

Evaluating Mechanical Bowel Preparation Prior to Total Laparoscopic Hysterectomy

Nicholas A. Ryan, MD, Vicki Sue-Mei Ng, MD, Haleh Sangi-Haghpeykar, PhD,
and Xiaoming Guan, MD, PhD

ABSTRACT

Background and Objectives: Mechanical bowel preparation (MBP) has been used prior to total laparoscopic hysterectomy (TLH), but evidence for its use is lacking. Our study seeks to assess whether or not completion of preoperative MBP prior to TLH improves visualization of the surgical field, bowel handling, or overall ease of the operation.

Methods: Women aged 18–65 years undergoing TLH for benign indications at a level 1 trauma center were randomized to a bowel preparation (BP; n = 39) or non-bowel preparation (NP; n = 39) regimen. After each operation, the surgeon completed a survey about intraoperative visualization of the surgical field, bowel handling, and the overall ease of the operation. The surgeon was also asked whether or not he thought the patient had completed MBP. The patient completed a survey about pre- and postoperative gastrointestinal discomfort. The surgeon was blinded to whether MBP was completed before the operation.

Results: There was no difference in intraoperative visualization, bowel handling, or overall ease of the operation between the BP and NP groups. Comfort levels before and after surgery were not significantly different between the two groups. The surgeon was able to correctly predict whether the patient performed MBP in 59% of cases.

Conclusion: The routine use of MBP before TLH does not improve intraoperative visualization, bowel handling, or overall ease of performing the procedure. It also has no

significant effect on patient comfort levels. MBP is not indicated before TLH for benign indications.

Key Words: Bowel preparation solution, Hysterectomy, Laparoscopy, Magnesium citrate.

INTRODUCTION

Mechanical bowel preparation (MBP) is the process by which the amount of intestinal contents is reduced by either chemical or physical means. It has not been shown to reduce the risk of surgical site infection, anastomotic leakage, or intraoperative contamination of the surgical field in elective colon surgeries.¹ It has been proposed that MBP before laparoscopic procedures improves intraoperative visualization and manipulation of the bowel. The first gynecologic study to assess these claims was undertaken by Muzii et al in 2006.² In that prospective randomized single-blind study, MBP (sodium phosphate) exerted no influence on the surgical field, surgical difficulty, or surgical times. In addition, MBP significantly increased the patient's discomfort during the preoperative night. The authors included multiple operations in their study, with the majority being laparoscopic ovarian cystectomies. In a similar study in 2013, Won et al³ concluded that MBP (sodium picosulfate) results in a statistically significant improvement in intraoperative visualization and bowel handling. However, given the small difference in the results of the visual analog scale used in the study, the authors cautioned that the added benefit may not be clinically significant. Of note, they found that patients who completed a minimal residue diet, with or without MBP, experienced more discomfort than those who simply fasted before the procedure.

The aforementioned studies dealt with benign gynecologic procedures as a whole. Recently, Siedhoff and colleagues⁴ examined total laparoscopic hysterectomy (TLH) specifically and concluded that MBP (sodium phosphate enema) did not improve intraoperative visualization of the surgical field. In the present study, we sought to further evaluate the necessity for MBP with an oral agent (magnesium citrate) before TLH for benign indications in a predominantly Hispanic patient sample.

Department of Obstetrics and Gynecology, Baylor College of Medicine, Houston, Texas (Drs. Ryan, Sangi-Haghpeykar, Guan).

Department of Obstetrics and Gynecology, St. Luke's Women's Center, San Francisco, California (Dr. Ng).

Presented as an abstract at the 42nd Annual American Association of Gynecologic Laparoscopists (AAGL) Global Congress on Minimally Invasive Gynecology, Washington, DC, November 12, 2013.

Address correspondence to: Nicholas Ryan, MD, Department of Obstetrics and Gynecology, Baylor College of Medicine, One Baylor Plaza, BCM610, Houston, TX 77030. Telephone: 502-472-3753, Fax: 832-825-9352, E-mail: naryan@bcm.edu

DOI: 10.4293/JSLS.2015.00035

© 2015 by JSLS, Journal of the Society of Laparoscopic Surgeons. Published by the Society of Laparoscopic Surgeons, Inc.

