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Review Article

Preoperative Mechanical Bowel Preparation for Abdominal, Laparoscopic, and Vaginal Surgery: A Systematic Review

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ABSTRACT **Study Objective:** Mechanical bowel preparation (MBP) continues to be widely used in gynecologic surgery, with the aim of reducing postoperative complications and improving the viewing and handling conditions in the surgical field. It is reported that MBP is an unpleasant patient experience and may be associated with adverse effects such as dehydration and electrolyte imbalance. This review evaluates the use of preoperative MBP compared with no MBP in adult patients undergoing open abdominal, laparoscopic, or vaginal surgery. Although the focus is on the use of MBP for gynecologic procedures, data from other surgical areas are covered when relevant.

Design: A comprehensive search of the databases Medline (from 1946), EMBASE (from 1947), PubMed, Cochrane Library Central (Register of Controlled Trials), and Google Scholar was performed to identify any randomized controlled trials (RCTs) and prospective or retrospective cohort studies comparing preoperative MBP to no MBP.

Results: Forty-three studies were identified in various surgical specialties, of which there were 5 RCTs in gynecology. The gynecologic studies reported no benefit for MBP in operative time or improved surgical field of view but did report a more unpleasant patient experience when MBP is used. RCTs from colorectal and urologic surgery were powered for infectious morbidity and anastomotic leak and did not demonstrate improved patient outcomes when MBP was used.

Conclusion: Evidence from high-quality trials reports no or few benefits from MBP or rectal enema across surgical specialties. In the field of gynecologic surgery, high-quality evidence supports the view that MBP may be safely abandoned. Journal of Minimally Invasive Gynecology (2015) ■, ■–■ © 2015 AAGL. All rights reserved.

Keywords: Bowel preparation; Surgery; Gynaecology; Laparoscopy

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Mechanical bowel preparation (MBP), including oral or rectal solutions, before surgery has been widely used in many surgical specialties since the 1970s [1–3]. By reducing fecal contents, MBP is theoretically thought to reduce bacterial load and subsequent peritoneal contamination, should there be inadvertent bowel entry, with reduced postoperative complications such as anastomotic or surgical site leak or infection. In addition, for minimally invasive gynecologic procedures, MBP is hypothesized to optimize surgical field of view and ease of bowel handling [4], potentially resulting in shorter surgical times.

Although there are theoretical advantages, MBP may require preoperative hospitalization, is an unpleasant patient experience [5–7], and may cause dehydration and electrolyte disturbance [8–13]. Studies have been performed in major surgical specialties evaluating the use of MBP. High-quality evidence does not support the use of MBP [14]. Despite these data, surveys in the fields of gynecologic and colorectal surgery report a high percentage of surgeons still routinely use bowel preparation [15–18].

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Previous studies have been specialty specific in evaluating the use of MBP. Outcomes are applicable to all specialties, however, and may be broadly classified as (1) surgeon outcomes, such as surgical field and bowel handling; (2) operative outcomes, such as intraoperative complications and operative times; and (3) patient outcomes, such as postoperative complications, overall morbidity, and duration of postoperative hospital stay. This systematic review evaluates the studies performed on MBP and assesses the outcomes for each of these categories. Evidence from all surgical specialties is assessed and, where possible, applied to make recommendations for gynecologic surgery.

Methods

A comprehensive search of the databases Medline (from 1946), EMBASE (from 1947), PubMed, Cochrane Library Central (Register of Controlled Trials), and Google Scholar was performed to identify any randomized controlled trials (RCTs) and prospective or retrospective cohort studies comparing preoperative MBP with no MBP. MBP was defined as any oral or liquid preparation taken at least 24 hours before surgery. This was compared with no additional preparation apart from dietary restrictions, preoperative fasting, or a single sodium phosphate enema on the day of rectal surgery to avoid extrusion of stool when using a transanally inserted stapling device. MESH terms were combined with key words: bowel preparation, preoperative bowel preparation, mechanical bowel preparation, bowel cleansing AND laparotomy [MeSH term explode], laparoscop* [MeSH term explode], colorectal surgery [MeSH term explode], urolog* [Mesh Term explode], gynecolog* OR gynaecolog* [MeSH Term explode].

