

## Original Research Article

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# Factors that predict urinary retention in patients who underwent inguinal hernia repair

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## ABSTRACT

**Background:** Some of the patients that undergo inguinal hernia repair develop urinary retention. We aimed to determine the rate of development of urinary retention and predicting factors after inguinal hernia repair.

**Methods:** Patients who underwent inguinal hernia in our center from January 2017 to January 2020 were included in the study. Patients were examined in 2 groups; group1 (developed urinary retention after inguinal hernia repair) and group 2 (did not develop urinary retention after inguinal hernia repair). We investigated the relationship between the development of urinary retention with age, perioperative history of benign prostate obstruction, hernia type and localization, duration of surgery and anesthesia, perioperative non-steroidal anti-inflammatory drug (NSAID), narcotic analgesic and antispasmolytic use, having diabetus mellitus (DM) and rheumatoid diseases, and perioperative fluid replacement.

**Results:** in group 1 and group 2, urinary retention developed in 11 (7.6%) of the patients. Patients who developed post-urinary retention were older than those without urinary retention ( $p=0.007$ ). The BPO, DM rates were higher ( $p=0.0001$ ), anesthesia and operation times were longer ( $p=0.003$ ;  $p=0.0001$ ); perioperative antispasmolytic use was higher ( $p=0.0001$ ); we determined that postoperative fluid replacement rate was higher ( $p=0.003$ ) and the rate of preoperative NSAID use was lower ( $p=0.0001$ ). Clavien grade 4 and grade 5 complications were not observed in patients.

**Conclusions:** Elderliness, DM history, antispasmolytic use, long operation and anesthesia duration, excessive postoperative fluid replacement and, not using perioperative NSAID increases the risk of urinary retention.

**Keywords:** Urinary retention, Inguinal hernia repair, antispasmolytic, NSAID, Fluid replacement

## INTRODUCTION

Inguinal hernia repair (IHR) is a common operation used in surgical operations.<sup>1,2</sup> In 2010 alone, 449,000 IHO were administered in the USA.<sup>2</sup> Postoperative urinary retention (POUR) develops at a rate of approximately 12%-25%.<sup>3,4</sup> Following IHR, POUR is a situation that requires urgent urinary catheter insertion and this discomfort brings

together factors such as urinary tract infection, increased morbidity, increased cost, prolonged hospital stay.<sup>5,6</sup> Investigating the risk factors causing POUR can help reduce the complication rate.<sup>7</sup> Advanced age, history of preoperative benign prostate hyperplasia (BPH), use of alpha-blocker, the effect of intraoperative narcotic drug use on POUR has been reported by many authors.<sup>8-14</sup> In studies conducted, we noticed that perioperative non-

steroid anti-inflammatory drug (NSAID) and antispasmodic drug use, hernia type (direct, indirect, combined), co morbidities such as diabetes mellitus (DM), rheumatoid arthritis were not investigated. In our study, we investigated the effects of the factors we pointed out on POUR.

## METHODS

Patients over 18 years of age who underwent open and laparoscopic inguinal hernia repair in our center between January 2017 and January 2020 were included in the study. The patients included in the study were operated by the same surgical team. Patient data were collected retrospectively in electronic environment. The urethral catheter was inserted only in patients who could not urinate even 6 hours after surgery. The patients were examined in 2 groups as group 1 (urinary retention developing after inguinal hernia repair) and group 2 (without urinary retention after inguinal hernia repair). In our study, we investigated the relationship between age, preoperative benign prostate obstruction (BPO) and prostate cancer history, hernia type and localization, duration of surgery and anesthesia, perioperative NSAID use, use of narcotic analgesics and antispasmodics, history of DM and rheumatologic disease, and perioperative fluid replacement and development in patients undergoing inguinal hernia repair. Urinary retention in the early period after complications developed in the postoperative period was evaluated according to the Clavien scale.

### Surgical technique

Laparoscopic inguinal hernia repair was performed open by 3-trocar technique and totally extraperitoneal procedures (TEP) method; inguinal hernia repair was

performed with an inguinal incision. General anesthesia was applied in both techniques. Polypropylene mesh (3.5 5.0 in) was used to cover all inguinal/femoral defects and co-adapted to Cooper's ligament and the anterior abdominal wall with spiral titanium tacks in both techniques.

### Statistical analysis

SPSS 23.0 software package was used for statistical analysis of the data. The categorical measurements were summarized in numbers and percentages and continuous measurements were summarized as mean and standard deviation (median and minimum-maximum when necessary). Chi-square test or Fisher test statistics were used for the comparison of categorical variables. Statistical significance level was taken as 0.05 in all tests.

