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THE USE OF MECHANICAL BOWEL PREPARATION (MBP) IN PELVIC RECONSTRUCTIVE SURGERY: A RANDOMIZED CONTROLLED TRIAL

Amos O. ADELOWO, MD, MPH^{3,4}, Michele R. HACKER, ScD^{2,3}, Anna M. MODEST, MPH^{2,3}, Costa A. APOSTOLIS, MD^{1,2}, Anthony J. DISCIULLO, MD^{1,2}, Katherine J. HANAWAY, MD^{1,2}, Eman E. ELKADRY, MD^{1,2}, Peter L. ROSENBLATT, MD^{1,2}, Kathleen J. ROGERS¹, and Lekha S. HOTA, MD^{1,2}

¹Department of Obstetrics and Gynecology, Division of Urogynecology, Mount Auburn Hospital, Cambridge, MA

²Department of Obstetrics, Gynecology and Reproductive Biology, Harvard Medical School, Boston, MA

³Department of Obstetrics and Gynecology, Beth Israel Deaconess Medical Center, Boston, MA

⁴Department of Obstetrics and Gynecology, Reliant Medical Group, Worcester, MA

Abstract

OBJECTIVE—To compare mechanical bowel preparation (MBP) using oral magnesium citrate with sodium phosphate enema to sodium phosphate (NaP) enema alone during minimally invasive pelvic reconstructive surgery.

METHODS—We conducted a single-blind, randomized controlled trial of MBP versus NaP in women undergoing minimally invasive pelvic reconstructive surgery. The primary outcome was intraoperative quality of the surgical field. Secondary outcomes included surgeon assessment of bowel handling and patient-reported tolerability symptoms.

RESULTS—153 participants were enrolled; 148 completed the study (71 MBP and 77 NaP). Patient demographics, clinical and intraoperative characteristics were similar. Completion of assigned bowel preparation was similar between MBP (97.2%) and NaP (97.4%). The MBP group found the preparation more difficult ($P < 0.01$) and reported more overall discomfort and negative preoperative side effects (all $P = 0.01$). Quality of surgical field at initial port placement was excellent/good in 80.0% of the MBP group compared with 62.3% in the NaP group ($P = 0.02$). This difference was not maintained by the conclusion of surgery ($P = 0.18$). Similar results were seen in the intent-to-treat population. Surgeons accurately guessed preparation 65.7% of the time for MBP

Corresponding Author: Lekha Hota MD, Division of Female Pelvic Medicine and Reconstructive Surgery, Boston Urogynecology Associates, 725 Concord Avenue, Suite 1200, Cambridge MA 02138, Tel: 617-354-5452, Fax: 617-354-0458, lhota@mah.harvard.edu.

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versus 41.6% for NaP ($P=0.36$). At two weeks postoperatively, both reported a median time for return of bowel function of 3.0 (2.0–4.0) days.

CONCLUSION—MBP with oral magnesium citrate prior to minimally invasive pelvic reconstructive surgery offered initial improvement in the quality of surgical field, but this benefit was not sustained. It was associated with an increase in patient discomfort preoperatively, but did not seem to impact postoperative return of bowel function.

LEVEL OF EVIDENCE—I

Keywords

Mechanical bowel preparation; Reconstructive pelvic surgery; Pelvic organ prolapse

INTRODUCTION

Pelvic organ prolapse is common in women and is associated with considerable morbidity and decreased quality of life. Surgical management includes many procedures performed laparoscopically or with robotic assistance. Surgical visualization is important, and an empty or decompressed bowel is thought to improve visualization and access to confined spaces by improving mobilization and retraction of the sigmoid colon during laparoscopic surgery.

