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; group 1 (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 anti-inflammatory drug (NSAID), narcotic analgesic and antispasmodic use, having diabetes 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 antispasmodic use was higher (p=0.0001); we determined that postoperative fluid replacement rate was higher (p=0.003) and the rate of perioperative NSAID use was lower (p=0.0001). Clavien grade 4 and grade 5 complications were not observed in patients.

Conclusions: Elderliness, DM history, antispasmodic 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, antispasmodic, NSAID, Fluid replacement

INTRODUCTION

Inguinal hernia repair (IHR) is a common operation used in surgical operations.¹² In 2010 alone, 449,000 IHO were administered in the USA.² Postoperative urinary retention (POUR) develops at a rate of approximately 12%-25%³.⁴ 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.⁵.⁶ Investigating the risk factors causing POUR can help reduce the complication rate.⁷ 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.⁸⁻¹⁴ In studies conducted, we noticed that perioperative non-
steroid anti-inflammatory drug (NSAID) and antispasmodytic 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 antispasmodlytics, history of DM and rheumatologic disease, and perioperative fluid replacement and development in the postoperative period. 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±15.1 (20-74) and 48.8±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; antispasmodytic 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).

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

Table 1: Patient demographic data.
In our study we carried out with 158 patients, POUR development after IHR was 7.9%. In the study by Ferzli et al, the rate was reported as 2.2% in 2020.

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 antispasmyotic 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

### 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 (%) |
|------------------|---------------|---------------|------------------|---------------|---------------|
| Age (p=0.007)    | Operation time (p=0.700) | Preoperative BPO (p=0.0001) | Perioperative narcotics (p=0.075) | Perioperative antispasmyotic (p=0.0001) | Hernia (p=0.219) |
| <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)     |
| Preoperative BPO (p=0.0001) | Prostate cancer (p=0.0001) | Perioperative narcotics (p=0.075) | Perioperative antispasmyotic (p=0.0001) | Hernia (p=0.219) |
| Prostate cancer exists | 11 (100) | 1 (0.7) | 5 (83.3) | 151 (99.3) |
| No prostate cancer exists | 0 (0) | 146 (99.3) | None | 1 (0.7) |
| Case type (p=1.000) | Perioperative narcotics (p=0.075) | Perioperative antispasmyotic (p=0.0001) | Hernia (p=0.219) |
| 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) |
| The party (p=0.221) | Quantity of postop. replaced fluid (p=0.700) | DM (p=0.0001) | Perioperative NSAI (p=0.0001) | Rheumatic disease (p=0.0001) |
| 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) | Direct | 0 (0) | 51 (33.6) |
| DM (p=0.0001) | Exits | 6 (100) | 34 (22.4) | Indirect | 3 (50) | 46 (30.3) |
| None | 0 (0) | 118 (77.6) | Direct+indirect | 3 (50) | 55 (36.2) |
| Surgery (p=0.0001) | Perioperative NSAI (p=0.0001) | Hernia (p=0.219) |
| Laparoscopic | 0 (0) | 122 (80.3) | 5 (83.3) | 5 (3.3) |
| Open repair | 6 (100) | 30 (19.7) | None | 1 (16.7) | 147 (96.7) |
| Duration of anesthesia (p=0.402) | Perioperative NSAI (p=0.0001) | Hernia (p=0.219) |
| <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) |
Farley et al study and 4% in Lau et al report.\textsuperscript{6,15-17} 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.\textsuperscript{17} 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 postoperative period.\textsuperscript{18} 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.\textsuperscript{19} 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.\textsuperscript{19,20} According to the study by Stallard et al peri-operative use of narcotic analgesics (opiate) increases the risk of urinary retention.\textsuperscript{2} According to the results of our study, we have identified that narcotic analgesics do not increase the risk of urinary retention. Use of perioperative α-blocker has been shown to decrease the risk of urinary retention in many studies.\textsuperscript{21-23} Alpha blocker usage has been shown to benefit only in high-risk patients in a study by Hall et al.\textsuperscript{24} 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.\textsuperscript{24}

