Zinc phosphide poisoning: introduction to typical MRI brain findings

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DESCRIPTION

A teenage girl was admitted to the emergency department with sudden-onset vomiting, abdominal pain and dizziness. Her relatives provided a history of rat poison (rodenticide) intake (approximately half packet, the full packet contains 10 g of zinc phosphide (Zn$_3$P$_2$); therefore, we estimated that she had ingested approximately 5 g a few hours earlier. Immediately after routine basic investigations and stabilisation, gastric lavage was performed. On physical examination, her vital signs were normal, except for tachycardia (pulse rate 130 beats/min). She was able to follow one-step commands. Deep tendon reflexes were vigorous with bilateral extensor plantar responses. Extraocular movements were regular without nystagmus. After 2 days of hospitalisation, she began to exhibit behavioural changes, worsening confusion and disorientation, and over the next few hours, her condition rapidly deteriorated. With these features in mind, central nervous system (CNS) involvement was suspected, and a MRI scan of the brain was performed, which revealed symmetrically distributed diffusion restriction in bilateral periventricular supratentorial white matter with a reversal in apparent diffusion coefficient images. The sulcal spaces were effaced in bilateral cerebral hemispheres signifying brain oedema. However, the remaining MRI sequences (T1, T2, fluid attenuated inversion recovery and susceptibility weighted images) did not reveal any abnormality (figure 1A–D). This white matter diffusion restriction without any abnormality on other MRI sequences has many differentials like toxic leucoencephalopathy, cranial irradiation, chemotherapy, immunosuppressive therapy, antimicrobial medications (eg, metronidazole), environmental toxins and drug abuse. Based on the history and MRI features, a diagnosis of leucoencephalopathy secondary to chemical rodenticide ingestion was made. As there is no specific antidote, the patient was managed conservatively. After a few days, her neurological symptoms gradually resolved, and she was able to perform her daily activities independently (table 1). After 3 weeks, a follow-up MRI...
ingested, these phosphides react with gastric acid and form phosphine gas, which is highly lethal. As these rodenticides are cheap and readily available on the market, ingestion (as a suicide agent) has become a public health problem, especially in rural areas. Although clinical and laboratory properties of metal phosphide poisoning have been described in the literature, very few clinical-radiological correlations of such cases have been published. Radiographic findings pertaining to pulmonary and abdominal complications have been described in previous reports of Zn3P2 poisoning. In our opinion, awareness of these MRI features would help emergency physicians or toxicologists/radiologists to detect this complication early and plan the appropriate treatment. To evaluate the CNS complications, MRI is the choice of investigation as it can be used to differentiate various types of leucoencephalopathy. It was found that this type of leucoencephalopathy can be treated symptomatically and is usually resolves with time. Here, we have described typical CNS imaging features in a patient with Zn3P2 poisoning, which, as far as we know, has not been reported in the literature.

### Disease course Clinical features

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<th>Disease course</th>
<th>Clinical features</th>
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<td>1. At the time of admission</td>
<td>Symptoms: Sudden-onset vomiting, abdominal pain and dizziness. Signs: Tachycardia, vigorous deep tendon reflexes and bilateral extensor plantar reflex</td>
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<td>2. Two days after admission</td>
<td>She developed behavioral changes and disorientation along with worsening confusion</td>
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<td>3. Nine days after admission</td>
<td>Neurological symptoms gradually resolved (she started to obey commands and became alert)</td>
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<td>4. On follow-up after 1 month</td>
<td>She recovered completely without any neurological deficit.</td>
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### Patient’s perspective

My daughter took rat poison and because of emotional distress we brought her to the hospital immediately, after which doctors did their best to treat her. Her behaviour changes were a major concern for us, but doctors gave us hope that she would be fine. After a few days of stay in the hospital, our daughter is now fine.

### Learning points

- There should be clinical and radiological correlation to detect this potentially reversible complication early, which may facilitate management.
- MRI brain is the choice of investigation in rodenticide poisoning affecting the central nervous system.
- After rodenicide ingestion, leucoencephalopathy follow-up scans are important to identify the reversal of the abnormalities.

REFERENCES