From Visual Changes to Rapid Death: A Case Report of a Rare Neurologic Infectious Disease

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Introduction

- Creutzfeldt Jakob Disease (CJD) is a rare, incurable, transmissible, rapidly progressive, and inevitably fatal neurodegenerative disease caused by prions (misfolded proteins).
- Clinical features include neuropsychiatric symptoms, myoclonus, visual disturbances, akinetic mutism, pyramidal and/or extrapyramidal symptoms.
- Multiple types of CJD: sporadic (most common), familial, iatrogenic, and variant.
- Autopsy is essential for definitive diagnosis and encouraged to differentiate between genetic vs. sporadic forms.

Case Presentation

- CC: **Altered Mental Status**
- History of Present Illness:
  - 63 y.o. Caucasian female presented with rapid decline in mental status over a period of 6 weeks.
  - Initial symptoms were visual changes and dizziness, then progressive memory loss and decline in her ADLS.
  - Patient progressed to paranoia, labile affect, tremors, and muscle stiffness.
  - Discoordination of eye movement with double vision was also reported.
  - Negative fundal examination and negative outpatient MRI. No symptomatic improvement with Pamelor, Medrol dose pack, Valium, Meclizine or Ubrogepant.
  - Family reported regular eating of stored venison coming from self-hunted deer. No other family members report similar symptoms.
- Past Medical History:
  - Morbid obesity, OSA, vertigo, essential HTN, prediabetes, diverticulosis
- Past Surgical History:
  - Colonoscopy with biopsy with no diagnostic abnormalities
- Medications:
  - Allopurinol, Colchicine, Spironolactone-Hydrochlorothiazide, Orphenadrine, Vitamins
- Social History:
  - Worked as a safety engineer, was working in a uranium plant 5 years ago
  - Lived in a house built before 1973 for 40 years
- Physical Exam:
  - Vitals: BP 143/64, HR 90, Temp 97.3F oral, RR 16, SpO2 96% on RA
  - Constitutional: No acute distress, dressed appropriately
  - HEENT: Visual field deficits (limited peripheral vision), no nystagmus, EOMI, PERRLA
  - Neuro: A&Ox2 (name, "medical building"), minimally verbal, intermittently follows basic 1-step commands, startles whenever touched suddenly and to bright light, increased muscle tone in all extremities with stiffened and flexed upper extremities, areflexic
  - Psych: Anxious mood, flat affect, slowed speech and brief responses, behavior is withdrawn
- Evaluation and Management:
  - **Differential diagnoses: CNS infection vs. prion disease vs. paraneoplastic syndrome vs. NMDA encephalitis vs. heavy metal toxicity vs. pseudotumor cerebri vs. drug side effect**
  - Labs: CBC with differential, BMP, PT/INR/PTT, glucose, lead levels, ANA screen and titer, Borrelia burgdorferi total IgG/IgM antibody, paraneoplastic panel
  - CSF analysis, lambda receptor antibody, CJD panel, NMDA receptor antibody IgG
  - Imaging: Brain MRI with and without contrast, EEG

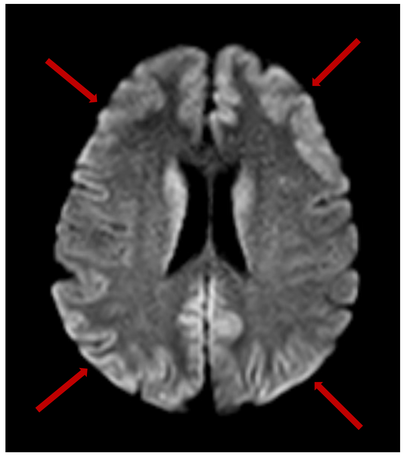


Figure 1. Diffusion weighted MRI image from 11/07/2023 showing hyperintensity ("cortical ribboning") throughout the bilateral cerebral hemispheres.

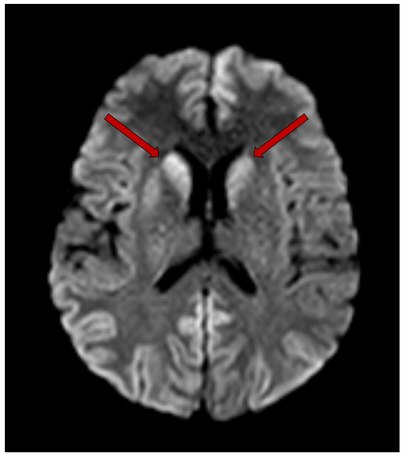


Figure 2. Diffusion weighted MRI image from 11/07/2023 showing symmetric hyperintensity in the bilateral basal ganglia (caudate nucleus).

