

WHOLE BOWEL IRRIGATION IN CHILDREN: PROLONGED POST-IRRIGATION DIARRHEA DUE TO ISOTONIC SALINE*

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Whole bowel irrigation (WBI) was performed in 60 children aged two to 16 yrs (mean 5.1 ± 0.5 yrs) in preparation for surgery (n: 59) and rectoscopy (n: 1). Isotonic saline (n: 43) and lactated Ringer's solutions (n: 17) were infused for irrigation. Vital signs remained stable during the procedure. Negligible electrolytic alterations were encountered. In general, WBI was well tolerated by all the patients. Two (3.3%) patients had abdominal cramps, vomiting was observed in nine (15%) and edema developed in one (16%).

The results of the preparation were assessed as satisfactory in 45 cases (75%), adequate in 10 cases (16.6%) and poor in 5 cases (8.3%). Diarrhea, as a complication of saline, has not been reported previously in the literature, but was observed in 32 of our cases (74.4%), and lasted 2-5 days (mean 3.38 ± 0.7 days) after irrigation. In addition, it is noteworthy that bile-stained intraluminal clear fluid was seen only in the patients who had been irrigated with lactated Ringer's solution. Our research related to this observation is continuing. *Key words: whole bowel irrigation, colonoscopy, rectoscopy, colonic surgery, diarrhea.*

Whole bowel irrigation (WBI) was first developed for the treatment of cholera¹. Hewitt et al² described their experience using WBI as a newer method of bowel preparation. They achieved rapid and effective cleansing of the colon by irrigating the intestinal tract with large volumes of saline or lactated Ringer's solutions^{2,3}.

Since Hewitt et al² first reported WBI in 1973, many studies comprising a large series of adults have been carried out, in which good tolerance, promptness and efficacy of the method have been observed⁴. We found only a few published reports describing the application of this procedure in childhood³⁻⁵. The purpose of this article is to report our experience using WBI in 60 children and to discuss the results.

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Material and Methods

This study includes children who underwent elective colorectal surgery or endoscopy between January 1986-June 1987. Indications for WBI are given in Table I.

TABLE I: Indications for Whole Bowel Irrigation

<u>Procedure</u>	<u>No of Patients</u>
Colostomy closure	38
Hirschsprung's disease	
Swenson's operation	7
Duhamel's operation	5
Hemicolectomy	1
Colonic interposition	1
Colotomy and polyp excision	1
Myectomy	4
Perineal pull-through	2
Rectoscopy	1
Total	60

WBI was performed in 60 patients aged between two to 16 years, who had no evidence of cardiac disorders, renal failure, cirrhosis or intestinal obstruction. The patients were admitted one day before the procedure was to be performed. Dietary restrictions were not recommended. A nasogastric tube was placed into the stomach and metoclopramide hydrochloride (Metpamide^R) was given (0.3 mg. per kg) intramuscularly 30 minutes before irrigation to initiate gastric emptying and to prevent abdominal cramps. Forty-three of the patients were irrigated with isotonic saline solution, while the others received lactated Ringer's solution. Antibiotics were not added to the solutions which were heated to 37 °C and administered via a nasogastric tube at a rate of 1m/kg/min for 30 minutes after the defecation material was clear.

Weight, hemoglobin, hematocrit, blood electrolytes, and urine density were determined before, during and after irrigation. Vital signs (heart beat, arterial blood pressure, body temperature) were monitored and recorded per 15 minutes. Observed complaints including nausea, vomiting, epigastric fullness and abdominal colic were also recorded. The adequacy of the preparation was assessed by direct inspection of the colon. The results were evaluated as either satisfactory (no fecal residue present), adequate (little residue), or poor (considerable residue). All the patients were prepared and operated on under the same conditions. Post-operative observation included clinical signs of irrigation-related complications.

Results

The first stool was usually passed 30-90 minutes after the initiation of irrigation (mean 61 ± 2.9 min). The clear fluid evacuation time changed and ranged between 60-270 minutes (mean 128 ± 7.9 min). The mean time of total irrigation was 222 ± 0.126 minutes. 2-11 liters (mean 3.88 ± 2.43 l) of irrigant were infused (mean 223 ml/kg). Preparation was completed without any discomfort in 48 patients (80%), two patients experienced abdominal cramps, vomiting was observed in nine patients and edema in one patient. Vital signs were normal. There were no significant changes in weight, serum electrolyte, hemoglobin or hematocrit values during and after irrigation. In some cases, urine density decreased slightly at the end of the procedure.

Preparation was assessed as satisfactory in 45 cases (75%), adequate in 10 cases (16.6%), and poor in 5 cases (8.3%). Bile-stained fluid was detected in all the patients irrigated with lactated Ringer's solution. Diarrhea was observed 2-5 days after preparation in 32 patients (74.4%) who had been irrigated with isotonic saline. The defecation rate was 4-6 times daily (mean 4.66 ± 0.4).

Discussion

Traditional methods are time consuming, difficult and frequently inadequate in cleansing the colon⁴. WBI is the best alternative to the usual methods used in children⁴. Many irrigants have been recommended^{4,6}. We preferred using isotonic saline and lactated Ringer's solutions because they are inexpensive and readily available. In addition, infusion of large volumes of these solutions were well tolerated. Since the absorbed volume was minimal, no significant hemodynamic or electrolytic alterations were encountered. Edema was only observed in one patient, and disappeared spontaneously. According to our experience, the administration of a diuretic is usually unnecessary in children.

The administration of neomycin and/or erythromycin may lead to pseudomembranous colitis, as described by Weidema et al⁷. Therefore, we did not add these drugs to the irrigants nor did we administer them orally. Excessive bile-stained intraluminal clear fluid was detected in the patients who had been irrigated with lactated Ringer's solution. We cannot ascertain the reason for this, but it is known that lactated Ringer's solution may produce a choleretic effect. We believe that in order to explain this occurrence, further investigation is required, and our research concerning this subject is continuing.

As far as we know, continual post-irrigation diarrhea has not been reported. It is considered a complication of saline and is explained by the prolonged purging effect of an irrigant due to the release of cholecystokinin and pancreozymin from the intestinal mucosa⁶.

WBI is effective in rapidly evacuating drug overdoses and/or ingested toxic foreign bodies (e.g. iron, tricyclic antidepressants, alkaline battery) from the gastrointestinal tract^{3,8,9}. WBI has also been administered to prepare the colon for double contrast barium enema⁴. None of our patients were irrigated for these reasons. Our study illustrated that WBI provides excellent preparation for colonic surgery and endoscopy, and that the preoperative admission time is reduced by 2-3 days. The procedure was well tolerated by our patients, and only prolonged diarrhea was a complication of isotonic saline irrigation. Thus, we decided to use lactated Ringer's solution in WBI.

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