

# ACUTE PHOSPHATE NEPHROPATHY AFTER ORAL SODIUM PHOSPHATE FOR BOWEL PREPARATION IN AN ELDERLY PATIENT

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## ABSTRACT

Acute phosphate nephropathy (APN) can result from oral sodium phosphate (OSP) (dibasic sodium phosphate and monobasic sodium phosphate) purgatives used for bowel cleansing before colonoscopy. Hyperphosphatemia, symptomatic hypocalcemia, hypernatremia, hypokalemia, high anion gap metabolic acidosis and acute kidney injury (AKI) are sometimes seen after OSP. Here in a case of AKI which advanced after preparation for colonoscopy with OSP

is presented. The patient was a 77 year old female. She had type 2 diabetes mellitus and hypertension. A colonoscopy was performed to investigate the etiology of constipation. OSP was administered for preparation of colonoscopy and, after the procedure AKI which clinically compatible with APN developed. APN was shown with renal biopsy.

**Keywords:** Acute kidney injury, acute phosphate nephropathy, hyperphosphatemia, oral sodium phosphate. *Nobel Med 2015; 11(3): 93-96*

## ORAL SODYUM FOSFAT İLE BARSAK HAZIRLIĞI SONRASINDA AKUT FOSFAT NEFROPATİwWSİ GELİŞMİŞ YAŞLI BİR OLGU

### ÖZET

Akut fosfat nefropatisi (APN) kolonoskopi öncesi bağırsak temizliği için kullanılmakta olan oral sodyum fosfat (OSP) (dibazik sodyum fosfat ve monobazik sodyum fosfat) içeren purgatiflere bağlı görülen bir klinik tablodur. Yan etki olarak hiperfosfatemi, semptomatik hipokalsemi, hipernatremi; hipokalemi, yüksek anyon açıklıklı metabolik asidoz ve akut böbrek

hasarı (ABH) görülebilmektedir. Bu yazıda OSP ile kolonoskopi hazırlığı yapılmış ve işlem sonrası ABH gelişmiş bir olgu sunulmuştur. Hasta 77 yaşında bir kadındı. Tip 2 diyabet ve hipertansiyon tanılarıyla izlenmekteydi. Kolonoskopi kabızlık etyolojisini araştırmak amacı ile yapılmıştı. Kolonoskopi hazırlığı için OSP kullanılmıştı. Ve işlem sonrası APN kliniği ile uyumlu ABH gelişmişti. APN tanısı renal biyopsi ile kesinleştirildi.

**Anahtar kelimeler:** Akut böbrek hasarı, akut fosfat nefropatisi, hiperfosfatemi, oral sodyum fosfat *Nobel Med 2015; 11(3): 93-96*

## INTRODUCTION

Acute phosphate nephropathy (APN) can result from oral sodium phosphate (OSP) purgatives used for bowel cleansing before colonoscopy. Hyperphosphatemia, symptomatic hypocalcemia, hypernatremia, hypokalemia, high anion gap metabolic acidosis, and acute kidney injury (AKI) are sometimes seen after OSP. Here, we present a case of AKI after preparation for colonoscopy using OSP.

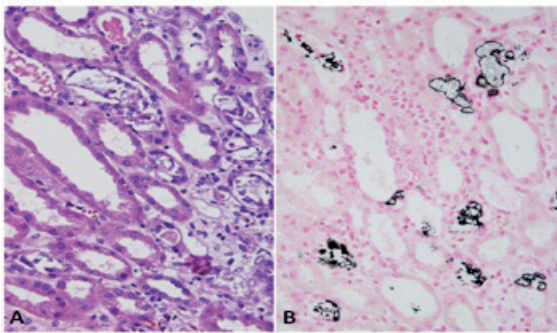
## CASE

A 77-year-old female presented to the emergency department with complaints of nausea and stomach burning. According to her medical history, she had type 2 diabetes mellitus and hypertension and was taking telmisartan, amlodipine, metformin, gliclazide, and rosuvastatin. A colonoscopy was performed to investigate the etiology of constipation 3 days ago and was apparently normal. OSP was administered in preparation for the colonoscopy. Her serum creatinine (0.91 mg/dL) and urea levels were normal, as determined before the colonoscopy. She claimed that she normally consumed less fluid. On review of her symptoms, there were no complaints of diarrhea or vomiting after the procedure. She said her nausea

