Sarcouncil Journal of Medicine and Surgery

ISSN(Online): 2945-3534

Volume- 05| Issue- 05| 2026

Research Article

Received: 10-04-2026 | Accepted: 05-05-2026 | Published: 22-05-2026

Health Outcomes and Common Risk Factors Associated with Urinary Retention in Old Age Patients Undergoing Inguinal Hernia Repair

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Abstract: Inguinal hernia surgery is bound to have urinary retention as one of its common side effects, particularly in the elderly. The aims of this study were to identify the prevalence of urinary retention after inguinal hernia repair and to identify the independent preoperative and intraoperative risk factors for urinary retention. A cross-sectional study was carried out of 115 male patients with inguinal hernia (mean age 76.4 ± 6.8 years). Collected data was divided into two groups, group 1 (28 patients) showed patients who suffer from urinary retention after operative, and group 2 (87 patients) showed patients without urinary retention after operative. We recorded our data from 2025 to 2026 in the follow-up from January 2025 to January 2026 in different hospitals in Iraq. All these data have been analyzed and incorporated in Clinical Enrollment, such as the type of anesthesia used, operating time, IV fluid, and recovery after surgery . According to patient outcomes, the overall incidence of postoperative urine retention was 24.3%. The frequency of LUTS (75.0% vs. 32.2%) and benign prostatic hyperplasia (BPH) (64.3% vs. 25.3%) in the postoperative urinary retention group differed significantly between the two groups. Following surgery, individuals with postoperative urine retention have far poorer outcomes (3.8 days in the hospital against 1.2 days, 6.2 pain ratings versus 3.1, and a higher unplanned readmission risk of 14.3% versus 1.1%). Urinary tract infections (21.4%), urinary overdistension injuries (10.7%), and permanent catheterization (7.1%) were the specific problems associated with postoperative urine retention. Almost a quarter of elderly men undergoing inguinal hernia surgery have postoperative urinary retention, which may be a significant factor in postoperative recovery and safety.

Keywords: Urinary retention, benign prostatic hyperplasia, Complications, and bladder overdistension injury.

INTRODUCTION

The inguinal hernia is one of the most commonly performed surgeries in the world, and a significant number of inguinal hernias occur in older adults because of the effects of tissue degeneration with age (HerniaSurge Group, 2018). Surgical advances have enabled safer surgery, but urinary retention is still a frequent complication in this age group. Postoperative urinary retention is usually defined as a failure to pass urine on their own after surgery, and requires the use of a catheter and can interfere with healing. In elderly patients, incidence is from 5% up to 25% depending on surgical and anesthetic factors (Lockhart, K. *et al*., 2018; Blair, A. B. *et al*., 2017). As people grow older, detrusor contractility decreases over time, and the incidence of BPH rises, making older people especially susceptible. This complication often makes it difficult for the patient to be discharged after surgery and is a burden to nursing. To ensure the efficiency of the outpatient setting and the safety of the patient, identification and treatment of postoperative urinary retention is therefore crucial (Hudak, K. E. *et al*., 2015).

Moreover, the etiology of postoperative urinary retention (POUR) in elderly patients is complex and includes physiological and procedural factors. Further suppression of sacral parasympathetic outflow occurs with regional anesthesia and the use of opioids, and an increase in urethral sphincter tone (Patel, J. A. *et al*., 2015; Shaw M.K. & Pahari H. 2014). Local edema and reflex micturition inhibition are likely related to surgical factors, such as bilateral repairs and longer operative times. Moreover, the use of additional medications (anticholinergic and sedative) that affect normal voiding mechanics adds further risks associated with geriatric polypharmacy (El-Dhuwaib, Y. *et al*., 2013; Rafiq, M. K. *et al*., 2016).

Moreover, the clinical implications of postoperative urinary retention go beyond the immediate problem of urinary difficulty and significantly affect morbidity and utilization of healthcare resources in older surgical patients (Koch, C. A. *et al*., 2006). Risks of catheterisation include urinary tract infection, urethral trauma, and delayed ambulation, which could lead to delirium and falls (Winslow, E. R. *et al*., 2004). The disadvantages of ambulatory surgery are always present in the form of greater ED revisits,

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DOI- https://doi.org/10.5281/zenodo.20341101

unplanned readmissions, and longer recovery times, which all contribute to the financial benefits. Acute urinary failure affects the patient's psychological independence, increases anxiety, and decreases satisfaction with care.

