Clinical Case Report

Sporadic Creutzfeldt-Jakob disease misdiagnosed as acute cerebral infarction: a case report highlighting the diagnostic value of MRI-DWI

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Abstract

Sporadic Creutzfeldt-Jakob disease (sCJD) is a rare, rapidly progressive human prion disease that often presents with nonspecific early symptoms. Its clinical manifestations may mimic common neurological conditions, including cerebrovascular disease and autoimmune encephalitis, contributing to diagnostic challenges. We retrospectively reviewed the diagnostic and therapeutic course of a 74-year-old man with sCJD. The patient initially presented with dizziness, blurred vision, and diplopia and was treated for acute cerebral infarction at another hospital, without symptomatic improvement. Over the following two months, his condition progressively deteriorated. He developed psychiatric and behavioral abnormalities, including incoherent speech, accompanied by a rapid decline in cognitive function, eventually progressing to akinetic mutism and impaired consciousness. Cranial diffusion-weighted imaging (DWI) revealed characteristic band-like cortical hyperintensities, known as the cortical ribbon sign. Although electroencephalography (EEG) showed abnormal electrical activity, typical periodic sharp wave complexes (PSWCs) were not observed. A planned lumbar puncture to obtain cerebrospinal fluid (CSF) for diagnostic tests, including 14-3-3 protein analysis and real-time quaking-induced conversion (RT-QuIC), was not performed because the patient developed acute delirium and could no longer cooperate. Based on the rapidly progressive clinical course and characteristic DWI findings, the patient was diagnosed with probable sCJD according to the applicable diagnostic criteria. This case highlights the importance of maintaining clinical suspicion for prion disease in older adults presenting with unexplained rapidly progressive cognitive decline, behavioral changes, or ataxia over a period of weeks to months. Early MRI with DWI is essential for diagnostic evaluation, alongside the systematic exclusion of infectious, metabolic, and autoimmune disorders.

Keywords: Sporadic Creutzfeldt-Jakob disease; Prion disease; Rapidly progressive dementia; Diffusion-weighted imaging; Cortical ribboning

1. Introduction

Creutzfeldt-Jakob disease (CJD) comprises a group of rapidly progressive neurodegenerative disorders caused by the accumulation of abnormally folded prion proteins in the central nervous system. CJD is conventionally classified into sporadic, genetic, and acquired forms. Sporadic CJD (sCJD) is the most common form, accounting for approximately 85% of cases, with an annual incidence of approximately 1–2 cases per million people (Hermann et al., 2021). As one of the most rapidly progressive forms of dementia, sCJD presents substantial challenges in clinical diagnosis and management (Hermann & Zerr, 2022).

The clinical presentation of sCJD is highly heterogeneous. In addition to rapidly progressive cognitive impairment, patients may develop myoclonus, visual disturbances, cerebellar signs, and pyramidal or extrapyramidal features. In advanced stages, the disease may progress to akinetic mutism and profound impairment of consciousness. The prognosis is extremely poor, with a median survival of approximately five months from disease onset, and only a small proportion of patients surviving beyond one year (Watson et al., 2022). Early manifestations, however, may be nonspecific and include dizziness, gait instability, visual disturbances, or psychiatric and behavioral changes. Consequently, sCJD may initially be misdiagnosed as cerebrovascular disease, psychiatric disorders, or other neurodegenerative conditions. Careful differentiation from other causes

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of rapidly progressive dementia is therefore essential (Geschwind & Murray, 2018).

Advances in diagnostic investigations, particularly magnetic resonance imaging with diffusion-weighted imaging (MRI-DWI) and cerebrospinal fluid (CSF) real-time quaking-induced conversion (RT-QuIC), have strengthened the antemortem diagnosis of sCJD. Characteristic cortical diffusion restriction, commonly referred to as the cortical ribbon sign, is an important imaging feature supporting the diagnosis (Park et al., 2021). Clinical diagnostic guidelines and specific infection prevention and control protocols have also been established to standardize diagnostic assessment and reduce the risk of iatrogenic transmission during procedures involving high-risk tissues (Chinese Society of Neurology, Neuroinfectious Diseases and Cerebrospinal Fluid Cytology Group, 2022; Ge et al., 2025).

