

Unmasking the Toxin: A Case Report of Metal Lead Encephalopathy Imitating Autoimmune Encephalitis in a Beautician

Prajeesh P Prakash¹, Asish Vijayaraghavan², Suja Raj L³

Summary

Lead encephalopathy is a rare but serious neurological complication, often underrecognised in adults. Its neuropsychiatric manifestations can closely mimic autoimmune encephalitis, posing diagnostic and therapeutic dilemmas. Reporting such cases is crucial in the Indian scenario where occupational exposures, including unregulated cosmetic products remain a public health challenge, and in the global context where lead toxicity continues to resurface in unsuspected ways. We describe a 41-year-old female beautician from Kerala who presented with progressive cognitive decline, visual hallucinations, seizures, ataxia, and raised intracranial pressure over three months. Initial clinical and radiological features suggested autoimmune encephalitis. However, negative autoimmune panels and the presence of microcytic hypochromic anaemia prompted further evaluation. Her serum lead levels were markedly elevated (72.23 µg/dL; normal <10 µg/dL), confirming lead encephalopathy secondary to chronic occupational exposure from cosmetic products. The patient was initiated on chelation therapy and provided supportive neurocritical care, along with occupational counselling to avoid further exposure. She showed gradual neurological recovery with improvement in cognition, seizure control, and gait, and was able to return to work with protective modifications. This case highlights the diagnostic complexity of adult-onset lead encephalopathy mimicking autoimmune encephalitis. In the Indian context, where occupational safety in the cosmetic industry is poorly regulated, and in the global context, where environmental toxins remain an underrecognised cause of neurological syndromes, awareness is critical.

Key words: Lead encephalopathy, Autoimmune encephalitis mimic, Heavy metal toxicity

Lead is a potent neurotoxin that can cause significant central nervous system dysfunction in both acute and chronic exposures. While paediatric lead encephalopathy is more widely recognised, adult presentations are rare and frequently overlooked. The clinical manifestations often overlap with autoimmune encephalitis (AIE), a leading cause of rapidly progressive neuropsychiatric syndromes, resulting in diagnostic delay and mismanagement (Manuraj et al, 2025; Vaphiades & Carey, 2023). In India, unregulated cosmetics and traditional preparations remain common sources of exposure (Raut et al, 2021).

Globally, sporadic reports of lead encephalopathy linked to occupational or cultural practices highlight its continuing clinical relevance

(Patwardhan et al, 2021). This case describes a beautician who developed lead encephalopathy mimicking AIE, underscoring the importance of occupational history, nursing vigilance, and multidisciplinary care.

Case Report

A 41-year-old female beautician presented with a three-month history of progressive cognitive decline, episodic memory lapses, social disinhibition, vivid visual hallucinations, recurrent headaches, and unsteady gait. She also reported transient diplopia, nausea, vomiting, and two episodes of focal seizures with secondary generalisation. On examination, she was alert but disoriented. Bilateral papilledema, myoclonic jerks of the hands, perioral dyskinesias, mild rigidity, and bilateral limb ataxia were observed, while cranial nerves were intact.

Investigations Undertaken

- MRI brain: Bilateral hyperintensities in the caudate and putamen.

The authors are: 1. Nursing Officer, Division of Nursing Service
2. Assistant Professor, Department of Neurology, 3. Lecturer, Division of Nursing Education, all 1 to 3 are at Sree Chitra Tirunal Institute for Medical Sciences and Technology, Thiruvananthapuram (Kerala).

- CSF: Opening pressure 310 mm H₂O, protein 85 mg/dL, normal glucose, no oligoclonal bands.
- EEG: Generalised delta slowing.
- Blood: Hb 8.2 g/dL with microcytic hypochromic anaemia.
- Serum lead: 72.23 µg/dL (normal <10 µg/dL).

Diagnosis: Lead encephalopathy secondary to chronic occupational exposure to cosmetic products. The rationale was based on neuropsychiatric features mimicking AIE, a negative antibody panel, anaemia, and markedly raised lead levels.

Nursing Management

The patient's nursing care was guided by the nursing process, focusing on stabilisation, prevention of complications, and safe discharge planning.

Nursing Diagnosis 1: Risk for neurological deterioration related to raised intracranial pressure

- Interventions: Continuous neurological monitoring with GCS and pupillary checks; head elevation; minimisation of straining activities.
- Expected outcome: Stable neurological status without further deterioration.
- Evaluation: Patient maintained normal ICP parameters; papilledema resolved on follow-up.

Nursing Diagnosis 2: Risk for injury related to recurrent seizures and impaired coordination.

- Interventions: Seizure precautions, administration of antiepileptic drugs, supervised ambulation, and fall prevention strategies.
- Expected outcome: No seizure-related injury during hospitalisation.
- Evaluation: Seizures were controlled, and the patient ambulated safely with support.

