

Original Research Article

Does inguinal hernia repair increase urinary retention? Our 10-year results

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ABSTRACT

Background: This study aimed to determine the incidence of urinary retention in patients undergoing inguinal hernia repair at our hospital as well as the predictors of urinary retention.

Methods: Patients who underwent inguinal hernia repair at Lokman Hekim university Akay hospital between January 2010 and January 2020 were included in the study. The total number of patients was 578. The patients were divided into two groups: group-1 (patients who developed urinary retention following inguinal hernia repair) and group-2 (patients who did not develop urinary retention following inguinal hernia repair). The relationship between urinary retention and age, history of preoperative BPH, type and localization of hernia, operative and anesthesia time, perioperative NSAID, narcotic analgesic and antispasmodic use, presence of DM and rheumatic diseases and perioperative fluid replacement was investigated.

Results: The median ages were 57.7±15.1 (20-74) and 48.8±17.5 (18-89) in groups 1 and 2, respectively (p<0.001). 5.36% (31/578) of the patients developed urinary retention. The group-1 were found to be at a more advanced age (p<0.001), have higher rates of BPH and DM (p<0.001), longer operative time (p<0.001), higher rate of perioperative antispasmodic use (p<0.001), higher rate of perioperative fluid replacement (p<0.001) and a lower rate of perioperative NSAID use (p<0.001) compared to those who did not develop postoperative urinary retention.

Conclusions: According to the results of this study, advanced age, history of DM and BPH, antispasmodic use, longer operative time, high amount of postoperative fluid replacement and no perioperative use of NSAIDs lead to an increased risk of urinary retention.

Keywords: Alpha-blocker, Urinary retention, Inguinal hernia

INTRODUCTION

Inguinal hernia repair (IHR) is among the commonly performed surgeries.^{1,2} In USA, 800,000 IHR procedures are performed each year.³ Complications such as urinary retention, testicular atrophy, pelvic pain, wound site infection, hematoma and others can be observed following surgery.⁴ The incidence rate of postoperative urinary retention (POUR) following IHR is nearly 1.6 to 25%.⁵⁻⁹ POUR requires immediate catheterization, which may lead to discomfort, urinary tract infections, increased

costs, prolonged hospital stay etc.^{10,11} Investigation of the risk factors for POUR may help reduce morbidity.¹² Various authors have reported the effects of advanced age, preoperative benign prostatic hyperplasia (BPH), alpha blocker use and intraoperative narcotic use on POUR.¹³⁻¹⁹ We found that the previous studies did not investigate the effects of perioperative nonsteroidal anti-inflammatory drug (NSAID) and antispasmodic use, hernia type (direct, indirect, combined) and diseases such as diabetes mellitus (DM) and rheumatic diseases on POUR. Therefore, this study aimed to investigate the

effects of the mentioned factors on POUR as well as the general predictors thereof.

METHODS

The study included the patients who underwent open and laparoscopic inguinal hernia repair at Lokman Hekim university Akay hospital between January 2010 and January 2020. The ethics committee approval was received from the medical ethics committee of Lokman Hekim university faculty of medicine (No.2020037).

Inclusion criteria

The inclusion criteria included undergoing open and laparoscopic inguinal hernia repair and male patients over eighteen years of age.

Exclusion criteria

Exclusion criteria excluded receiving regional anesthesia, male patients under eighteen years of age and female patients.

The patients included in the study were operated by three surgeons who had more than 20 years of professional experience. Patient data were retrospectively collected. The total number of patients was 578. The follow-up time was three months in 210 patients, nearly six months in 140 patients and 12 months and longer in 218 patients. The information regarding whether all patients developed urinary retention in the early postoperative period was obtained. All available data could be reached only in 218 patients. Therefore, all patients were included in the calculation of the POUR rate, whereas 218 (for whom all available data could be reached) patients were included in the evaluation of the predictive factors for POUR. A urinary catheter was placed in patients who were unable to urinate six hours postoperatively. 14F (French) or 16F Foley catheters were placed in patients who developed urinary retention. In addition, alpha blockers (tamsulosin, silodosin, alfuzosin) were added to the treatment regimen. The catheters were removed on the fourth day of treatment.