Mechanical bowel preparation (MBP) is a preoperative oral chemical preparation to eliminate fecal matter from the intestinal tract based on the assumption that this decreases bowel-related surgical complications.¹ However, MBP has been associated with substantial patient discomfort and side effects, such as dehydration and electrolyte abnormalities.²

A Cochrane review of elective colon and rectal surgery concluded neither oral nor rectal bowel preparation reduced the risk of anastomotic leakage or surgical site infection³. Recent studies demonstrated no advantage to MBP in laparoscopic gynecologic surgery and reported increased adverse effects.^{4,5} Although evidence against routine use in colorectal and laparoscopic gynecologic surgery exists, many pelvic reconstructive surgeons use preoperative bowel preparation.⁶

There are limited data assessing the effect of bowel preparation before laparoscopic or robotic pelvic reconstructive surgery. To our knowledge, no studies have assessed surgical field visualization of the sacral promontory and deep pelvis. The aim of this single-blind randomized clinical trial was to compare MBP using oral magnesium citrate saline laxative with sodium phosphate enema to sodium phosphate (NaP) enema alone during laparoscopic and robotic pelvic reconstructive surgery. The primary outcome was intraoperative surgeon assessment.

Our study hypothesis is that the use of oral magnesium citrate MBP will not show a difference in the quality of surgical field and bowel handling during laparoscopic or robotic assisted female pelvic reconstructive surgery when compared to NaP enema alone.

MATERIALS AND METHODS

This was a single-blind, randomized clinical trial of participants recruited from the Female Pelvic Medicine and Reconstructive Surgery Clinic at Mount Auburn Hospital from January 2012 through September 2015. Women were eligible if they were 18 years of age or older, had stage II or greater apical prolapse, were symptomatic, desired laparoscopic or robotic surgical correction, were willing to be randomly assigned to one of two treatment arms and were able to provide informed consent in English. The procedures were performed at one teaching hospital and supervised or performed by one of four fellowship-trained female pelvic medicine and reconstructive surgeons and one gynecologist specializing in minimally invasive surgery. All of the surgeons had extensive training in the surgical procedures. Exclusion criteria included current pregnancy, plans for future pregnancy, history of uterine, cervical or vaginal cancer, abdominopelvic irradiation, known adverse reaction to synthetic materials, colorectal cancer, and contraindication to laparoscopy or use of magnesium citrate. The institutional review board at Mount Auburn Hospital approved this trial.

We used computer-generated block randomization, stratified by surgical approach (laparoscopic or robotic), using blocks of 4, 6, and 8 to randomize participants to the MBP group or the NaP enema alone group. One of the authors (KJR), who was not involved in data collection or assessment of any outcome, concealed the randomization in sealed opaque envelopes and was the only investigator with access to the randomization scheme. After written informed consent was obtained, participants were randomized and the details of the assigned bowel preparation were extensively reviewed with a research nurse. Those randomized to MBP were instructed to drink two 10-ounce bottles of magnesium citrate saline laxative the day before surgery and use one (133ml) NaP enema rectally both the night before and the morning of surgery. The NaP enema alone group was asked to use one (133ml) NaP enema rectally the night before and another the morning of surgery. Participants were provided with a copy of the instructions. Per standard preoperative surgical protocol, all participants were allowed a clear liquid diet the day before surgery and nothing to eat or drink after midnight. It was acceptable however, for them to take medications the morning of the procedure with a sip of water. Study participants were instructed to not discuss the assigned bowel preparation with the surgical team, holding room nurses or circulating operating room nurse upon arrival for their surgery. They were instructed that they could share the information with the anesthesia team for the purpose of fluid management. The study was presented to the Department of Anesthesiology before enrollment commenced, and daily reminders were given to the anesthesiologist not to discuss the bowel preparation regimen with the surgical team.

The primary outcome, visualization of the surgical field, was measured using a modified version of the self-administered questionnaire developed by Yang et al.; the questionnaire was completed immediately after the procedure by the attending surgeon.⁵ Surgeons were asked to evaluate the surgical field overall as excellent, good, fair, or poor at two time points—after laparoscopic port placement and at the end of the procedure. Using the same scale, surgeons evaluated bowel preparation, bowel handling, and visualization of specific structures, and degree of difficulty completing the procedure. Surgeons also were asked which bowel preparation they thought the participant had completed.

