

Brain manganese deposition: potential effects of long-term parenteral nutrition

Deposição cerebral de manganésio: efeitos da nutrição parentérica a longo prazo

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Keypoints

What is known

- Manganese serves as a cofactor for numerous enzymes, and its inclusion in parenteral nutrition (PN) admixtures is recommended across various clinical scenarios.

What is added

- Brain manganese deposition represents a rare consequence of long-term PN and may manifest in patients with pauci-symptomatic neurological conditions.

Manganese is a cofactor for several enzymes and its administration in parenteral nutrition (PN) admixtures is recommended^{1,2}. Nevertheless, exposure to manganese through PN has been associated with acute and long-term toxicity manifestations^{3,4}.

We report a 15 year-old boy with a previous medical history of short bowel syndrome due to complicated gastroschisis. He underwent two transverse enteroplasty procedures and was submitted to intestinal transplant at five years old. He was on continuous PN until the transplant and intermittent supplementation afterwards, for a total period of eight years. He was referred to neurological consultation due to mild and intermittent episodes of headache and a gait imbalance. Symptoms began during the period he was on PN supplementation and persisted for several months, with progressive improvement over time. Neurological examination revealed preserved cranial nerve function, motor strength, sensation, and coordination. He presented no movement abnormalities, dystonia, or

parkinsonism. A brain magnetic resonance angiography revealed a symmetrical hyperintensity signal of basal ganglia in T1-weighted images, normal signal in T2-weighted images and no vascular abnormalities (Fig. 1). The features of this imaging are characteristic of paramagnetic properties, which are observed in manganism, due to manganese overexposure. During the following two years, he did not show additional neurological complaints or deficits. Given that the patient had discontinued PN by the time of the initial neurological evaluation, no follow-up MRI was conducted. Nevertheless, prior studies have reported an improvement of T1 hyperintensities in the basal ganglia following the discontinuation of PN⁵.

This case reports a child who underwent long-term PN and presents pauci-symptomatic neurological manifestations which seem unrelated to brain manganese deposition. The authors would like to highlight the clinical and neuroimaging features of this uncommon entity.

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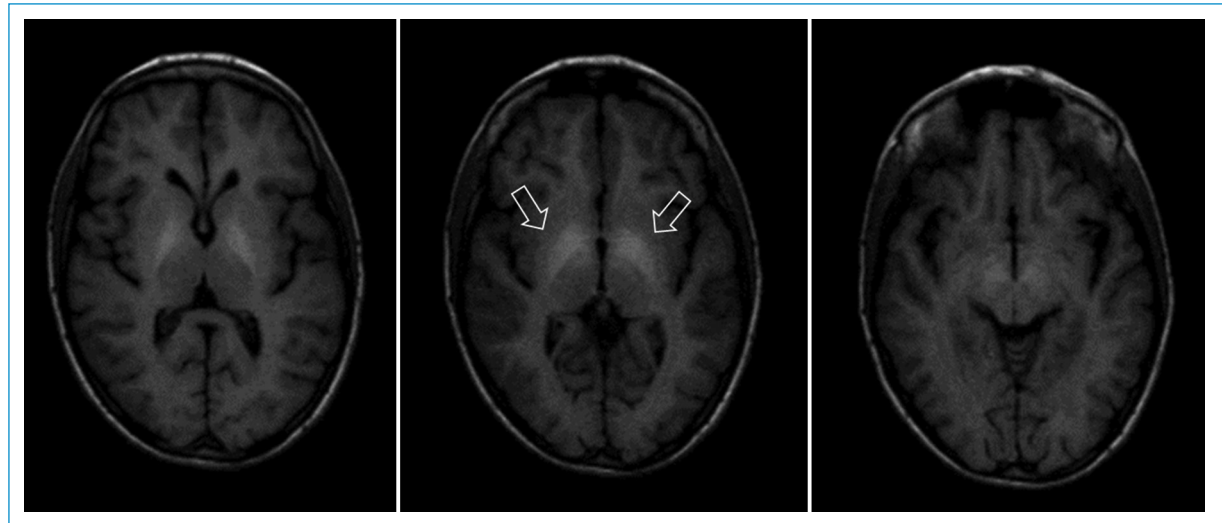


Figure 1. Cerebral MRI depicting bilateral basal ganglia hyperintensity (white arrows) in T1-weighted image as a result of manganese deposition in a child with long term parenteral nutrition.

Author contributions

J. Fonseca: Conception and design of the study, report, review or other type of work or paper. Critical review of the article for important intellectual content. Final approval of the version to be published. Agreement to be accountable for the accuracy or integrity of the work. R. Sousa: Conception and design of the study, report, review or other type of work or paper. Final approval of the version to be published. Agreement to be accountable for the accuracy or integrity of the work. C. Melo: Conception and design of the study, report, review or other type of work or paper. Critical review of the article for important intellectual content. Final approval of the version to be published. Agreement to be accountable for the accuracy or integrity of the work.

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Conflicts of interest

None.

Ethical considerations

Protection of humans and animals. The authors declare that the procedures followed complied with the ethical

standards of the responsible human experimentation committee and adhered to the World Medical Association and the Declaration of Helsinki. The procedures were approved by the institutional Ethics Committee.

Confidentiality, informed consent, and ethical approval.

The authors have followed their institution's confidentiality protocols, obtained informed consent from patients, and received approval from the Ethics Committee. The SAGER guidelines were followed according to the nature of the study.

Declaration on the use of artificial intelligence. The authors declare that no generative artificial intelligence was used in the writing of this manuscript.

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