The patients were divided into two groups: group-1 (patients who developed urinary retention following inguinal hernia repair) and group-2 (patients who did not develop urinary retention following inguinal hernia repair). In the present study, the relationship between the development of urinary retention in the early postoperative period and age, history of preoperative BPH, type and localization of hernia, type of surgery (open, laparoscopic), operative and anesthesia time, perioperative NSAID, narcotic analgesic and antispasmodic use, presence of DM and rheumatic diseases and perioperative fluid replacement was investigated in patients who underwent inguinal hernia repair. Post-operative complications were evaluated according to the Clavien grading scale.

Surgical technique

Laparoscopic inguinal hernia repair was performed with the totally extraperitoneal (TEP) technique using three trocars, whereas open inguinal hernia repair was performed with an inguinal incision. General anesthesia was used in both techniques. In both techniques, polypropylene mesh (3.5-5.0 in.)

was used to cover all inguinal/femoral defects and coated to Cooper's ligament and the anterior abdominal wall with spiral titanium tacks.

Statistical analysis

Descriptive statistics for the continuous variables were expressed with mean, standard deviation, median and minimum-maximum values, whereas categorical variables were expressed with frequency (n) and percentage (%) values. Categorical variables were compared using the chi-square or Fisher's exact test. Mann-Whitney U test was used to compare continuous variables that did not exhibit normal distribution with two-level variables. Multivariate logistic regression analyses were conducted to determine the factors predicting urinary retention, wherein odds ratios were calculated in 95% confidence intervals. IBM SPSS 23.0 was used for all analyses and $p < 0.05$ was considered statistically significant.

RESULTS

The number of patients included in the study was 218. The number of patients was 31 in group 1 and 187 in group 2. The median ages were 57.7 ± 15.1 (20-74) and 48.8 ± 17.5 (18-89) in groups 1 and 2, respectively ($p < 0.001$). Forty (18.3%) patients were preoperatively diagnosed with BPH, 43 (19.7%) patients were secondary cases, 88 (40.4%) patients had bilateral inguinal hernia, 66 (30.3%) patients had combined inguinal hernia (direct and indirect inguinal hernia), 87 (39.9%) patients underwent open repair and 63 (28.9%) patients were diagnosed with DM. Perioperatively, 52 (23.9%) patients received antispasmodics, 172 (78.9%) patients received NSAIDs and 53 (24.3%) patients received narcotic analgesics. Mesh grafts were used in all patients. The mean length of hospital stay was one day (min 1 day, max 2 days) in patients who developed urinary retention (Table 1).

Thirty-one (5.36%) patients developed urinary retention. 14F or 16F Foley catheters were placed in patients who developed urinary retention. In addition, alpha blockers (tamsulosin, silodosin, alfuzosin) were added to the treatment regimen. The catheters were removed on the fourth day of treatment. Urinary retention recurrence was observed in three patients and these patients had history of BPH. These patients underwent transurethral plasma kinetic resection of the prostate by the urology team in the following period, since they did not benefit from

medical therapy during follow-up. One patient who developed urinary retention exhibited prostatitis due to catheterization and this patient was re-hospitalized and administered parenteral therapy. Two patients had

ongoing hematuria up to one week after removal of the catheter. None of the patients exhibited Clavien grade 4 and grade 5 complications.

Table 1: Medical and sociodemographic characteristics of the subjects.

Variable	Frequency (%)
Age (years)	
<40	79 (36.2)
>40	139 (63.8)
Preoperative BPH	
Yes	40 (18.3)
No	178 (81.7)
Case status	
Primary	175 (80.3)
Secondary	43 (19.7)
Side operated	
Right	61 (28.0)
Left	69 (31.7)
Bilateral	88 (40.4)
Diabetes mellitus	
Yes	63 (28.9)
No	155 (71.1)
Laparoscopic vs. open repair	
Laparoscopic	131 (60.1)
Open repair	87 (39.9)
Operative time (min)	
<60	127 (58.3)
>60	91 (41.7)
Anesthesia time (min)	
<60	97 (44.5)
>60	121 (55.5)
Perioperative narcotic use	
Yes	165 (75.7)
No	53 (24.3)
Perioperative antispasmodic use	
No	166 (76.1)
Yes	52 (23.9)
Amount of postop fluid replacement (CC)	
<1000	107 (49.1)
>1000	111 (50.9)
Type of hernia	
Direct	58 (26.6)
Indirect	94 (43.1)
Direct with indirect	66 (30.3)
Rheumatic disease	
Yes	23 (10.6)
No	195 (89.4)
Perioperative NSAID use	
Yes	172 (78.9)
No	46 (21.1)
Occurrence of postop urinary retention	
Yes	31 (14.2)
No	187 (85.8)

BPH=benign prostatic hyperplasia; NSAID=nonsteroidal anti-inflammatory drug.