Study participants completed questionnaires in the preoperative holding area regarding their bowel and quality-of-life symptoms during the preoperative period. Symptoms, such as abdominal pain, nausea and embarrassment, were rated on a 10-point severity scale of “none” to “worst possible”. All participants were asked if they completed the assigned regimen and if they would be willing to perform the same preparation for a future surgery. Intraoperative data was collected immediately after the surgery.

During each surgery, antibiotic prophylaxis was administered before incision and sequential compression stockings were placed before induction of anesthesia. Concomitant procedures were performed at the surgeon’s discretion for management of stress urinary incontinence, vaginal outlet relaxation or any additional vaginal surgical intervention. All patients remained in the hospital for one night or more, as clinically indicated. Patients were evaluated for urinary retention before discharge. Routine postoperative evaluation was performed at two weeks by a nurse practitioner or physician and at six weeks by the operating surgeon. Return of bowel function was assessed with a questionnaire at two and six weeks postoperatively and pelvic organ prolapse was assessed using the pelvic organ prolapse quantification (POP-Q) system.

Based on data from Oliveira et al., we assumed that the MBP would yield excellent or good visualization of the surgical field in 87% of procedures.^{5,7} Assuming a two-sided alpha of 0.05, 70 evaluable participants per group would provide 80% power to detect an absolute difference of 20%. We aimed to enroll 88 participants per group to allow for 20% loss to follow up. All analyses were performed with a per-protocol approach, using the participants who underwent the planned surgical procedure. In addition, we analyzed the primary outcome using an intent-to-treat approach, in which the primary outcome was dichotomized as excellent/good or fair/poor and we assumed that anyone missing primary outcome data had fair/poor visualization. Data are presented as median (interquartile range) or proportion. Comparisons were made using the Chi-square or Fisher’s exact test for categorical variables and the Wilcoxon rank sum test for continuous variables. All tests were two sided, and P values <0.05 were considered statistically significant. Data were analyzed with SAS 9.4 (SAS Institute Inc., Cary, NC).

RESULTS

During study period, 153 women were consented and randomized: 74 to MBP and 79 to the NaP enema alone. Among the MBP group, 15 (20.8%) had a prior hysterectomy and 20 (25.6%) among the NaP enema group had a prior hysterectomy. In the MBP group, 72 underwent surgery, and 71 of those women had the planned laparoscopic or robotic procedure. In the NaP enema group, 78 underwent surgery, and 77 of those women had the planned laparoscopic or robotic procedure. Thus, 148 (96.7%) participants completed the study. The primary outcome could only be assessed in 147 participants for the per-protocol analysis, because one surgeon’s questionnaire was missing [Figure 1]. The two groups were similar with regard to demographic and clinical characteristics [Table 1]. The study population was primarily non-Hispanic white and post-menopausal, and the majority of women had a history of abdominal or pelvic surgery.

Nearly all (97.2%) women in the MBP group reported that they completed the assigned bowel preparation (completing greater than 50% of the magnesium citrate preparation and complying with a clear liquid diet) compared with 97.4% in the NaP enema alone group. Women in the MBP group generally found the bowel preparation more difficult ($P<0.01$) and were more likely to report that they would rather try a different preparation in the future (72.2% in the MBP group and 19.5% in the NaP enema alone group, $P<0.001$). Women in the MBP group also were more likely to report overall discomfort and negative preoperative side effects, such as abdominal cramping or pain (77.8% vs. 54.6%), bloating or swelling (69.4% vs. 44.2%), embarrassment (58.3% vs. 29.9%), weakness (66.7% vs. 28.6%), dizziness (52.8% vs. 18.2%), and fecal incontinence (70.8% vs. 29.9%) all $P=0.01$. Results from the quality-of-life assessment questionnaire completed by study participants in the preoperative period are presented in Table 2.