PATIENTS AND METHODS

A cross-sectional study design was carried out to determine the incidence and risk variables for post-operative urine retention of elderly patients having inguinal hernia repair. The current study is based on 1015 patients who were admitted to different hospitals in Iraq for selective inguinal surgical repair in hernias. These patients had to be 65 years of age or older. The sample was 100% male (n = 115), with a mean age of 76.4 years (SD 6.8). To reduce confounding, patients with pre-existing urinary catheters, those with an established diagnosis of neurogenic bladder, and those who required dialysis with chronic renal failure were not included in the analysis. The surgical outcome data was separated into two groups: group 1 included 28 individuals who were assessed for the development of urine retention following surgery, and group 2 included 87 patients who hadn't got urinary retention following surgery.

The clinical data was taken out of the hospital EMRs in different hospitals in Iraq. The American Society of Anesthesiologists (ASA) categorization, age, sex, and body mass index (BMI) were the patient baseline data used in this investigation. Preoperative factors were baseline blood creatinine levels, symptoms of lower urinary tract infection (LUTs), and a history of benign prostatic hyperplasia (BPH). The kind in anesthesia (general or regional/local), the duration of the procedure in minutes, and the amount of intravenous fluid used were among the intraoperative data gathered. Following surgery, the following outcomes were measured: hospital stay, pain during and after the procedure on a scale of 010, and the amount of oral morphine equivalent in milligrams. The pre-operative features were lower urinary tract symptoms (LUTs) as determined by the International Prostate Symptom Score (IPSS) and documented benign prostatic hyperplasia (BPH) (64.3%).

The clinical data associated with the two groups were compared using the Student t-test for continuous variables and the chi-square or Fisher's exact test for categorical variables. A multivariate logistic regression model is generated in order to find independent determinants of postoperative urine retention. Model variables are those from the univariate analysis that have been corrected for potential confounding factors and have a p-value of less than 0.20. The data are presented using odds ratios (OR) and 95% confidence intervals (CI). SPSS version 26.0 is used for all analyses, alongside a level of significance in 0.05.

RESULTS

The study population consisted of 115 elderly male patients who underwent inguinal hernia repair (mean age 76.4, SD 6.8 years), which was conducted in the majority of elderly patients. This was reflected in the higher proportion of male patients, as inguinal hernia was more prevalent in males than in females. The average BMI (kg/m2) was 25.8 (SD = 3.2), which represented overweight patients. Interestingly, more than a third of patients (n = 42) had a physical status score of American Society of Anesthesiologists (ASA) III or greater, indicating that more than one-third of patients had a significant systemic disease or other comorbidities that may impact perioperative risk and recovery.

Table 1: Outlines the demographic characteristics of patients with urinary retention.

Characteristic	Total (N=115)
Age (years), mean (SD)	76.4 (6.8)
Male, n (%)	115 (100%)
BMI (kg/m2), mean (SD)	25.8 (3.2)
ASA Score ≥≥ III, n (%)	42 (36.5%)

Urinary retention occurred after surgery in 28 individuals (24.3%). Nevertheless, 75.7% all individuals (n = 87) did not suffer from post-operative urine retention. The significance of postoperative urine retention in the postoperative outcome in this older surgical group is highlighted by this slightly raised incidence, which should be evaluated before to surgery in order to reduce the risks associated with postoperative urinary retention and followed afterward.

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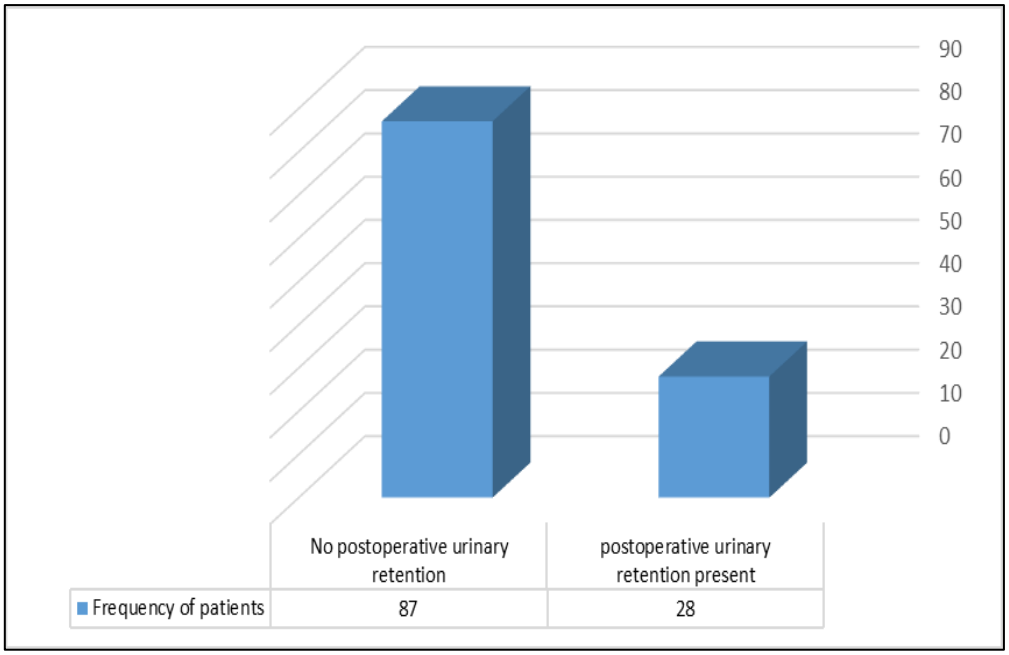