## RESULTS

The numbers of patients included in the study were 158. Patients in group 1 were 11, and in group 2 total patients were 147. Median age was  $57.7 \pm 15.1$  (20-74) and  $48.8 \pm 17.5$  (18-89) ( $p=0.104$ ) in group 1 and group 2 respectively. Number of patients with the diagnosis of preoperative BPO and prostate Ca is 12. Secondary case number is 23, number of bilateral inguinal hernia cases were 75, diagnosed with DM were 40; 36 patients were with open repairs; antispasmodic was administered in 15 patients, NSAID was administered in 132 patients, narcotic analgesic was not administered in only 2 patients. 58 preoperative patients were diagnosed as combined inguinal hernia (direct and indirect inguinal hernia). Mesh graft was applied to all patients. Average duration of hospital stay of patients developed urinary retention was 1.5 days (minimum 1 day, maximum 2 days) (Table 1).

**Table 1: Patient demographic data.**

Demographic data	N (%)	Demographic data	N (%)
<b>Age (in years)</b>		<b>Operation time</b>	
<40	61 (38.6)	<60 min	90 (57)
>40	97 (61.4)	>60 min	68 (43)
<b>BPO</b>		<b>Perioperative narcotics</b>	
Preoperative, prostate Ca exists	12 (7.6)	Exists	156 (98.7)
No Preoperative, prostate Ca	146 (92.4)	None	2 (1.3)
<b>Case type</b>		<b>Perioperative antispasmodic</b>	
Primary case	135 (85.4)	None	143 (90.5)
Secondary case	23 (14.6)	Exists	15 (9.5)
<b>The party</b>		<b>Quantity of postoperative replaced fluid</b>	
Right side	50 (31.6)	<1000CC	68 (43)
Left side	33 (20.9)	>1000CC	90 (57)
Bilateral	75 (47.5)	<b>Hernia</b>	
<b>DM</b>		Direct hernia	51 (32.3)
Exists	40 (25.3)	Indirect hernia	49 (31)
None	118 (74.7)	Direct+indirect hernia	58 (36.7)

Continued.

Demographic data		N (%)	Demographic data		N (%)
<b>Surgery</b>			<b>Rheumatic disease</b>		
Laparoscopic		122 (77.2)	Exists		10 (6.3)
Open repair		36 (22.8)	None		148 (93.7)
<b>Duration of Anesthesia</b>			<b>Perioperative NSAIDs</b>		
<60 min		64 (40.5)	Exists		132 (83.5)
>60 min		94 (59.5)	None		26 (16.5)

**Table 2: Univariate analysis results used to identify independent risk factors affecting postoperative urinary retention.**

Demographic data	Group 1 N (%)	Group 2 N (%)	Demographic data	Group 1 N (%)	Group 2 N (%)
<b>Age (p=0.007)</b>			<b>Operation time (p=0.700)</b>		
<40	0 (0)	61 (41.5)	<60 min	4 (66.7)	86 (56.6)
>40	11 (100)	86 (58.5)	>60 min	2 (33.3)	66 (43.4)
<b>Preoperative BPO (p=0.0001)</b>			<b>Perioperative narcotics (p=0.075)</b>		
Prostat Ca exists	11 (100)	1 (0.7)	Exists	5 (83.3)	151 (99.3)
No prostat Ca	0 (0)	146 (99.3)	None	1 (16.7)	1 (0.7)
<b>Case type (p=1.000)</b>			<b>Perioperative antispasmodolytic (p=0.0001)</b>		
Primary case	10 (90)	125 (85)	None	6 (100)	137 (90.1)
Secondary case	1 (9.1)	22 (15)	Exists	0 (0)	15 (9.9)
<b>The party (p=0.221)</b>			<b>Quantity of postop. replaced fluid (p=0.700)</b>		
Right side	6 (54.5)	44 (29.9)	<1000 CC	2 (33.3)	66 (43.4)
Left side	2 (18.2)	31 (21.1)	>1000 CC	4 (66.7)	86 (56.6)
Bilateral	3 (27.3)	72 (49)	<b>Hernia (p=0.219)</b>		
<b>DM (p=0.0001)</b>			Direct	0 (0)	51 (33.6)
Exists	6 (100)	34 (22.4)	Indirect	3 (50)	46 (30.3)
None	0 (0)	118 (77.6)	Direct+indirect	3 (50)	55 (36.2)
<b>Surgery (p=0.0001)</b>			<b>Rheumatic disease (p=0.0001)</b>		
Laparoscopic	0 (0)	122 (80.3)	Exists	5 (83.3)	5 (3.3)
Open repair	6 (100)	30 (19.7)	None	1 (16.7)	147 (96.7)
<b>Duration of anesthesia (p=0.402)</b>			<b>Perioperative NSAID (p=0.0001)</b>		
<60 min	1 (16.7)	63 (41.4)	Exists	0 (0)	132 (86.8)
>60 min	5 (83.3)	89 (58.6)	None	6 (100)	20 (13.2)