In the MBP group 85.9% of participants underwent a laparoscopic apical reconstruction, while 14.1% had a robotic approach, which was similar to the NaP enema alone group, with 88.3% and 11.7%, respectively. The groups also were similar with regard to blood loss and length of hospitalization, as well as intraoperative and postoperative complications (all $P=0.52$; Table 3). In the MBP group there was an incidental cystotomy that was recognized intraoperatively and repaired. A small bowel enterotomy during lysis of adhesion was unrecognized in a participant in the NaP enema alone group. The participant was readmitted nine days after surgery for exploratory laparotomy, small bowel resection and primary re-anastomosis. The six postoperative complications in the MBP group were one posterior vaginal wall hematoma, three cases of incisional cellulitis, one case of left calf pain with negative evaluation that spontaneously resolved, and one urethral prolapse with mucosal infarction. The four complications in the NaP enema alone group were two cases of incisional cellulitis, one case of persistent urinary retention from concomitant sling procedure, and one abdominal wall hematoma.

When assessed as a dichotomous outcome in the per-protocol population, the overall quality of the surgical field at initial port placement was noted to be excellent/good in 80.0% of participants in the MBP group compared with 62.3% in the NaP enema alone group ($P=0.02$). However, this difference was not maintained at the conclusion of the surgery, with 88.6% assessed as excellent/good in the MBP group and 80.5% in the NaP enema alone group ($P=0.18$). Similar results were seen in the intent-to-treat population. At port placement, the visualization was excellent/good in 77.8% of participants in the MBP group and 61.5% in the NaP enema alone group ($P=0.03$). At conclusion of the surgery, visualization was similar in both groups (86.1% and 79.5% in the MBP and NaP enema alone groups, respectively, $P=0.28$).

When visualization of the surgical field was assessed with the four separate categories of the Likert scale, there was no significant difference between groups at initial laparoscopic port placement ($P=0.07$) or at the conclusion of surgery ($P=0.49$) [Table 4]. Acceptability of the visualization of critical pelvic structures that are important landmarks during laparoscopic apical reconstructive surgery, such as sacral promontory, right and left ureters, and posterior cul-de-sac, also was not different between groups (all $P=0.06$; Figure 2a). The majority of the surgeons in both treatment groups reported excellent or good visualization of these

structures. The quality of bowel handling with laparoscopic instruments and the perception of small bowel preparation also did not differ between the two groups (both $P = 0.24$; Figure 2b), although the assessment of large bowel preparation appeared to be more favorable in the MBP group ($P=0.048$), this did not change the overall impression of visualization.

Visualization of the uterus appeared to be better in the MBP group ($P<0.01$) however, there was no significant difference in visualization of adnexal structures between groups ($P=1.0$ for the right adnexa and $P=0.59$ for the left adnexa, Figure 2c).

Large bowel assessment using intraoperative palpation and inspection showed the large bowel to be collapsed in roughly half of participants in each group ($P=0.24$; Table 4). Similarly, there was no difference between the groups in the presence of bowel adhesions that required adhesiolysis for improved visualization, or the use of additional techniques such as laparoscopic fan retractors, temporary bowel suspension sutures or placement of additional ports for bowel retraction to improve visualization (all $P = 0.33$).

When asked to speculate whether the patient used MBP or NaP enema alone based on their intraoperative assessment, the surgeons were accurate 65.7% of the time for participants in the MBP group and 41.6% of the time for those in the NaP enema alone group. This difference was not significant ($P=0.36$).

The two-week postoperative participant questionnaire revealed that return of bowel function, defined as first bowel movement or initial passage of flatus, occurred on a median of 3.0 (2.0–4.0) days in both the MBP and NaP enema alone groups ($P=0.34$). Eight participants (11.4%) reported leakage of stool postoperatively in the MBP group compared with 12 (15.6%) in the NaP enema alone group. The majority with stool leakage in the MBP group (87.5%) reported that it continued for over four days compared with 50.0% in the NaP enema alone group. Prolapse quantification at the six-week postoperative follow-up visit was similar between the groups ($P=0.90$) [Table 5].

