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Urinary retention in early urinary catheter removal after colorectal surgery

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ABSTRACT

Background: High urinary infection (UTI) rate (12%) for our rectal surgery prompted practice change to early catheter removal (postoperative day 2) and prophylactic tamsulosin. Here we report urinary retention (UR) and UTI after this change.
Methods: Retrospective cohort study in male patients 50+ years undergoing elective colorectal surgery from July 2015 to July 2017. Multivariate regression was used to determine risk factors for urinary retention.
Results: 157 patients, 57 without and 100 with tamsulosin had UR 11.46% and UTI 5.13%. Of all potential risk factors, ileus (OR 5.50, 95% CI: 1.86–16.24) was an independent risk factor for urinary retention.
Conclusions: Urinary retention of 11% after colorectal resection is within literature range and associated with post-operative ileus. Tamsulosin did not affect UR in our small study sample. Early catheter removal was associated with decreased UTI rate.

1. Introduction

Post-operative urinary tract infections (UTI) contribute significantly to patient morbidity after colorectal surgery.[1,2] The rate of UTI after colorectal surgery is about 4%, which is higher than other gastrointestinal surgeries.[3] Our hospital NSQIP data indicated an alarmingly high 12% UTI rate for our rectal surgeries.

Early removal of urinary catheters has been implemented in Enhanced Recovery After Surgery (ERAS) protocols to reduce post-operative UTI rates.[4] However, early catheter removal may increase the rate of post-operative urinary retention (UR), which causes patient discomfort and prolongs length of stay. Literature estimates for post-operative UR after colorectal surgery range widely, from 2% to 50%. Multiple studies have highlighted the importance of balancing the risks of UTI and UR when designing protocols for urinary catheter removal.[5]

Tamsulosin is an alpha-1 adrenergic antagonist that relaxes the bladder neck to facilitate emptying.[6] Several studies, including small, randomized control trials, have demonstrated the efficacy of tamsulosin to reduce the rates of UR after hernia repair by about 20%.[7] For colorectal surgery, a small, randomized trial found no improvement in UR with peri-operative tamsulosin at a dose of 0.2 mg/day.[8] However, a retrospective study found that administering tamsulosin 0.4 mg daily in the peri-operative period decreased rates of acute post-operative UR by four-fold in men undergoing rectal cancer resections.[9]

Therefore, we hypothesized that early catheter removal combined with perioperative tamsulosin may decrease rates of UTIs without increase in retention. Our study aims were to determine rates of urinary retention and UTI in colorectal resection surgery with removal of urinary catheter at postoperative day 2 and to identify risk factors for urinary retention.

2. Methods

2.1. Study design

This is a retrospective cohort study of consecutive male patients age 50 or older that underwent elective colorectal surgery from July 2015 to July 2017 at a single academic hospital. All patients

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followed our ERAS pathway with removal of urinary catheter on post-operative day two. As of 2016, male patients over the age of 50 were given prophylactic Tamsulosin 0.4 mg PO once daily for 3 days pre-operatively until discharge from hospital. UR was defined as any re-insertion of a Foley catheter or use of an in-and-out catheter in the post-operative period. UTI was defined by the CDC criteria.

Ethics boards of University of British Columbia and St. Paul's Hospital gave approval for the study.

2.2. Inclusion & exclusion criteria

Consecutive elective colorectal cases in male patients 50 years old or older from July 2015 to July 2017 were included. Excluded were patients with prior prostate surgery, history of benign prostatic hypertrophy (BPH), patients already on tamsulosin or another alpha blocker, pathology showing tumor extension to bladder or prostate, operative urethral or bladder injury, and prolonged urinary catheterization required for monitoring ill patients.

2.3. Data collection

Patients were identified and charts reviewed using the St. Paul's Hospital ERAS and NQSIP database. Potential risk factors for UTI and urinary retention were identified from a literature review and included in our data collection. Patient factors included: age, American Society of Anesthesiologist score (ASA), history of BPH, history of voiding difficulties, and neoadjuvant chemoradiation. Operative factors included: lesion location (colon vs rectal; rectal defined as total mesorectal excision, preoperative radiation, temporary or permanent stoma/abdomino-perineal resection), laparoscopic vs. open procedure, operative duration and intra-operative fluid volume. Post-operative factors included: day of removal of urinary catheter, prophylactic tamsulosin (pre & post op, pre op only, post op only or none), epidural or PCA (patient controlled narcotic analagesia), ileus, anastomotic leak, and length of stay in hospital. Ileus was defined as vomiting, intolerance of adequate oral diet, and use of nasogastric suction on postop day 4 or greater.

