Urinary Catheter Management

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Abstract

After colorectal resection surgery, early urinary catheter removal has been promoted as a part of the national Surgical Care Improvement Project. However, the decrease in urinary tract infection expected with this strategy must be balanced against an increased risk for urinary retention. A systematic review of the literature was undertaken to summarize the evidence for and against early postoperative urinary catheter removal. For nonpelvic colorectal resection, the evidence supports removal of the catheter on postoperative day 1 for patients who are not at high risk for urinary retention, including patients with thoracic epidurals. For mid-to-low rectal surgery, the risk of urinary retention is increased, and catheter removal on day 3 to day 6 is recommended; however, the exact timing of removal cannot be recommended based on current studies.

Keywords

- urinary catheterization
- postoperative care
- colorectal surgery

Objective: On completion of this article, the reader should be able to summarize the recommended management for urinary catheters after colorectal resection surgery.

Background

Urinary catheter placement is standard practice for abdominal colorectal operations, providing bladder decompression, measurement of urine output, and management of postoperative urinary retention. However, the potential morbidity of urinary catheterization includes urinary tract infection (UTI), a subset of which result in urosepsis, patient discomfort, and increased length of hospitalization.[1,2] A 2008 nationwide study by Wald and colleagues revealed that surgical patients catheterized for more than 2 days postoperatively had a higher risk of UTI, longer length of stay, and even higher mortality after adjusting for patient comorbidity and other factors relevant to these outcomes.[3] Therefore, the Surgical Care Improvement Project (SCIP) has implemented a national hospital quality measure (SCIP-Inf-9) entitled, "Urinary Catheter Removed on Postoperative Day 1 (POD 1) or Postoperative Day 2 (POD 2) with Day of Surgery Being Day Zero."[4] This measure applies to colorectal surgery patients, even those undergoing proctectomy. Colorectal surgery patients in the United States typically undergo urinary catheterization for a median of 4 days.[3] Therefore, colorectal surgeons must now consider a change in practice to early urinary catheter discontinuation, or must provide justification in the medical record for longer duration of catheterization.

What factors determine the duration a urinary catheter is needed for colorectal surgery patients? The key factor is the incidence and duration of postoperative urinary retention, but data on this outcome are limited. A large, retrospective study of colorectal cancer patients who had a transurethral catheter inserted before surgery and removed 4 to 7 days postoperatively showed a risk of urinary retention after catheter removal of 1.7% for colon cancer patients and 9.1% of rectal cancer patients.[5] This and other studies have suggested that proctectomy (particularly with low anastomosis and for locally advanced rectal cancer), abdominoperineal resection, concomitant pelvic procedures, older age, history of urinary dysfunction, male gender, prostate enlargement, lung disease, neurologic diseases, and longer operation may be risk factors for postoperative urinary retention.[5–7] Surgical technique, specifically autonomic nerve preservation, is of course a key factor in minimizing postoperative urinary dysfunction.[8] Anesthetic techniques (such as epidural analgesia), medications, and perioperative fluid administration are also contributing factors.[7]

Urodynamic and questionnaire studies further support a higher risk of urinary dysfunction after proctectomy versus colectomy surgery due to autonomic nerve damage at

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surgery.[9–13] A study of colorectal surgery patients in which urinary functioning was measured postoperatively estimated return of normal urinary function in a median of 3 days after colon operations and 6 days after rectal operations.[12] However, most patients in the study were able to void successfully after catheter removal, despite abnormal urodynamics, indicating that need for recatheterization and urinary tract infections are the outcomes of real interest to colorectal surgeons, rather than urodynamics.[8,12] Another study of 52 patients after total mesorectal excision documents a 29% rate of urodynamic dysfunction at 2 weeks after surgery, which improved to 13% at 3 months.[11] In this study, the patients with urinary dysfunction were generally managed with a temporary suprapubic catheter.

We have identified three management questions regarding duration of urinary catheterization after colorectal resection, and attempt to provide guidance despite the sparse evidence:

- How long should urinary drainage continue after nonrectal, abdominal colorectal surgery?
- How long should urinary drainage continue after pelvic colorectal surgery/proctectomy?
- How long should urinary drainage be continued during postoperative epidural analgesia?

Method

There is limited experimental evidence on which to base decisions regarding the duration of urinary catheterization in colorectal surgery patients. Therefore, this systematic review relies on a combination of small trials and observational studies for its recommendations. The search strategy had two phases: (1) search for primary literature, and (2) search for guidelines. The goal of these searches was to identify observational or experimental trials studying perioperative urinary catheterization practices for general surgery or colorectal surgery, with urinary retention, UTI, and/or urodynamics as outcomes. The search excluded studies of pediatric patients.