Here, we report the diagnostic and clinical course of an elderly man who initially presented with dizziness and visual disturbances but subsequently experienced rapid neurological deterioration, progressing to akinetic mutism within approximately two months. By discussing this case in the context of the relevant literature, we aim to highlight the diagnostic challenges of sCJD, particularly its nonspecific early manifestations, the value of MRI-DWI, and the importance of distinguishing it from potentially treatable conditions.

2. Case Study

2.1. Medical history

A 74-year-old man was admitted to the Department of Neurology at our hospital on October 8, 2024, with a more than 2-month history of dizziness accompanied by psychiatric and behavioral abnormalities, which had worsened over the preceding week.

Approximately 2 months before admission, the patient developed dizziness without an identifiable precipitating factor, which progressively impaired his ability to walk independently. The symptoms were accompanied by nausea, vomiting, blurred vision, and diplopia. He denied severe headache, loss of consciousness, or limb convulsions at that time. He subsequently sought medical attention at another hospital, where cranial MRI raised suspicion of an acute occipital lobe infarction. Despite receiving symptomatic treatment, including therapies aimed at improving cerebral circulation and vitamin B supplementation, his symptoms did not improve.

Approximately 1 month after symptom onset, the patient developed prominent psychiatric and behavioral abnormalities, including reduced responsiveness to questions, incoherent speech involving references to events that had not occurred, and inappropriate laughter. His ability to perform activities of daily living also progressively declined. He developed involuntary upper-limb movements, difficulty grasping and holding objects, and increasing difficulty walking. During the week before admission, his condition deteriorated further, with markedly reduced food intake and progressive loss of verbal communication with family members. He subsequently developed akinetic mutism, responded increasingly slowly to external stimuli, and became bedridden. He was therefore transferred to our hospital for further diagnostic evaluation and treatment.

2.2. Past medical history and family history

The patient had a 20-year history of hypertension, with a reported maximum blood pressure of 149/110 mmHg, and had been taking oral amlodipine regularly for blood pressure control. In 2020, he underwent coronary stent implantation for coronary artery disease and was subsequently prescribed long-term aspirin therapy. He also reported a history of smoking for more than 50 years (approximately 6–7 cigarettes per day) and alcohol consumption for more than 40 years (approximately 250 mL of liquor per occasion, 3–5 times per month). He denied a history of diabetes mellitus or known exposure to toxic substances. There was no family history of similar rapidly progressive cognitive impairment or hereditary neurological disorders.

2.3. Physical examination

On admission, the patient's body temperature was 36.8 °C, pulse rate was 74 beats/min, respiratory rate was 16 breaths/min, and blood pressure was 138/74 mmHg. Cardiopulmonary and abdominal examinations revealed no obvious abnormalities.

Neurological examination revealed an impaired level of consciousness, with markedly reduced responsiveness to questions. Assessment of higher cortical functions was limited by poor cooperation. Both pupils were equal, round, and approximately 2.5 mm in diameter, with prompt pupillary light responses. Assessment of eye movements was limited by poor cooperation. Bilateral forehead wrinkling and nasolabial folds were symmetrical, and the tongue protruded in the midline. Voluntary movements were

present in all four limbs, with increased muscle tone. Sensory and coordination examinations could not be reliably performed because of poor cooperation. Deep tendon reflexes were graded as 2+ in all four limbs. The left plantar response was equivocal, whereas the right plantar response was negative. The neck was supple, Kernig's sign was negative, and the Romberg test was recorded as negative.

2.4. Auxiliary examinations

Routine blood tests, coagulation studies, thyroid function tests, and urinalysis revealed no significant abnormalities. Screening tests for hepatitis B, hepatitis C, syphilis, and HIV were negative. Serum homocysteine was elevated at 34.8 μmol/L, while serum vitamin B12 was greater than 2,000 pg/mL.

Carotid ultrasonography demonstrated bilateral carotid atherosclerosis with plaque formation, as well as plaque formation in the right subclavian artery. Echocardiography revealed widening of the aortic sinus and ascending aorta, symmetrical thickening of the interventricular septum and left ventricular wall, mild aortic regurgitation, and impaired left ventricular diastolic function.

Cranial MRI, including diffusion-weighted imaging (DWI) and T2-weighted fluid-attenuated inversion recovery (T2-FLAIR) sequences, demonstrated multiple lacunar lesions and leukoaraiosis. Notably, DWI revealed abnormal band-like hyperintensities along the cerebral cortex, consistent with the cortical ribbon sign. EEG showed abnormal electrical activity, although typical periodic sharp wave complexes (PSWCs) were not observed.