Number of patients with urinary retention was 11 (7.6%). 14F or 16F Foley catheter was inserted in patients that have urinary retention also alpha blocker (tamsulosine, silodosine, alfuzosine) was added to the treatment, urinary catheter was withdrawn on the third day of treatment. Urinary retention was developed in 3 patients. Patients who developed urinary retention for the second time had a history of BPO and did not benefit from medical treatment in their follow-up, plasma kinetic transurethral prostate resection was performed. Prostatitis developed due to urinary catheterization in one of the patient with urinary retention, he was rehospitalized and parenteral treatment was initiated. Hematuria continued for up to 1 week after the urinary catheter was removed in two of the patients. Clavien grade 4 and grade 5 complications were not observed in patients. Statistical evaluation of demographic and clinical characteristics of patients with and without postoperative urinary retention was done. The patients who developed postop urinary retention were older than those who did not develop urinary retention

(p=0.007); BPO, DM rates were higher (p=0.0001), anesthesia and operation times were longer (p=0.003), (p=0.0001); perioperative antispasmodolytic use was higher (p=0.0001); We found that the rate of postop fluid replacement was higher (p=0.003) and the rate of NSAID usage was lower (p=0.0001) (Table 2). No statistically significant variable was found, with multi-variate logistic regression analysis on variables that were significant in univariate analysis, to determine the independent risk factors affecting postoperative urinary retention.

## DISCUSSION

Inguinal hernia repair is a common operation performed by general surgery doctors. Urinary retention develops in some patients following surgery and this brings a series of health and financial problems. In our study we carried out with 158 patients, POUR development after IHR was 7.6%. In the study by Ferzli et al, the rate was reported as 1.6%, in the study of Winslow et al it was 7.9%, 22.2% in

Farley et al study and 4% in Lau et al report.<sup>6,15-17</sup> We found that the duration of hospital stay of patients who developed urinary retention was shorter (1.5 days/2.8 days) in our study compared to the study performed by Lau et al.<sup>17</sup> Petros et al found that replacing more than 1000 CC fluid increases the risk of developing urinary retention in their study on 111 patients in early post-operative period.<sup>18</sup> In this respect, results of our study support the results of Petros et al.

In study conducted on 113 patients by Kozol et al fluid replacement did not significantly increase the risk of urinary retention postoperative.<sup>19</sup> In our study, we could not investigate the effect of mesh application on urinary retention, since all patients who underwent Inguinal Hernia repair were subjected to mesh. We also did not include these patients in our study because we thought that regional anesthesia would affect detrusor muscle of bladder. Urinary retention rate was similar in patients receiving regional and general anesthesia (2.4% vs. 3.0% respectively) in meta-analysis made by Jensen et al.<sup>19,20</sup> According to the study by Stallard et al peri-operative use of narcotic analgesics (opiate) increases the risk of urinary retention.<sup>5</sup> According to the results of our study, we have identified that narcotic analgesics do not increase the risk of urinary retention. Use of perioperative  $\alpha$ -blocker has been shown to decrease the risk of urinary retention in many studies.<sup>21-23</sup> Alpha blocker usage has been shown to benefit only in high-risk patients in a study by Hall et al.<sup>24</sup> In our study, we could not receive information on whether many patients used alpha blocker or not. Therefore, we were unable to investigate the effect of alpha blockers on urinary retention. Hall et al found that bilateral inguinal hernia repair increased the risk of urinary retention. We found that performing bilateral inguinal hernia repair does not increase urinary retention in our study. However, when we look at the effect of BPO on postoperative developed urinary retention, our results were similar to those obtained by Hall et al. Both of the studies suggest that BPO, increased the risk of postoperative urinary retention.<sup>24</sup>

Unlike other studies, we found that the presence of DM history, non-steroidal anti-inflammatory drug (NSAID) and antispasmodic drug usage increased the risk of urinary retention in the postoperative period.

### Limitations

The limitations of our study are; the retrospective nature of the study, the insufficient number of patients, and the differences between the groups, and the difference in the number of patients. Therefore, prospective studies with higher patient numbers and more homogeneous groups are needed.

### CONCLUSION

Elderliness, DM history, antispasmodic usage, long operation and anesthesia duration, excessive postop fluid

replacement and, not using perioperative NSAID increases the risk of urinary retention.

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

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