2.4. Statistical analysis

Primary outcomes of UTI and urinary retention rates were calculated as cumulative incidences. Univariate analysis was performed on potential risk factors of UR. A multivariate model incorporated statistically significant risk factors from univariate analysis screen and regressed to determine adjusted odds ratios. P value less than 0.05 was considered significant. Statistical analysis was performed using SAS 9.4.

3. Results

244 male patients 50 years or older were enrolled in the ERAS pathway during the study period. 87 patients were excluded: 31 already on alpha blockers, 13 with tumor extension/intra-operative injury to urethral structures, 18 had previous TURP, 22 had catheterization for ICU monitoring and 3 had prolonged catheterization due to urology request, patient request or surgeon request for close proximity of tumor to prostate but not invading.

As such, 157 patients were included in the analysis: 57 without and 100 with prophylactic tamsulosin (54 received tamsulosin pre and post-op, 41 post op only, and 5 pre-op only). Demographic information is summarized in Table 1.

Primary outcomes were rates of UR 11.46% and UTI 5.13%. UTI rate amongst patients with UR was 27.78% and only 2.16% amongst those without retention in our cohort, thus the odds of being diagnosed with UTI if you had UR in our cohort was 17.44 [95% CI: 3.74–81.36, $p < 0.01$].

Univariate analyses of potential risk factors for UR are shown in Table 2. Only lesion location, operative duration and ileus were significant potential factors on the univariate screen. Multivariate regression analysis was performed integrating lesion location, operative duration and ileus to determine adjusted odds ratios. Only ileus was found to be statistically significant with an adjusted odds ratio of 5.50 [95% CI = 1.86, 16.24], $p < 0.01$. Lesion location and operative duration were found not to be statistically significant with adjusted odds ratios of 3.05 [95% CI = 0.68, 13.74], $p = 0.15$ and 1.00 [95% CI = 1.00, 1.01], $p = 0.34$ respectively.

4. Discussion

Our UTI rate was 5% after changing to the protocol of removing urinary catheters on postop day 2 after colorectal surgery, however on subgroup analysis we found our UTI rate was still high amongst rectal surgery patients, 9% vs our previous NSQIP reported UTI rate of 12%. Our UTI rate after colon resections is only 1%, which is amongst the lower reported averages. Patients with UR were also at higher risk of developing a UTI in our cohort, 28% vs. 2%.

Overall UR after this change in protocol was 11% and was significantly different between colon and rectal resections (3.8% vs. 19.2%, $p = 0.002$, chi square), although we were unable to show rectal location as a significant predictor of UR in our multivariate regression analysis. In comparison to the current study where UR was 19.2% for rectal surgery after average urinary catheter removal day of 2.73, when we looked back at our previous 53 consecutive rectal surgery patients, the UR was 15.1% with an average urinary catheter removal day of 4.08 and the UR difference was not statistically significant ($p = 0.54$, chi square). This indicates it is reasonably safe to remove the urinary catheter as per change in protocol to day 2 for rectal surgery patients.

Reports of UR after colorectal surgery vary widely in the literature between 2 and 50%. UR is 5–22% higher after pelvic surgery compared with after abdominal surgery,[10,11] perhaps in part from injury to autonomic nerves supplying the bladder during rectal surgery.[9] Benoist et al. compared early catheter removal on post-operative day 1 to standard removal on day 5 after rectal surgery. Their group concluded that early catheter removal is appropriate for most patients undergoing rectal resection but that urinary catheter removal should be delayed for low rectal cancers.[10] Other small studies have also advocated for early urinary catheter removal after colorectal surgery.[12–14] However, 2 reviews argue

Table 1
Demographics.

Demographics	Patients (n = 157)
Age (years), mean (±SD)	65.1 (9.0)
Lesion location, n (% rectal)	78 (49.7)
MIS, n (%)	115 (73.3)
OR duration (minutes), mean (±SD)	188.9 (74.2)
LOS (days), mean (±SD)	6.8 (4.7)
Intra-op fluid balance (mL), mean (±SD)	1439.1 (713.4)
POD urinary catheter removal, mean (±SD)	2.2 (1.1)
Neoadjuvant chemoradiation, n (%)	42 (26.8)
Prior voiding difficulty, n (%)	18 (11.5)
Epidural, n (%)	55 (35.0)
PCA, n (%)	124 (80.0)
Ileus, n (%)	35 (22.4)
Anastomotic leak, n (%)	7 (4.5)
Prophylactic tamsulosin	
none	57 (36.3)
pre and post op	54 (34.4)
pre-op only	5 (3.3)
post-op only	41 (26.1)

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