



Milking the Diagnosis

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Case: A 67-year-old man presented with a 6-month history of episodic weakness. The episodes typically began with nausea and vomiting, followed by severe weakness involving inability to lift his upper or lower extremities against gravity or walk without assistance. The weakness typically lasted 12-24 hours before beginning to improve. He did not seek medical care for any of his previous episodes. During detailed medication history, the patient reported regular consumption of “a lot” of milk of magnesia for 3-4 years, up to 12 ounces in 24 to 48 hours.

He had 1+ reflexes throughout and 4/5 strength in all extremities but was unable to maintain erect posture in a seated position. Cranial nerves were intact.

Labs: Mg 12.2 mg/dL, Cr 2.0 mg/d, Ca 7.7 mg/dL

Course: The patient was treated with intravenous normal saline as well as twice-daily intravenous furosemide. His symptoms improved rapidly, with return to baseline strength, normalization of his deep tendon reflexes and ability to ambulate by hospital day 2, at which point he was discharged to home.

Discussion: The general internist should be aware of the clinical manifestations of hypermagnesemia, which can have severe and even fatal complications.^{1,2} Plasma magnesium concentration is predominantly regulated by the kidneys. Thus, symptomatic hypermagnesemia is most often seen in patients with renal impairment, though it can occur with normal renal function after large magnesium loads (Table 1).

Discussion: (cont'd)

Neuromuscular toxicity is the most common manifestation of hypermagnesemia, as it decreases transmission across the neuromuscular junction. Symptoms may range from hyporeflexia to respiratory depression and coma. Bradycardia and hypotension can also be seen, with extremely elevated levels producing complete heart block and cardiac arrest.

In the setting of normal renal function, treatment of hypermagnesemia involves cessation of magnesium containing therapies and may include loop diuretics to enhance magnesium excretion.

For patients with mild to moderate renal impairment, management includes intravenous isotonic fluids with a loop diuretic. Dialysis may be required in patients with advanced CKD, those with moderate to severe acute kidney injury, or in the setting of severe hypermagnesemia. Patients with severe manifestations or who require dialysis should initially receive intravenous calcium as a magnesium antagonist.³

Conclusion: Given the potentially severe consequences of untreated hypermagnesemia, the general internist should be familiar with its manifestations. Early recognition of hypermagnesemia in patients with signs and symptoms of neuromuscular toxicity is crucial for the initiation of appropriate therapies.

Table 1 – Causes of Hypermagnesemia

Common	Rare
<ul style="list-style-type: none"> • Excess magnesium intake * <ul style="list-style-type: none"> ❖ Oral ingestion <ul style="list-style-type: none"> ○ Antacids (Milk of Magnesia, etc.) ○ Magnesium supplementation (mag oxide) ○ Epsom salts ○ Laxatives (magnesium citrate) ○ Dead Sea water poisoning ❖ Parenteral administration <ul style="list-style-type: none"> ○ Magnesium infusion ❖ Rectal administration <ul style="list-style-type: none"> ○ Magnesium containing enemas <p>* Toxicity most often occurs in the setting of renal dysfunction</p>	<ul style="list-style-type: none"> • Primary hyperparathyroidism (occasionally) • Familial hypocalciuric hypercalcemia • Diabetic ketoacidosis • Hypercatabolic states, i.e., tumor lysis syndrome • Lithium ingestion • Milk-alkali syndrome • Adrenal insufficiency

References:

1. Randall, Russell E. "Hypermagnesemia in Renal Failure." *Annals of Internal Medicine Ann Intern Med* 61.1 (1964): 73. Web.
2. Jung, G. J. "Severe Hypermagnesemia Causing Quadriplegia in a CAPD Patient." *Peritoneal Dialysis International* 28.2206 (2008): Web.
3. Yu, Alan S L, and Aditi Gupta. "Causes and Treatment of Hypermagnesemia." *UpToDate.com*, 23 Apr. 2015. Web. 22 May 2015.