2.5. Diagnosis and treatment process

The patient was an older adult presenting with a subacute onset and rapidly progressive neurological deterioration. Over approximately two months, his condition progressed from dizziness, gait instability, and visual disturbances to prominent psychiatric and behavioral abnormalities, cognitive impairment, loss of functional independence, and ultimately akinetic mutism. In view of this rapidly progressive clinical course, prion disease was considered a leading diagnostic possibility. The differential diagnosis also included autoimmune encephalitis, central nervous system infections, metabolic or toxic encephalopathy, cerebrovascular disease, and other neurodegenerative disorders.

The patient had a history of hypertension and coronary artery disease, and acute occipital lobe infarction had previously been suspected at another hospital. However, his symptoms failed to improve following treatment for presumed cerebrovascular disease and continued to deteriorate. The cerebrovascular abnormalities identified on imaging were insufficient to explain the extent and rapid progression of his neurological impairment. In contrast, the characteristic cortical ribbon-like hyperintensities on MRI-DWI substantially increased the clinical suspicion of sCJD.

Following admission, lumbar puncture was planned to obtain cerebrospinal fluid (CSF) for routine analysis, biochemical examination, autoimmune encephalitis antibody testing, 14-3-3 protein analysis, and real-time quaking-induced conversion (RT-QuIC). However, during the procedure, after local anesthesia and needle insertion, the patient developed acute delirium and became markedly uncooperative. Consequently, the lumbar puncture could not be completed and the procedure was discontinued.

Based on the rapidly progressive clinical course, cognitive impairment, increased muscle tone, and characteristic MRI-DWI findings, the patient was clinically diagnosed with probable sCJD according to the applicable diagnostic criteria. However, the absence of CSF biomarker results and neuropathological examination limited the possibility of further diagnostic confirmation. As no established curative treatment is currently available for sCJD, management focused on supportive and symptomatic care. During hospitalization, the patient received supportive measures, including fluid replacement and nutritional support. Following detailed discussions with the family regarding the suspected diagnosis, prognosis, and limitations of further investigations and treatment, the family elected not to pursue additional invasive investigations and requested discharge against medical advice.

3. Discussion

The pathological mechanisms underlying prion diseases differ fundamentally from those of conventional infectious diseases. The normal cellular prion protein (PrP^C) can undergo an abnormal conformational conversion into a pathogenic form enriched in β-sheet structures, which subsequently promotes the misfolding of normal PrP^C through a templated mechanism. The accumulation of abnormal prion proteins in the central nervous system is associated with neuronal loss, spongiform degeneration, and gliosis. Unlike genetic prion

diseases, sporadic Creutzfeldt-Jakob disease (sCJD) is generally not associated with pathogenic germline mutations in the PRNP gene. Its pathogenesis is thought to in Hermann et al. (2021).

Rapid clinical progression is a hallmark of sCJD. Although the disease commonly manifests with cognitive impairment, myoclonus, visual or cerebellar symptoms, and pyramidal or extrapyramidal signs, its early presentation is often nonspecific and heterogeneous. Initial symptoms may include dizziness, gait instability, visual disturbances, or psychiatric and behavioral abnormalities, potentially leading to diagnostic delays or misdiagnosis. In the present case, the patient initially presented with dizziness, gait instability, and blurred vision and was initially diagnosed with cerebral infarction. However, his condition deteriorated rapidly, ultimately progressing to akinetic mutism. Although definite myoclonus was not observed, the absence of an individual characteristic symptom does not exclude sCJD, underscoring the importance of considering the overall clinical presentation and disease trajectory.

