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Postoperative urinary retention in colorectal surgery within an enhanced recovery pathway

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ABSTRACT

Background: Enhanced recovery after surgery (ERAS) guidelines for colorectal surgery suggest routine transurethral bladder drainage with early removal to prevent urinary tract infection (UTI). The aim of this study was to identify risk factors for urinary retention (UR). **Methods:** This retrospective analysis included all colorectal patients since ERAS implementation in May 2011–November 2014. From the prospective ERAS database, over 100 items related to demographics, surgery, compliance, and outcome were analyzed. Risk factors for UR were identified by multiple logistic regressions; then, UR was correlated to functional outcomes and UTI and acute kidney injury rates.

Results: The study cohort consisted of 513 consecutive patients. Of these, 73 patients (14%) presented with UR. Multivariate analysis identified male gender (odds ratio 1.4; 95% CI, 1–1.8; $P = 0.045$) and postoperative thoracic epidural analgesia (EDA; odds ratio 2.6; 95% CI, 1.6–4.3; $P \leq 0.001$) as independent risk factors for postoperative UR. Functional recovery was impeded in patients with UR, who were less mobile (mobilization day 1 >4 h: 57% versus 70%, $P = 0.024$) and gained more weight (2.8 ± 2.5 kg versus 1.6 ± 3 kg on day 1, $P = 0.001$) due to fluid overload. Furthermore, patients with urinary catheters reported more pain (visual analog scales day 3: 3.1 ± 2.5 versus 2.2 ± 2.4 , $P = 0.002$) and depended longer on intravenous fluid administration (termination of intravenous fluids later than day 1: 53% versus 39%, $P = 0.021$). Ten of 73 patients (14%) developed UTI in patients with UR and 42 of 440 (10%) in patients without UR ($P = 0.276$). Six of 73 patients (8%) developed acute kidney injury in patients with UR and 36 of 440 (8%) in patients without UR ($P = 0.991$).

Conclusions: Male gender and EDA were independent risk factors for postoperative UR which appeared to be a significant impediment for functional recovery.

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Introduction

Enhanced recovery after surgery (ERAS) pathways in colorectal surgery have been associated with decreased complication rates, positively influencing length of stay and costs.^{1,2} To promote early mobilization and thus functional recovery, adjuncts such as nasogastric tubes or postoperative urinary catheters should be avoided if possible. Hence, the ERAS guidelines suggest early postoperative removal of transurethral routine bladder drainage, regardless of the usage of thoracic epidural analgesia (EDA).² Furthermore, it has been repeatedly demonstrated that early removal of bladder catheters decreases the rate of urinary tract infections (UTIs).³

The aim of the current study was to assess incidence and risk factors for urinary retention (UR) in a consecutive cohort of colorectal patients treated according to the ERAS pathway. In a second step, impairment of functional recovery with repetitive urinary drainage was evaluated.

Methods

The study cohort consisted of all consecutively operated colorectal surgical interventions between May 2011 and November 2014 at the University Hospital of Lausanne (CHUV). All colorectal patients were treated according to the ERAS protocol, and no patient was excluded from this retrospective analysis. Data were collected prospectively by a dedicated clinical nurse in the official ERAS Interactive Audit System. Informed consent was obtained from all patients before surgery, and the study was approved by the Institutional Review Board. The study was conducted according to the STROBE (STrengthening the Reporting of OBservational studies in Epidemiology) criteria and registered under www.researchregistry.com (UIN research registry 833).

The institutional enhanced recovery pathway was published previously⁴ and is in accordance with the ERAS recommendations updated 2013.² When epidural analgesia (EDA) was considered, the catheter was inserted at a thoracic level (Th8-Th10) before induction of anesthesia, and a continuous perfusion of bupivacaine 0.5% was maintained until the end of the surgical procedure. A solution with a local anesthetic, opioids, and adrenaline (bupivacaine 0.1%, fentanyl 2 µg/mL, and adrenaline 2 µg/mL) was started at the recovery room at a rate of 6-10 mL/h and maintained for 2 d after minimally invasive surgery and 4 d after open surgery. The efficacy of EDA was evaluated every day by dedicated nurses of the analgesia unit. Patients without EDAs were managed by combinations of paracetamol, metamizole or nonsteroidal anti-inflammatory drugs, and opioids. Failure of EDA was defined as removal of EDA before the anticipated time point because of different reasons such as insufficient pain relief, dislodged or accidentally withdrawn catheters or nontolerance due to other reasons, in accordance to the descriptions of Hermanides.⁵ Baseline demographic and pertinent surgical information was recorded. Surgical procedures were subdivided, distinguishing further between right and left or sigmoid colectomies and rectal procedures for the purpose of this study. *Extended major surgery* (rectum

resection, proctocolectomy, total colectomy, and ileal pouch-anal anastomosis) was distinguished from *major surgery* (segmental colectomy, stoma procedure, and small bowel surgery). Data about ERAS-specific perioperative care items were prospectively collected.² Urinary catheters were removed within 24 h after the surgical procedure, except for low rectal resections where the withdrawal of the catheter was performed on postoperative day (POD) 3 or 4. Functional recovery parameters such as mobilization, weight gain, tolerance of oral fluids or sip feeds and time to flatus and stool were assessed on a daily basis. Furthermore, patients reported on visual analog scales (VAS) the perception of pain and nausea. UTI were defined as clinical infections proved by positive urine cultures. Acute kidney injury (AKI) was defined as an increase in serum creatinine level $\times 1.5$ or decrease in glomerular filtration rate (GFR) by 25%.⁶

Outcomes and/or study end points

The primary end point was the rate of postoperative UR. Postoperative UR was defined as the need for postoperative insertion of a Foley catheter due to voiding problems (including single in-and-out straight catheters). Other reasons for postoperative catheter insertion such as fluid guidance or reoperation were not accounted for. Risk factors for UR were identified among demographic, surgery-related, and perioperative care items.

Secondary end points were functional recovery and urinary complications (UTI and AKI), which were compared between the two groups (UR versus no UR).

Statistical analysis

Descriptive statistics for categorical variables were reported as frequency (%), while continuous variables were reported as mean (standard deviation) or median (interquartile range). Chi-square test was used for comparison of categorical variables. All statistical tests were two-sided, and a level of 0.05 was used to indicate statistical significance. Variables with P values ≤ 0.05 were then entered into a multivariate logistic regression (based on a probit regression model) to provide adjusted estimations of the odds ratio (OR). Data analysis was performed with the Statistical Software for the Social Sciences SPSS Advanced Statistics 22 (IBM Software Group, Chicago, IL) and MATLAB Statistical Toolbox v10.1 (Mathworks, Natick, MA).

Results

Patients

A total of 513 patients were included over the observed period. The baseline characteristics of the two groups (UR versus no UR) were comparable except for gender and World Health Organization (WHO) performance score and are illustrated in [Table 1](#).

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