RESEARCH

Factors Affecting Urinary Retention in Critically Ill Trauma Patients

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ABSTRACT

The objective of this retrospective study was to gain a better understanding of patient and care factors that may contribute to urinary retention in critically ill trauma patients. Fifty trauma patients over a 1-year period with an *International Classification of Diseases, Tenth Revision* (*ICD-10*) code for urinary retention were identified and analyzed. Most patients had an indwelling urinary catheter placed on admission, and it was reinserted in 39 patients. Male gender, orthopedic trauma, and anesthesia were possible contributing factors for urinary retention in our sample population. The use of paralytics and more than one operative intervention had a significant relationship with prescribing bladder medications. It is imperative to have protocols based on best evidence to guide management of urinary retention in this critically ill trauma patient population.

Key Words

Bladder, Pharmacological management, Trauma, Urinary retention

The trauma population includes a variety of blunt and penetrating polytrauma that can require multiple surgeries and significant amounts of fluid and blood product for survival. These interventions usually, but not always, require insertion of an indwelling urinary catheter for accurate monitoring of urine output to guide resuscitation. Best practices related to prevention of catheter-associated urinary tract infections include early removal of the indwelling urinary catheter. However, after the catheter is removed, the patient is at risk for urinary retention, which may require reinsertion of a catheter.

Urinary retention is the inability to voluntarily void urine. This condition can be acute or chronic Selius and Subeti (2008) noted that causes of urinary retention are numerous. Acute urinary retention (AUR) is common in men. The incidence increases with age. In contrast, AUR is rare in women. It is estimated that there are three cases of AUR per 100,000 women per year. The female-to-male incidence rate ratio is 1:13 (Selius & Subeti, 2008). Although causes are varied, initial treatment for urinary retention generally involves catheterization, indwelling or intermittent, until the causative issue is resolved. Further management varies based on the etiology.

In a cross-sectional study performed by Wu, Auerbach, and Aaronson (2012), one of the seven types of surgical care improvement projects monitored by The Joint Commission (TJC) were evaluated for postoperative urinary retention (POUR). Study results demonstrated that both male gender and increase in age were high predictors for urinary retention. Surgeries that increased risk were orthopedic in nature compared with vascular surgeries that had significantly lower urinary retention rates. Incidence of renal failure increased risk for retention. Obesity was not a contributing factor for retention. Patients who developed POUR were more likely to develop urinary tract infections and had longer length of stay.

Kowalik and Plante (2016) discussed contributions to and lack of definition of POUR. They note that research has previously identified that some surgical patients have a higher incidence of POUR, such as anal–rectal surgery or total joint arthroplasties. Anesthesia and multiple pharmacological agents also contribute to higher incidences of POUR by rendering the detrusor muscle weak or inactive. In addition, the risk of POUR increases as the length of time of surgery and amount of intravenous fluids administered increases.

Basheer et al. (2017) evaluated the preventative effectiveness of tamsulosin (Flomax) on 95 male neurosurgical patients with POUR. In this double-blind, randomized, placebo-controlled study, patients were preoperatively given tamsulosin or placebo. Results did not yield a statistical difference in development of POUR between the control and experimental groups with a small sample size contributing to this finding. In addition, the tamsulosin group developed a higher rate of POUR than the control group.

There is a lack of literature addressing critically ill trauma patients and urinary retention. This gap in the literature prompted this exploratory investigation.

PURPOSE

The purpose of this study was to gain a better understanding of patient and care factors that may contribute

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to urinary retention and its management in critically ill trauma patients, both those undergoing surgical procedures and those who do not.

RESEARCH QUESTIONS

What factors may contribute to urinary retention and its management in critically ill trauma patients?

METHODS

Following institutional review board approval, a descriptive, exploratory, retrospective chart review was conducted at a Level I trauma center from the fourth quarter of 2016 to the third quarter of 2017. The study included patients admitted to the trauma intensive care unit with a subsequent *International Classification of Diseases, Tenth Revision* (*ICD-10*) code for urinary retention. Trauma patients without urinary retention were excluded.