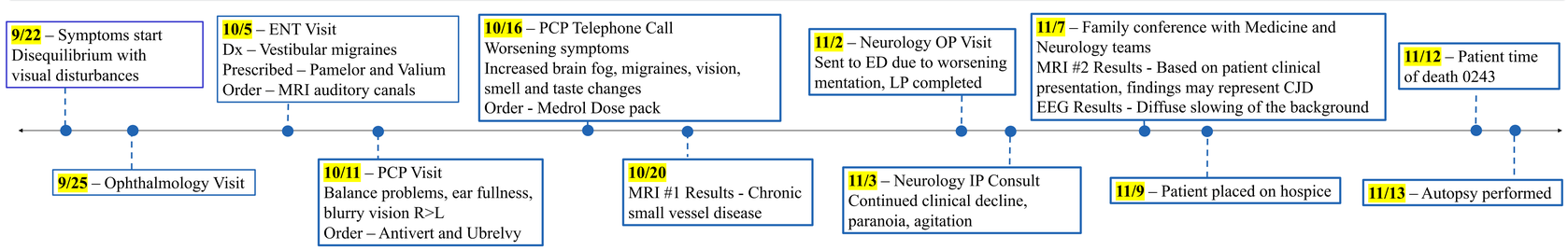
Test Name (specimen)	Test Result	Reference Range for Non-prion Disease
Western Blot Analysis (frozen)	Positive	Negative
HE/IHC Analysis (fixed)	Positive	Negative
Genetic Analysis (DNA)	No Mutation	No Mutation
Final Diagnosis	**Sporadic Creutzfeldt-Jakob disease (MM1)**	
Pathogenic Variant	Not Detected	
Codon 129 Polymorphism	**129M/M**	

Table 1. The National Prion Disease Pathology Surveillance Center Autopsy Results

CSF Analysis	Test Result	Reference Range for Non-prion Disease
14-3-3 protein	Elevated at 35,828 AU/ml	<30 – 1999 AU/ml
T-tau protein	Elevated at 11,440 pg/ml	0 – 1149 pg/ml
RT-QuIC	Indeterminate	Negative
Glucose	77	40 – 80 mg/dl
Protein	28	15 – 55 mg/dl

Table 2. Cerebral Spinal Fluid Analysis and Creutzfeldt-Jakob Disease Panel

Clinical Course



Discussion

- This is a clinical case of a patient with Creutzfeldt–Jakob disease, a rare neurodegenerative disease with a rapid clinical course. CJD is uniformly fatal with death occurring within 1 year of the onset of symptoms, with a median disease duration of 6 months.
- CJD is the most frequently occurring prion disease in humans. In its clinical course, CJD initially has nonspecific neurologic findings, and thus, a high clinical suspicion is necessary.
- The infectious agents responsible for causing prion disease are misfolded aggregates of cellular prion protein PrPC. Disease arises with the conversion and accumulation of the α-helical configuration of PrPC to β-pleated configuration PrPSc.
- Polymorphisms within the prion protein gene impacts susceptibility to different variants of prion diseases. Among the extensively studied polymorphisms is the methionine/valine polymorphism at codon 129 of the PRNP gene.
- CJD incidence is 1 per million worldwide annually. The population of Michigan in 2023 was 10,037,261, thus the anticipated incidence in CJD in MI would be 10. There were 27 reported cases of CJD in 2023 and 15 of those cases were in Wayne County.

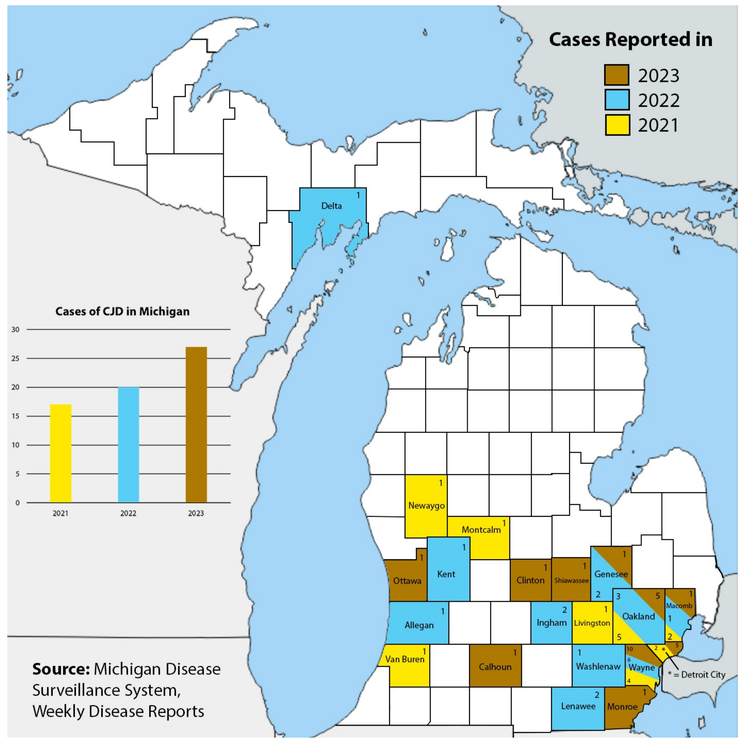


Figure 3. Cases of CJD reported by county in Michigan in 2021, 2022, and 2023. 17 cases reported in 2021 (yellow). 20 cases reported in 2022 (blue). 27 cases reported in 2023 (brown). Total cases per county in corresponding year are indicated by the number shown.

Conclusion

- To date, CJD presents significant challenges due to its lack of curative treatment options and inability to halt disease progression. Supportive treatment is the only goal of care.
- Early diagnosis of CJD is crucial, allowing for effective communication and time to educate the patient's family on the disease progression and expectations. Connecting with patient advocacy groups and support network can offer valuable emotional support and resources.

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