DISCUSSION

Use of MBP with oral magnesium citrate offered initial improvement in the quality of surgical field at port placement compared with NaP enema alone. This benefit was not maintained throughout the surgery, and MBP was not associated with improved bowel handling compared to NaP enema alone. Importantly, women undergoing MBP before laparoscopic or robotic pelvic reconstructive surgery for prolapse reported decreased satisfaction and increased overall discomfort and distressing bowel symptoms compared with women in the NaP enema alone group. In addition, MBP was not associated with improved participant outcomes, such as time to first bowel movement and six-week postoperative POP-Q, and the incidence of intraoperative and postoperative complications were similar between the groups. Further, the inability of surgeons to correctly identify intraoperatively whether MBP was administered based on bowel handling suggests that MBP may not provide the expected benefits. This provides strong evidence to suggest that MBP should not be used routinely in women undergoing laparoscopic or robotic reconstructive pelvic surgery for apical prolapse.

Advanced laparoscopic gynecologic procedures require optimal visualization of pelvic structures within the surgical field, manipulation of bowel loops out of the pelvis, as well as easy manipulation of the rectosigmoid colon away from the sacral promontory during sacrocolpopexy. Adequate visualization of the sacral promontory and posterior cul-de-sac, as well as other pelvic structures, is critical for successful laparoscopic or robotic pelvic reconstructive surgery. Our results demonstrate that NaP enema alone provided visualization and handling similar to that of MBP.

Muzii et al. investigated bowel preparation with oral sodium phosphate solution in benign laparoscopic adnexal surgery and other minor laparoscopic procedures and did not find any advantage regarding preparation of surgical field, operative time, intraoperative or postoperative complications, or length of hospital stay. Conversely, the MBP group reported significantly greater preoperative discomfort.⁴ While the utility and role of MBP was investigated by Yang et al. for advanced laparoscopic gynecologic procedures without any difference noted for the acceptability of surgical field,⁵ we are unaware of studies specifically assessing laparoscopic or robotic female pelvic reconstructive surgery and the effect of MBP on surgical field visualization or patient's quality of life in the perioperative period as currently investigated in our study.

Our study has several limitations. One limitation in our study design is the lack of a true control group in which there is no form of bowel preparation. The surgeons at our institution preferred to have some form of distal bowel decompression in order to prevent accidental bowel leakage during the procedure. Another study limitation is that all participants were from a single site; however, assessments were performed by five trained specialists with a high volume of minimally invasive pelvic reconstructive surgery who were blinded to treatment assignment. Thus, we do not believe this limits the generalizability of our findings. The lack of validated patient and surgeon questionnaires also is a limitation of our study. To minimize this limitation and allow for comparison with other trials, we used modified versions of questionnaires from previously published studies.^{5, 6} Additionally, our population was younger than would be expected for a group of women undergoing prolapse surgery and we did not measure electrolytes in our study. Given the risk of electrolyte imbalance in the MBP group, our findings may not be generalizable to an older population who may be at higher risk for electrolyte imbalance. Finally, because the surgeons in our study completed their questionnaire at the end of surgery, they may have had a difficult time recalling information about visualization of the initial field or information about intraoperative characteristics. We would be most concerned about the recall issue if it were differential between the two treatment arms and thus could introduce bias into the study. For example, if the NaP enema did not provide adequate visualization, thus making the surgery longer and more difficult, then surgeons may have been more likely to rate the visualization as poorer than it actually was. If this type of bias were present in our study, then in truth the NaP enema would have created even better visualization of the initial field than we reported and thus would not explain our findings. Lastly, the failure to obtain preoperative bowel function data may also be a limitation of the study. However, given that the randomization seemed to successfully balance the distribution of characteristics we did measure between the two groups, we would expect prior bowel function to be similar between the groups as well. The strengths of our study include the randomization and the fact that the assessors of

the primary outcome (surgeons) were blinded to the treatment group. In addition, we had a well-characterized surgical cohort undergoing a well-defined operative approach with similar modality of visualization of the pelvic structures, thus providing Level I evidence. Emerging evidence suggests a lack of benefit and potential for harm with routine use of MBP; thus, it is important to evaluate our current practice as it applies to minimally invasive pelvic reconstructive surgery. Our study provides much-needed evidence questioning the utility of oral MBP in laparoscopic and robotic pelvic reconstructive surgery for prolapse, with findings that are consistent with prior Level I studies in advanced gynecologic surgeries⁵ and vaginal prolapse surgery.⁶