MATERIALS AND METHODS

This prospective randomized single-blind study was performed from February 27, 2013, through April 1, 2014, at Ben Taub Hospital (BTH), a teaching institution affiliated with Baylor College of Medicine in Houston, Texas. The study was approved by the respective local ethics committees of Baylor College of Medicine and BTH. All study participants gave written or verbal informed consent before participation.

Patients aged 18–65 years, who were scheduled to undergo TLH for benign indications with the principal investigator were eligible for the study. The subjects were then randomized to either the bowel-preparation (BP) or the non-bowel-preparation (NP) group by using a list generated by SAS (Cary, North Carolina). Subjects in the BP group were advised to complete the following bowel regimen, which was consistent with institutional guidelines: the day before surgery, a light breakfast followed by a clear liquid diet; for MBP, completion of a 10-oz bottle of magnesium citrate (half the bottle at 4 PM, the other half at 7 PM); and nothing by mouth (NPO) after midnight. The NP group was advised to eat a light breakfast the day before surgery, followed by a clear liquid diet and NPO after midnight.

The procedures were performed by one attending surgeon in the Minimally Invasive Section of the Baylor College of Medicine Department of Obstetrics and Gynecology who was blinded to the bowel regimen used by the patient. Immediately after the procedure, the attending physician completed a 4-question survey which asked him to rate intraoperative visualization of the surgical field, ease of bowel handling, and overall ease of the operation. These questions were the primary study outcomes. A 5-point scale was used for each question: 1, very poor/very difficult; 2, poor/moderately difficult; 3, adequate/average difficulty; 4, good/easy; and 5, excellent/very easy. In the final question, the surgeon was asked whether the patient completed a bowel regimen that included MBP. The patients completed a 4-question survey as well. To assess compliance, the patient was asked: “Did you complete the mechanical bowel preparation (magnesium citrate) before your operation?” Responses to 2 questions were made according to a visual analog scale (1–5, with accompanying faces depicting severity), to assess pre- and postoperative gastrointestinal discomfort levels. The final question asked the patient if she would recommend completion of the MBP to others undergoing the same procedure. Additional information was obtained after the operation, including the patient’s age, ethnicity,

gravidity, parity, body mass index (BMI), estimated blood loss during surgery (EBL), weight of the pathologic uterine tissue, and number of previous abdominal surgeries.

Our sample size estimation was based on our hypothesis that the study’s primary outcome (adequate visualization) would be the same, with or without MBP. Kelly et al⁵ previously reported an adequate visualization rate of 86.5% with bowel preparation. Using this rate, assuming a margin of equivalence of $\pm 15\%$ (72–99%), with α set at 0.05, our study would be adequately powered (at least 80%) with 120 patients in each group ($N = 240$). We halted subject enrollment before meeting the original goal of 240 because of the overwhelming evidence supporting no difference in surgeon questionnaire responses between the 2 groups. Patients in the 2 study groups were compared by *t* test for continuous normally distributed variables, Wilcoxon rank sum test for nonnormal or ranked variables, and χ^2 /Fisher’s exact test for grouped variables. $P < .05$ was considered statistically significant. All analyses were performed in SAS statistical software.

RESULTS

A total of 91 subjects were identified and approached from February 2013 to March 2014. Two patients declined surgery, 4 were operated on by a different surgeon, 2 underwent hysterectomy by a different route, 4 underwent hand-assisted total laparoscopic hysterectomy for large uteri, and 1 declined to participate due to stress. Thirty-nine patients were randomized into each arm of the study (**Figure 1**).