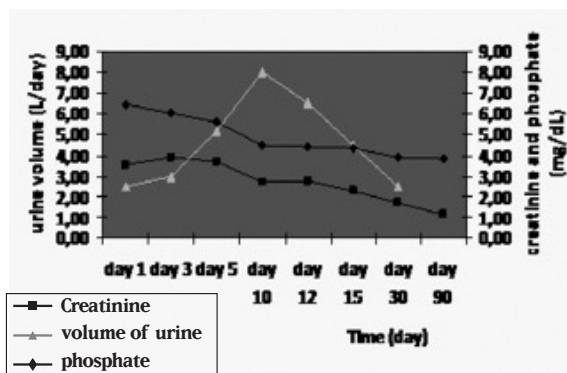
had increased significantly in the past 2 days. She was hospitalized with a diagnosis of AKI (creatinine = 3.55 mg/dL, urea = 74 mg/dL). Other admission laboratory parameters, including liver-cardiac-urinalysis, were normal. Intravenous hydration was started, and all drugs were stopped.

On physical examination, she was afebrile, with a regular pulse rate of 80 bpm, blood pressure of 140/74 mmHg, and respiratory rate of 16 breaths/min. She did not appear dehydrated. Her sclerae were anicteric. There was mild pitting edema of the legs and feet. Her lungs were clear to auscultation and heart sounds were normal, with no added sounds. No hernia was apparent on examination. Palpation of the abdomen revealed mild epigastric tenderness. Bowel sounds were normal. No hepatosplenomegaly, ascites, or palpable masses were detected. A neurologic examination revealed no abnormality. The rest of her examination was unremarkable. Her phosphate level was 6.48 mg/dL, and calcium, potassium, and sodium levels were all within normal limits. The baseline biochemical parameters on presentation are presented in Table. HbA1C was 7.4%. Further blood analyses showed normal results for folic acid, vitamin B<sub>12</sub>, prothrombin time, and activated partial thromboplastin time. Protein electrophoresis was normal. Urinalysis showed normal sediment. The 24-h urinary protein excretion was 194 mg. Parathyroid hormone, free T4, and TSH levels were normal. The serological examination was negative for HBsAg, anti-HCV antibody, anti-HIV antibody, and anti-HBs. On an ultrasonographic examination, both kidneys were apparently normal.

A renal biopsy was performed because of elevated creatinine levels despite adequate hydration and was consistent with APN (Figure 1). The biopsy showed minimal tubular dilatation, flattening of the epithelium, fragments of cells within the tubular lumina, intratubular calcifications (in the distal nephron), and interstitial inflammatory infiltrate with occasional eosinophils. No specific treatment was given. Creatinine values gradually began to fall after the second week. The volume of urine was between 2500 and 8000 mL/day. The course of serum creatinine and phosphorus levels and amount of urine per day are shown in Figure 2. After her polyuria was resolved, she remained in the nephrology outpatient clinic for monitoring. Her serum creatinine level returned to the normal range 12 weeks after diagnosis.



**Figure 1.** Renal biopsy: minimal tubular dilatation, flattening of the epithelium, fragments of cells within the tubular lumina, intratubular calcifications and interstitial inflammatory infiltrate with occasional eosinophils (A: HE 200x, B: von Kossa 200x).



