Quantification of risk factors in 500 patients with postoperative urinary retention

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Introduction: *An Institutional Quality and Safety Initiative to reduce postoperative urinary retention (POUR) and improve patient safety indicators (PSIs) was undertaken after a nurse driven protocol for catheter removal lead to an increase in POUR. The aim of this study was to identify the number of risk factors present in patients with POUR while examining the prevalence of those risk factors individually.*

Materials and methods: *A retrospective review of our institution's surgical database was performed to identify 500 consecutive cases of POUR between July 1, 2013 and July 1, 2014. POUR was defined as the inability to void postoperatively with bladder scan volumes greater than 450 mL and subsequent need for catheterization with an output greater than 450 mL. These records were individually reviewed for 15 known independent risk factors for urinary retention. Patients with incomplete records or preoperative baseline urinary retention requiring catheterization were excluded.*

Results: *Of the 500 consecutive patients with POUR, 288 (57.6%) were male and 212 (42.4%) were female. At the time of voiding trial, all 500 patients with POUR (100%) had at least one perioperative risk factor identified and over 75% had six or more (mean 6.88, median 7, range 1-12).*

Conclusions: *Multiple perioperative risk factors are present in the vast majority of patients with POUR. Many of the risk factors are modifiable and represent an opportunity for intervention. This could ultimately lead to a risk profile which could be used to optimize timing of postoperative voiding trials, thus improving patient care (improve PSIs and patient comfort, reduce trauma) while maintaining low rates of CAUTI.*

Key Words: postoperative urinary retention (POUR), intraoperative fluid rate, void trial, bladder scan

Introduction

Our institution established a nurse-driven protocol for early postoperative catheter removal in an effort to minimize catheter associated urinary tract infections (CAUTIs). This motivated the authors to assess the rate of urinary retention at our institution, which was found to be 9.8% of 20,455 surgical patients in FY2013. An Institutional Quality and Safety Initiative to reduce postoperative urinary retention (POUR) and improve patient safety indicators (PSIs) was undertaken. Despite being extremely common, literature on POUR is somewhat limited. Estimates of prevalence typically range up to 25%.[1,2] At our institution, urinary retention is the single most common reason for urologic consultation, with the vast majority of instances being in postoperative patients. The initial goal of this initiative was to identify the prevalence of 15 known risk factors for POUR in an effort to ultimately delineate potential opportunities for intervention.

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Material and methods

IRB approval was obtained to retrospectively identify and review all surgical procedures done at our institution during FY2013 in order to identify 500 consecutive cases of POUR. POUR was defined as the inability to void postoperatively with bladder scan volumes greater than 450 mL and subsequent need for catheterization with an output greater than 450 mL. Risk factors were defined as being present if they were present on the day of the failed void trial. All records were individually reviewed for 15 known independent risk factors for urinary retention. Patients with incomplete records or preoperative baseline urinary retention requiring catheterization were excluded. The risk factors were as follows: opioid based analgesia, major surgery, an operative fluid rate over 500 mL/hr, the use of anticholinergic agents during anesthesia, age over 65, use of an alpha agonist, an extended operative time (over 180 minutes), postoperative immobilization, the absence of an intraoperative foley catheter, a neurological disorder at baseline, diabetes, a pre-existing urinary condition, perioperative diuretic use, postoperative ileus or constipation, or the use of lumbar epidural or spinal anesthesia. Major surgery was defined as: total joint replacement, open abdominal or thoracic surgery, craniotomy, laminectomy or discectomy.

TABLE 1. **Prevalence of each individual risk factor**

POUR risk factor	**Prevalence (n, %)**
Opioid based analgesia	485 (97.0%)
Major surgery	373 (74.6%)
Operative IV fluid rate > 500 mL/hr	343 (68.4%)
Anticholinergic agent during anesthesia	336 (67.2%)
Age > 65	294 (58.8%)
Alpha agonist use	282 (56.4%)
Extended operative time (> 180 min)	285 (57.0%)
Postoperative immobilization	263 (52.6%)
Absence of intraoperative foley catheter	159 (31.8%)
Baseline neurological disorder	165 (27.0%)
Diabetes	122 (24.4%)
Pre-existing urinary dysfunction	113 (22.6%)
Perioperative diuretic use	93 (18.6%)
Postoperative ileus/constipation	84 (16.8%)
Lumbar epidural/spinal anesthesia	77 (15.4%)

