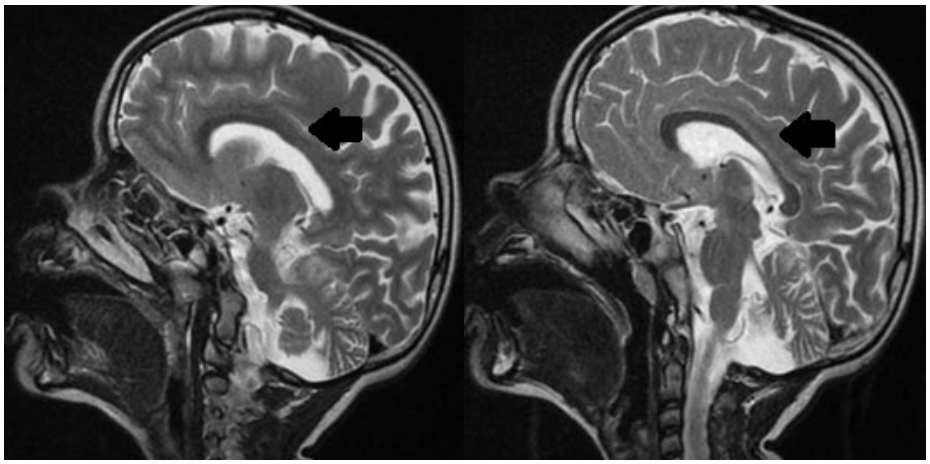

Figure 1. T2-Weighted Sagittal Section: Reduced Volume of Fibers and Commissures of the Corpus Callosum Accompanied by a Reduction in the Mantle of the Periventricular White Substance in its Posterior Aspect (black arrows).

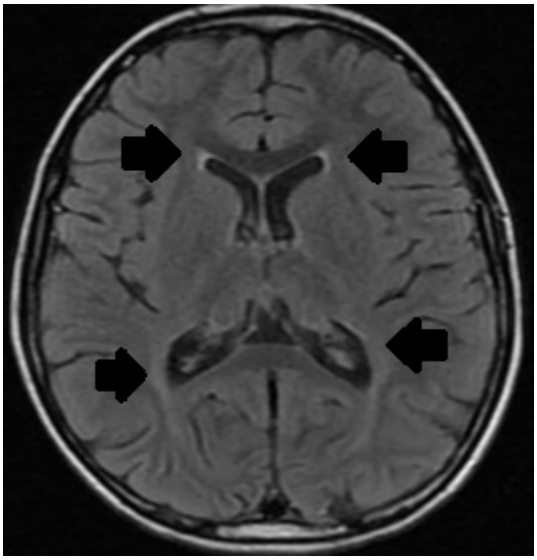

Figure 2. FLAIR Axial Section: Bilateral Hyperintensity in the Periventricular White Matter (black arrows).

seizures and her parents were not inbred.

Discussion

The present case described imaging findings in a particular subtype of CLN is a relevant addition to some cases previously published. To our knowledge, this is the first case of genetically confirmed CLN5 to not report cerebellar atrophy; this absent finding is also uncommon in leukodystrophies in general.[6]

CLN's cerebral gross pathology is usually characterized by supra and infratentorial atrophy,[7-10] which correlates with MRI findings.[3-5,11] Our patient had diminished volume of the fibers and commissures of the corpus callosum plus a reduction in the mantle of the periventricular white matter; this is consistent with other studies that have displayed cortical atrophy in MRI.[3-5] She also displayed a bilateral hyperintensity within the periventricular white matter, which is part of the usual imaging presentation[3-5] and, surprisingly, a normal-sized cerebellum. This may

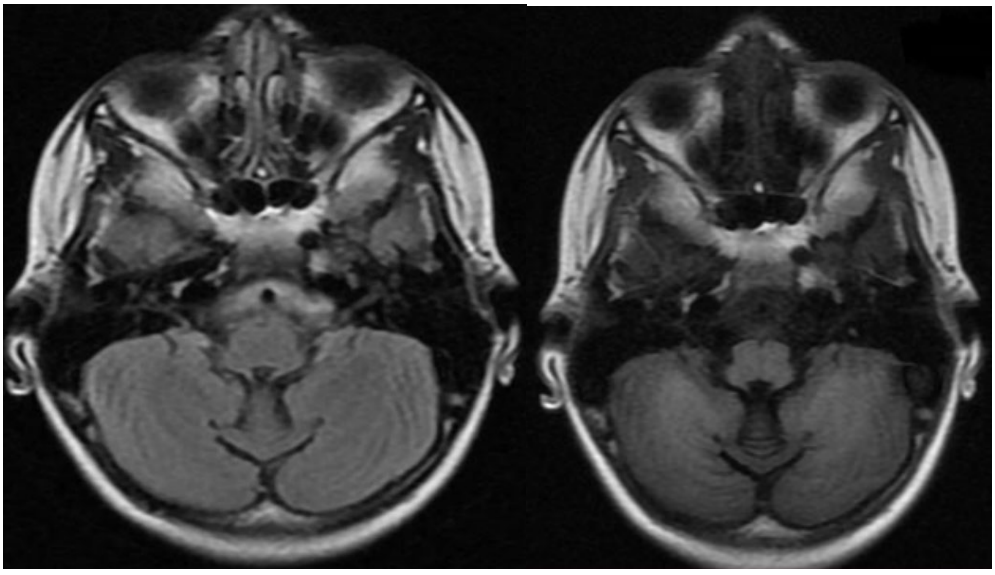

Figure 3. FLAIR and T1-Weighted FLAIR Axial Sections: No Significant Volumetric Reduction of the Cerebellum (white arrows).

be explained by the early age at imaging study; CLN is considered to be a progressive neurodegenerative disease.[1,2]

The patient presented with many signs and symptoms that are common among the large spectrum of childhood leukodystrophies: motor impairment, dysautonomia (eg, acute urinary retention), cognitive impairment, and seizures. These symptoms, in the context of a childhood leukodystrophy, are usually progressive and are non-specific; MRI patterns and genetic tests in patients suspected to have a leukodystrophy can lead to a definite diagnosis. Age of onset varies greatly between these diseases, but in NCL, it usually first presents between ages 4 and 7,[6] which is compatible with the patient reported.

Conclusion

Some clinical and radiological characteristics are typical of this disease, such as age, cognitive delay and the increased T2-weighted intensity of the periventricular white matter; the current case stands out because of missing the cerebellar atrophy. Therefore, it is recommended to not hold just to the classical imaging findings to suspect some leukodystrophy, in this particular case, the CLN group.

Conflict of Interest Disclosures

The authors report no competing interests.

Ethical Statement

An informed consent form for publication of the study obtained form the patient.

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