In conclusion, MBP with oral magnesium citrate demonstrated no added advantage in quality of surgical field, visualization of pelvic structures, bowel manipulation, perioperative complication, or length of hospitalization when compared with NaP enema alone. MBP, however, did significantly increase patient gastrointestinal symptoms and discomfort. Based on our investigation, NaP enema alone may serve as a reasonable option in place of oral magnesium citrate MBP in laparoscopic or robotic pelvic reconstructive surgery for prolapse given it has been shown to achieve similar surgical field visualization quality and bowel handling with laparoscopic instruments with less patient discomfort and better patient tolerability. The result of our investigation is a valuable contribution to the current evidence in gynecological surgery and, more specifically, for laparoscopic or robotic pelvic reconstructive surgery for prolapse.

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Figure 1.
Participant flow diagram

a

b

Figure 2.

- a. Visualization of other structures
- b. Bowel preparation
- c. Visualization of uterine structures (among women without a hysterectomy)

Table 1

Characteristics of participants who underwent surgery

	MPB (n=72)	NaP enema (n=78)
Age	48.5 (47.6–49.3)	48.7 (47.7–49.5)
Body mass index	26.9 (24.0–30.2)	26.5 (24.0–30.4)
Race/ethnicity		
Non-Hispanic White	67 (93.1)	74 (94.9)
Other	5 (6.9)	4 (5.1)
Nulliparous		
Yes	1 (1.4)	2 (2.6)
No	71 (98.6)	76 (97.4)
History of prior abdominal or pelvic surgery		
Yes	43 (59.7)	42 (53.8)
Laparotomy	16 (37.2)	22 (52.4)
Operative Laparoscopy	21 (48.8)	20 (47.6)
Vaginal	8 (18.6)	9 (21.4)
No	29 (40.3)	36 (46.2)
Post-menopausal		
Yes	57 (79.2)	64 (82.1)
No	15 (20.8)	14 (17.9)
Pre-operative POP-Q stage		
Stage 0–1	0 (0.0)	0 (0.0)
Stage 2–4	72 (100.0)	78 (100.0)

Data are presented as median (interquartile range) or n (%).

Table 2

Pre-surgery questionnaire of participants who underwent surgery

	MBP (n=72)	NaP enema (n=77)*	P
Completed assigned bowel preparation			1.0
Yes	70 (97.2)	75 (97.4)	
No	2 (2.8)	2 (2.6)	
How easy or difficult was it for you to perform the bowel preparation?			0.001
Very easy	11 (15.3)	22 (28.6)	
Easy	21 (29.2)	37 (48.1)	
Slightly difficult	25 (34.7)	13 (16.9)	
Moderately difficult	12 (16.7)	3 (3.9)	
Very difficult	3 (4.2)	2 (2.6)	
Would you be willing to have the same bowel preparation again?			0.0003
Yes	51 (70.8)	72 (93.5)	
No	21 (29.2)	5 (6.5)	
Would you rather try a different bowel preparation in the future?			<0.0001
Yes	52 (72.2)	15 (19.5)	
No	20 (27.8)	62 (80.5)	
Presence of symptoms			
Abdominal cramping or pain	56 (77.8)	42 (54.5)	0.003
Hunger	58 (80.6)	60 (77.9)	0.69
Abdominal bloating or swelling	50 (69.4)	34 (44.2)	0.002
Embarrassment	42 (58.3)	23 (29.9)	0.0005
Insomnia	41 (56.9)	36 (46.8)	0.21
Weakness	48 (66.7)	22 (28.6)	<0.0001
Thirst	63 (87.5)	62 (67.5)	0.004
Dizziness	38 (52.8)	14 (18.2)	<0.0001
Nausea	44 (61.1)	16 (20.8)	<0.0001
Vomiting	8 (11.1)	3 (3.9)	0.12
Fecal Incontinence	51 (70.8)	23 (29.9)	<0.0001
Fear	26 (36.1)	20 (26.0)	0.18
Overall discomfort	71 (98.6)	54 (70.1)	<0.0001
Difficulty with the bowel preparation	57 (79.2)	42 (54.5)	0.002

Data are presented as median (interquartile range) or n (%).