MRI is an important component of the antemortem diagnostic evaluation of sCJD. A meta-analysis by Park et al. (2021) reported a sensitivity of approximately 91% and a specificity of approximately 97% for diffusion-weighted imaging (DWI) in the diagnosis of sCJD. Characteristic imaging findings include hyperintensities in the caudate nucleus and putamen, as well as cortical diffusion restriction manifesting as the cortical ribbon sign. In some patients, abnormalities on T2-weighted imaging or fluid-attenuated inversion recovery (FLAIR) sequences may be subtle, whereas DWI can reveal more conspicuous changes. In the present case, although leukoaraiosis and lacunar infarcts were observed, these findings are commonly associated with small-vessel disease in older adults and were insufficient to explain the patient's rapidly progressive neurological deterioration. The combination of a rapidly progressive cognitive syndrome and characteristic MRI-DWI findings supported a diagnosis of probable sCJD in accordance with the applicable diagnostic criteria, despite the absence of CSF 14-3-3 and RT-QuIC results. Nevertheless, cortical diffusion restriction is not specific to sCJD and may also occur in conditions such as status epilepticus, hypoxic-ischemic encephalopathy, hypoglycemia, and autoimmune encephalitis. Therefore, MRI findings should be interpreted in conjunction with the clinical presentation and other available investigations.

EEG remains a useful adjunctive investigation in the diagnosis of sCJD. Typical periodic sharp wave complexes (PSWCs), although characteristic, may vary according to disease stage and molecular subtype. Early in the disease course, EEG may demonstrate only generalized or diffuse slowing. Consequently, the absence of typical PSWCs in the present case does not exclude sCJD and should be interpreted in the context of the patient's clinical and radiological findings (Zerr et al., 2009).

CSF biomarkers also contribute to the diagnostic evaluation of sCJD. CSF 14-3-3 protein has historically been used as a supportive biomarker; however, it primarily reflects rapid neuronal injury and lacks disease specificity, as elevated levels may also occur in conditions such as cerebral infarction and encephalitis. RT-QuIC has emerged as a more disease-specific diagnostic assay by detecting prion-seeding activity in CSF, with high specificity and substantial sensitivity (Chatzikonstantinou et al., 2021; Hermann et al., 2021). CSF testing should therefore be considered promptly when sCJD is suspected and when clinically feasible. In the present case, lumbar puncture could not be completed because of the patient's acute delirium and inability to cooperate. The absence of CSF biomarker results represents an important limitation of the diagnostic evaluation.

The differential diagnosis of sCJD requires careful consideration, particularly because several potentially treatable disorders can present with rapidly progressive cognitive decline. Autoimmune encephalitis may manifest with psychiatric and behavioral abnormalities, cognitive impairment, and, in some cases, cortical DWI abnormalities. The absence of fever alone is insufficient to exclude this diagnosis. In the present case, autoimmune encephalitis could not be definitively excluded because CSF analysis and antibody testing were unavailable. Similarly, although the patient's syphilis and HIV screening results were negative and no fever was reported, central nervous system infection could not be completely excluded in the absence of CSF examination. Metabolic and nutritional encephalopathies were also considered. Normal thyroid function and vitamin B12 levels, together with the absence of an evident history of toxic exposure, reduced the likelihood of certain alternative diagnoses, although these findings alone were not sufficient to exclude all metabolic or nutritional causes.

Cerebrovascular disease was an important initial

differential diagnosis in this case. The patient had multiple vascular risk factors, and neuroimaging demonstrated small-vessel disease, making the initial diagnosis of cerebral infarction clinically understandable. However, the subsequent rapid and continuous deterioration was less consistent with an isolated acute infarction or stable chronic cerebrovascular disease. The observed vascular abnormalities may therefore have represented coexisting pathology rather than the primary cause of the progressive neurological syndrome. Similarly, the rapid progression from gait and visual disturbances to severe cognitive impairment and akinetic mutism within approximately two months was substantially faster than the typical course of chronic neurodegenerative disorders such as Alzheimer's disease or frontotemporal dementia. The tempo of clinical deterioration was therefore an important clue favoring sCJD over these alternative diagnoses.

At present, no established disease-modifying treatment is available to reverse the neurological damage associated with sCJD. Management is primarily supportive and focuses on nutritional support, symptom control, prevention of complications, and appropriate palliative care as the disease advances. Symptomatic treatment may include the management of seizures, myoclonus, agitation, or psychotic symptoms, together with measures to reduce the risk of pressure injuries, aspiration, and other complications. sCJD is associated with a very poor prognosis, and many patients experience substantial deterioration and death within months of disease onset.

Infection prevention and control are also important considerations in the clinical management of patients with sCJD. Although sCJD is a transmissible prion disease, routine social contact and standard nursing care are not recognized routes of transmission. Precautions should primarily focus on preventing exposure to tissues associated with high prion infectivity, particularly the brain, spinal cord, and certain ocular tissues. Because abnormal prion proteins are resistant to conventional disinfection and sterilization procedures, medical instruments that have contacted high-risk tissues must be managed in accordance with established prion-specific decontamination protocols. Appropriate adherence to these protocols is essential to minimize the risk of iatrogenic transmission.

