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Batten disease with Narcolepsy and Functional Neurological Disorder: A Case Report

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Case Report

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Abstract

Background

Juvenile Batten disease, or neuronal ceroid lipofuscinosis type 3 (CLN3), is a rare neurodegenerative condition defined by progressive symptoms including seizures, vision impairment, motor decline, decaying cognitive function, and neuropsychiatric symptoms. The co-occurrence of functional neurological disorder (FND) and narcolepsy - conditions with significant clinical overlap with CLN3 symptoms - has not previously been reported in the literature.

Case presentation:

We describe a 17-year-old female with CLN3 who developed complex seizure-like events and profound daytime somnolence during adolescence. Her presentation was complicated by severe major depression, generalised anxiety, and suicidality. Elective video-encephalogram (EEG) monitoring confirmed a diagnosis of functional seizures. Subsequent Multiple Sleep Latency Testing (MSLT) confirmed a diagnosis of narcolepsy. Treatment with armodafinil resulted in marked and sustained improvements in energy, mood stability, and a dramatic reduction in functional seizure frequency, which had previously been resistant to standard psychiatric and anti-epileptic interventions.

Conclusions

This case highlights the previously unreported co-occurrence of FND and narcolepsy in patients with CLN3. These conditions can mimic core disease symptoms, leading to diagnostic overshadowing. Identifying and treating these comorbidities, particularly through stimulant therapy for narcolepsy, can significantly improve quality of life and functional outcomes in adolescents with juvenile Batten disease.

Background

Juvenile Batten disease, or neuronal ceroid lipofuscinosis type 3 (CLN3), is a rare neurodegenerative disorder arises from CLN3 gene mutation. The typical clinical onset occurs in childhood, where the initial hallmark is loss of vision. Over subsequent years, this is followed by the emergence of neuropsychiatric instability and a gradual decay in cognitive function (1, 2). As the pathology advances, patients often encounter sleep disturbances, motor deficits, and the onset of epilepsy. In the later stages of the disease, complications such as dysphagia, debilitating movement disorders, and cardiac issues arise (1, 2).

Cognitive and behavioural shifts in CLN3 tend to follow the initial visual decline by several years. Concurrently, patients may exhibit a range of psychiatric symptoms, including anxiety, clinical depression, aggression, or psychosis (1, 2). These challenges often peak in intensity shortly after the

initial diagnosis and may paradoxically appear to diminish as global neurological function further deteriorates. Given the protracted nature of the disease, managing these behavioural fluctuations is often a significant burden on the quality of life for both the patient and their caregivers (3, 4).

Seizures affect most patients with CLN3 and are usually one of the earliest symptoms to present. Bilateral tonic-clonic seizures are the most common type, and myoclonic or focal nonmotor seizures are less frequent and present later (5, 6). This case report is the first description of Functional Neurological Disorder (FND) with functional seizures in Batten disease.

Sleep disturbance occurs in more than half of patients with CLN3 and are thought to be related to the neurodegenerative process. The most common types are nighttime waking, nightmares, or difficulty initiating sleep (1, 7). Many patients with Batten disease also have daytime sleepiness (7). To our knowledge, this is also the first report of objective Multiple Sleep Latency Test (MSLT) confirmed Narcolepsy in a patient with CLN3 disease and treatment of this with a stimulant.

Both functional seizures and narcolepsy share significant clinical overlap with the core features of Batten disease, particularly regarding seizure-like activity and profound fatigue, creating a high risk for diagnostic overshadowing. While there is established evidence for managing FND and Narcolepsy in the general population, there is no published literature regarding the identification and management of these specific comorbidities within the CLN3 phenotype.

Case Presentation

Jemima is a 17-year-old female with CLN3 disease who was referred to consultation-liaison psychiatry with a history of worsening low mood, generalised anxiety, and complex seizure-like events. Jemima is the eldest of six children, all of whom live at home with both parents. Her younger brother also has CLN3, while her other siblings are unaffected. Prior to her functional decline, Jemima was a gifted musician and was actively involved at church.

Infancy, childhood history, and developmental milestones were unremarkable. There was no history of primary neurodevelopmental disorders, and her primary school academic performance was high. Her psychiatric history was limited to a period of community-based psychology around age 12–13 years old to address emerging irritability and anxiety.

Jemima was diagnosed with CLN3 at age 11 via genetic testing, following several years of progressive visual impairment. By age 15, her vision had deteriorated significantly, necessitating the use of a cane and braille. She also developed progressive cognitive difficulties, particularly affecting short-term memory and word retrieval, which required significant educational supports within her mainstream secondary school.

From age 15, Jemima experienced a marked decline in mental health and she referred by the neurology team to the consultation-liaison psychiatry team at the tertiary level children's hospital where the

majority of her care was based. Major Depressive Disorder, Obsessive-Compulsive Disorder and Generalised Anxiety Disorder were diagnosed in the context of adjusting to a life-limiting illness, barriers with parent-child attunement, and disrupted adolescent individuation. She was commenced on fluoxetine and titrated up to 40mg with very partial efficacy. She continued to have multiple emergency department presentations following impulsive suicidal actions, including self-ligation and an attempt to jump from a moving vehicle. These episodes were at times triggered by the grief of losing autonomy and the distress of watching peers reach developmental milestones. Clonidine was also commenced for initial insomnia.