POUR = postoperative urinary retention

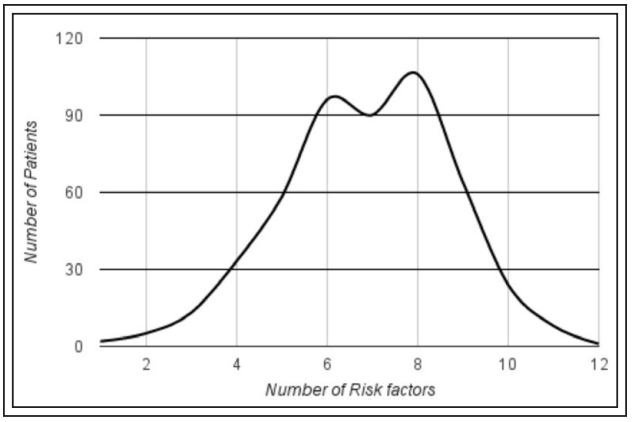

Figure 1. Number of risk factors present in 500 POUR patients

The prevalence of each risk factor was calculated, and the total number of risk factors present in each individual patient was counted.

Results

Of the 500 patients identified with POUR, 288 (57.6%) were male and 212 (42.4%) were female. The most common risk factor identified was the use of opioid based analgesia, which was observed in 485 patients (97%). This was followed by major surgery and a high intraoperative fluid administration rate. The prevalence of each individual risk factor is listed in Table 1.

The number of risk factors present in any patient ranged from 1-12. In other words, all patients who developed POUR in this cohort had at least 1 risk factor for POUR. The most common number of risk factors present was 8. The median was 7, and the mean was 6.88. Due to the bimodal shape of the curve, over 75% of the patients in this cohort had 6 or more risk factors present at the time of their void trial. See Figure 1 for distribution.

Discussion

Urinary retention is a condition with which all urologists are familiar. Many risk factors have been defined. The anesthesia literature has demonstrated age, anesthetic regimen used (particularly anticholinergic use), and baseline neurological and urinary function to be a significant predictors of POUR.[3,4] The colorectal surgical literature has shown that high intraoperative fluid rates, ileus and bladder distension predispose to POUR.[1,5,6] The orthopedic surgical literature identified epidural anesthesia and increased operative time to be independent risk factors in this cohort.[7] The literature available to support the role of analgesic regimens

in POUR is robust.[2,8,9] Despite of the knowledge of these risk factors, we elucidated that many patients are subjected to a multitude of risk factors, some of which are modifiable.

Many factors are outside of the surgeon's control. Baseline characteristics, such as neurologic conditions, preoperative urinary function and age, cannot be manipulated.. Potentially, multidisciplinary providers can, however, pay special attention to these patients and optimize the circumstances to facilitate a voiding trial that is most likely to succeed.

Ninety-seven percent of our patients used opiates for pain control despite 127 of the 500 patients undergoing minor surgeries such as minimally invasive procedures or procedures on superficial tissue. We did not specifically assess bladder distension, but a high intraoperative fluid rate and the lack of a Foley catheter would predispose to bladder overdistension. It is the opinion of the authors that this represents an opportunity to intervene at a systems level. By educating surgeons and anesthesiologists, fluid rates can be tempered intraoperatively without compromising the patient's fluid status in a large majority of cases. Similarly, the authors submit that voiding trials should not begin in the presence of ongoing spinal or epidural anesthesia.

We acknowledge the limitations of our study including the retrospective nature and the absence of a control group. Some of the patterns described here could also be a product of clinical decision-making at our institution rather than guiding principles. The value of this data, however, lies in the patterns revealed by the data. Only 25% of the patients who experience urinary retention had five or fewer risk factors. While eliminating all 15 risk factors would be difficult if not impossible, minimization of these factors can be achieved with awareness and conscientiousness.

Conclusion

Many risk factors for POUR are present in the majority of patients who ultimately develop the condition. Knowledge of these risk factors can lead to opportunities for all members of the health care team to intervene and optimize the circumstances around the voiding trial which may then contribute to the delivery of improved patient care. □

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