Chemical Colitis Caused by Hydrogen Peroxide Enema in a child: A case report and Literature Review

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Abstract

A 2-year-old girl, previously healthy, was brought to the Emergency Department because of significant cramping abdominal pain with recurrent hematochezia after an accidental hydrogen peroxide enema (35%, 5mL) by her caregiver. She was hospitalized to the pediatric department and treated with NPO, intravenous fluid and parenteral antibiotic therapy. Laboratory, radiologic, endoscopic evaluation were performed during admission period. She was discharged with fully recovered state on 10th hospital day, and this is the first case report of acute chemical colitis by accidental hydrogen peroxide enema in children.

Keywords: Colitis; Children; Hydrogen peroxide
Introduction:

Hydrogen peroxide is a chemical compound that has a single peroxide chain which is unstable and split into reactive radicals. In the past it was used for enemas therapeutically to relieve meconium ileus in infants, and fecal impaction in adults for nearly 100 years. But this products have largely been abandoned after it was proven that it can cause colonic damage similar to that of ulcerative colitis, or pseudomembranous colitis. There are some case reports of chemical colitis resulting from self-administrated hydrogen peroxide enema in naturopathic therapy in adult, but no case has been reported about caustic injury after ingesting hydrogen peroxide in children. We report a rare case of severe, acute colitis after administration of a hydrogen peroxide enema in a child.

CASE DETAILS

A 2-year old girl was referred our emergency department for complaining of bloody stool and, cramping abdominal pain for a 12-hour period. She was previously healthy and was taking no medication. Her caregiver reported rectal administering 5mL 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.

On arrival at the emergency department, she was hemodynamically stable and in no respiratory distress. The abdominal physical examination revealed a soft abdomen with mild, diffuse tenderness and hyperactive bowel sound. Rectal examination revealed
nonspecific findings. All result of blood test were normal except for mild leukocytosis; white blood cell count was 10,900/uL and hemoglobin (Hb) level was 11.4g/dL. Her growth and development were normal and there were no evidence of physical or sexual child abuse.

Ultrasonography and plain abdominal film suggested a diffuse colonic distention (Fig 1.). A flexible sigmoidoscopy was performed to assess the severity of the mucosal injury, it showed diffuse mucosal hemorrhage, and marked edema with friability in rectal mucosa (Fig 2.). Pathologic findings revealed erosion of the surface, sloughing with lymphocyte aggregation (Fig 3.). On subsequent history, the caregivers indicated that the 35% hydrogen peroxide was used for natural health purposes. It was kept in a home refrigerator for cleansing properties, but it was mistaken for glycerin suppository by them.

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

The Figure Legends

Fig 1. An abdominal plain film on the day of the acute episode revealed diffuse gaseous dilatation of colonic loops (A,B).

Fig 2. A flexible sigmoidoscopy revealed diffuse mucosal hemorrhage, and marked edema with friability in rectal mucosa after rectal administration of 5 mL of 35% hydrogen peroxide.
Fig 3.

Photomicrograph of esophageal mucosal biopsy demonstrated surface erosion, sloughing with lymphocyte aggregation in the sigmoid colon and rectal mucosa. (H&E stain).

DISCUSSION

Hydrogen peroxide is a clear, colorless, odorless oxidizing agent. It has concentrations ranging from 3% to 90%, and is widely available in a variety of medical and household products. It is most often used as an irrigation, disinfecting solution and 3% solutions are used as common household disinfectants. Therefore it can be a common source of accidental poisonings, especially in children. Because of it is unstable and decomposability into water and oxygen in the presence of alkali or enzyme catalase, it can be contribute in mucous membranes such as liver, kidney, red blood cells and bone marrow. 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 thought to be secondary to the chemical reaction resulting in penetration of highly reactive oxygen species resulting in damage to colonic mucosa. The volume of oxygen liberated from the decomposition of hydrogen peroxide can be considerable, with 30 mL of 35% hydrogen peroxide yielding 3.5 L of oxygen, and it is thought to be 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 with 3% solution can cause instant bubbling on the mucosal surface followed by a whitening of the mucosa termed the ‘snow white’ sign.\textsuperscript{4} After exposure, the colon becomes distended within moments. Despite the potential for severe injury from hydrogen peroxide, it has been used extensively throughout medical history.\textsuperscript{1} In reported cases, many cases have occurred after accidental contamination of endoscopes with hydrogen peroxide in adults.\textsuperscript{7}

Clinical sequelae range from mild, self-limited colitis to strictures, perforations requiring surgery or even fatal course.\textsuperscript{7} For example, there is a report about a patient who developed chemical colitis with rectal bleeding after self administration of a hydrogen peroxide enema in Korea, and clinical course was good with conservative management.\textsuperscript{8} But in other case report, the clinical presentation was consistent with acute ulcerative colitis symptoms–sudden onset of abdominal pain with bloody diarrhea- and the patient developed shock and died on the fourth hospital day.\textsuperscript{9}

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 treatments include bowel rest, broad spectrum antibiotics, and fluid resuscitation.\textsuperscript{7}

In this case, the patient presented with symptoms that include abdominal pain and hematochezia. Clinical manifestations were similar to other cases of hydrogen peroxide enema in adult. And radiologic, endoscopic findings were similar to other chemical colitis including mucosal friability and hemorrhage, but ‘snow white’ sign was not seen. Pathologic findings were also similar to other cases of chemical colitis by hydrogen peroxide enema in adult.\textsuperscript{8} Because this is the first report of chemical colitis caused by 35\% hydroden peroxide in childen, we chose the recommended treatments like adults\textsuperscript{7}, and
the clinical course was good in this children. However, it should be monitored for late-onset complication 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 describes its use as an enema. Therefore, we believe clinicians and caregivers should be aware of this potentially lethal chemical culprit and pay attention about handling hydrogen peroxide because the storage and use of 35% hydrogen peroxide for natural health benefits can result in an emerging source for more serious accident in children.

Conflicts of Interest

The authors have no financial conflicts of interest.

References