The databases searched for primary, English-language literature included Ovid Medline and PubMed. The search included studies indexed up to December 2012. Search terms (keywords) used were "Urinary catheter removal," "foley catheter removal," "Postoperative" and "urinary catheter" and "trial," "Postoperative" and "foley catheter" and "trial," "Colorectal" and "urinary catheter," "Colorectal" and "foley catheter," "urinary catheter" and "timing," "postoperative urinary retention" and "urinary catheter," "postoperative urinary retention" and "colorectal," and "postoperative urinary retention" and "general surgery." Finally, bibliographies of articles identified with the above search were scanned for additional relevant articles.

The search for existing practice guidelines was performed by searching the National Guideline Clearinghouse (http://guideline.gov/). Search terms used were "urinary catheter" and "postoperative," "urinary catheter removal," "catheter removal," "foley catheter," "CAUTI," and "perioperative catheter."

Results

Systematic review of the evidence to address the three guiding questions above resulted in the following recommendations (►**Table 1**):

Recommendation #1: For routine, intraperitoneal colorectal resection, the urinary catheter can be removed on postoperative day #1 (level of evidence: III; grade of recommendation: B).

This recommendation is in agreement with guidelines from the Centers for Disease Control and Prevention[14] and the SCIP guideline discussed above.[4]

The only level I evidence comparing different strategies for urinary catheter removal after nonproctectomy abdominal surgery comes from a trial of catheter removal on day 1 versus at time of epidural removal, in patients with continuous

Table 1 Recommendations for urinary catheter management after colorectal resection surgery

Guiding question	Evidence-based recommendation	Comments
How long should urinary drainage continue after nonrectal, abdominal colorectal surgery?	For routine, intraperitoneal colorectal resection, the urinary catheter can be removed on postoperative day #1.	Patients at high risk for urinary retention (e.g., history of urinary dysfunction, prostate enlargement) may require longer catheterization.
How long should urinary drainage continue after pelvic colorectal surgery/proctectomy?	For mid to low rectal surgery, the urinary catheter can be removed on postoperative day 3–6, depending on the patient's risk for urinary retention.	Same as above
How long should urinary drainage be continued during postoperative epidural analgesia?	For colorectal surgery in which an epidural catheter is used for perioperative pain management, removal of the urinary catheter prior to epidural discontinuation can be considered, and is associated with lower risk for urinary tract infection.	Same as above

thoracic epidural analgesia after abdominal or thoracic surgery.[15] This small trial with a very heterogeneous group of patients showed a lower risk of UTI among patients randomized to early catheter removal (1.9% vs. 13.6%), and a nonsignificant trend toward higher risk of urinary retention (7.6% vs. 1.8%). Note that this trial excluded patients considered to be at "high risk of urinary retention."

Post hoc subgroup analysis of a randomized trial comparing postoperative day (POD) #1 versus POD #5 urinary catheter removal for proctectomy patients, excluding those with low rectal cancer, examined the risks of urinary retention and UTI. There was an insignificant difference (14% vs. 7%) in urinary retention between day 1 and 5 catheter removal in this upper rectal subgroup, but much lower risk of UTI with early removal (12% vs. 40%). These data suggest that upper rectal surgery patients can probably be treated like colectomy patients.[16]

In addition, many observational studies have documented the safety of urinary catheter removal on POD #1 after colectomy, and "fast-track" colectomy protocols routinely contain a provision for urinary catheter removal on POD #1.[17,18] In the frequently cited, prospective study of fast-track colectomy by Basse et al,[19] 7 of 60 patients (12%) with urinary catheters removed on POD #1 developed urinary retention, successfully managed by "single in and out catheterization." These patients also had epidural catheters; therefore, colectomy patients without epidurals might be expected to have lower rates of urinary retention. Kahokehr and colleagues report a 5% risk of postoperative urinary retention in a small, prospective study comparing laparoscopic right colectomy without epidural analgesia and fast-track open surgery with epidural analgesia.[20]

Note that patients considered to be at increased risk for postoperative urinary retention may be appropriately managed with a longer duration of urinary catheterization, with medical record documentation of the rationale (for risk factors, see the Background section above, and the review by Baldini[7]). Early catheter removal involves a change in practice for many hospitals; a study by Wald and colleagues showed that a hospital-level audit and feedback system was effective in decreasing the duration of catheterization in hospitalized patients.[21]

Recommendation #2: For mid to low rectal surgery, the urinary catheter can be removed on postoperative day 3 to day 6, depending on the patient's risk for urinary retention (level of evidence: III; grade of recommendation: C).

