



ORIGINAL ARTICLE

Oral sodium phosphate for bowel preparation in endoscopic submucosal dissection training in a pig model: A pilot study



Chien-Yuan Hung ^{a,b,c,d}, Ming-Jen Chen ^{a,c,d,e},
Chih-Jen Chen ^{a,c,d,e}, Chia-Yuan Liu ^{a,c,d,e},
Shou-Chuan Shih ^{a,b,c,d}, Kuang-Chun Hu ^{a,b,c,d},
Horng-Yuan Wang ^{a,b,c,d,*}

^a Division of Gastroenterology, Department of Internal Medicine, Mackay Memorial Hospital, Taipei, Taiwan

^b Health Evaluation Center, Mackay Memorial Hospital, Taipei, Taiwan

^c Mackay Junior College of Medicine, Nursing and Management, Taipei, Taiwan

^d Department of Medicine, Mackay Medical College, New Taipei, Taiwan

^e Clinical Skills Training Center, Department of Medical Education, Mackay Memorial Hospital, Taipei, Taiwan

Received 25 September 2013; accepted 18 March 2014

Available online 18 December 2014

KEYWORDS

Bowel preparation;
Endoscopic submucosal
dissection;
Live pig model;
Sodium phosphate

Summary *Background:* The technical complexity of endoscopic submucosal dissection (ESD) demands adequate training to lower the surgical risks. The diameter and mucosal structure of the porcine colon is similar to the human colon making the pig a good animal for colonoscopic procedure training. However, a standardized animal bowel preparation used in colonic ESD training has not been established.

Methods: Colonoscopic procedures were performed in 12 pigs, divided into four groups. The control group (Group 1) fasted and received no preprocedure preparation. Group 2 received a single dose of sodium phosphate 2 mL/kg; Group 3 and Group 4 received split doses of sodium phosphate (2 mL/kg and 4 mL/kg, respectively). An experienced endoscopist, blinded to the preparation method, assigned a score from excellent (4 points) to poor (1 point) at five regions of the colon. The final mean bowle cleansing score was calculated from five regions in each pig. Serum biochemistry and electrolyte levels were analyzed.

* Corresponding author. Division of Gastroenterology, Department of Internal Medicine, Mackay Memorial Hospital, Number 92, Section 2, Chungshan North Road, Taipei 104, Taiwan.

E-mail address: hywang@ms2.mmh.org.tw (H.-Y. Wang).

Results: The different doses of sodium phosphate preparations did not change the serum glucose, creatinine, sodium, potassium, calcium, or phosphorus levels. The colonic cleansing scores in Group 1 (1.3 ± 0.4 ; mean \pm standard deviation) and Group 2 (1.5 ± 0.2) were lower than those of Group 3 (2.6 ± 0.6) and Group 4 (3 ± 0.2).

Conclusion: The use of oral sodium phosphate is easy and safe in porcine bowel preparation for ESD training. Bowel preparation using a split dose of 2 mL/kg or 4 mL/kg sodium phosphate produces an adequate bowel cleansing. The optimal dosage still needs to be established in a large-scale study.

Copyright © 2014, The Gastroenterological Society of Taiwan, The Digestive Endoscopy Society of Taiwan and Taiwan Association for the Study of the Liver. Published by Elsevier Taiwan LLC. Open access under [CC BY-NC-ND license](#).

Introduction

Endoscopic submucosal dissection (ESD) is a standard, widely accepted procedure for performing *en bloc* resection of early gastrointestinal neoplasms [1]. The technique is very operator-dependent, involving special skills and instrumentation. The learning curve from novice level to full competency should be supported systematically at every stage with adequate training programs. A panel of experts from Europe reached a consensus that hands-on experience with live pigs should be a major part of any structured training program [2]. At present, training in endoscopy or developing new endoscopic techniques relies mainly on the pig model [3], as the porcine colon is comparable in size and structure to the human colon. In our previous report, we examined the depth of ESD specimens from the resected specimens. Histological examination of these specimens showed that the muscularis mucosa and superficial submucosa were present in the specimens; this observation demonstrated the feasibility of the ESD technique for resection [4].

A gradually increasing number of publications have described ESD training using the porcine colon [5–9]. The bowel cleansing protocols currently used in pigs were initially extrapolated from protocols used in humans or dogs [10–12]. The regimens include dietary restrictions, administration of stimulant laxatives, enemas, oral polyethylene glycol lavage, and sodium phosphate. Researchers should be aware of the range of options and the advantages of various colonoscopy preparations, as well as their limitations [13], to determine the ideal bowel preparation for experimental animals used in ESD training.

In contrast with human medicine, few researches have been performed to evaluate the safety and efficacy in bowel preparation for pigs. Polyethylene glycol (PEG) has been extensively used in humans with good efficiency; however, it requires a substantially large volume of solution to achieve the optimal result. Sodium phosphate is a low-volume, hyperosmolar laxative and has been found to be effective; it is a well-accepted bowel preparation used before a colonoscopic procedure in humans. However, few literatures discussed the use of sodium phosphate solution in experimental animals, and a standardized regimen of bowel preparation has not been established.

The primary goal of this study was to access the difference in efficacy between different doses of sodium

phosphate in bowel preparation. The secondary goal was to determine the safety of sodium phosphate use through serum biochemistry and electrolyte analysis.

Methods

Preparation of pigs

All pigs, weighing between 26 kg and 28 kg, were supplied by our institution's Animal Center. The study was conducted over three sessions, with four pigs randomly used in each session. The animals just received boiled rice 2 days before study. Food was withheld, but water was allowed during the preparation for colonoscopy. In the study groups, each pig received 2 mL/kg or 4 mL/kg sodium phosphate, diluted with the same volume of water, via orogastric intubation. All procedures and animal treatments were conducted in accordance with the Guide for the Care and Use of Laboratory Animals and were approved by the Animal Care and Use Committee and The Institutional Review Board of Mackay Memorial Hospital, Taipei, Taiwan (MMH-A-S-100-34).

The radiopaque marker method to evaluate colonic transit time

Because bowel preparations have rarely been tested in pigs, three additional pigs were used for a preliminary study to evaluate colonic transit time. The pigs were administered a capsule containing handmade radiopaque markers with food every 8 hours. After an additional 8 hours, a series of abdominal radiographs were taken every 8 hours to evaluate the average colonic transit time until a pig passed the first mark (Fig. 1).

Colonic cleansing methods

An oral sodium phosphate solution (Fleet Phospho-soda; C.B. Fleet Co., Inc., Lynchburg, VA, USA) was administered in either a single or split dose of 2 mL/kg, or a split dose of 4 mL/kg. The single dose of sodium phosphate was given in the evening (6:00 PM) on the day before the examination. The split doses were divided into two portions, with half of the dose given in the evening (6:00 PM) on the day before the examination and the second dose given the next

Download English Version:

<https://daneshyari.com/en/article/3278546>

Download Persian Version:

<https://daneshyari.com/article/3278546>

[Daneshyari.com](https://daneshyari.com)