Nursing Diagnosis 3: Imbalanced nutrition related to anaemia and decreased oral intake

- Interventions: Nutritional counselling, iron-rich and protein-supplemented diet, adherence to chelation therapy.
- Expected outcome: Improvement in haemoglobin and nutritional status.
- Evaluation: Haemoglobin and general nutritional condition improved on follow-up.

Nursing Diagnosis 4: Deficient knowledge regarding occupational hazards

- Interventions: Patient and family education about lead toxicity, safe handling of cosmetics, use of personal protective equipment, and workplace ventilation.

- Expected outcome: Patient demonstrates understanding of preventive measures.
- Evaluation: Patient and family adopted protective modifications before resuming work.

Outcome and Follow-up

With chelation therapy and comprehensive nursing care, the patient showed marked neurological recovery. Cognition and memory improved, hallucinations resolved, seizures were controlled, and gait was normalised. Papilledema subsided, and repeated blood tests confirmed declining lead levels. She returned to her profession with occupational modifications, including protective equipment and improved workplace ventilation, and remained stable on follow-up.

Discussion

Adult lead encephalopathy remains a diagnostic challenge as it often masquerades as autoimmune or metabolic encephalitis (Manuraj et al, 2025; Vaphiades & Carey, 2023). In India, unregulated cosmetics such as sindoor and kajal are important yet underrecognised sources of exposure (Raut et al, 2022). Globally, cases have been reported in association with Ayurvedic medicines, industrial exposure, and opioid adulterants (Schröter, 1991; Suleman et al, 2021).

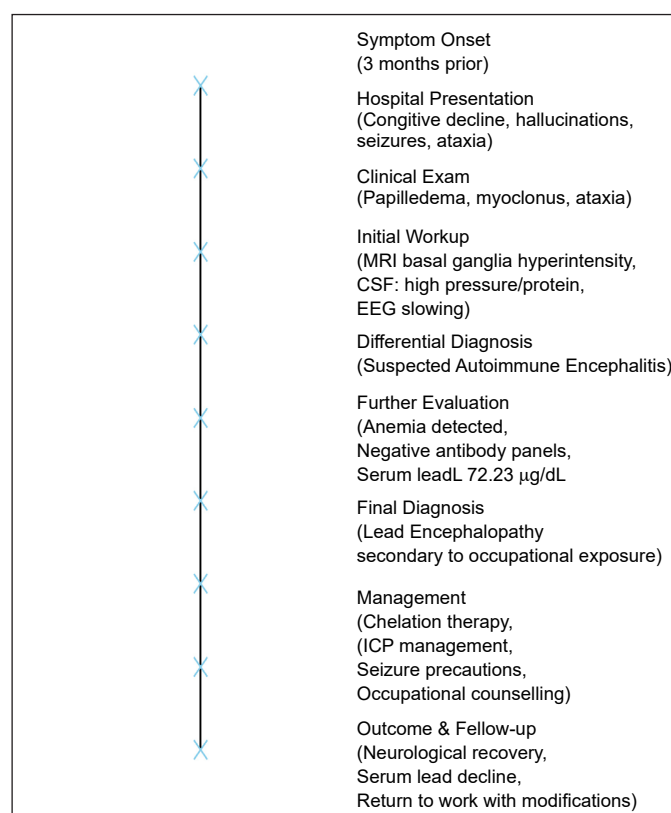


Fig 1: Case timeline: Lead encephalopathy mimicking autoimmune Encephalitis.

Our case is unique in highlighting occupational exposure among beauticians, a rarely described high-risk group. The presence of microcytic anaemia and raised intracranial pressure was a diagnostic clue that distinguished this condition from AIE. Radiological findings of basal ganglia hyperintensities are consistent with lead toxicity, though they may overlap with other causes (Patwardhan et al, 2021). Chelation therapy with agents such as CaNaEDTA, BAL, or succimer is effective if initiated early (Rao et al, 2014).

Timeline of clinical presentation, investigations, diagnosis, management, and outcome in a case of lead encephalopathy is shown in Fig 1.

Nurses play a pivotal role in early recognition of atypical features, meticulous neurological surveillance, implementation of seizure and ICP precautions, and occupational counselling, thereby preventing its recurrence and ensuring recovery.

Ethical Consideration

Written informed consent was obtained from the patient for publication of this case report and related clinical details. Institutional ethical approval was not required for a single case report as per policy.

Conclusion

Lead encephalopathy in adults may closely resemble autoimmune encephalitis, risking misdiagnosis and inappropriate immunosuppression. Detailed occupational history, basic haematological evaluation, and nursing vigilance are crucial for timely recognition. Early initiation of chelation therapy facilitates favourable neurological outcomes.

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