

Pediatrics

## Chemical Colitis Caused by Hydrogen Peroxide Enema in a Child : A Case Report and Literature Review

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A 2-year-old girl, previously healthy, was brought to our emergency department due to abdominal pain (cramping), following recurrent hematochezia after an accidental hydrogen peroxide enema (35%, 5 mL) by her caregiver. She was hospitalized and admitted to the pediatric department and treated with NPO (nil per os), intravenous fluid, and parenteral antibiotic therapy. Laboratory, radiologic, endoscopic evaluations were performed. She was discharged with full recovery 10 days after admission. This may be the first case report of acute chemical colitis by accidental hydrogen peroxide enema in children.

**Key Words:** Colitis, Child, Hydrogen peroxide

### Introduction

Hydrogen peroxide, a chemical compound that has a single peroxide chain is unstable and split into reactive radicals. It was used for enemas therapeutically to relieve ileus in infants, and fecal impaction in adults for nearly last 100 years<sup>1)</sup>. But this products have been abandoned after proven that it can cause colonic damage similar to that of ulcerative colitis, pseudomembraneous colitis. There are case reports of chemical colitis after self-administrated hydrogen peroxide enema in naturopathic adult<sup>2,3)</sup>, and a few case has been reported about caustic injury after ingesting hydrogen peroxide in children. We report a rare case of chemical colitis after administration of a hydrogen peroxide enema in a girl.

### Case Report

A 2-year girl was referred emergency department (ED) for complaining of bloody stool, cramping abdominal pain for a 12-hour period. She was previously healthy

and was taking no medication. On subsequent history, her caregivers reported rectal administering 5 mL of 35% hydrogen peroxide solution. They planned fecal disimpaction with glycerin suppositories for defecation difficulty of their child. The hydrogen solution was stored in a home refrigerator for cleansing properties, but it was mistaken for glycerin suppository. A small amount of hematochezia was noted.

When she arrived to the ED, she was hemodynamically stable. And she was not in respiratory distress. The abdominal physical examination revealed a mild, diffuse tenderness and hyperactive bowel sound but abdomen was soft. Rectal examination revealed nonspecific findings. Bloodwork was normal except for mild leukocytosis; white blood cell was 10,900/mm and the hemoglobin level was 11.4 g/dL. Her growth and development were normal and there were no evidence of physical or sexual abuse.

Ultrasonography and plain abdominal film suggested a diffuse colonic distention (Fig. 1). A flexible sigmoidoscopy showed diffuse mucosal hemorrhage, edema with friability in rectal mucosa (Fig. 2). Pathologic findings revealed erosion of the surface, sloughing with lym-

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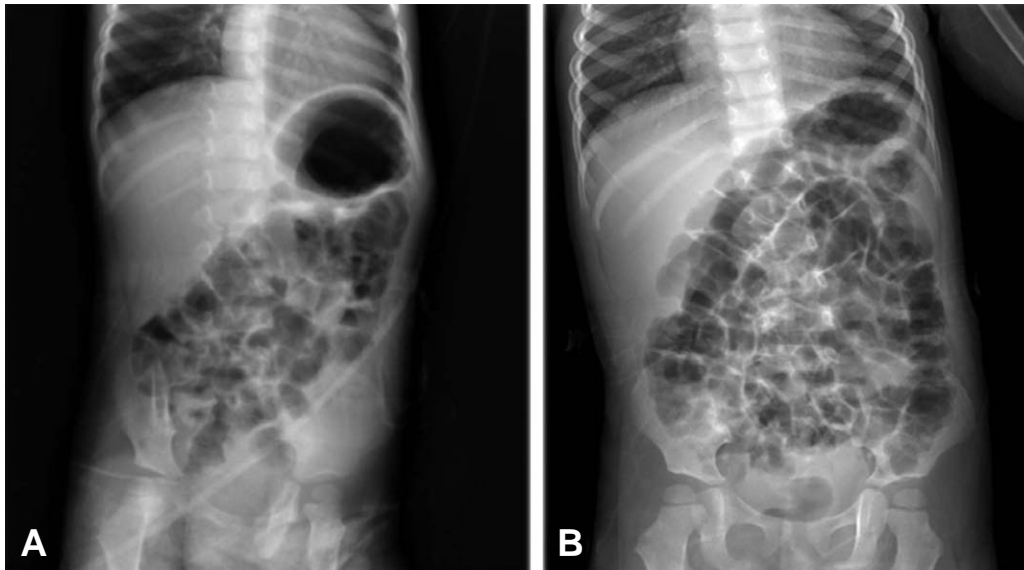
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phocyte aggregation (Fig. 3).