RESULTS

Sample

Fifty trauma patients coded with urinary retention were identified. Thirty-seven patients underwent surgical procedures in the operating room (OR). The number of trips to the OR varied from zero to six, with the majority of patients (52%) going to the OR two times or more. Twelve patients only underwent one trip to the OR (24%). Fifteen patients went to the OR twice (30%). Thirteen patients did not go to the OR.

Of the 49 patients with complete data, 45 (92%) were on sedating medications while in the trauma intensive care unit and 16 (33%) were prescribed paralytics during that time. All but one patient had an indwelling urinary catheter inserted at hospital admission (see Table 1).

TABLE 1 Sample Demographics

	Patients Undergoing Operating Room Procedures	Patients Not Undergoing Operating Room Procedures
Number	37	13
Age	18–83 years (mean = 43 years) 26 patients < 60 years	21–94 years (mean = 61 years) 5 patients < 60 years
Gender	Males = 28 Females = 9	Males = 10 Females = 3
Diagnoses	Motor vehicle related = 16 Gunshot wounds = 7 Auto vs. Pedestrian = 5 Burns = 3 Other = 4	Fall = 7 (5 with fractures, 1 with fractures and SDH, 1 w/SDH) Burns = 2 Other = 4
Indwelling urinary catheter placed on admission	36 (97%)	13 (100%)
Length of time with initial indwelling urinary catheter	Range (n = 36): 5 hr 32 min to 33 days 15 hr 3 min Mode: approximately 1 day (n = 7) Medium: Approximately 3 days	Range (n = 13): 1 day 9 hr 43 min to 27 days 19 hr 37 min Mode: Approximately 4 days (n = 5) Medium: Approximately 4 days
Indwelling urinary catheter replaced	30 (81%)	10 (77%)
Significant bladder-related history	2 (urinary retention, prostate cancer)	2 (urethral stricture, urinary retention)
Prescribed medication for urinary retention	21 (64%) (12 Hytrin, 8 Flomax, 1 both)	6 (46%) (4 Flomax, 2 Hytrin)

Note. *SDH = subdural hematoma.*

Indwelling Urinary Catheter

We posed the following question: How long was the initial indwelling urinary catheter in place and how soon after it was removed, was another one inserted? In the group of patients who underwent surgical procedures in the OR, the catheter stayed in place from 5 hr 32 min to 33 days 15 hr 3 min, with a mode of approximately 1 day (n = 7) and medium time of approximately 3 days. The time the indwelling urinary catheter remained in non-OR trauma patients ranged from 1 day 9 hr 43 min to 27 days 19 hr 37 min, with a mode and median of approximately 4 days.

Although the standard protocol included bladder scanning and intermittent catheterization following discontinuation of the indwelling catheter, inconsistency in documentation prohibited data collection. Patients who did not get an indwelling urinary catheter reinserted for urinary retention included seven of 36 (21%) trauma operative patients, with five of the seven patients having the catheter for less than 2 days. Three of the 13 (23%) trauma nonoperative patients did not require catheter reinsertion. They had their initial urinary catheters in place for 11–27 days.

In the 39 patients who had an indwelling urinary catheter reinserted, the catheter was placed 297 min (approximately 5 hr) to 15,602 min or about 11 days after removal of the initial one, with a mean of 3,175 min (a little more than 2 days).

Bladder Medications

Twenty-seven patients, 23 males and four females, were prescribed medications for urinary retention with Terazosin or Hytrin (n = 14), an alpha-adrenergic blocker, prescribed a little more often than tamsulosin or Flomax (n = 12), an alpha blocker. Both medications relax the muscles of the prostate and bladder neck. But, Flomax cannot be crushed and, therefore, not administered via a feeding tube. We did not collect data on feeding tubes for purposes of this study. One patient received both medications. The majority (85%) of patients had undergone at least one surgical procedure (see Table 2).

TABLE 2 Urinary Retention Medications

	Terazosin or Hytrin	Tamsulosin or Flomax	Both	Total
Male	13	9	1	23 males
Surgical	11	7	1	
Female	1	3	0	4 females
Surgical	1	3	0	
Total	14	12	1	

Of the four patients with a history of bladder-related issues, two with a history of urinary retention had the indwelling urinary catheter reinserted but did not get prescribed bladder medications. One patient with a history of prostate cancer and another patient with urethral stricture required another urinary catheter and bladder medications.