* One participant survey not available.

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Table 3

Surgical characteristics and complications of participants who had laparoscopic or robotic surgery

	MBP (n=71)	NaP enema (n=77)	P
Pelvic procedure			0.50
Laparoscopic sacrocervicopexy	43 (60.6)	47 (61.0)	
Laparoscopic Sacrocolpopexy	16 (22.5)	17 (22.1)	
Laparoscopic Sacrohysteropexy	2 (2.8)	4 (5.2)	
Robotic Sacrocervicopexy	9 (12.7)	5 (6.5)	
Robotic Sacrocolpopexy	1 (1.4)	4 (5.2)	
Estimate blood loss			0.96
50 cc	47 (66.2)	53 (68.8)	
51–100 cc	20 (28.2)	20 (26.0)	
>100 cc	4 (5.6)	4 (5.2)	
Hospital night stays			0.81
0 (Outpatient)	1 (1.4)	1 (1.3)	
1	69 (97.2)	73 (94.8)	
2	1 (1.4)	3 (3.9)	
Intra-operative complications			1.0
Yes	1 (1.4)	1 (1.3)	
No	70 (98.6)	76 (98.7)	
Post-operative complications			0.52
Yes	6 (8.5)	4 (5.2)	
No	65 (91.5)	73 (94.8)	

Data are presented as n (%).

Table 4

Surgeon post-operative questionnaire of participants who had laparoscopic or robotic surgery

	MBP (n=70)	NaP enema (n=77)	P
Quality of surgical field after initial laparoscopic port placement			0.07
Excellent	9 (12.9)	11 (14.3)	
Good	47 (67.1)	37 (48.1)	
Fair	10 (14.3)	24 (31.2)	
Poor	4 (5.7)	5 (6.5)	
Quality of surgical field at the conclusion of the surgery			0.49
Excellent	26 (37.1)	23 (29.9)	
Good	36 (51.4)	39 (50.6)	
Fair	7 (10.0)	14 (18.2)	
Poor	1 (1.4)	1 (1.3)	
Large bowel assessment using intra-operative palpation and inspection			0.24
Collapsed	38 (54.3)	40 (51.9)	
Gas-filled	25 (35.7)	22 (28.6)	
Stool-filled	7 (10.0)	15 (19.4)	
Additional techniques used to improve exposure of surgical field			
Laparoscopic fan retractors	36 (51.4)	42 (54.5)	0.71
Temporary bowel suspension sutures	46 (65.7)	47 (61.0)	0.56
Placement of additional ports specifically for bowel retraction	3 (4.3)	7 (9.1)	0.33
During the surgery, were bowel adhesions present that required adhesiolysis to improve visualization?			0.54
Yes	23 (32.9)	29 (37.7)	
No	47 (67.1)	48 (62.3)	

Data are presented as n (%).

Table 5

Post-operative follow-up of participants who had laparoscopic or robotic surgery

	MBP (n=70)	NaP enema (n=77)	P
Days until first bowel movement or flatus	3.0 (2.0–4.0)	3.0 (2.0–4.0)	0.34
Stool leakage			0.48
Yes	8 (11.4)	12 (15.6)	0.16
1–3 days after surgery	1 (12.5)	6 (50.0)	
4+ days after surgery	7 (87.5)	6 (50.0)	
No	62 (88.6)	65 (84.4)	
Six week post-operative POP-Q			0.95
0	43 (61.4)	45 (58.4)	
1	25 (35.7)	29 (37.7)	
2	2 (2.9)	3 (3.9)	

Data are presented as median (Interquartile range) or n (%).