Teaching *NeuroImages*: Methotrexate neurotoxicity

Resolution and evolution of MRI changes within 48 hours

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Figure 1 First cranial MRI scan

Diffusion-weighted imaging shows restricted diffusion in the left centrum semiovale (A). This correlated with decreased apparent diffusion coefficient signal in the same area (B).

Figure 2 Cranial MRI scan 44 hours later

Diffusion-weighted imaging shows resolution of prior left-sided changes and evolution of a new area of restricted diffusion in the right centrum semiovale (A). Again, this correlated with decreased apparent diffusion coefficient signal (B).

A 13-year-old girl presented with acute-onset right hemiparesis involving the face, arm, and leg equally. She was receiving weekly intrathecal methotrexate (last dose 6 days prior) for recently diagnosed acute lymphocytic leukemia. Brain MRI (figure 1) showed diffusion restriction in the left centrum semiovale with reduced apparent diffusion coefficient. Her hemiparesis resolved within 24 hours, but 2 hours later she developed 12-hour left hemiparesis involving face, upper limb, and dysarthria. Follow-up

neurologic examination was normal. Repeat MRI (figure 2) 44 hours after the original MRI showed acute right centrum semiovale changes. The changes that were previously seen on the left side had resolved. As before, all changes noted were localized completely in white matter, nonvascular territory. This was consistent with methotrexate neurotoxicity,^{1,2} possibly secondary to homocysteine accumulation causing direct endothelial injury.³ The patient resumed intrathecal methotrexate 1 month later as part of her

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ongoing chemotherapeutic regimen without further incidents.

AUTHOR CONTRIBUTIONS

Saad Kanaan: acquisition of data, literature review. Karan Poddar: analysis and interpretation. Yu-Tze Ng: study supervision, analysis and interpretation.

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S. Kanaan and K. Poddar report no disclosures. Y. Ng is a consultant for Lundbeck, Inc., and is on the speakers' bureau for UCB Pharma, Lundbeck Inc., Supernus Inc., and Cyberonics Inc. Go to Neurology.org for full disclosures.

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