Waiting-list induced proctitis: The hydrogen peroxide enema

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SI Gan, LM Price. Waiting-list induced proctitis: The hydrogen peroxide enema. *Can J Gastroenterol* 2003;17(12):727-729.

Hydrogen peroxide is a widely available disinfectant that has been reported to cause colitis. We report a case of a 67-year-old man who presented with an acute proctitis caused by a self-inflicted 3% hydrogen peroxide enema. The patient's intention was to cure himself of a recently diagnosed prostate cancer, because the waiting list for oncological consultation was deemed too long. The pathogenesis of hydrogen peroxide mucosal injury and a review of the literature is discussed.

Key Words: *Chemical; Colitis; Enema; Hydrogen peroxide; Proctitis*

Hydrogen peroxide has been used in a variety of clinical applications in gastroenterology. These include therapy for meconium ileus and fecal impaction, radiological localization of gastrointestinal hemorrhage and the demonstration of rectovaginal fistulae (1-5). While these techniques have been all but abandoned, more recently Wu et al (6) and Kalloo et al (7) both reported using 3% hydrogen peroxide in visualization of acute upper gastrointestinal bleeding. Finally, hydrogen peroxide has also been used widely as an endoscopic disinfectant. This practice has led to several reports of inadvertent iatrogenic hydrogen peroxide-induced enteritis (8-10).

While self-induced chemical injury to the esophagus is not uncommon, acute proctitis and colitis are more rare incidents in the medical literature. We describe the case of a limited proctitis caused by a self-administered hydrogen peroxide enema.

CASE PRESENTATION

A 67-year-old man presented to the emergency room complaining of profuse diarrhea, tenesmus and urgency over a 24 h period. The diarrhea was initially nonbloody but had subsequently turned bright red in color. Past medical history included only type II diabetes mellitus with no known complications. He had no significant history of gastrointestinal disease. Medications included metformin and glyburide. There was no history of nonsteroidal anti-inflammatory drug use, and the use of metformin long preceded the diarrhea. The patient had no history of travel or antibiotic use. His only risk factor for ischemic colitis was his diabetes. Physical examination revealed a soft and nontender abdomen. Rectal examination was normal other than a diffusely hardened prostate. The

Rectite causée par un lavement au peroxyde d'hydrogène et liée à une liste d'attente trop longue

Le peroxyde d'hydrogène est un désinfectant facilement accessible, connu pour causer des colites. Voici le cas d'un homme de 67 ans qui est venu consulter pour une rectite aiguë, provoquée par l'auto-administration d'un lavement avec une solution de peroxyde d'hydrogène à 3 %. Son intention était de guérir un cancer de la prostate diagnostiqué depuis peu parce qu'il jugeait trop longue la liste d'attente pour une consultation en oncologie. Il sera question dans le présent article de la pathogenèse des lésions causées à la muqueuse par le peroxyde d'hydrogène et on fera un survol de la documentation sur le sujet.

patient was afebrile but had a white blood cell count of $15.7 (\times 10^9/L)$. His hemoglobin level was normal. Gastroenterology was consulted.

After closer questioning, the patient disclosed that he had recently been diagnosed with prostate cancer on rectal biopsy. While the biopsy had been performed two weeks before, he had only received the results two days before presentation. Subsequent to his diagnosis, he was then told that his appointment to be seen at the local cancer agency would be in seven to eight week's time. On returning home, the patient was so distraught with the waiting period that he attempted to cure himself by way of what he believed to be a caustic enema. Believing the prostate gland lay somewhere in the rectal vault, the patient reported using 100 mL to 200 mL of 3.5% hydrogen peroxide per rectum.

A flexible sigmoidoscopy showed a friable, inflamed mucosa within the rectum. Several white patches were visible in the areas of inflammation (Figures 1A and 1B). The proctitis extended to approximately 15 cm and then tapered to normal.

The patient was discharged home. The diarrhea abated as did the blood per rectum. A repeat sigmoidoscopy 10 days later revealed the area to have healed almost completely. Only mild areas of erythema were still visible. Biopsies were taken and failed to reveal any signs of fibrosis or scarring. The patient was started on hormonal treatment for his prostate cancer in the interim.

