

Injury by hypertonic phosphate enema

JOHN B. PIETSCH, MD; HARRY M. SHIZGAL, MD, FRCS[C]; JONATHAN L. MEAKINS, MD, D SC, FRCS[C]

Complications due to the administration of either therapeutic or diagnostic enemas are not common but are very troublesome. The injury may be mechanical, from the use of hard nozzles, balloons or excess pressure,¹⁻⁵ or the result of irritation by chemicals (for example, soapsuds) that cause such complications as anaphylactic reactions,⁶ rectal gangrene,⁷ peritonitis⁸ and acute colitis.^{9,10}

It was hoped that the introduction of commercially prepared enemas in disposable plastic bottles with short tips would reduce the incidence of complications. However, the hypertonic phosphate in many of these preparations may have compounded the problem. Absorption of inorganic phosphates from these enemas has been reported to cause hypocalcemic tetany in both children and adults.¹¹⁻¹³ Turell¹⁴ reported 12 cases of anorectal injury resulting from use of these enemas and concluded that the effect of the hypertonic phosphate greatly aggravated the mechanical injury.

We have seen three patients with extraperitoneal perforation of the anorectum secondary to administration of a hypertonic phosphate (Fleet) enema. With an animal model we evaluated the effect on this injury of parenteral administration of methylprednisolone.

Case reports

Case 1

A 62-year-old woman received a Fleet

enema while convalescing from a knee arthrodesis. Half an hour later she complained of rectal and lower abdominal pain; rectal examination revealed tenderness and bright red blood. She was transferred to the Royal Victoria Hospital, where proctoscopy showed a 3-cm tear of the posterolateral rectal wall. She was treated with sitz baths and antibiotics, but a large perirectal hematoma developed. Increasing inflammation and frank necrosis of perianal tissues, including the sphincters, necessitated establishment of a defunctioning loop colostomy and repeated débridement of the perianal area. Three months after discharge she returned to hospital because of persistent rectal drainage and abscess formation, for which abdominoperineal resection of the rectum was performed. She was discharged well.

Case 2

A 62-year-old woman was given a Fleet enema while convalescing from a fractured hip. Rectal pain and a small amount of bleeding per rectum began and she was transferred 2 days later to the Royal Victoria Hospital. Circumferential necrosis of the rectum with crepitus in the tissues was detected. A defunctioning colostomy was fashioned and débridement of the necrotic tissue, including the sphincters, performed. Frequent débridement and dressing changes were required. She was discharged with healed wounds, functional loss of the rectum and a permanent colostomy.

Case 3

A 48-year-old man given a Fleet enema 2 days after elective tympanoplasty for chronic otitis media had immediate pain and burning in the anorectum. When his bowels moved, a small amount of fresh blood was noted in the stools. He felt flushed and had a chill, an oral temperature of 38°C and abdominal pain. The anorectum was erythematous, and firm

and warm to the touch. Sitz baths provided no relief. The next day he was noted to have red, blistered buttocks and was unable to sit. Parenteral therapy with gentamicin and clindamycin was begun 24 hours after the injury and continued for 7 days. In addition, methylprednisolone, 500 mg *q6h*, was given intravenously for 3 days. Over the next 4 to 5 days the tenderness, erythema and induration resolved and tissue loss was limited to a small area of mucosa on the posterolateral aspect of the rectum. He maintained good sphincteric control and was discharged on the 8th day.

Evaluation of methylprednisolone therapy

Methods

The effect of steroids on the inflammatory reaction produced by hypertonic phosphate solutions was evaluated in 10 rabbits. In the midportion of one ear 1.0 ml of either saline or Fleet enema solution (a combination of sodium phosphate and sodium biphosphate containing 2178 meq/l of sodium and 1756 meq/l of phosphate) was injected intradermally. Four rabbits received saline, and the other six, the enema solution. The latter six required anesthesia with sodium thiopental because of the pain the injected solution causes. Three of the rabbits that received the hypertonic phosphate solution were given methylprednisolone, 20 mg/kg intravenously, 24, 48 and 72 hours after the ear injection. All animals were examined daily for 1 week after the injection. The response was graded according to the diameter of the erythematous area as follows: grade 1, 5 to 10 mm; grade 2, 10 to 15 mm; grade 3, 15 to 20 mm; and grade 4, more than 20 mm.

From the departments of surgery and microbiology, Royal Victoria Hospital and McGill University, Montreal

Reprint requests to: Dr. Jonathan L. Meakins, Royal Victoria Hospital, 687 Pine Ave. W, Montreal, PQ H3A 1A1

ACTIFED*

Tablets/Syrup

Tripolidine HCl/Pseudoephedrine HCl

Antihistamine/Decongestant

Indications: The prophylaxis and treatment of symptoms associated with the common cold, acute and subacute sinusitis, acute eustachian salpingitis, serous otitis media with eustachian tube congestion, aerotitis media, croup and similar lower respiratory tract diseases; in allergic conditions which respond to antihistamines including hay fever, pollenosis, allergic and vasomotor rhinitis, allergic asthma.

Precautions: Use with caution in hypertensive patients and in patients receiving MAO inhibitors. Patients should be cautioned not to operate vehicles or hazardous machinery until their response to the drug has been determined. Since the depressant effects of antihistamines are additive to those of other drugs affecting the central nervous system, patients should be cautioned against drinking alcoholic beverages or taking hypnotics, sedatives, psychotherapeutic agents or other drugs with CNS depressant effects during antihistaminic therapy. Rarely, prolonged therapy with antihistamines can produce blood dyscrasias.