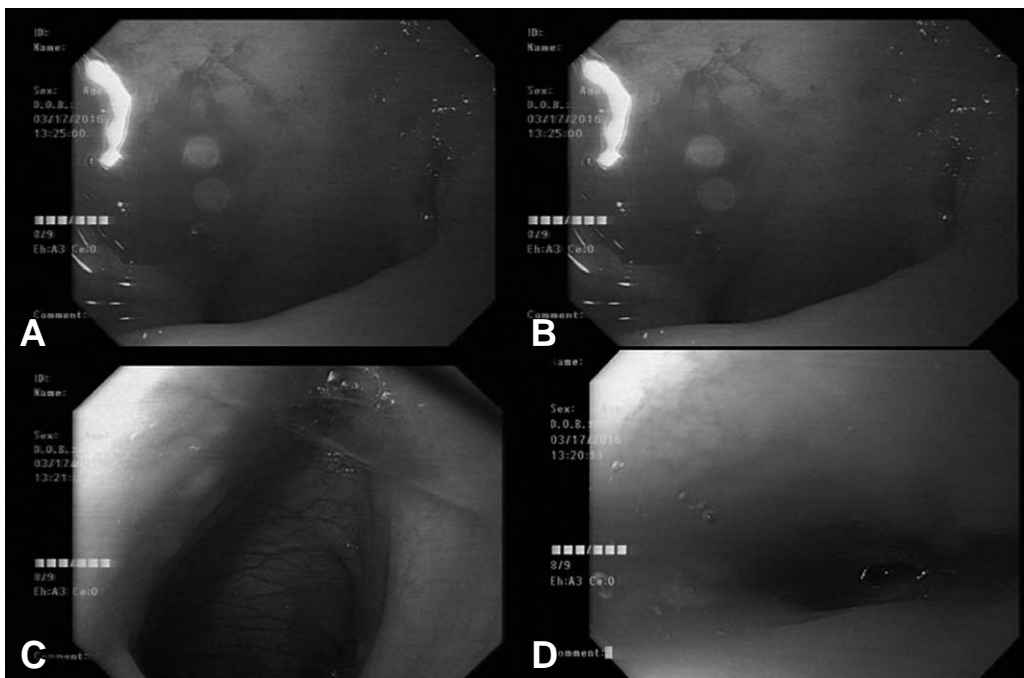
The patient was managed conservatively with NPO and parenteral antibiotics (metronidazole, 30 mg/kg/day). Hematochezia resolved within 6th hospital days, and abdominal pain was improved in the 3rd hospital day. The patient's hemoglobin (Hb) level remained stable. She was discharged without complications after 10 hospital days.

## Discussion

Hydrogen peroxide- a clear, colorless, odorless oxidizing agent- has concentrations ranging from 3% to 90%, and it is widely available in a variety of medical products<sup>4</sup>. It is most often used as an irrigation, disinfecting solution and 3% solutions are used as common house-



**Fig. 1.** An abdominal plain film on the day of the acute episode revealed a diffuse gaseous dilatation of colonic loops.



**Fig. 2.** A flexible sigmoidoscopy revealing diffuse mucosal hemorrhage, marked edema with friability in rectal mucosa after rectal administration of 5 mL of 35% hydrogen peroxide.