There are only two published, randomized trials comparing different durations of urinary drainage after proctectomy surgery.[16,22] The trial by Benoist and colleagues showed higher high rates of urinary retention with catheter removal on postoperative day 1 (31% vs. 10%), and higher rates of urinary tract infection with removal on postoperative day 5 (42% vs. 20%).[16] A second trial by Zmora et al, in which rectal dissection patients were randomized to urinary catheter removal on either day 1, 3, or 5 appears to have been underpowered to show a difference between groups. However, there was a trend toward higher risk of retention with day 1 removal and higher risk of urinary tract infection with day 5 removal.[22]

Although these studies do not provide strong guidance regarding the exact date of catheter removal for proctectomy patients, the range of 3 to 6 days after surgery is supported by existing studies of urodynamics and short-term versus long-term urinary retention.[12,16] That is, most patients who develop retention after removal at 5 days appear to have long-term rather than short-term retention.[16] Risk factors for urinary retention mentioned above can be used to risk-stratify patients for earlier versus later removal within the 3- to 6-day range. Unfortunately, a small, randomized trial of the $\alpha - (1A-)$ adrenoceptor antagonist tamsulosin for prophylaxis of urinary retention after rectal cancer surgery failed to show a prophylactic effect.[23] Therefore, there is no proven pharmacologic method for preventing retention in proctectomy patients.

Recommendation #3: For colorectal surgery in which an epidural catheter is used for perioperative pain management, removal of the urinary catheter prior to epidural discontinuation can be considered, and is associated with lower risk for urinary tract infection (level of evidence: III; grade of recommendation: C).

The trial by Zaouter and colleagues, including both thoracic and abdominal surgery patients with epidurals for perioperative analgesia, showed a lower risk of UTI among patients randomized to early catheter removal (1.9% v. 13.6%), and a nonsignificant trend toward higher risk of urinary retention (7.6% vs. 1.8%). Note that this trial excluded patients considered to be at high risk of urinary retention, and catheter removal while epidural is still functioning may or may not be advisable in patients with risk factors for urinary retention. Observational studies of catheter removal on day 1 after colectomy or thoracotomy with epidural analgesia show a 9 to 12% rate of recatheterization,[19,24–26] which can often be treated with a single in-and-out catheterization.

Other Results

A related topic also relevant to colorectal surgeons is the role of suprapubic catheterization, as an alternative to transurethral catheterization. Although this topic was not systematically reviewed, there is evidence that suprapubic catheterization has advantages for patients with urinary retention. In support of this statement is a Cochrane meta-analysis of 14 randomized trials comparing suprapubic versus transurethral catheterization for short-term urinary drainage, including several trials with colorectal surgery patients.[27] Transurethral catheterization was associated with significantly more cases of bacteriuria, more frequent recatheterization, and more discomfort. A current status review in *Diseases of the Colon and Rectum* by Branagan and colleagues also supports consideration of suprapubic catheters in patients after proctectomy, citing lower rates of UTI, patient preference, and easier transition to spontaneous voiding for patients with suprapubic catheters.[28]

Several clinical practice guidelines were identified that addressed prevention of catheter-associated urinary tract infections in hospitalized patients.[29,30] However, these did not focus on surgical patients, and in general recommended catheters be discontinued "as early as possible." One useful,

evidence-based recommendation from the 2009 International Clinical Practice Guidelines from the Infectious Diseases Society of America is that hospitals use automated reminder systems or automatic stop orders to ensure early discontinuation of most catheters.[29]

Conclusions

In summary, for abdominal colorectal surgery, early urinary catheter removal on POD #1 is recommended in patients who are not at high-risk for urinary retention, including patients with thoracic epidurals. For mid-to-low rectal surgery, the risk of urinary retention is increased, and catheter removal on day 3 to 6 is recommended; however, the exact timing of removal cannot be recommended based on current studies. Urinary catheters do not have to be maintained in all patients with thoracic epidural analgesia. An ongoing, prospective, nonrandomized trial (NCT01186237) entitled, "Early Removal of Urinary Catheters in Patients after Rectal Surgery: a Prospective Study" seeks to define the incidence of urinary retention following colorectal surgery; we hope this and other future studies will provide stronger evidence to guide practices for urinary catheter management after various colorectal operations.

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