Table 2: Univariate analysis results that are used to identify independent risk factors affecting postop urinary retention.

Variables	Total	Group I patients who developed urinary retention (n=31) (%)	Group II patients who did not develop urinary retention (n=187) (%)	P value
Age (years)				
<40	79 (100)	1 (1.3)	78 (98.7)	<0.001
>40	139 (100)	30 (21.6)	109 (78.4)	
Preoperative BPH				
Yes	40 (100)	31 (77.5)	9 (22.5)	<0.001
No	178 (100)	0 (0)	178 (100)	
Case status				
Primary	175 (100)	14 (8.0)	161 (92.0)	<0.001
Secondary	43 (100)	17 (39.5)	26 (60.5)	
Type of hernia				
Direct	58 (100)	5 (8.6)	53 (91.4)	0.165
Indirect	94 (100)	18 (19.1)	76 (80.9)	
Direct and indirect	66 (100)	8 (12.1)	58 (87.9)	
Side operated				
Right	61 (100)	6 (9.8)	55 (90.2)	0.463
Left	69 (100)	10 (14.5)	59 (85.5)	
Bilateral	88 (100)	15 (17.0)	73 (83.0)	
Operative time (min)				
<60	127 (100)	7 (5.5)	120 (94.5)	<0.001
>60	91 (100)	24 (26.4)	67 (73.6)	
Diabetes mellitus				
Yes	63 (100)	27 (42.9)	36 (57.1)	<0.001
No	155 (100)	4 (2.6)	151 (97.4)	
Laparoscopic vs. open repair				
Laparoscopic	131 (100)	12 (9.2)	119 (90.8)	0.009
Open repair	87 (100)	19 (21.8)	68 (78.2)	
Anesthesia time (min)				
<60	97 (100)	4 (4.1)	93 (95.9)	<0.001
>60	121 (100)	27 (22.3)	94 (77.7)	
Perioperative narcotic use				
Yes	165 (100)	13 (7.9)	152 (92.1)	<0.001
No	53 (100)	18 (34.0)	35 (66.0)	
Perioperative antispasmodic use				
No	166 (100)	12 (7.2)	154 (92.8)	<0.001
Yes	52 (100)	19 (36.5)	33 (63.5)	
Perioperative NSAID use				
Yes	172 (100)	5 (2.9)	167 (97.1)	<0.001
No	46 (100)	26 (56.5)	20 (43.5)	
Amount of postop fluid replacement (CC)				
<1000	107 (100)	3 (2.8)	104 (97.2)	<0.001
>1000	111 (100)	28 (25.2)	83 (74.8)	
Rheumatic disease				
Yes	23 (100)	8 (34.8)	15 (65.2)	0.003
No	195 (100)	23 (11.8)	172 (88.2)	
Length of hospital stay, median (range)	1 (1,2)	1 (1,2)	1 (1,2)	<0.001

BPH benign prostatic hyperplasia; NSAID=nonsteroidal anti-inflammatory drug.

Thirty-one (5.36%) patients developed urinary retention. 14F or 16F Foley catheters were placed in patients who

developed urinary retention. In addition, alpha blockers (tamsulosin, silodosin, alfuzosin) were added to the

treatment regimen. The catheters were removed on the fourth day of treatment. Urinary retention recurrence was observed in three patients and these patients had history of BPH. These patients underwent transurethral plasma kinetic resection of the prostate by the urology team in the following period, since they did not benefit from medical therapy during follow-up. One patient who developed urinary retention exhibited prostatitis due to catheterization and this patient was re-hospitalized and administered parenteral therapy. Two patients had ongoing hematuria up to one week after removal of the catheter. None of the patients exhibited Clavien grade 4 and grade 5 complications.