Figure 1: Distribution of the health outcomes of Postoperative Urinary Retention into both groups.

Based on an examination of pre-operative parameters, two highly significant characteristics were chosen as predictors of postoperative urine retention. Retention was more common in patients with BPH than in patients without (64.3% of the patients needed retention in comparison to 25.3 percent of patients without retention. Similarly, LUTS was experienced by 75.0% in the postoperative urinary retention cohort and 32.2% of the non-retention group.

Table 2: Identifying the risk factors of all patients who participated in this study.

Factor	postoperative urinary retention (*n*=28)	No postoperative urinary retention (*n*=87)	*P*-value
History of BPH, *n* (%)	18 (64.3%)	22 (25.3%)	<0.001
Pre-existing LUTs, *n* (%)	21 (75.0%)	28 (32.2%)	<0.001
Baseline Creatinine (mg/dL), mean (SD)	1.2 (0.3)	1.1 (0.2)	0.08

There were significant differences between groups for intraoperative variables. The postoperative urinary retention group (53.6%) was more likely to have general anesthesia than the non-postoperative urinary retention group (40.2%), while local/regional anesthesia was more likely in the non-retention group (59.8% vs 46.4%), but these differences were not reported as being statistically significant. Differences were more evident for the procedural metrics: The number of surgeries required for patients who developed postoperative urinary retention was longer, and surgeries were longer on average (68.4 ± 14.2 minutes) than for those who did not develop urinary retention (54.6 ± 12.1 minutes). In addition, patients who had surgical urinary retention during surgery received more crystalloid (1.8 ± 0.4 L vs. 1.3 ± 0.3 L), potentially causing bladder over-distension and postoperative voiding dysfunction.

Table 3: Intraoperative clinical outcomes.

Variable	Postoperative urinary retention (*n*=28)	No postoperative urinary retention (*n*=87)
Anesthesia Type: General, *n* (%)	15 (53.6%)	35 (40.2%)
Anesthesia Type: Local/Regional, *n* (%)	13 (46.4%)	52 (59.8%)
Duration of surgery (min), mean (SD)	68.4 (14.2)	54.6 (12.1)
IV Fluids administered (L), mean (SD)	1.8 (0.4)	1.3 (0.3)

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In a few domains, significant differences regarding recovery were observed between patients undergoing surgery with and without postoperative urinary retention. Retention also was associated with a significantly longer mean length of stay compared to no retention (3.8 days ± 1.5 vs. 1.2 days ± 0.4, respectively). Post-surgical urinary retention is important with regard to length of stay and discharge. Similarly, the postoperative urinary retention group (6.2 ± 1.8 on a 0–10 pain scale) had significantly higher scores than the non-retention group (3.1 ± 1.1), which could suggest that urinary retention increases the likelihood of postoperative pain or that higher levels of pain make normal voiding more difficult. Further, the rates of unplanned admission was substantially more in patients with postoperative urinary retention (14.3% vs. 1.1%).

Table 4: Recovery outcomes of postoperative.

Metric	Postoperative urinary retention (n=28)	No postoperative urinary retention (n=87)
Length of hospital stay (days), mean (SD)	3.8 (1.5)	1.2 (0.4)
Post-op pain score (0-10), mean (SD)	6.2 (1.8)	3.1 (1.1)
Unplanned readmission, n (%)	4 (14.3%)	1 (1.1%)

Opioid exposure was significantly associated with a dose-response relationship with urinary retention after surgery. The amount of opioids given during surgery (in fentanyl equivalents) was greater in patients who developed retention (155 ± 45 μg) than in those who did not (110 ± 30 μg). Even more was the difference of the postoperative urinary retention group (MME 45 ± 12) vs. the non-retention group (MME 22 ± 8) in the postoperative period.

