

## CLINICAL VIGNETTE

# Severe Hypocalcemia and Hyperphosphatemia after Fleet Enema Administration

Hamid R. Hajmomenian, M.D.

### *Case Report*

An 85-year-old man was admitted to the hospital for hematochezia. Reportedly the patient started having bright red blood per rectum one day prior to admission to the hospital. The patient's physical examination on arrival to emergency room revealed hypotension and tachycardia responsive to intravenous fluid administration. Laboratory tests on arrival to the hospital showed a serum calcium of 9.6 mg/dl; creatinine 1.2 mg/dl; sodium 135 mmol/L; BUN 25 mg/dl; potassium 4.8 mmol/L and serum CO<sub>2</sub> content of 29 mmol/L. The patient was evaluated by the gastroenterology service and a colonoscopy was considered for further evaluation of the patient's gastrointestinal bleed. The patient was hydrated with intravenous fluid, and received a fleet's enema as part of prepping for colonoscopy.

On the following day, the patient's laboratory tests revealed a serum calcium of 6.7 mg/dl with ionized level of 0.79 mg/dl. Patient has also developed acute kidney injury with an elevation of serum creatinine of 1.9 mg/dl, and hypernatremia with a serum sodium of 161 mmol/L. The patient was continued on intravenous fluid and treated with calcium supplementation. The serum phosphorous was found to be elevated at 14.6 mg/dl. On the third hospital day, laboratory tests showed worsening of hypocalcemia, with a total calcium of 4.8 and an ionized calcium of 0.58 mg/dl, despite receiving intravenous calcium, and worsening of acute kidney injury, with creatinine rising to 2.2 mg/dl. Repeat serum phosphorous rose to 22 mg/dl. With continued treatment of the patient's hypocalcemia and renal failure with intravenous calcium and intravenous fluids, he eventually had improvement in his renal function and electrolytes, with repeat laboratory tests showing a serum creatinine of 1.4 mg/dl; total serum calcium of 7.7 mg/dl; ionized calcium of 1.19

mg/dl; and serum phosphorous of 6.7 mg/dl on the fifth hospital day.

### *Discussion*

Sodium phosphate preparations have been associated with severe electrolyte abnormalities. These electrolyte abnormalities include severe hyperphosphatemia<sup>1</sup>, severe hypocalcemia<sup>2</sup>, hypokalemia<sup>3</sup>, hypernatremia<sup>4</sup>, and hyponatremia<sup>5</sup>. In addition to electrolyte disturbances, renal toxicity, arrhythmias and ischemic bowel injury are among other adverse events associated with administration of sodium phosphate preparation<sup>6</sup>. There have been fatal case reports secondary to these adverse events following administration of sodium phosphate preparations<sup>7</sup>.

There are subsets of patients who are at higher risk of developing these adverse effects. These include patients with pre-existing cardiac disease, patients with chronic or acute kidney diseases and reduced glomerular filtration rate, patients receiving more than the standard dose of sodium phosphate preparations, and patients with advanced age and debilitation<sup>9</sup>. The elevated risk of hyperphosphatemia in older patients may be due to an age-related decline in renal function, decreased bowel motility, systemic and gastrointestinal diseases, or concomitant use of medications that affect kidney or gastrointestinal function.

Hyperphosphatemia is the main cause of the other electrolyte abnormalities in this patient and it has been shown that the increase in serum phosphorous level negatively correlates with baseline GFR<sup>2</sup>. In our case, the patient had a pre-existing chronic kidney disease as reflected by an elevated serum creatinine of 1.2 mg/dl on admission, and this should be taken as a warning sign. These patients should use a different

preparation rather than sodium phosphate to prepare for his colonoscopy. Because reported laboratory kidney function tests results do not always reflect an accurate glomerular filtration rate in elderly patients<sup>10</sup>, it would be advisable to avoid using sodium phosphate as a preparation for colonoscopy or as a cathartic particularly in elderly patients.

Submitted on October 24, 2013

## REFERENCES

1. **DiPalma JA, Buckley SE, Warner BA, Culpepper RM.** Biochemical effects of oral sodium phosphate. *Dig Dis Sci.* 1996 Apr;41(4):749-53. PubMed PMID: 8674396.
2. **Beloosesky Y, Grinblat J, Weiss A, Grosman B, Gafter U, Chagnac A.** Electrolyte disorders following oral sodium phosphate administration for bowel cleansing in elderly patients. *Arch Intern Med.* 2003 Apr 14;163(7):803-8. PubMed PMID: 12695271.
3. **Vanner SJ, MacDonald PH, Paterson WG, Prentice RS, Da Costa LR, Beck IT.** A randomized prospective trial comparing oral sodium phosphate with standard polyethylene glycol-based lavage solution (Golytely) in the preparation of patients for colonoscopy. *Am J Gastroenterol.* 1990 Apr;85(4):422-7. PubMed PMID: 2183591.
4. **Ahmed M, Raval P, Buganza G.** Oral sodium phosphate catharsis and acute renal failure. *Am J Gastroenterol.* 1996 Jun;91(6):1261-2. Review. PubMed PMID: 8651185.
5. **Frizelle FA, Colls BM.** Hyponatremia and seizures after bowel preparation: report of three cases. *Dis Colon Rectum.* 2005 Feb;48(2):393-6. PubMed PMID: 15812590.
6. **Adamcewicz M, Bearely D, Porat G, Friedenberg FK.** Mechanism of action and toxicities of purgatives used for colonoscopy preparation. *Expert Opin Drug Metab Toxicol.* 2011 Jan;7(1):89-101. doi: 10.1517/17425255.2011.542411. Review. PubMed PMID: 21162694; PubMed Central PMCID: PMC3030244.
7. **Fass R, Do S, Hixson LJ.** Fatal hyperphosphatemia following Fleet Phospho-Soda in a patient with colonic ileus. *Am J Gastroenterol.* 1993 Jun;88(6):929-32. Review. PubMed PMID: 8503390.
8. **Szoke D, Dolci A, Genderini A, Panteghini M.** Fatal electrolyte abnormalities following enema administration. *Clin Chem.* 2012 Nov;58(11):1515-8. doi: 10.1373/clinchem.2011.170183. PubMed PMID: 23104957.
9. **Barkun A, Chiba N, Enns R, Marcon M, Natsheh S, Pham C, Sadowski D, Vanner S.** Commonly used preparations for colonoscopy: efficacy, tolerability, and safety—a Canadian Association of Gastroenterology position paper. *Can J Gastroenterol.* 2006 Nov;20(11):699-710. Review. PubMed PMID: 17111052; PubMed Central PMCID: PMC2660825.
10. **Drenth-van Maanen AC, Jansen PA, Proost JH, Egberts TC, van Zuilen AD, van der Stap D, van Marum RJ.** Renal function assessment in older adults. *Br J Clin Pharmacol.* 2013 Oct;76(4):616-23. doi: 10.1111/bcp.12199. PubMed PMID: 23802656; PubMed Central PMCID: PMC3791984.