

## Original article

# Kidney injury after sodium phosphate solution beyond the acute renal failure

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## ABSTRACT

**Background and objectives:** Screening colonoscopy with polypectomy reduces colorectal cancer incidence and mortality. An adequate bowel cleansing is one of the keys to achieving best results with this technique. Oral sodium phosphate solution (OSP) had a widespread use in the 90s decade. Its efficacy was similar to polyethylene glycol (PEG) solution, but with less cost and convenient administration. Series of patients with acute renal failure due to OSP use have been reported. However, large cohorts of patients found no difference in the incidence of renal damage between these two solutions.

**Methods:** From 2006 to 2009 we identified twelve cases of phosphate nephropathy after colonoscopy prepared with OSP. All patients were followed up to six months. All patients had received just a single dose.

**Results:** We analyzed 12 cases with phosphate nephropathy; three patients debuted with AKI and nine patients had chronic renal injury. Four cases were confirmed with renal biopsy. One patient with AKI needed hemodialysis at diagnosis without subsequent recovery. Two patients (both with chronic damage) fully recovered their previous renal function. The remaining patients (nine) had an average loss of estimated glomerular filtration rate of 24 ml/min/1.73 m<sup>2</sup>.

**Conclusions:** The use of OSP can lead to both acute and chronic renal damage. However, chronic injury was the most common pattern. Both forms of presentation imply a significant and irreversible loss of renal function. Further studies analyzing renal damage secondary to bowel cleaning should consider these two different patterns of injury.

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**Abbreviations:** OSP, oral sodium phosphate; PEG, polyethylene glycol; AKI, acute kidney injury; CKD, chronic kidney disease; PN, phosphate nephropathy; ACE inhibitor, angiotensin-converting enzyme inhibitor; ARB, angiotensin receptor blocker; MDRD4, modification of the diet in renal disease; eGFR, estimated glomerular filtration rate; Scr, serum creatinine; CHF, chronic heart failure; ESRD, end stage renal disease.

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## Daño renal después de preparación colónica con soluciones de fosfato. Más allá del fracaso renal agudo

### R E S U M E N

#### Palabras clave:

Insuficiencia renal crónica  
Insuficiencia renal  
Nefropatía

**Antecedentes y objetivos:** La colonoscopia con polipectomía con fines de cribado reduce la incidencia del cáncer colorrectal y la mortalidad por esta enfermedad. Una preparación colónica aceptable es una de las claves para conseguir mejores resultados con esta técnica. Las soluciones de fosfato de sodio oral (OSP) fueron muy utilizadas en la década de los noventa del siglo pasado. Su eficacia era similar a la de las soluciones de polietilenglicol (PEG), pero más baratas y con una administración sencilla. Se han descrito series de casos de pacientes con insuficiencia renal aguda provocada por OSP. Sin embargo, en cohortes amplias de pacientes no se observó ninguna diferencia en la incidencia de daño renal entre estas dos soluciones.

**Métodos:** Entre 2006 y 2009 identificamos 12 casos de nefropatía por fosfato tras preparación con OSP para colonoscopia. Se realizó el seguimiento de todos los pacientes durante 6 meses. Todos los pacientes habían recibido una única dosis.

**Resultados:** Analizamos 12 casos de nefropatía por fosfato; 3 se manifestaron con IRA y 9 presentaron daño renal crónico. Cuatro de los casos se confirmaron mediante biopsia renal. Un paciente con IRA precisó hemodiálisis en el momento del diagnóstico, sin que experimentara recuperación posterior. Dos pacientes (ambos con daño crónico) recuperaron totalmente su función renal anterior. Los demás pacientes (9) presentaron una pérdida media en la filtración glomerular estimada de 24 ml/min/1,73 m<sup>2</sup>.

**Conclusiones:** El uso de OSP puede ocasionar daño renal tanto agudo como crónico. Sin embargo, el daño crónico fue el más frecuente. Ambas formas de presentación suponen una pérdida considerable e irreversible de función renal. Nuevos estudios que analicen el daño renal secundario a preparación colónica deben considerar estos dos patrones distintos de daño.

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## Introduction

The use of colonoscopy for routine screening for colon and rectal cancer has been one of the most successful public health projects worldwide. Although colonoscopy is the most frequent technique that requires a proper bowel preparation, it could be necessary in others diagnosis tests: CT colonography, barium enema and surgery on the gastrointestinal tract. Effective preparation requires an adequate level of cleansing.

The osmotically balanced, polyethylene glycol-based electrolyte solutions are elected because they are safer and faster than large volume saline-based electrolyte solutions. Many patients have great difficulty to drink the large volume, that can result in unsuccessful preparation and poorly cleansed colon, and therefore, inadequate study assessment.<sup>1</sup> The small volume of oral sodium phosphate solution (OSP) was associated with improved patients compliance, less discomfort, and superior colonic cleansing.

The OSPS is not exempt from risks. It can cause transient hyperphosphatemia and can induce intravascular volume contraction. There have been reports of serious adverse events, including death, and there have been case reports of nephrocalcinosis with renal failure associated with the use of oral sodium phosphate.<sup>2-4</sup> In fact, in 2008 FDA issued a warning about the use of OSP in patients with chronic kidney disease (CKD) or major cardiovascular comorbidities.

Unfortunately, the results of the available epidemiologic data from large populations are quite confusing some studies reporting a potent association<sup>5-7</sup> and others reporting non-significant trends toward better kidney outcomes after OSP compared with other purgatives.<sup>2,8</sup> A major limitation of most of these studies is they just consider renal damage when an acute renal failure happens. However the chronic damage has been well documented with the use of this purgative solution.<sup>9,10</sup>

Given the large number of patients exposed to OSP annually, clarification of this association is compelling. We present a series of patients with acute and chronic renal damage link to use of OSP.

## Material and methods

### Patient selection and study design

From 2006 to 2009 we identified 12 patients with suspected nephropathy after colonoscopy prepared by phosphosoda. The clinical suspicion of PN (was based on the presence of an acute or chronic renal function deterioration (>50% from basal serum creatinine) chronologically related to colonoscopy. In all the patients, the presence of proteinuria o hematuria was ruled out by repeated urine analysis, also presence of urinary tract obstruction or other urinary tract abnormalities was excluded

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