Acute lead poisoning mimicking posterior reversible encephalopathy

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DESCRIPTION

A man in his 50s without any significant medical history was admitted in intensive care unit (ICU) for coma following seizures. His relatives reported recent abdominal pain and hepatitis. Symptoms progressively increased within the last few weeks with asthenia associated with headache and drowsiness. Neurological examination at ICU admission revealed tetrapyramidal syndrome and comatose state requiring mechanical ventilation. Brain MRI revealed bilateral T2 fluid-attenuated inversion recovery(FLAIR) hyperintense signal involving temporal and occipital lobes consistent with posterior reversible encephalopathy syndrome (PRES) (figure 1). Cerebrospinal fluid (CSF) appeared cloudy with high protein level (2.18 g/L), without meningitis. Blood tests revealed hepatitis (serum glutamic-oxaloacetic transaminase (SGOT) 108 UI/L and serum glutamic-pyruvic transaminase (SGPT) 118 UI/L) and microcytic regenerative anaemia at 68 g/dL. Basophilic stippling in the erythroblasts were found on the peripheral red blood smear (figure 2). After ruling out the usual causes of PRES (eg, hypertension, autoimmune disorders and drugs) and considering the combination of these clinical and biological data, lead levels were measured at day 10 following ICU admission and were elevated in blood, CSF, urine and liver biopsy, respectively, at 797.9 µg/L (n<85), 24.0 µg/L (n<10), 172.0 µg/L (n<30) and 151.3 µg/g (n<3.1). The patient was treated with intravenous calcium disodium EDTA at 1000 mg/m^2/day associated with oral 2,3-dimercaptosuccinic acid succimer (DMSA) at 10 mg/kg three times a day for 5 days followed after 7 days by calcium EDTA alone, resulting in a decrease of BLL at 547.0 µg/L. The patient recovered, allowing mechanical ventilation weaning 1 week after treatment initiation and hospital discharge 1 month later. The suspected lead source was herbal medicine after exhaustive research of other potential exposition. Investigations did not reveal lead intoxication among his relatives. Brain MRI controlled 15 days after treatment initiation showed a partial regression of the T2 FLAIR signal hyperintensity (figure 1).

Lead is a divalent cation interacting with protein ion-biding sites, especially calcium. More than 90% of the lead is stocked in cortical bone with a half-life of decades.[1] Lead encephalopathy symptoms are non-specific, ranging from headaches or delirium to seizures and coma. It generally occurs for blood lead levels (BLL) higher than 1000–2000 µg/L, suggesting that higher BLL have been reached for our patient before first measurement.

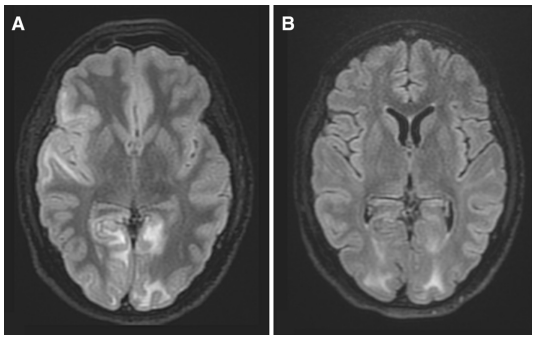

Figure 1 Axial T2 FLAIR brain MRI on admission and after chelation therapy. Brain MRI on admission showed a T2 FLAIR hyperintensity involving the right insular cortex and the bilateral temporal and occipital white matter, related to vasogenic oedema (A). The control of T2 FLAIR MRI after initiation of chelation therapy revealed a partial regression of the cortical and subcortical abnormalities (B).

Mechanisms of neurotoxicity are poorly understood. The first potential mechanism is the effect of lead on calcium-dependent cellular processes, as lead interferes with presynaptic calcium channel activation as well as glutamatergic and cholinergic excitatory neurotransmitters release.[1 2] The second potential mechanism is related to the lead affinity for endothelial cells and blood–brain barrier (BBB). The BBB dysfunction may lead to brain vasogenic oedema mimicking PRES and to high CSF protein as observed in this case.[3] The inhibition of d-aminolaevulinic acid dehydratase, a crucial enzyme in haeme biosynthesis, contributes to incorrect erythrocyte formation. The basophilic stippling is the consequence of pyrimidine 5′-nucleotidase

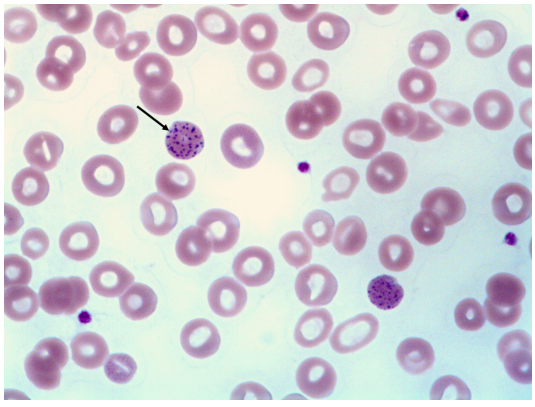

Figure 2 Red blood smear. Peripheral red blood smear showing basophilic stippling in erythroblasts (arrow). Wright-Giemsa stain, original magnification ×100.

inhibition causing aggregate formation of RNA molecules, although it is not specific of lead poisoning (eg, thalassaemia, which can also cause microcytic anaemia).[1]

After rigorous exploration of all potential sources of lead exposition, the latter's eviction remains the primary therapeutic intervention.[4] The clinician may add chelation therapy in case of high BLL or significant symptoms. The two most used chelating agents for adults are DMSA and calcium EDTA.[5] The agent selection depends on symptoms severity, BLL and the presence or absence of essential contraindications such as renal or liver failure.

Learning points

- Lead poisoning can mimic posterior reversible encephalopathy syndrome.
- Lead poisoning should be suspected in the presence of regenerative microcytic anaemia and basophilic stippling in erythrocytes.

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Case reports provide a valuable learning resource for the scientific community and can indicate areas of interest for future research. They should not be used in isolation to guide treatment choices or public health policy.

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