The search included all articles up to June 2014. Additionally, the reference lists of published articles were handsearched, and any additional studies identified were included in the review.

Articles to be included in the systematic review were identified according to the PRISMA process [19] outlined in Figure 1 [20–51]. Two reviewers independently reviewed the titles and abstracts of the articles for relevance and then retrieved the full text article to confirm eligibility, according to the inclusion and exclusion criteria outlined in Table 1.

Journal articles were independently assessed and assigned a quality of evidence grade score based on the Grading or Recommendations Assessment, Development and Evaluation (GRADE) System [52]. The grading system was rated as high, moderate, low, or very low. Complications were graded according to the Clavien-Dindo grading system [53].

Results

Forty-three studies fitting the inclusion criteria and meeting no exclusion criteria were identified: 38 studies comparing MBP with no preparation and 5 studies comparing MBP with a single rectal enema. Details of the individual studies, including the number of patients, type of surgery, type of bowel preparation used, the statistically significant results, and the grade of evidence are summarized in Tables 2 and 3.

For gynecologic surgery, 4 RCTs were identified. Laparoscopic surgery was studied in 4 of these studies, with a total of 645 patients [6,7,55,64], and 1 study of 150 patients was performed on vaginal prolapse [54]. Two studies compared MBP with no MBP [55,64], 1 study compared bowel preparation with 7-day low-fiber diet [6], and 1 study compared no bowel preparation, 2-day low-residue diet, and 2-day low-residue diet in combination with MBP [7].

From other surgical specialties, 23 studies met the inclusion criteria in colorectal surgery comparing MBP with no MBP: 13 RCTs (4932 patients) [57,59–63,65–71], 2 prospective cohort studies (418 patients) [72,74], and 8 retrospective cohort studies (5141 patients) [75,78,81,83–86,89]. All studies included only elective surgery; however, they were heterogeneous in the types of surgery performed (ileocolic, colocolic, and colorectal) and mode of surgery (laparoscopic or open surgery, or combination of both).

For urology, 2 RCTs with total of 126 patients [56,58], 1 prospective cohort study of 62 patients [73], and 2 retrospective cohort studies of 363 patients [80,88] evaluating the use of MBP before radical cystectomy and ileal conduit surgery were identified. Three other studies were found in urology: a retrospective cohort of 2740 patients undergoing laparoscopic nephrectomy [76], a retrospective cohort study on laparoscopic prostatectomy [77], and a retrospective case control study of 151 radical prostatectomy patients where rectal injury occurred [79].

Additionally, 2 retrospective cohort studies reported on 560 patients undergoing thoracic surgery, either unilateral or bilateral thoracotomy [87], and 200 patients undergoing pancreaticoduodenectomy [82]. Furthermore, 5 studies evaluated the use of MBP to a single rectal enema as the comparator group [90–94].

In the studies comparing MBP with no MBP, only the 5 high GRADE studies in gynecology (a total of 795 patients) included assessment of the operative field [6,7,54,55,64] as an outcome. Only 1 of these reported any difference in the surgeon's rating of the intraoperative field, with MBP in conjunction with low-fiber diet found to have minimal but statistically better surgical views ($p < .01$) and bowel handling ($p = .04$) by visual analogue scale [7] that was not reproduced on a verbal descriptor scale of the visual field. In a separate high GRADE blinded study [55], surgeons were only able to correctly guess the allocation of the patient approximately 50% of the time, indicating that MBP has minimal impact on the surgical view.

In 16 studies [6,7,54,55,58,61,64,66,68,70,72,73,76,77,80,87] the impact of MBP on duration of surgery was evaluated. Of these studies, only 1 study found a