From age 15, Jemima also developed intermittent "seizure-like" episodes. These episodes typically involved prolonged periods of unresponsiveness with forced eye closure, interspersed with asynchronous shaking of the limbs and rhythmic pelvic flexion and extension. Her movements were often discoordinated, occasionally involving arm spasms where her limbs were held in a dystonic-like posture above her head with wrists dorsi-flexed. Given her underlying Batten disease, these were initially treated as epilepsy with Lamotrigine. However, the events persisted and her mental health deteriorated significantly with each dose increase leading to worsening depression and suicidality. An elective admission for video-EEG monitoring captured several events characterised by unresponsiveness, asynchronous shaking, and pelvic thrusting but no electrographic correlates. These were diagnosed as FND with functional seizures. During this elective admission, lamotrigine was ceased and mirtazapine 7.5mg was commenced in addition to the fluoxetine to treat ongoing depressive symptoms. Clonidine was changed to guanfacine 2mg to assist with physiological arousal underpinning the functional seizures. Psychoeducation was provided regarding functional seizures and Jemima engaged well in long-term outpatient psychological therapy including dearousal techniques such as grounding and deep breathing, acceptance, physiotherapy, and emphasis on social and educational routine.

Over the next 6–12 months Jemima’s major depression and thoughts of self-harm improved significantly. This was sustained despite excessive weight gain necessitating a switch to agomelatine 50mg, in addition to the longstanding fluoxetine. However, Jemima continued to have functional seizures multiple times a day, particularly during times of increased stress. Significantly, the motor characteristics and features of Jemima’s functional seizure episodes changed over time. With each change there was concern from her and the family that this signalled the emergence of epilepsy and she had multiple medical admissions for EEG monitoring. No evidence of organic seizure was detected.

Throughout this period, Jemima also suffered from profound and worsening daytime somnolence and fatigue, which led to her withdrawal from mainstream education at age 16. While her fatigue was initially attributed to her depression and the progressive nature of Batten disease, the degree of hypersomnolence appeared out of proportion to her cognitive state and persisted despite an improvement in mood. A sleep study and MSLT conducted at age 17 demonstrated a mean sleep latency of 4 minutes and 10 seconds across five naps, with sleep achieved in every instance. These findings were consistent with a diagnosis of Narcolepsy. A trial of Armodafinil 150mg was commenced. Both Jemima and her parents reported a dramatic and sustained improvement in her energy levels, mood stability, and cognitive engagement. Remarkably, the commencement of stimulant therapy led to a near-

total cessation of the functional seizures that had previously dominated her clinical picture. With her physiological state stabilised, Jemima was able to re-engage meaningfully in psychological interventions, focusing on a values-driven approach to living. She resumed her involvement in music ministry and church leadership, reporting a significant improvement in her overall quality of life. Jemima was able to engage meaningfully in dialogue about how she understands her CLN3 diagnosis, her fears regarding disability and death, and how she can act in accordance with her values despite her decline. Jemima was transitioned to adult mental health services 6 months after commencement of armodafinil and continued to have sustained improvement in fatigue, functional seizures, and mood.

Discussion and Conclusions

This case report is the first to describe co-occurrence of Batten Disease with either FND or Narcolepsy. Behavioural and emotional disturbances are well-documented in CLN3 and are recognised as major contributors to reduced quality of life (3). However, this case demonstrates how treatable comorbidities may be masked by the primary neurodegenerative diagnosis. Clinicians should be the alert to the possibility of functional symptoms or narcolepsy in Batten disease.

In this case, Jemima's seizure-like episodes were initially thought to be epilepsy due to the inherent predisposition of CLN3 towards organic seizures (1). Notably, the patient demonstrated a marked deterioration in mood and an increase in suicidality following the up titration of anti-epileptic medication that had been commenced for presumed epilepsy. Formal psychiatric assessment and elective video-EEG monitoring were able to uncover a diagnosis of functional seizures. Furthermore, when Jemima's episodes changed over time to include different characteristics such as muscle twitches these needed to be recurrently investigated for emergence of epilepsy as functional symptomatology could not be assumed. This highlights the complexity of diagnosing and managing functional seizures in CLN3. Identification of functional seizures is important to avoid unnecessary polypharmacy and psychiatric harm.

Jemima's excessive fatigue and amotivation was initially attributed to co-existing depression and the underlying Batten disease. It was only after formal sleep investigation performed due to unremitting fatigue despite improved depressive symptoms, that her narcolepsy was diagnosed. Treatment led to substantial improvement in quality of life. This suggests that co-occurring narcolepsy should be considered in patients with Batten disease who have unremitting and severe fatigue. Effective treatment for narcolepsy is readily available.

While the generalisability of a single case report is limited, the significant clinical overlap between these conditions and the core symptoms of CLN3 suggests a need for further research into the prevalence and management of complex phenotypes in CLN3.

Abbreviations

CLN3

Neuronal ceroid lipofuscinosis type 3
EEG
Electroencephalogram
FND
Functional neurological disorder
MSLT
Multiple sleep latency test

Declarations

Ethics Approval and consent to participate

Ethics approval was obtained from the Sydney Children's Hospital Network Human Research Ethics Committee. Written informed consent to participate was obtained from the patient and their parent.

Consent for publication

Written informed consent to publish was obtained from the patient and their parent.

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Author Contribution

DY and AA reviewed the patient data and notes, clinical progress and management. DY prepared the initial manuscript draft. DY and AA contributed significant editing and review of the manuscript. All authors read and approved the final manuscript.

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Data Availability

Materials are available from the corresponding author on request.

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