Table 5: Anesthesia outcomes.

Opioid Use	Postoperative urinary retention (*n*=28)	No postoperative urinary retention (*n*=87)
Intra-op Opioids (Fentanyl eq. *μg*), mean (SD)	155 (45)	110 (30)
Post-op Opioids (MME), mean (SD)	45 (12)	22 (8)

In 28 patients, the postoperative urinary retention was observed, some of which were complications. In this subpopulation, 21.4% (n = 6) developed urinary tract infection (UTI), which may be related to the need for catheterization. Over-distention, causing mechanical trauma in the bladder, occurred in 10.7% (n = 3). Furthermore, in patients with long-term catheterization, there was no causative video dysfunction, as this was seen in 7.1% (n = 2) of the patients, suggesting that postoperative urinary retention may be associated with long-term voiding dysfunction in certain patients.

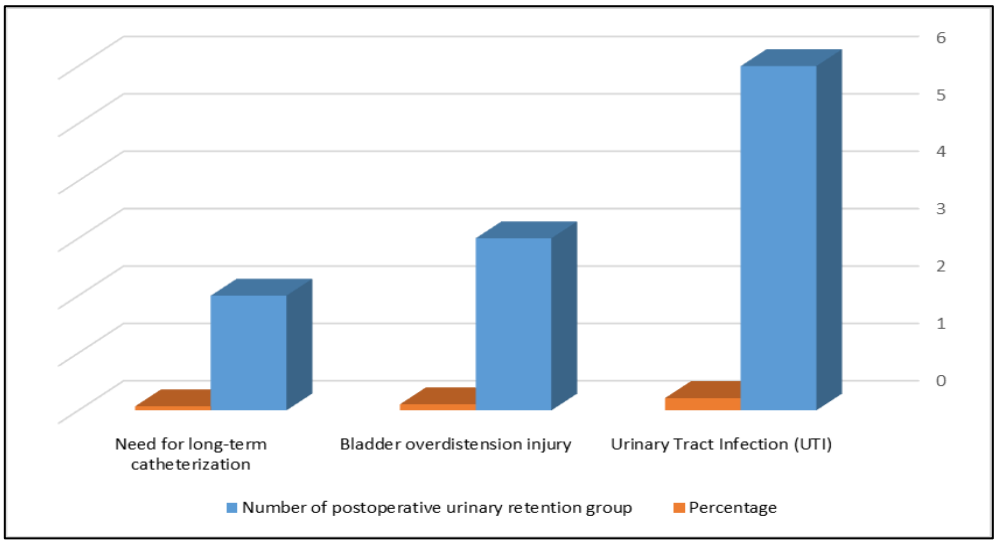

Figure 2: Postoperative complications.

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The occurrence of urinary retention after surgery increased in age (age greater than 80 years). A roughly fivefold increased risk was associated with a history of BPH. The likelihood of fluid retention was 2.6 times higher for operations longer than 60 minutes, while the risk in oral hydration surpassing 1.5 liters was 3.2 times higher.

Table 6: An analysis of multivariate logistic regression to the factors related to patients.

Risk Factors	Odds Ratio (OR)	95% CI
Age > 80 years	2.1	[1.1, 4.2]
History of BPH	4.8	[2.1, 10.5]
Fluid intake > 1.5L	3.2	[1.5, 6.8]
Surgery duration > 60 min	2.6	[1.2, 5.5]

DISCUSSION

Urinary retention is a major and common complication that occurs after the inguinal hernia repair in elderly patients, and its incidence rate has been reported as 2-30% depending on surgical technique, patient factors, and perioperative management (Aleman, R. *et al*., 2021, Di Natale, S. *et al*., 2021). In this study, the incidence of postoperative urinary retention was found to be 24.3% in elderly men with inguinal hernia repairs, with a range similar to other reports of 15% to 30% in other surgical populations. Age >80 years, history of benign prostatic hyperplasia (BPH), fluid administered during surgery >1.5 L, and surgery duration >60 minutes were independent predictors of urinary retention in the multivariate analysis.