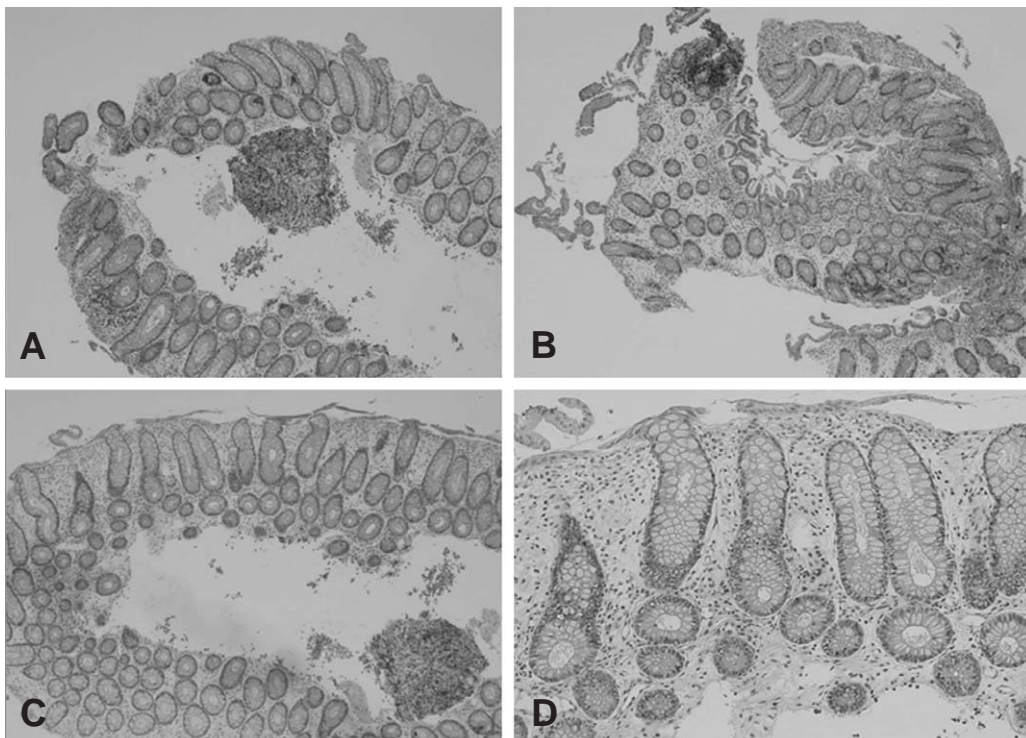
hold disinfectants. So it can be a source of accidental poisonings, especially in children. Because it is unstable and decomposable into water and oxygen in the presence of alkali, enzyme catalase, it can contribute in mucous membranes such as liver, bone marrow, red blood cells, and kidney. So, the quantity of oxygen produced exceeds maximum blood solubility; venous gas formation within the mesenteric and portal venous system can occur, resulting in systemic embolization and lipid peroxidation.

Chemical colitis is a type of colitis, an inflammation of the large intestine, caused by the introduction of chemicals to the colon by an enema or other procedures. Like other injury, the pathogenesis of hydrogen peroxide colitis is the secondary change to the chemical reaction resulting in penetration of highly reactive oxygen species resulting in damage to colonic mucosa<sup>5,6</sup>. It is secondary to absorption of hydrogen peroxide into the epithelial interstices and capillaries, so this rapid release of oxygen can lead to hollow viscous perforation. Hydrogen peroxide enteritis can cause instant bubbling on the mucosal surface followed by a whitening of the mucosa. It is called the 'snow white' sign. After exposure, the colon becomes distended within moments. Despite the possibility of severe injury from hydrogen peroxide, it has

been used extensively throughout medical history. In reported studies, many cases have occurred after accidental contamination of endoscopes with in adults with hydrogen peroxide.

Clinical sequelae range are variable from mild, self-limited colitis to strictures, perforations requiring surgery or even fatal<sup>7</sup>. For example, there was a report about a patient who developed chemical colitis with rectal bleeding after self administration of a hydrogen peroxide enema<sup>8</sup>.

Endoscopy should be performed in all hemodynamically stable patients to assess for injury because signs and symptoms do not consistently correlate with the extent of injury. The recommended treatment are bowel rest, broad spectrum antibiotics and fluid resuscitation. In this case, the patient presented with symptoms that included abdominal pain and hematochezia. Clinical manifestations were similar to other cases of hydrogen peroxide enema in adults, and the radiologic and endoscopic findings were similar to other chemical colitis including mucosal friability and hemorrhage, but the 'snow white' sign was not seen. Pathologic findings were also similar to other cases of chemical colitis by hydrogen peroxide enema in adults. Because this is the



**Fig. 3.** Photomicrograph of esophageal mucosal biopsy demonstrating surface erosion, sloughing with lymphocyte aggregation in the sigmoid colon and rectal mucosa (H&E, orig. mag.  $\times 600$ ).

first report of chemical colitis caused by 35% hydrogen peroxide in children, we chose the recommended treatments for adults, and the clinical course was good in this child. However, she should be monitored for late-onset complications because there is no exact data about long-term complications of chemical colitis in children. Hydrogen peroxide is readily available from pharmacies in Korea, and several websites are available to the public that describe its use as an enema. Therefore, we believe clinicians and caregivers should be aware of this potentially lethal chemical culprit and pay attention to handling hydrogen peroxide because the storage and use of 35% hydrogen peroxide for natural health benefits can result in an emerging source for more a serious accident in children.

### Conflicts of Interest

The authors have no financial conflicts of interest.

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