The demographic and clinical characteristics of the patients who developed postoperative urinary retention were statistically evaluated. Consequently, it was found that the patients over 40 ($p<0.001$), those preoperatively diagnosed with BPH ($p<0.001$), secondary cases ($p<0.001$), patients with an operative and anesthesia time longer than 60 minutes ($p<0.001$), those diagnosed with DM ($p<0.001$) and patients who underwent open repair ($p=0.009$) had a higher risk of developing urinary retention. Moreover, it was also observed that the patients with an anesthesia time longer than 60 minutes ($p<0.001$), those who were not perioperatively administered narcotics and NSAIDs ($p<0.001$), patients who were perioperatively administered antispasmodics ($p<0.001$), those who received postop fluid replacement more than 1000 cc ($p<0.001$) and patients who had a rheumatic disease ($p=0.003$) had higher rates of urinary retention. In addition, the length of hospital stay was higher in patients who developed urinary retention (mean rank=139.45) than those who did not (Mean rank=104.53) ($p<0.001$) (Table 2).

We conducted a multivariate logistic regression analysis with variables that provided significant results in univariate analyses in order to determine the independent risk factors affecting postop urinary retention and found that the lack of perioperative NSAID use leads to increased risk of urinary retention (95% CI (10.84-96.16); OR:32.29; $p<0.001$) (Table 3).

Table 3: Multivariate analysis results that are used to identify independent risk factors affecting postop urinary retention.

Urinary retention	Factor	P	OR	95% CI
Peri-operative NSAID	No	<0.001	32.29	10.84-96.16

NSAID=nonsteroidal anti-inflammatory drug.

DISCUSSION

Inguinal hernia repair is commonly performed by general surgeons. Some patients develop urinary retention following the surgery, which leads to a series of health

and financial problems. In the present study conducted with 578 patients, the rate of POUR following IHR was 5.36%. The same rate was reported to be 1.6% in a study by Ferzli et al 7.9% in a study by Winslow et al 22.2% in a study by Koch et al and 4% in a study by Lau et al.^{7-9,11}

Compared to the results obtained by Lau et al the length of hospital stays in patients who developed urinary retention was shorter in the present study (1 day vs. 2.8 days).⁹

In a study by Petros et al conducted with 111 patients the risk of developing urinary retention was reported to be higher in patients who receive more than 1000 cc of postop fluid replacement.²⁰ Results of the present study are also supportive of these findings obtained by Petros and Bradley. In another study by Kozol et al conducted with 113 patients, it was shown that fluid replacement did not lead to a significant increase in the risk of urinary retention in the early postoperative period.²¹

In the present study, we could not evaluate the effects of using a mesh on urinary retention, since inguinal hernia repair was performed with meshes in all patients.

In addition, we did not include the patients who received regional anesthesia, as we believed it would affect the detrusor muscle of the urinary bladder. According to a meta-analysis by Jensen et al, the rates of urinary retention were similar in patients who received regional and general anesthesia (2.4% vs. 3.0%, respectively).²²

Stallard et al stated that perioperative use of narcotic analgesics (opiates) led to increased risk of urinary retention. In the present study, narcotic analgesics were not found to increase the risk of urinary retention.¹⁰

Various studies have shown that perioperative use of alpha blockers lead to decreased risk of urinary retention.²³⁻²⁵ According to a study by Hall et al use of alpha blockers was only beneficial in high-risk patients. In the present study, we could not reach any information about the use of alpha blockers in most of the patients.²⁶ Therefore, the effect of alpha blockers on urinary retention could not be investigated.

Hall et al found that bilateral inguinal hernia repair led to increased risk of urinary retention. In the present study, it was observed that bilateral inguinal hernia repair did not increase the risk of urinary retention. However, considering the effects of BPH on postop urinary retention, our results were similar to those obtained by Hall et al. Both studies showed that BPH caused an increased risk of postop urinary retention.²⁶

Unlike previous studies, also found that history of DM and rheumatic diseases, perioperative antispasmodic use and lack of perioperative NSAID use lead to increased risk of urinary retention in postoperative period.

The limitations of this study were as follows: there was a great difference between the number of patients included in each group and the study was retrospective.

CONCLUSION

According to the results of this study, advanced age, history of DM and BPH, antispasmodic use, longer operative time, high amount of postoperative fluid replacement and no perioperative use of NSAIDs lead to an increased risk of urinary retention.

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Ethical approval: The study was approved by the Institutional Ethics Committee

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