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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REFERENCES
1. Jenkins JT, O’Dwyer PJ. Inguinal hernias. BMJ. 2008;336:269-72.
2. Hall MJ, Schwartzman A, Zhang J, Liu X. Ambulatory surgery data from hospitals and ambulatory surgery centers: United States, 2010. Natl Health Stat Rep. 2017;102:1-5.
3. Haskell DL, Sunshine B, Heifetz CI. A study of bladder catheterization with inguinal hernia operations. Arch Surg. 1974;109:378-80.
4. Goldman G, Leviav A, Mazor A, Kashtan H, Aladgeom D, Greenstein A, et al. Alpha-adrenergic blocker for posthernioplasty urinary retention. Prevention and treatment. Arch Surg. 1988;123:35-6.
5. Stallard S, Prescott S. Postoperative urinary retention in general surgical patients. Br J Surg. 1988;75:1141-3.
6. Koch CA, Grinberg GG, Farley DR. Incidence and risk factors for urinary retention after laparoscopic inguinal hernia repairs. Surg Endosc. 2008;22(11):2575-80.
7. Sivasankaran MV, Pham T, Divino CM. Incidence and risk factors for urinary retention following laparoscopic inguinal hernia repairs. Surg Endosc. 2015;29:3140-5.
8. Hall MJ, Schwartzman A, Zhang J, Liu X. Ambulatory surgery data from hospitals and ambulatory surgery centers: United States, 2010. Natl Health Stat Rep. 2017;102:1-5.
9. Patel JA, Kaufman AS, Howard RS, Rodriguez CJ, Jessie EM. Risk factors for urinary retention after laparoscopic inguinal hernia repairs. Surg Endosc. 2015;29:3140-5.
10. Woo HH, Carmalt HL. A placebo controlled double blind study using perioperative prazosin in the prevention of urinary retention following inguinal hernia repair. Int Urol Nephrol. 1995;27(5):557-62.
11. Sivasankaran MV, Pham T, Divino CM. Incidence and risk factors for urinary retention following laparoscopic inguinal hernia repair. Am J Surg. 2014;207(2):288-92.
12. Mohammadi-Fallah M, Hamedanchi S, Tayyebi-Azar A. Preventive effect of tamsulosin on postoperative urinary retention. Korean J Urol. 2012;53(6):419-23.
13. Mason SE, Scott AJ, Mayer E, Purkayastha S. Patientrelated risk factors for urinary retention following ambulatory general surgery: a systematic review and meta-analysis. Am J Surg. 2016;211(6):1126-34.
14. Shaw M, Pahari H. The role of peri-operative use of α-blocker in preventing lower urinary tract symptoms in high risk patients of urinary retention undergoing inguinal hernia repair in males above 50 years. J Indian Med Assoc. 2014;112:13-4.
15. Blair AB, Dwarakanath A, Mehta A, Liang H, Hui X, Wyman C, et al. Postoperative urinary retention after inguinal hernia repair: a single institution experience. Hernia. 2017;21(6):895-900.
14. Goldman G, Leviav A, Mazor A, Kashtan H, Aladgem D, Greenstein A, et al. \(\alpha\)-adrenergic blocker for posthernioplasty urinary retention: prevention and treatment. Arch Surg. 1988; 123(1):35-6.

15. Ferzli G, Sayad P, Huie F, Hallak A, Usal H. Endoscopic extraperitoneal herniorrhaphy. A 5-year experience. Surg Endosc. 1998;12:1311-3.

16. Winslow ER, Quasebarth M, Brunt LM. Perioperative outcomes and complications of open vs laparoscopic extraperitoneal inguinal hernia repair in a mature surgical practice. Surg Endosc. 2004;18:221-7.

17. Lau H, Patil NG, Yuen WK, Lee F. Urinary retention following endoscopic totally extraperitoneal inguinal hernioplasty. Surg Endosc. 2002;16:1547-50.

18. Petros JG, Bradley TM. Factors influencing postoperative urinary retention in patients undergoing surgery for benign anorectal disease. Am J Surg. 1990;159:374-6.

19. Kozol RA, Mason K, McGee K. Post-herniorrhaphy urinary retention: a randomized prospective study. J Surg Res. 1992;52:111-2.

20. Jensen P, Mikkelsen T, Kehlet H. Postherniorrhaphy urinary retention-effect of local, regional, and general anesthesia: a review. Reg Anesth Pain Med. 2002;27:612-7.

21. Mohammadi-Fallah M, Hamedanchi S, Tayyebi-Azar A. Preventive effect of tamsulosin on postoperative urinary retention. Korean J Urol. 2012;53(6):419-23.

22. Shaw M, Pahari H. The role of peri-operative use of \(\alpha\)-blocker in preventing lower urinary tract symptoms in high risk patients of urinary retention undergoing inguinal hernia repair in males above 50 years. J Indian Med Assoc. 2014;112:13-4.

23. Unal Y, Kilinc MF. Does inguinal hernia repair affect uroflowmetric parameters? A prospective controlled clinical trial. Low Urin Tract Symptoms. 2019;11(3): 99-103.

24. Hall BR, Armijo PR, Grams B, Lonmelin D, Oleynikov D. Identifying patients at risk for urinary retention following inguinal herniorrhaphy: a single institution study. Hernia. 2019;23(2):311-5.

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