Charcoal Hemoperfusion and Methotrexate Toxicity

A.	Andrew	McIvor
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Dear Sir,

High-dose methotrexate (MTX) with leucovorin rescue has become a successful treatment widely accepted by oncologists. When MTX is administered to patients with normal renal function adequately hydrated and alkalinized, renal failure is seen only occasionally and unexpectedly. Failure of prompt removal of this drug from the system, however, leads to severe mucositis, myelosuppression and almost certain death.

In the case reported, the patient survived plasma MTX concentrations of 328 $\mu\text{mol/l}$ or greater for 33 h. Prompt institution of combined charcoal hemoperfusion [1–3], with supportive leucovorin therapy [4], completely prevented gastrointestinal and hematologic toxicity and allowed continuation of further chemotherapy within 28 days.

A 39-year-old man with stage 4B Burkitts lymphoma was treated with 3000 mg/m² MTX intravenously and responded with marked tumor lysis syndrome. Despite allopurinol and urinary alkalinization, the patient developed oliguria and acute renal failure (serum creatinine 397 $\mu\text{mol/l}$).

MTX level measured at 33 h after infusion was 328 $\mu\text{mol/l}$ (toxic level > 0.5 $\mu\text{mol/l}$). Increased leucovorin rescue at 1,000 mg/m² intravenously every 6 h and emergency charcoal hemoperfusion was instituted using an Adsorba 300 C hemoperfusion (Gambo) cartridge containing 300 g of cellulose-coated activated charcoal.

A total of 38 h of hemoperfusion was performed over the next 7 days with marked reduction of serum MTX (fig. 1). This was concomitant with marked clinical improvement and an increase in urinary output. Renal function returned to baseline at day 28.

This case illustrates that prompt institution of leucovorin rescue combined with charcoal hemoperfusion may minimize or eliminate the otherwise rapidly progressive and fatal outcome of severe MTX toxicity. This technique is safe and easy to perform and can be continued until nontoxic blood levels are reached.

Fig. 1. Rapid reduction in serum MTX in response to charcoal hemoperfusion.

References

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