There was a positive, significant relationship between use of paralytics and bladder medications (p = .019). There was a statistically significant relationship between the number of trips to the OR (no trips to one trip vs. more than two trips) and bladder medications (p = .004). Paralytics and trips to the OR explained 25% of the variance (R^2) in bladder medications (F = 7.57(df 2), p = .001).

Special Cases

Since spinal cord paralysis can contribute to urinary retention, two cases were reviewed. One patient experienced paralysis following a gunshot wound who did require reinsertion of an indwelling urinary catheter and bladder medication, whereas a second patient who suffered a cervical fracture with paralysis following a motor vehicle accident did not require catheter reinsertion or bladder medications.

DISCUSSION

In general, almost all trauma patients admitted to hospital and trauma critical care unit had an indwelling urinary catheter inserted on admission. The length of time for the initial urinary catheter to remain in place varied, with a median time of 3 days for operative patients and 4 days for nonoperative patients. From 77%–81% of patients studied had the catheter replaced within 5 hr to 11 days, with a mean of approximately 2 days. Bladder medications were prescribed more often in trauma patients with urinary retention who had undergone surgery. The choice of medication may have been dependent on the presence of a feeding tube.

A few factors correlated with use of pharmacological agents for urinary retention. There were more men than women in our study diagnosed with urinary retention, a finding supported by Wu et al. (2012). Increased age has been identified as a contributing factor for urinary retention (Wu et al., 2012), and in our sample, 18 of the 50 subjects were older than 60 years, with seven prescribed bladder medications, and nine requiring reinsertion of an indwelling urinary catheter. Wu et al. (2012) also suggested that orthopedic involvement correlates with urinary retention, which was a frequent secondary diagnosis in our sample. Approximately 75% of our sample did sustain some type of fracture or orthopedic condition.

Critically, trauma patients experience urinary retention but placement of an indwelling urinary catheter and/or pharmacological interventions are not standard practice.

We found pharmacological prescribing practices varied among the physician staff, depending on their preferences, experiences, and/or knowledge.

LIMITATIONS

The retrospective nature of the study was a limitation relying on documentation in the electronic health record. Because of inconsistencies in documentation on bladder scanning and residual volumes, we were unable to collect this data. In addition, generalizability was limited due to the small sample size at one institution.

CONCLUSION

Urinary retention in trauma patients can be caused by several factors, including gender, predisposing factors, orthopedic injuries, and use of sedation medications/general anesthesia. Our findings indicate that it is difficult to reliably predict which patients may experience urinary retention. Current practices emphasize standardized approaches toward patient problems. Urinary retention, in the setting of major trauma, may be amenable to a standardized approach as a guideline, which can be individualized based on patient factors. Nurses play a key role in crafting these guidelines, sharing their clinical experiences and expertise with indwelling urinary catheters, intermittent urinary catheterization, bladder scanning, urinary infections, and administration of medications for urinary retention. Bladder management is continuously addressed by direct care nurses 24/7. Further research could add to the body of knowledge and possibly allow for the creation of a standardized plan of care for urinary retention prevention.

KEY POINTS

- Urinary retention is a common problem found in the trauma population.
- Removal of an indwelling urinary catheter immediately postoperatively may not be within the best interest of the patient.
- Further study needs to be conducted to study the efficacy of terazosin versus tamsulosin.

REFERENCES

Basheer, A., Alsaidi, M., Schultz, L., Chedid, M., Abdulhak, M., & Seyfried, D. (2017). Preventive effect of tamsulosin on postoperative urinary retention in neurosurgical patients. *Surgical Neurology, 8*(75), 1–12.

Kowalik, U., & Plante, M. K. (2016). Urinary retention in surgical patients. *Surgical Clinics of North America, 96*(3), 453–467.

Selius, B. A., & Subedi, R. (2008). Urinary retention in adults: Diagnosis and initial management. *American Family Physician, 77*(5), 643–650.

Wu, A. K., Auerbach, A. D., & Aaronson, D. S. (2012). National incidence and outcomes of postoperative urinary retention in the surgical care improvement project. *American Journal of Surgery, 204*(2), 161–171.