DISCUSSION

Chemical colitis is not uncommon. Several reports of various substances causing colonic inflammation exist. These include soap, lye, ammonia, glutaraldehyde, potassium permanganate,

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Received for publication April 3, 2003. Accepted June 9, 2003

Figure 1 Hydrogen peroxide proctitis. **A** Endoscopic appearance of the distal rectum demonstrating the 'snow-white sign' and mucosal erythema and edema; **B** Linear erosions and white plaques in the proximal rectum

vinegar, chloroxylenol and chlorhexidine (11-14). While all these chemicals likely have a direct irritant and/or caustic effect on the mucosa, the mechanism of damage by hydrogen peroxide to colonic mucosa is unique.

The pathogenesis of hydrogen peroxide colitis has been reported to be secondary to penetration of the chemical into the mucosa with subsequent production of oxygen ($2\text{H}_2\text{O}_2 \rightarrow 2\text{H}_2\text{O} + \text{O}_2$). Experimental models have shown that after seconds of exposure, the colon becomes distended, white and bloodless. Microscopically, minute gas cysts form as a result of oxygen production in both mucosa and submucosa within 1 min of exposure, followed by vascular congestion, focal hemorrhage and ulceration (15). Gas bubbles infiltrate the large veins and lymphatics and can be noted in the portal vein, right side of the heart, liver, lungs and inferior vena cava. Fatal gas embolisms have also been reported (15-17). Due to the rapid decomposition of the hydrogen peroxide by tissue catalase, the majority of damage is transient. When followed over time, however, the mucosa can progress to become gangrenous and necrotic.

Reports of hydrogen peroxide colitis are sparse in the literature. In 1951, Pumphery (18) reported two patients with acute colitis following hydrogen peroxide enema. Sheehan (19) delineated the pathogenesis of the disease by animal experimentation, after describing another case of hydrogen peroxide colitis (19). By 1981, when Meyer et al (20) reported three more patients with hydrogen peroxide colitis, the use of hydrogen peroxide enema for various therapeutic and diagnostic procedures was already uncommon.

Renewed interest in this phenomenon occurred in the past two decades, after four reports of a total of 22 cases of inadvertent iatrogenic hydrogen peroxide exposure to the colon. All of these 22 cases were attributed to contamination of the air-water channels of the colonoscope (8-10,21). Most episodes occurred in relation with a 'final rinse' of the channels using 3% hydrogen peroxide solution before or after glutaraldehyde submersion. Bilotta and Wayne (8) reported on seven of these patients, and coined the "snow white" sign caused by mucosal whitening after peroxide exposure. Jonas et al (10) noted that these endoscopic findings of discrete and confluent plaques could be mistaken for pseudomembranous colitis. The authors recommended that hydrogen peroxide be avoided in the final phase of cleansing. Interestingly, glutaraldehyde, the other agent commonly used in colonoscope disinfection, has also been reported as causing a unique form of acute iatrogenic colitis

(22). The cases occurred shortly after the introduction of a 2.0% glutaraldehyde solution (in contrast to a previously used 0.2% solution) and were generally associated with inadequate rinsing of the channels. A second source of glutaraldehyde proved to be from within the tubing used to connect the water bottles to the endoscopes. Similar to the hydrogen peroxide cases, patients presented with tenesmus, bright red blood per rectum and abdominal cramping. Pathology was indistinguishable from ischemic colitis. Another relatively recent report (23) of glutaraldehyde colitis involved six cases that were attributed to an automatic scope-disinfecting machine. The authors stated that the problems could be avoided by repeatedly changing rinse water, force-air drying the channels and washing endoscopes before use (23). This was confirmed in a study in 2001 that found that after machine disinfection, there was no significant glutaraldehyde residue in the scope if the scope was soaked for 5 h in saline and if the channels were rinsed (24).

A more unfortunate aspect to this case is the anxiety state that led to the self-induced proctitis. Waiting lists for almost all procedures and consultations continue to grow in Canada, but a particular need has been identified in oncology (25-27). These waits are difficult to avoid under the current economic and resource limitations and, therefore, special attention should be paid to the emotional burden that a new diagnosis of cancer may impose. Certainly in our patient, his belief was that his condition was imminently fatal and that two months was far too long to go with hormonal treatment alone. With appropriate follow-up and proper counseling as to the nature, course, prognosis and treatment of the specific disease, it may be possible to avert such potentially disastrous situations.

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