Severe metabolic changes following oral sodium phosphate in a patient of renal cell carcinoma - On dialysis

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Introduction

Phosphate-based cathartic agents can be bought over the counter (OTC) as remedial for constipation. It is widely prescribed for colon preparation before any form of intra-abdominal surgery or colonoscopy. Rarely, its use can lead to symptomatic hypocalcemia and hyperphosphatemia.

Case Report

We report a 49-year-old female who had a history of end-stage renal failure secondary to IgA glomerulonephritis. She has been on regular hemodialysis since 2001. She was found to have right renal cell carcinoma during a routine 5 yearly ultrasound surveillance. She was referred to a urologist who arranged for an elective laparoscopic nephrectomy of her right kidney.

The calcium and phosphate levels taken 1 month before the surgery were normal at 2.75 mmol/L and 0.97 mmol/L, respectively, and she had a complaint of severe constipation from tumor-related hypercalcemia. She was prescribed lactulose solution accordingly. One day before the planned surgery, she volunteered information that she had purchased two sachets of OTC oral sodium phosphate (OSP) for her severe constipation. She had symptoms of tingling and bilateral carpal pedal spasm after consuming the OSP. Calcium and phosphate levels were 1.08 mmol/L and 5.88 mmol/L, respectively. Electrocardiogram done showed corresponding QT-interval prolongation. The strong temporal relationship between the OTC consumption and the acute metabolic abnormalities led nephrologists to believe that this was an unusual case of acute hypocalcemia and hyperphosphatemia secondary to OSP. Urgent hemodialysis with high flux dialyzer was initiated. The patient was also given intravenous calcium simultaneously through a central line. Her symptoms improved rapidly with the instituted treatment. The repeat calcium and phosphate levels 4 h after dialysis were 2.34 mmol/L and 1.84 mmol/L. Her calcium and phosphate remain stable after cessation of OSP.

Discussion

Laxatives are solutions of certain ingredients introduced orally or rectally to induce laxation. The different categories of laxatives include hyperosmotic chemicals (glycerin, sorbitol), lubricant (mineral oil), salines (sodium phosphate/sodium biphosphate), and stool softeners (docusate potassium).

ABSTRACT

Oral sodium phosphate (OSP), an effective bowel purgative, is available over the counter (OTC) and requires a substantially lower volume than polyethylene glycol-based preparative agents. Rarely, OSP consumption has been associated with acute hypocalcemia and hyperphosphatemia. We describe a case of chronic kidney disease patient developing symptomatic hypocalcemia following OTC OSP.

KEY WORDS: Hyperphosphatemia, hypocalcemia, laxatives, sodium phosphate
OSP has been long used as purgative for colonoscopy since 1990. It is frequently given in favor of standard polyethylene glycol-based lavage solutions because of the smaller required volume, which results in better patient compliance and improved colonic cleansing.

In this case, according to the objective causality assessment by the Naranjo probability scale, the causal association between OSP and the adverse event was probable (Naranjo score = 6). The adverse drug reaction was evaluated for causality assessment using the World Health Organization-Uppsala Monitoring Center (WHO-UMC) criteria. The assigned causality category with the WHO-UMC criteria for this adverse drug reaction was “likely.” In January 2014, the United States Food and Drug Administration issued a warning that using more than one dose of OTC sodium phosphate product in 24 h can cause rare but serious kidney injury, arrhythmias, or even death.[1] Various types of metabolic derangement, i.e., hyperphosphatemia, hypocalcemia, hypernatremia, hypokalemia, and metabolic acidosis have been associated with OSP. Central pontine myelinolysis has been reported in a patient whose sodium rose to 180 mMol/L after an OSP consumption.[2]

Hyperphosphatemia is more likely to occur in patients with renal insufficiency, who have decreased excretion of phosphate. The other at-risk groups are those who are elderly, those who had intestinal obstruction, decreased intestinal motility, or on concomitant medications that can reduce renal perfusion (diuretics, angiotensin converting enzyme inhibitor, or angiotensin receptor blocker).[3] Patients with history of congestive heart failure should also use OSP with cautioned as the resulting hypernatremia could lead to acute fluid overload. Even in patients with normal renal function, significant changes in the serum calcium and phosphate levels occurred after OSP.[4] In some occasions, this can lead to acute kidney injury. The sole causative factor could be explained by the case of biopsy-proven phosphate-induced nephrocalcinosis reported by Desmeules et al., where the nature and localization of the lesions strongly suggest that phosphate ingestion led to obstructive calcium-phosphate crystalluria, followed by intratubular nephrocalcinosis.[4]

Conclusion

Phosphate-based cathartic agents should only be used in patients with normal renal function. It may be prudent to evaluate serum calcium and phosphate levels before and after administration of sodium phosphate. OTC OSP abuse should be suspected when a patient with renal impairment and constipation presents with sudden hypocalcemia and hyperphosphatemia.

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Conflicts of Interest
There are no conflicts of interest.

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