Editorial

Clinical practice guidelines for enhanced recovery after colon and rectal surgery

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Enhanced recovery protocols (ERP), also referred to as enhanced recovery after surgery (ERAS) and fast track protocols are standardized procedures and practices that are used during the perioperative period in patients undergoing specific surgical procedures (1). They are reported to improve patient outcomes following a wide variety of surgical procedures. ERP is a component of the quality improvement process and must be continuously evaluated to assess compliance and improve outcomes (2,3). It is also apparent that the improvements in outcome associated with an ERP are incremental with the implementation of only a single component resulting in improved outcomes (4).

Colon and rectal surgery has historically been associated with a high risk of morbidity and complications. Common morbidities included surgical site infection, perioperative nausea and vomiting (PONV), deep venous thrombosis, urinary retention and ostomy complications for patients who require an ostomy. The morbidity and complications associated colon and rectal surgery led to increased hospital stays (8 and 5 days for open and laparoscopic procedures respectively) and higher cost (5). As many as one third of patients were also readmitted after discharge; further increasing costs and decreasing patient satisfaction (6). A 2011 Cochrane review found that use of an ERP, when compared with conventional perioperative patient management after elective colon and rectal surgery, was associated with decreases in overall complications and length of hospital stay (7). ERP has also been shown to reduce healthcare costs and improve patient satisfaction (8). The improved outcomes with the use of an ERP are reported for patients who undergo both open and laparoscopic colon and rectal surgery (9).

Currently published ERP's for colon and rectal surgery vary widely in complexity and supporting evidence. ERP is usually implemented as a bundle which precludes identification of the relative importance of the individual components. The institution of oral nutrition, the removal of epidural and urinary catheters early in the postoperative period, avoidance of nasogastric tubes and multimodal analgesia are common components of the majority of published ERP's (2).

The Clinical Practice Guidelines for Enhanced Recovery after Colon and Rectal Surgery from the American Society of Colon and Rectal Surgeons (ASCRS) and Society of American Gastrointestinal and Endoscopic Surgeons (SAGES) by Joseph C. Carmichael, M.D, *et al.* defines current best practices for improved outcomes after colon and rectal surgery (1). These guidelines are the result of a combined effort by the ASCRS Clinical Practice Guidelines Committee and SAGES Surgical Multimodal Accelerated Recovery Trajectory Enhanced Recovery Task Force and Guidelines Committees. Both organizations are to be commended for collaborating on this much needed update of the prior guidelines published in 2012–2013 (10,11). Since these earlier guidelines, there has been extensive further research and significant advances in optimizing care after colon and rectal surgery. Dr. Carmichael and the joint ASCRS/SAGES work group performed an exhaustive

review of the English language literature from 1990–2016. In all, 764 publications with embedded reference were reviewed by the work group and 371 were referenced in these guidelines. The Grading of Recommendations, Assessment, Development, and Evaluation system previously described by the American College of Chest Physicians was used to define the quality of the supporting evidence and for each guideline (12). The supporting literature was reviewed for the established components of a colon and rectal surgery ERP described previously and the more recent additions to most ERPs. Guidelines for the preoperative and perioperative management of patients undergoing elective colon and rectal surgery were developed with the quality of the supporting evidence defined (*Table 1*).

The joint ASCRS/SAGES workgroup is to be congratulated for the herculean effort of condensing the volumes of literature on this topic into a concise and extremely usable set of guidelines. However, some of the components deserve further discussion. First is the recommendation that "Mechanical bowel preparation plus oral antibiotic bowel preparation before colorectal surgery is the preferred preparation and is associated with reduced complication rates. 2B." This is a complete reversal from earlier guidelines. Mechanical and antibiotic bowel preparation is a time tested process that has been reported to reduce the risk of infectious complications of colorectal surgical procedures; surgical site infections and anastomotic dehiscence. In the past, numerous randomized clinical trials comparing preoperative mechanical preparation to no preparation in patients undergoing elective colorectal surgery, when combined in meta-analyses, demonstrated no significant benefit from either mechanical or antibiotic bowel preparation. This lack of benefit was thought to be related to stress and starvation of the bowel (13). More recent studies which include perioperative carbohydrates to address the detrimental effects of the bowel prep have demonstrated decreased surgical site infections with mechanical and antibiotic bowel preparation (14).

Thoracic epidural analgesia has long been considered the gold standard for pain management in patients having open colon and rectal surgical procedures in many studies. However, the modest analgesic benefits demonstrated for this modality are countered by the numerous trials, that when combined in meta-analyses, have demonstrated no benefit for thoracic epidural analgesia when compared to other modalities of pain control. Thoracic epidural analgesia may even delay hospital discharge after laparoscopic colon and rectal surgery; presumably because of the associated increased risk of hypotension and urinary complications (15,16). These guidelines address some of the urinary complications associated with thoracic epidural analgesia by recommending "Urinary catheters should be removed within 24 hours of elective colonic or upper rectal resection when not involving a vesicular fistula, irrespective of thoracic epidural analgesia use. 1B." While not a specific recommendation, transversus abdominis plane (TAP) block is discussed briefly as a modality that when compared with systemic opioids is associated with a decreased length of stay for patients having laparoscopic colon and rectal surgical procedures (17). While it is too early to be certain, TAP block has the potential to become the preferred method of pain control following both laparoscopic and open colon and rectal surgical procedures.