Patient characteristics are shown in **Table 1**. The 2 study groups were similar with respect to age, BMI, gravidity,

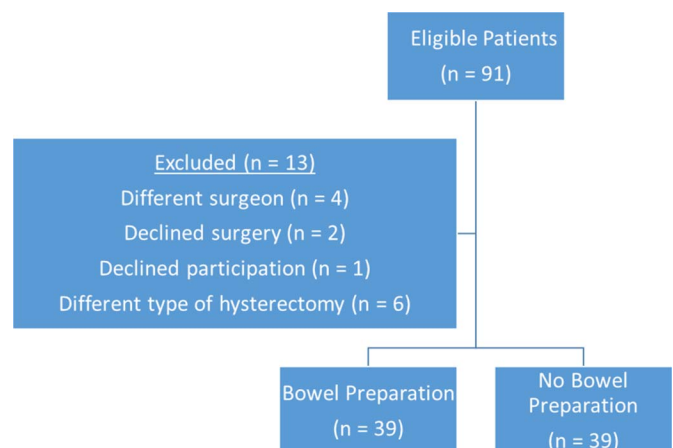


Figure 1. Selection flowchart for research subjects.

Table 1.
Patient Characteristics

Patient Characteristics	BP (n = 39)	NP (n = 39)	P
Age, y	42.9 (7.5)	43.9 (6.2)	.56
Gravidity	3.4 (2.0)	3.2 (1.9)	.55
Parity	2.7 (1.7)	2.5 (1.4)	.45
BMI, kg/m ²	34.6 (7.9)	34.8 (8.5)	.98
Estimated blood loss, ml	79.7 (88.7)	119.4 (139)	.27
Specimen weight, g	251.0 (167.4)	318.3 (196.9)*	.08
Previous abdominal surgeries	1.90 (1.45)	1.72 (1.42)	.56

Data are the mean (SD).
*n = 36.

parity, number of previous abdominal surgeries, estimated blood loss, and weight of pathologic tissue. Of note, 3 subjects in the NP arm had pathology reports that did not include the weight of the specimen. Fifty-one percent of the study participants were Hispanic.

The results of the patient survey are presented in **Table 2**. Completed surveys were obtained from 88% of the research subjects. Compliance with the bowel regimens was found to be 88.6% in the BP group and 88.2% in the NBP group. There was no significant difference in pre- or postoperative discomfort scores between the 2 groups. The change in discomfort scores (preoperative minus postoperative) was also similar. Ninety percent of patients whose preoperative bowel regimen included MBP reported that they would recommend its use to a friend undergoing the same procedure.

Table 2.
Results of the Patient Survey

Item	BP (n = 35)	NP (n = 34)	P*
Compliance, n (%)	31 (89%)	30 (88%)	NS
Discomfort score			
Preoperative	4.17 (1.01)	4.34 (1.14)	.26
Postoperative	3.26 (1.46)	3.36 (1.41)	.73
Change	0.91 (1.78)	1.03 (1.6)	.92

Data are the mean (SD), unless otherwise noted.
*Based on the Wilcoxon rank sum test.

Table 3 displays the results of the surgeon survey. All subjects in the BP arm had excellent (i.e., 5/5) scores in the 3 categories. Only one subject in the NP arm had scores that were less than “excellent” across the board. There was no significant difference in intraoperative visualization, bowel handling, or overall ease of the surgery between the 2 groups based on the results of the surgeon’s survey. The surgeon was able to identify 39% of the patients who completed the MBP. Conversely, he was able to identify 80% of those who did not complete the MBP. Overall, the surgeon was correct in his assessment of the use of MBP 59% of the time.

DISCUSSION

The use of MBP prior to laparoscopic procedures for benign conditions has been thought to improve intraoperative visualization and manipulation of the bowel. However, the existing body of evidence²⁻⁴ does not support this idea. Our preliminary study reinforces this argument specifically for TLH. Ingestion of magnesium citrate the night before the procedure did not result in an improvement in intraoperative visualization, bowel handling, or overall ease of performance of the procedure. We acknowledge that, although the combination of a clear liquid diet and fasting after midnight may result in equivalent intraoperative bowel findings when compared to the addition of MBP, it may also be the case that in most patients, the use of the Trendelenburg positioning obviates the need for any preoperative bowel regimen at all. The observation that the surgeon was able to guess correctly whether the patient had ingested the bowel preparation in only 59% of the cases speaks to the superfluous nature of this preoperative requirement.

