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Definition, Incidence, Risk Factors, and Prevention of Paralytic Ileus Following Radical Cystectomy: A Systematic Review

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Abstract

Context: Postoperative paralytic ileus (POI) has profound clinical consequences because it represents a substantial burden on both patients and health care resources.

Objective: To determine the knowledge base regarding POI in the radical cystectomy (RC) population with an emphasis on preventive measures and risk factors.

Evidence acquisition: A systematic literature search of Medline (1966 to February 2011) and a study review were conducted. Eligible studies explicitly reported the incidence of POI and/or at least two quantitative measures of gastrointestinal recovery.

Evidence synthesis: The search identified 727 relevant articles; 77 met eligibility criteria, comprising 13 793 patients. Of these, 21 used explicit definitions of POI, and they varied widely. Across studies, the incidence of POI ranged from 1.58% to 23.5%. Possible risk factors for POI included increasing age and body mass index. Seventeen studies reported effects of an intervention on POI: 3 randomized controlled studies, 11 observational cohort studies with concurrent comparison, and 3 observational cohort studies with nonconcurrent comparison. Gum chewing was associated with shortened times to flatus (2.4 vs 2.9 d; $p < 0.0001$) and bowel movement (BM) (3.2 vs 3.9 d; $p < 0.001$) in one observational cohort study ($n = 102$); omission of a postoperative nasogastric tube (NGT) was associated with shorter time to flatus (4.21 vs 5.33 d; $p = 0.0001$) and shorter length of stay (14.4 vs 19.1 d; $p = 0.001$) in one observational cohort study ($n = 430$); and the routine use of bowel preparation was associated with an increased incidence of POI (5% vs 19%) in another series ($n = 86$). Additionally, readaptation of the dorsolateral peritoneal layer was shown to shorten times to flatus ($p = 0.016$) and times to BM ($p = 0.011$) in one randomized controlled study ($n = 200$).

Conclusions: The incidence/definition of POI after RC is highly variable. An improved reporting strategy is needed to identify true incidence and risk factors, and to guide future research for both potential preventive and therapeutic interventions.

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1. Introduction

Despite major improvements in perioperative patient care, radical cystectomy (RC) continues to be associated with a

high complication rate [1–3]. One of the most common complications is postoperative paralytic ileus (POI) [2–5]. Transient cessation of bowel activity is expected following major abdominal surgery with small bowel motility and

gastric emptying returning quite quickly (within 24 and 48 h, respectively). Large bowel recovery, however, is typically more protracted, taking up to 3–5 d to resume activity [6,7]. Despite the expectation of diminished intestinal motility following surgery, the period without signs of bowel function often extends beyond what is acceptable and is then diagnosed as POI.

POI has been mainly studied in patients undergoing general abdominal surgery. It has been shown to prolong the length of stay (LOS) by days to weeks and is associated with increased morbidity and costs [8–10]. Estimates of incidence vary in the general surgery literature, and clinical trials have been conducted to identify strategies to prevent POI. A meta-analysis of the effect of postoperative gum chewing revealed a decrease in the rate of POI and LOS [11]. A Cochrane review of the effect of prokinetic agents on POI found that certain medications reduce time to flatus and duration of hospital stay [12]. Epidural anesthesia, in contrast to opiate use, was found to reduce POI but not length of hospital stay [13]. Alvimopan, a peripherally acting μ -opioid receptor antagonist, was found to reduce time to flatus as well as accelerate time to hospital discharge [14]. Finally, early commencement of oral fluids has been shown to reduce time to bowel sounds and solid diet intake and has demonstrated improvement toward shorter hospital stays [15].

To improve our understanding of POI as it relates specifically to RC patients, we conducted a systematic review of the evidence base on POI for patients undergoing RC. We sought to capture the reported incidence of POI, interventions to prevent POI, and risk factors for POI among RC populations. We also include standardized care pathways that, although they do not examine a specific intervention, have similarly been used to optimize gastrointestinal (GI) recovery and/or the incidence of POI.

2. Evidence acquisition

We conducted a systematic review of Medline from 1966 to February 2011 in adherence with the Preferred Reporting Items for Systematic Reviews and Meta-analysis guidelines [16] using the following search criteria:

1. Medical Subject Headings (MeSH) terms: *cystectomy*, *preoperative care* or *intraoperative care* or *postoperative care* or *perioperative care* or *postoperative period* or *intraoperative complications* or *postoperative complications*
2. Ovid text word terms: *preoperative care* or *intraoperative care* or *postoperative care* or *perioperative care* or *postoperative period* or *intraoperative complications* or *postoperative complications*
3. Linkage: Items 1 and 2, limited to human adults and publications in English

We then conducted an additional search for additional articles using only the following text word terms: *cystectomy* and *ileus*. We specifically used Ovid text word terms for the perioperative period to maximize the sensitivity of the search strategy. Studies reviewed were limited to those that

reported primary data. To be eligible for inclusion, studies had to report one or more of the following: (1) incidence of POI using an explicit definition or at least two quantitative measurements of GI recovery including LOS, time to bowel sounds, time to flatus, time to bowel movement (BM), time to liquid diet/oral intake, time to regular diet; (2) potential risk factors for the development of POI; and (3) interventions to prevent or limit the incidence or duration of POI. Data from cohorts represented in more than one publication were only reported once. Exclusion criteria were studies with <10 patients, case reports, or those studies not reporting any data on POI or GI recovery.

Study quality and methodology for randomized controlled trials (RCTs) was assessed using the Jadad scale [17] and the Consolidated Standards for Reporting Trials (CONSORT) statement [18]. In the Jadad scale, a maximum score of 5 points (2 for randomization, 2 for blinding, and 1 for accountability of all patients) can be attained, and an overall score ≥ 3 indicates a high-quality study [17]. In the CONSORT scale, a 22-item checklist receives 0–2 points depending on the quality of the description (0 = no description, 1 = inadequate description, 2 = adequate description). In observational cohort studies, quality was assessed using the Newcastle-Ottawa scale [19], where studies are given up to 9 total points for meeting criteria in selection, comparability, and exposure. We considered studies as high quality if they received 8 or 9 points, medium quality if they received 6 or 7 points, and low quality if they received ≤ 5 points [19].

3. Evidence synthesis

3.1. Overview

Initially, our search yielded 727 potentially relevant publications (Fig. 1). The titles of all 727 results were reviewed, and if the publication could not be eliminated based on title alone, the abstract was subsequently reviewed. The remaining 332 manuscripts were reviewed in full to determine eligibility. A total of 77 articles contained data in accordance with the eligibility criteria.

From these 77 articles, we identified 13 793 patients who underwent RC and who were noted to have experienced or not experienced POI in the postoperative period. We identified studies that did not explicitly identify patients with POI but did note various indicators of the return of bowel function according to our criteria.

3.2. Incidence of postoperative paralytic ileus

Of the 77 studies, 68 reported the incidence of POI. The rate of POI for cystectomy patients varied from 1.58% to 23.5% with an average rate of POI of 9.86% for 13 793 patients.

3.3. Definitions of postoperative paralytic ileus

The definition for POI varied among reports. Only 21 of the 77 studies meeting initial search criteria used explicit definitions of POI. Among RCTs, no definition of POI was

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