The importance of perioperative diet and fluid management is emphasized with 7 recommendations on this topic ranging from clear liquids and carbohydrate loading up to 2 h preoperatively, to goal directed, chloride-restricted crystalloid solutions intraoperatively, to discontinuation of intravenous fluids and starting a regular diet soon after discharge from the post anesthesia care unit. Both excessive fluid restriction and intravenous fluid overload can result in impaired organ function with increased postoperative morbidity, and longer hospital stays. Chloride-restricted, balanced salt crystalloid solutions are preferred to normal saline because of the potential to develop hyperchloremic metabolic acidosis. Further, an increased risk of renal dysfunction, postoperative morbidity, and mortality has been identified in observational studies with the use of normal saline as the perioperative fluid in surgical patients (18).

Postoperative nausea and vomiting and ileus are major causes of morbidity following colon and rectal surgery. Postoperative nausea and vomiting increases hospital costs and significantly reduces patient satisfaction and prevention has been shown to significantly improve patient outcomes. For patients with a high risk of PONV, the use of 3 or more prophylactic anti-emetics has demonstrated the most benefit in prospective studies. There are 6 guidelines addressing this topic. These include a recommendation for "preemptive, multimodal antiemetic prophylaxis in all at-risk patients to reduce postoperative nausea and vomiting. 1A". Specific agents discussed include dexamethasone, ondansetron (or another 5-hydroxytryptamine antagonist), intravenous acetaminophen, and gabapentin. The use of a total intravenous anesthesia technique is also briefly discussed. The guidelines for prevention of ileus include, sham feedings and the immediate resumption of a regular

Table 1 Practice guidelines for enhanced recovery after colon and rectal surgery (12)

No.	Practice guideline	Grade of recommendation
1	A preoperative discussion of milestones and discharge criteria should typically be performed with the patient before surgery	1C
2	Ileostomy education, marking, and counseling on dehydration avoidance should be included in the preoperative setting	1B
3	A clear liquid diet may be continued <2 hours before general anesthesia	1A
4	Carbohydrate loading should be encouraged before surgery in nondiabetic patients	2B
5	Mechanical bowel preparation plus oral antibiotic bowel preparation before colorectal surgery is the preferred preparation and is associated with reduced complication rates	2B
6	Prehabilitation before elective surgery may be considered for patients undergoing elective colorectal surgery with multiple comorbidities or significant deconditioning	2B
7	Preset orders should be used as a part of the enhanced care pathway	2C
8	A bundle of measures should be in place to reduce surgical site infection	1B
9	A multimodal, opioid-sparing, pain management plan should be used and implemented before the induction of anesthesia	1B
10	Thoracic epidural analgesia is recommended for open colorectal surgery, but not for routine use in laparoscopic colorectal surgery	1B
11	Antiemetic prophylaxis should be guided by preoperative screening for risk factors for postoperative nausea/vomiting	2B
12	Preemptive, multimodal antiemetic prophylaxis should be used in all at-risk patients to reduce postoperative nausea and vomiting	1A
13	Maintenance infusion of crystalloids should be tailored to avoid excess fluid administration and volume overload	1B
14	Balanced chloride-restricted crystalloid solutions should be used as maintenance infusion in patients undergoing colorectal surgery	1C
15	In high-risk patients and in patients undergoing major colorectal surgery associated with significant intravascular losses, the use of goal-directed fluid therapy is recommended	1B
16	A minimally invasive surgical approach should be used whenever the expertise is available and appropriate	1A
17	The routine use of intra-abdominal drains and nasogastric tubes for colorectal surgery should be avoided	1B
18	Early and progressive patient mobilization is associated with shorter length of stay	1C
19	Patients should be offered a regular diet immediately after elective colorectal surgery	1B
20	Sham feeding (i.e., chewing sugar-free gum for ≥10 minutes 3 to 4 times per day) after colorectal surgery is safe, results in small improvements in GI recovery, and may be associated with a reduction in the length of hospital stay	1B
21	Alvimopan is recommended to hasten recovery after open colorectal surgery, although its use in minimally invasive surgery remains less clear	1B
22	Intravenous fluids should be discontinued in the early postoperative period after recovery room discharge	1B
23	Urinary catheters should be removed within 24 hours of elective colonic or upper rectal resection when not involving a vesicular fistula, irrespective of thoracic epidural analgesia use	1B
24	Urinary catheters should be removed within 48 hours of mid-rectal/lower rectal resections	1B

diet. Chewing gum after colon and rectal surgery has been extensively studies with conflicting results. However, given the limited risk and potential benefit, these guidelines do include a recommendation for gum chewing after surgery. These guidelines also recommend resuming an oral diet immediately after colon and rectal surgery. Feeding started early in the postoperative course can help prevent the complication of ileus. However, it has also been found that too much feeding can overwhelm the gastrointestinal tract, resulting in a severe ileus (19). It would seem unnecessary to institute "sham" feedings when actual feedings are resumed immediately postoperatively.

In summary, the joint panel is to be congratulated for achieving their goal of defining the current best practices to achieve the optimal outcomes in patients undergoing colon and rectal surgical procedures and providing practitioners with very helpful guidelines for the management of these patients.

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Footnote

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