In addition, our results did not demonstrate a significant difference in pre- and postoperative gastrointestinal discomfort levels between the 2 groups, suggesting that the

Table 3.
Results of the Surgeon Survey

Parameter Scores	BP (n = 39)	NP (n = 39)	P*
Intraoperative visualization	5 (0)	4.95 (0.32)	.33
Bowel handling	5 (0)	4.95 (0.32)	.33
Overall ease of the operation	5 (0)	4.95 (0.32)	.33

Data are the mean (SD).
*Based on the Wilcoxon rank sum test.

addition of magnesium citrate to the preoperative bowel regimen had no effect on perioperative discomfort levels. We found this result somewhat surprising; one would assume that ingesting a laxative would increase the patient's discomfort level. Similar findings were reported by Siedhoff et al,⁴ whereas the studies by Muzii et al² and Lijoi et al⁶ showed that MBP increased preoperative discomfort. The difference in discomfort scores between the studies may be tied to the type of bowel preparation used and the route of administration.

Compliance with the bowel regimens was similar between the 2 groups (88.6% for the BP group, 88.2% for the NP group). This finding is similar or even better than compliance rates found by Lijoi and colleagues,⁶ who compared 1 week of a low-fiber diet to MBP. Sixty-eight percent of patients randomized to the MBP arm in that study were compliant with the oral laxative (a combination of polyethylene glycol, anhydrous sodium sulfate, sodium bicarbonate, sodium chloride, and potassium chloride).

The main strength of our study is its prospective single-blind randomized nature. Our study is set apart from previous studies in several ways. We used a different bowel preparation (magnesium citrate) and the patient population was predominantly Hispanic. That a single surgeon completed all the operations in the study can be viewed as both a strength and a weakness. Use of the same surgeon helps to maintain consistency when evaluating the parameters in the surgeon's survey. On the other hand, the level of the fellowship-trained, minimally invasive surgeon's skills may not be representative of the generalist obstetrician-gynecologist performing laparoscopy. Another weakness of the study was the inability to compare operative times between the 2 groups.

The evidence against the use of MBP prior to benign gynecologic procedures is strong. Future research should look at the utility of MBP when removing large uteri or

operating on patients who have a BMI approaching class II or III obesity levels (defined by the World Health Organization as BMI >35 or >40, respectively). In these instances, the amount of pelvic operating space available to the surgeon is compromised—no matter the degree of Trendelenburg positioning used—and bowel preparation may be of some benefit. We believe that the results of our study demonstrate that the use of preoperative MBP prior to total laparoscopic hysterectomy for benign indications is unjustified.

References:

1. Pineda CE, Shelton AA, Hernandez-Boussard T, Morton JM, Welton ML. Mechanical bowel preparation in intestinal surgery: a meta-analysis and review of the literature. *J Gastrointest Surg.* 2008;12:2037–2044.
2. Muzii L, Bellati F, Zullo MA, Mancini N, Angioli R, Panici PB. Mechanical bowel preparation before gynecologic laparoscopy: a randomized, single-blind, controlled trial. *Fertil Steril.* 2006;85:689–693.
3. Won H, Maley P, Salim S, Rao A, Campbell N, Abbott J. Surgical and patient outcomes using mechanical bowel preparation before laparoscopic gynecologic surgery. *Am J Obstet Gynecol.* 2013;121:538–546.
4. Siedhoff MT, Clark LH, Hobbs KA, Findley AD, Moulder JK, Garrett JM. Mechanical bowel preparation before laparoscopic hysterectomy. *Am J Obstet Gynecol.* 2014;123:562–567.
5. Kelly NM, Rodgers C, Patterson N, et al. A Prospective audit of the efficacy, safety, and acceptability of low-volume polyethylene glycol (2 L) versus standard volume polyethylene glycol (4 L) versus magnesium citrate plus stimulant laxative as bowel preparation for colonoscopy. *J Clin Gastroenterol.* 2012;46:595–601.
6. Lijoi D, Ferrero S, Mistrangelo E, et al. Bowel preparation before laparoscopic gynaecological surgery in benign conditions using a 1-week low fibre diet: a surgeon blind, randomized and controlled trial. *Arch Gynecol Obstet.* 2009;280:713–718.