Methotrexate-related neurotoxicity

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A 17-year-old girl with history of acute lymphoblastic leukemia (ALL) presented with acute aphasia and right-side weakness 1 week after starting treatment with intravenous methotrexate. MRI showed a focal area of increased signal on diffusion-weighted imaging (Fig. 1) with low signal on ADC images (Fig. 2) consistent with reduced diffusion in the left centrum semiovale in nonvascular distribution.

Chemotherapy for ALL has a high incidence of acute neurotoxicity, especially with methotrexate. High-dose

Fig. 1 Diffusion-weighted trace image

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Fig. 2 ADC image

treatment, intrathecal treatment, young age and concomitant radiation therapy are risk factors. Methotrexate has a direct neurotoxic effect and causes cytotoxic edema, although the exact pathophysiology of methotrexate neurotoxicity is unclear [1]. There is predilection for involvement of the periventricular white matter. Patients present with encephalopathy and stroke-like symptoms. Early detection is possible with diffusion-weighted imaging with FLAIR and subsequent T2 hyperintensity developing over time [1]. Patients often recover from methotrexate-induced neurotoxic events despite white matter changes on MRI [2].

References

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