Moreover, urological history before surgery was the strongest risk factor, as BPH and LUTS (both $p<0.001$) were significantly more common in the postoperative urinary retention group than in the non-urinary retention group (64.3% vs. 25.3%, 75.0% vs. 32.2%, respectively). BPH had the highest odds ratio, at 4.8, and was the most independent predictor. A study in the Canadian showed that prior diagnosis of benign prostatic hyperplasia (BPH) or history of urinary retention significantly increases risk, as do anti-cholinergic drugs (used to treat BPH), which decrease the output of the detrusor (Ammar, A. S. *et al*., 2020).

The absence of any significant relationship with the baseline serum creatinine ($p=0.08$) further indicates that renal function is not a good indicator of bladder emptying efficiency in this situation. The results are especially significant in elderly patients, where extended periods of immobility and insertion of a catheter may lead to delirium, and loss of function, or complications like pressure injury (Wei, W., & Fanous, M. 2023).

In addition, factors during the operation also were critical. Intravenous fluid volume (OR 3.2) and duration of surgery (>60 minutes; OR 2.6) were independently associated with postoperative urinary retention. A similar study in the USA has also recorded that prolonged anaesthetic duration and intensive fluid replacement leads to overdistended bladders and temporary detrusor atony. General anesthesia was more common in patients that developed postoperative urinary retention, but this did not remain significant in the multivariate model, probably due to confounding by concomitant opioid use and surgical complexity (Caparelli, M. L. *et al*., 2021; Melzer, M., & Welch, C. 2013). Indeed, both intraoperative fentanyl equivalents (IFE) and postoperative morphine milligram equivalents (MME) were significantly higher in the Postoperative urinary retention cohort, and are known to have a profound effect on micturition, in that they increase urethral sphincter tone, decrease bladder contractility, and reduce the urge to void, all of which contribute to urinary retention (Hall, M. J. *et al*., 2017).

Additionally, there are several patient- and procedure-related risk factors which have been consistently identified in retrospective cohort studies and systematic reviews (Koch, C. A. *et al*., 2006; Patel, J. A. *et al*., 2015; Sivasankaran, M. V. *et al*., 2014). Advanced age is still the most powerful predictor; patients aged > 50 years had a significantly higher rate of postoperative urinary retention (5.5%) than patients aged < 50 years (1.6%). The effect of postoperative urinary retention on the clinical outcomes of this group was significant. Those who had retention had a significantly longer hospital stay (3.8 days vs. 1.2 days), higher postoperative pain scores (6.2 points vs. 3.1 points), and a much higher risk of unplanned readmission (14.3% vs. 1.1%). In the postoperative urinary retention group, 21.4% suffered from UTI, 10.7% had bladder overdistension injury, while 7.1% needed long-term catheterization. The complications observed are consistent with previous studies showing that higher morbidity, greater use of health services,

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and longer recovery patterns are associated with postoperative urinary retention (Mason, S. E. *et al*., 2016; Blair, A. B. *et al*., 2017).

A study in the United Kingdom of over 4,000 patients determined that these three factors are interrelated in increasing the risk of patient retention. Similarly, in a French study (Hall, B. R. *et al*., 2019) of endoscopic total extraperitoneal (TEP) repairs, advanced age and unilateral surgery (which may suggest less familiarity with catheterization) was found to be independent predictors after multivariate adjustment. Anesthetic technique is also important, with spinal or regional anesthesia—known to inhibit the sacral nerve pathways involved in bladder emptying—correlated with increased risk for postoperative urinary retention, and with local anesthesia, a reduced risk for postoperative bladder and urinary tract complications in patients (Shaw, M. K., & Pahariº, H. 2014).

CONCLUSION

Almost 25% of elderly male patients who received inguinal hernia surgery develop urinary retention, and this condition is a potent predictor of worse clinical outcomes, including increased hospital stays, greater pain after post-operative surgery, higher rates of re-hospitalization, and postoperative complications such as urinary tract infections or urinary damage. Advanced age (>80 years), benign prostatic hyperplasia, and received fluid during surgery (>1.5 L) and surgical time (>60 min) are further identified as independent factors associated with postoperative urinary retention by multivariate analysis.

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Source of support: Nil; **Conflict of interest:** Nil.

Cite this article as:
GATEA, H. A., Al-Musawi, H. Y. M. K. & Sayhood, H. M. A. "Health Outcomes and Common Risk Factors Associated with Urinary Retention in Old Age Patients Undergoing Inguinal Hernia Repair." *Sarcouncil Journal of Medicine and Surgery* 5.5 (2026): pp 28-34.

Publisher: SARC Publisher