**Figure 2.** Course of serum creatinine and phosphorus levels and amount of urine per day.

## DISCUSSION

The drugs used to clean the colon for colonoscopy should be safe and effective for successful diagnosis and treatment. OSP is a product commonly used for

bowel preparation before colonoscopy.<sup>1,2</sup> There are many reports on both the reliability and side effects of OSP.<sup>2-5</sup> Generally, side effects are observed in patients over 55 years of age. Risk factors known to increase the risk of development of phosphate nephropathy include preexisting acute or chronic kidney disease or a kidney transplant, advanced age, female gender, hypertension, diabetes mellitus, true or effective volume depletion, abnormal bowel motility, use of medications such as ACE-Is, ARBs, diuretics, lithium, or nonsteroidal anti-inflammatory drugs, excessive/repeated dosing of OSP, active colitis, and atherosclerosis.<sup>2-5</sup>

OSP-induced APN exhibits two different clinical patterns: early symptomatic and late insidious.<sup>6</sup> The former consists of an acute illness that manifests as changes in mental status, tetany, or cardiovascular collapse, usually occurring within 1 h after receiving OSP, and patients present with severe hyperphosphatemia and hypocalcemia. These patients require urgent fluid resuscitation, rapid correction of electrolyte disturbances, and sometimes dialysis. Some patients with this presentation survive and show renal function recovery. The second pattern is associated with a more insidious onset of APN (days to months) and is generally irreversible.<sup>7</sup> The patient presented in this report apparently fell into this category. Typically, at the time of diagnosis, serum phosphorus and calcium levels are normal or phosphorus may be elevated slightly, and calcium is decreased slightly, especially within the first 3 days of bowel preparation.

The main pathological findings in the kidney biopsy are nephrocalcinosis and tubulointerstitial nephropathy, in agreement with what we found.<sup>8</sup> A prospective study assessing renal impairment after preparation for colonoscopy showed that OSP appeared to be safe in well-hydrated subjects with a normal renal status.<sup>9</sup> In that study, creatinine clearance was  $\geq 60$  mL/min/1.73 m<sup>2</sup>, and most of the patients were males; thus, the results should not be generalized to females. In addition, that study showed that the quality of the bowel preparation and efficacy of polyp detection were superior after OSP to those after polyethylene glycol (PEG). Other studies have also suggested that OSP is more effective than PEG-based lavage solutions.<sup>10</sup> However, PEG is more advantageous in terms of side effects.

Table. Baseline biochemical laboratory data.		
	Values	Reference Values
Glucose (mg/dL)	107	(70-106)
Urea (mg/dL)	74	(17-43)
Creatinine (mg/dL)	3.55	(0.6-1.1)
Sodium (mEq/L)	136	(134-146)
Potassium (mEq/L)	3.94	(3.5-5.2)
Clorur (mEq/L)	106	(97-108)
Uric acid (mg/dL)	6.45	(2.6-6)
Calcium (mg/dL)	7.85	(8.5-10.5)
Phosphorus (mg/dL)	6.48	(2.7-4.5)
ALP (U/L)	51	(30-120)
AST (U/L)	15	(0-31)
ALT (U/L)	10	(0-38)
LDH (U/L)	185	(0-247)
GGT (U/L)	22	(0-38)
CK (U/L)	44	(0-145)
Total bilirubin (mg/dL)	0.57	(0.3-1.2)
Total protein (g/dL)	5.64	(6.0-8.0)
Albumin (g/dL)	3.25	(3.2-5.5)
ESR (mm/h)	34	(0-20)
CRP (mg/dL)	0.59	(0-0.8)
WBC (/ $\mu$ L)	5000	(4000-10,000)
Hb (g/dL)	11.1	(11.5-16)
Platelet (/UI)	199 000	(150 000-400 000)

WBC: White blood cells, Hb: hemoglobin, ALP: alkaline phosphatase, AST: aspartat aminotransferase, ALT: alanine aminotransferase, LDH: lactate dehydrogenase, GGT: gamma glutamyl transferase, ESR: erythrocyte sedimentation rate, CRP: C reactive protein, CK: creatine kinase

## CONCLUSION

OSP is associated with clinically relevant electrolyte abnormalities and acute kidney injury, particularly in elderly patients. Thus, the use of OSP in older patients and in those with risk factors for APN should be avoided. We wish to alert all physicians and colonoscopy centers who are using OSP for bowel preparation to keep in mind the development of AKI due to OSP, especially in geriatric patients. Hydration is the cornerstone for prevention and treatment of AKI; thus, physicians should recommend all patients to increase their water intake.

\* The authors declare that there are no conflicts of interest.

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