Adverse Effects: None serious. Some patients may exhibit mild sedation or mild stimulation.

Dosage: Adults & children over 6 years, 2 teaspoonfuls of syrup or 1 tablet 3 times daily. Children 4 months to 6 years, 1/2 adult dose. Infants up to 4 months, 1/2 teaspoonful of syrup 3 times daily.

Supplied: Syrup, Tablets: Each white, biconvex tablet 7.4 mm in diameter with code number WELLCOME M2A on same side as diagonal score mark or each 10 ml of clear, lemon-yellow syrup contains tripolidine HCl 2.5 mg and pseudoephedrine HCl 60 mg.

The syrup is available in 115, 225 and 2250 ml bottles; tablets are available in packages of 12 and 24, and bottles of 100 and 500.



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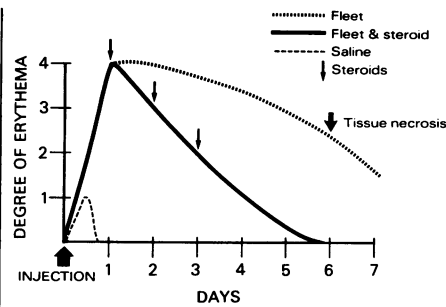


FIG. 1—Inflammatory response in rabbits to solutions injected intradermally into ear.

Results

The results are illustrated in Fig. 1. In the four rabbits given an injection of saline the erythema lasted a few hours and disappeared by 24 hours. In the six rabbits given an injection of hypertonic phosphate solution pronounced erythema and induration were evident by 24 hours. In the three untreated rabbits the inflammation progressed to central necrosis and full-thickness tissue loss by 5 to 7 days. However, in the three rabbits treated with methylprednisolone the inflammation resolved over the next 5 days without any tissue loss.

Discussion

Enema injuries of the anorectum and colon range from mucosal irritation to perforation, the latter being extraperitoneal in two thirds of cases and intraperitoneal in one third.¹⁵ The perforation is usually above the dentate line and therefore painless. However, when hypertonic phosphate solution is then injected, pain ensues promptly and a pronounced inflammatory response occurs. Parenteral administration of methylprednisolone, initiated 24 hours after the injury, resolves the inflammation and prevents tissue necrosis. Intra-peritoneal perforation requires emergency laparotomy, lavage, drainage and temporary diversion; the value of steroid therapy in this injury is unknown.

In our three patients extraperitoneal perforation of the anorectum was secondary to administration of a hypertonic phosphate enema. Extensive tissue necrosis, including the loss of internal and external sphincters, occurred in two patients. Both required a permanent colostomy and one required abdominoperineal resection of the rectal remnant because of persistent drainage and abscess formation. The extensive destruction of the rectum and surrounding tissues was avoided in one patient, who was treated early with parenteral administration of antibiotics and methylprednisolone.

Perforation of the anorectum during enema administration is a simple mechanical injury; bacterial contamination is effectively prevented by establishment of a temporary colostomy. However, when the enema solution contains hypertonic phosphate, which can create much tissue destruction, the problem is greatly compounded, as happened in our cases 1 and 2. Successful treatment of extraperitoneal perforation of the anorectum in this instance and avoidance of irreparable tissue damage depend on early diagnosis and aggressive treatment with appropriate parenteral antibiotics and steroids.

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References

1. ROLAND CG, ROGERS AG: Rectal perforations after enema administration. *Can Med Assoc J* 81: 815, 1959
2. LEWIS JW, KERSTEIN MD, KOSS N: Barium granuloma of the rectum: an uncommon complication of barium enema. *Ann Surg* 181: 421, 1975
3. LARGE PG, MUKHEIBER WJ: Injury to the rectum and anal canal by enema syringes. *Lancet* 2: 596, 1956
4. HARTMAN AW, HILLS WJ: Rupture of the colon in infants during barium enema: report of 2 cases. *Ann Surg* 145: 712, 1957
5. HAMIT HF: Perforation of the colon after barium enema and air contrast studies. *Am Surg* 21: 1226, 1955
6. SMITH D: Severe anaphylactic reaction after a soap enema. *Br Med J* 4: 215, 1967
7. BENDIT M: Gangrene of the rectum as a complication of enema. *Br Med J* 1: 664, 1945
8. FRECH HC, LANIER RL: Injuries to the bowel as the result of an enema. *Am J Obstet Gynecol* 74: 1146, 1957
9. PIKE BJ, PHILLIPPI PJ, LAWSON EH: Soap colitis. *N Engl J Med* 285: 217, 1971
10. BARKER CS: Acute colitis resulting from soapsuds enema. *Can Med Assoc J* 52: 285, 1945
11. SWERDLOW DB, LABOW S, D'ANNA FJ: Tetany and enemas: report of a case. *Dis Colon Rectum* 17: 786, 1974
12. HONIG PJ, HOLTAPPLE PG: Hypocalcemic tetany following hypertonic phosphate enemas. *Clin Pediatr* 14: 678, 1975
13. MCCONNELL T: Fatal hypocalcemia from phosphate absorption from laxative preparation. *JAMA* 216: 147, 1971
14. TURELL R: Laceration to the anorectum incident to enema. *Arch Surg* 81: 953, 1960
15. WOLFE WG, SILVER D: Rectal perforation with profuse bleeding following an enema. *Arch Surg* 92: 715, 1966