Several limitations should be acknowledged in the present case. First, lumbar puncture could not be completed, precluding the assessment of CSF biomarkers, including RT-QuIC and 14-3-3 protein. Second, the MRI report did not provide a systematic description of the affected cortical regions or apparent diffusion coefficient (ADC) values, limiting the detailed characterization of the diffusion abnormalities. Third, PRNP genetic analysis and neuropathological examination were not performed, preventing molecular or pathological confirmation of the diagnosis. Finally, the patient was lost to follow-up after discharge, and his subsequent clinical course and survival time could not be established. These limitations reduce the degree of diagnostic certainty and should be considered when interpreting the findings. Nevertheless, the rapidly progressive clinical course and characteristic MRI-DWI abnormalities strongly supported the diagnosis of probable sCJD.

4. Conclusion

Although sporadic Creutzfeldt-Jakob disease (sCJD) is rare, it should be considered in the differential diagnosis of middle-aged and older adults presenting with rapidly progressive cognitive decline, psychiatric or behavioral abnormalities, or cerebellar and visual symptoms evolving over weeks to months. The cortical ribbon sign on MRI-DWI represents a valuable diagnostic clue, while CSF RT-QuIC provides highly specific diagnostic evidence and should be performed promptly when clinically indicated. Nevertheless, even when sCJD is strongly suspected, potentially treatable conditions, including autoimmune encephalitis, infectious diseases, and metabolic disorders, must be carefully excluded. In the absence of effective disease-modifying treatment, clinical management should prioritize early diagnosis, avoidance of unnecessary or disproportionate medical interventions, appropriate palliative care, and strict adherence to prion infection prevention and control protocols, particularly when handling high-risk tissues and medical instruments.

Declaration

The authors declare no conflict of interest.

References

Chatzikonstantinou, S., Kazis, D., Karantali, E., Knights, M., McKenna, J. et al. (2021) A meta-analysis on rt-quic for the diagnosis of sporadic cjd. *Acta Neurologica Belgica* **121**, 341–349.

Chinese Society of Neurology, Neuroinfectious Diseases and Cerebrospinal Fluid Cytology Group (2022) Chinese guidelines for diagnosis and treatment of Creutzfeldt-Jakob disease 2021. *Chinese Journal of Neurology* **55**, 1215–1224.

Ge, T., Jia, Y., Li, C., Huang, J., Meng, X. et al. (2025) Expert consensus on infection prevention and control of Creutzfeldt-Jakob disease in medical institutions. *Chinese Journal of Infection Control* **24**, 437–450.

Geschwind, M. & Murray, K. (2018) Differential diagnosis with other rapid progressive dementias. In Pocchiari, M. & Manson, J., editors, *Handbook of Clinical Neurology*. Elsevier, Amsterdam, The Netherlands.

Hermann, P., Appleby, B., Brandel, J., Caughey, B., Collins, S. et al. (2021) Biomarkers and diagnostic guidelines for sporadic Creutzfeldt-Jakob disease. *The Lancet Neurology* **20**, 235–246.

Hermann, P. & Zerr, I. (2022) Rapidly progressive dementias—aetiologies, diagnosis and management. *Nature Reviews Neurology* **18**, 363–376.

Park, H., Kim, M., Suh, C., Kim, S., Shim, W. et al. (2021) Diagnostic value of diffusion-weighted brain magnetic resonance imaging in patients with sporadic Creutzfeldt-Jakob disease: a systematic review and meta-analysis. *European Radiology* **31**, 9073–9085.

Watson, N., Hermann, P., Ladogana, A., Denouel, A., Baiardi, S. et al. (2022) Validation of revised international Creutzfeldt-Jakob disease surveillance network diagnostic criteria for sporadic Creutzfeldt-Jakob disease. *JAMA Network Open* **5**, e2146319.

Zerr, I., Kallenberg, K., Summers, D., Romero, C., Taratuto, A. et al. (2009) Updated clinical diagnostic criteria for sporadic Creutzfeldt-Jakob disease. *Brain* **132**, 2659–2668.