

Successful treatment of tetanus with magnesium in a dialysis patient

Yukari Mae, Tomoaki Takata, and Hajime Isomoto

Division of Medicine and Clinical Science, Faculty of Medicine, Tottori University

All correspondence concerning this paper should be addressed to:

Tomoaki Takata, M.D., Ph.D.

Division of Medicine and Clinical Science, Department of Multidisciplinary Medicine,
Faculty of Medicine, Tottori University, 36-1, Nishimachi, Yonago, Tottori 683-8504,
Japan.

E-mail address: t-takata@tottori-u.ac.jp

Tel: +81-859-38-6527; Fax: +81-859-38-6529

Running title: Magnesium for tetanus in hemodialysis patient

Received: September 27, 2019

Revised: November 21, 2019

This article has been accepted for publication and undergone full peer review but has not been through the copyediting, typesetting, pagination and proofreading process, which may lead to differences between this version and the Version of Record. Please cite this article as doi: 10.1111/tap.13459

Dear Editor:

Tetanus is a life-threatening disease caused by *Clostridium tetani* infection. The clinical manifestation includes spasms and autonomic nervous system disturbance. Neurotoxin from the microbe blocks neurotransmitter release from the inhibitory pathways of the motor and autonomic nervous system (1), resulting in the overactivation of sympathetic nerve and extreme hypertension. Hypotension and bradycardia, often seen in severe cases, are attributed to a sudden withdrawal of sympathetic activity, and controlling rapid fluctuation of the hemodynamics is difficult in such patients.

An 87-year-old man with end-stage renal disease (ESRD) on maintenance hemodialysis (HD) was admitted to the hospital with dysarthria. He had hurt 7 days before the administration. His course got worse complicating trismus, spasms, and respiratory failure. He was transferred to our intensive care unit. On examination, his blood pressure was 216/138 mmHg, heart rate was 110/min. He showed muscle rigidity in his arms and legs. With the diagnosis of tetanus, penicillin G was started. Rocuronium, propofol, and fentanyl were used for controlling spasms. His respiratory failure required mechanical ventilation. His blood pressure was labile showing extreme hypotension, and that resulted in the cessation of intermittent hemodialysis. Continuous hemodiafiltration was initiated, however the blood pressure remained labile. Intravenous injection of magnesium-sulfate targeting the serum magnesium concentration of 2-3 mmol/L succeeded in stabilizing his hemodynamics (Fig. 1). Magnesium was continued for 2 weeks and renal replacement therapy could be switched to intermittent HD.

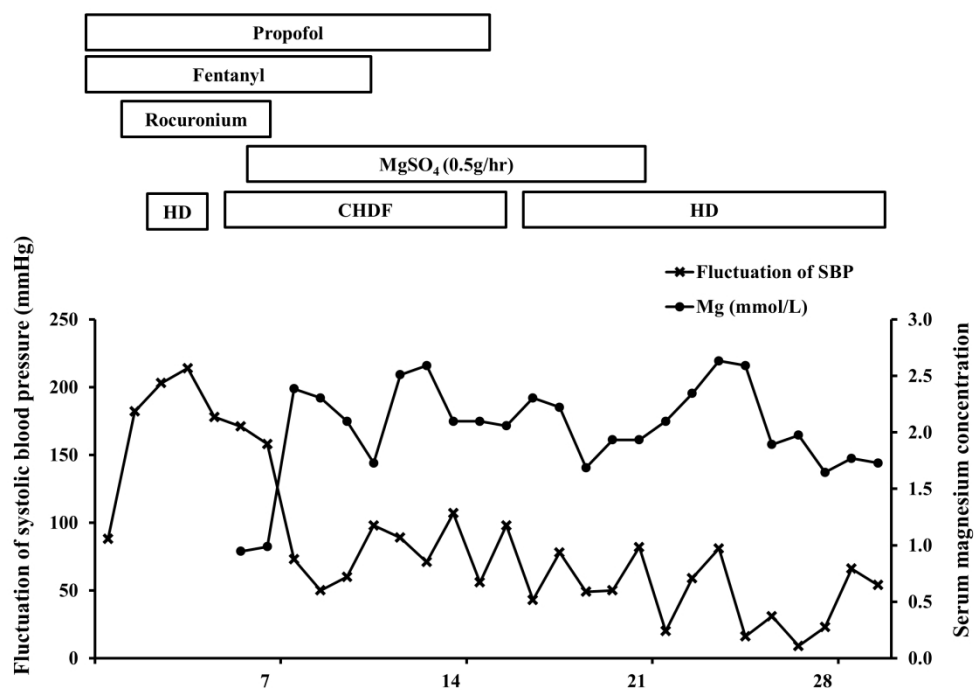
Magnesium has been shown to be effective in reducing spasms and autonomic

instability (2). Intravenous infusion of magnesium targeting the concentrations of 2-4 mmol/L is recommended from a randomized controlled trial in patients without renal impairment (1). Hypermagnesemia causes nausea and headache at the concentration of 2-3 mmol/L, and hypotension, muscle paralysis and coma above the concentration of 3 mmol/L (3). Serum magnesium concentration in patients with ESRD tends to be high and depends on dialysis clearance. It has recently been suggested that magnesium supplementation targeting high normal range may be beneficial in reducing all-cause and cardiovascular mortalities (4).

In patients with ESRD, serum magnesium concentration tends to be high and depends on dialysis clearance (4). Our patient was successfully treated by monitoring serum magnesium level. Magnesium can be a therapeutic option for tetanus even in patients with ESRD.

References

1. Thwaites C, Yen L, Loan H, et al. Magnesium sulphate for treatment of severe tetanus: a randomized controlled trial. *Lancet* 2006;368:1436-43.
2. Yen L, Thwaites C. Tetanus. *Lancet*. 2019;393:1657-68.
3. Onishi S, Yoshino S. Cathartic-induced Fatal Hypermagnesemia in the Elderly. *Intern Med* 2006;45:207-10.
4. Apetrii M, Covic A, Massy ZA. Magnesium supplementation: a consideration in dialysis patients. *Semin Dial* 2018; 31: 11-14.



Stabilized haemodynamics after injection of magnesium