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Research Article

# Comparing the Effects of Hot Pack and Lukewarm-Water-Soaked Gauze on Postoperative Urinary Retention; A Randomized Controlled Clinical Trial

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**Background:** Urinary retention is a common postoperative complication that mandates urinary catheterization. Urinary catheterization is associated with different physical, mental, and financial problems for both patients and healthcare systems. The patient inconvenience, urinary tract infections, and increase in hospital stay and expenses are common problems of urinary retention and urinary catheterization. Therefore, alternative ways of relieving urinary retention, preferably noninvasive interventions, are of great interest.

**Objectives:** The aim of this study was to compare the effects of placing hot pack and lukewarm-water-soaked gauze on the suprapubic region on male patients with postoperative urinary retention.

**Patients and Methods:** This was a three-group, randomized, controlled trial. A convenience sample of 126 male patients who had undergone general, orthopedic, or urologic surgeries were recruited. The block randomization method was used for allocating patients to either the two experimental groups (the hot pack and the lukewarm-water-soaked gauze groups) or the control one. Patients in the experimental groups were treated by placing either hot pack or lukewarm-water-soaked gauze on the suprapubic region. All patients were monitored for 20 minutes for urinary retention relief. If they did not experience urinary retention relief (starting urine flow and bladder evacuate), urinary catheterization would be performed. The data was collected using information sheet. Elimination of urinary retention was compared among study groups. The one-way analysis of variance and the Chi-square tests were used for analyzing data.

**Results:** Respectively, 59.5%, 71.4%, and 7.1% of patients in the hot pack, the soaked gauze, and the control groups experienced relief from urinary retention and the bladder was emptied. There was a significant difference among study groups in percentage of patients who experienced urinary retention relief. However, the difference between the two experimental groups was not significant. The time to urinary retention relief in hot pack, soaked gauze, and control groups was  $15.45 \pm 3.15$ ,  $13.83 \pm 3.80$ , and  $14.59 \pm 3.29$  minutes, respectively. The difference among the study groups in time to urinary retention relief was not statistically significant.

**Conclusions:** Both the lukewarm-water-soaked gauze and the hot pack techniques had significant effects on postoperative urinary retention and significantly reduced the need for urinary catheterization. Using these two simple and cost-effective techniques for managing postoperative urinary retention is recommended.

**Keywords:** General Surgery; Urinary Retention, Nurses

## 1. Background

Urinary retention (UR) refers to the inability of bladder to evacuate urine during voiding (1, 2). Many patients develop UR after surgery. Because of the differences in patient populations, UR definitions, and UR management interventions, the incidence of postoperative UR (POUR) has been reported differently, ranging from 5% to 75% (3-6). All male and female patients from different age groups might develop POUR after different surgeries. POUR is associated with considerable health and financial consequences (1, 2, 4).

The causes of UR include decreased bladder sensation, tension on the bladder, anxiety, surgeries, or other factors that affect the bladder (1). The most common surgeries that might cause POUR are the abdominal, anorectal, colorectal, urologic, and gynecologic ones. Surgery-induced alterations in sacral reflex can cause contraction

of the bladder sphincter and bring about POUR (5). After surgeries on other parts of the body, POUR may happen due to sedation, anesthesia, decreased mobility, fluid overload, medications, pain, and anxiety (7). Besides the direct effects of surgery on POUR, sedative and anesthetic agents might also suppress the sensation of bladder filling and predispose patients to POUR. Moreover, the increased tone of the bladder internal sphincter, caused by postoperative pain, might significantly contribute to POUR. On the other hand, opioid analgesics, which are administered for managing postoperative pain, might also cause POUR through the same mechanism (4).

Developing UR and subsequent urinary stasis is associated with different consequences and complications such as infection, transmural ischemia, decreased bladder sensation and contractility, and temporary or perma-

ment damage to the bladder, detrusor muscle, ureters, and kidneys (1, 2, 4). Moreover, UR can cause pain and anxiety, prolong hospital stay, and increase healthcare costs (4, 5).

The key measure for managing UR is urinary catheterization (8). Catheterization is performed when the bladder is palpable, the afflicted patient has great discomfort, and the primary UR treatments are ineffective. Catheterization is an invasive procedure with potential complications, including catheter-associated urinary tract infections (UTIs), urethral trauma, prostatitis, pain, and discomfort. According to Steggall et al. about 80% of all nosocomial UTIs occur due to catheterization. Accordingly, decision on managing UR by catheterization should be made with great caution (4).

There are different safe and inexpensive nursing interventions for preventing and managing POUR that can reduce the need for catheterization (1, 2). For instance, placing gauze that is immersed in lukewarm water on the suprapubic region can help alleviate POUR (9). Hosseini et al. found that compared with onion-covered gauze, the water-soaked gauze applied on suprapubic region, was more effective in relieving male patients' UR after cardiac catheterization (9). However, to the best of our knowledge, no study was conducted on comparing the effects of hot pack and water-soaked gauze on POUR.

## 2. Objectives

The aim of this study was to compare the effects of placing hot pack and lukewarm-water-soaked gauze on the suprapubic region on male patients' postoperative urinary retention.

## 3. Patients and Methods

This was a three-group, randomized, and controlled trial. The study was conducted in May through July 2014. The study setting was the surgical unit of Milad Hospital, Kashan City, Iran. All male patients who had undergone orthopedic, urologic, or general surgeries in the study setting and according to physician's diagnosis had developed POUR (by lack of urinate after operation, discomfort, and pain in suprapubic region) constituted the study population. Study sample size was calculated after a pilot study and based on (Type I error) of 0.05, (Type II error) of 0.2, and effect size of 0.65. Accordingly, 126 patients (42 patients in each group) were recruited through convenience sampling method. The accommodations and care services of the study setting were similar for all patients. The inclusion criteria were being 20 to 75 years old, no history of known urinary tract disorders, no urinary catheterization in their recent surgery, no history of massive bleeding throughout recent surgeries, and a confirmed diagnosis of POUR. Patients who needed emergency urinary catheterization during the study were excluded.

Data collection instruments were a demographic ques-

tionnaire, a surgery datasheet, and a POUR datasheet. The demographic questionnaire contained items on patients' age, height, weight, and body mass index (BMI). Demographic data were collected by either asking patients or referring to their medical records. The surgery datasheet included items about the kind of anesthesia, the kind of surgery, and the administered opioids and fluids. Finally, the POUR datasheet consisted of questions on the type of the intervention and the interval between starting the intervention and obtaining UR relief. We used a standard (Casio, Tokyo, Japan) chronometer for measuring this time.

Study participants were randomly allocated to three groups, namely, the hot pack, the lukewarm-water-soaked gauze, and the control groups, by using the block randomization technique in 21-senary block. Before starting the interventions, we measured the study participants' axillary body temperature by using a mercury thermometer (to eliminate the effect of body temperature on the performance of soaked gauze). Patients in the hot pack group were treated by placing a hot pack (Hospital and Home Care Nanjing, China) containing 200 mL of 50°C water in direct contact on the suprapubic region for 20 minutes. We also treated patients in the second treatment group by putting a standard 10 × 10-cm<sup>2</sup> gauze on the suprapubic region for 20 minutes. The gauze had been already soaked in 15 mL of 25°C to 30°C water (The gauzes were not re-wetted). Patients in the control group received no intervention. At the beginning of intervention, the time was measured for 20 minutes. The time of urination was recorded. If UR was not relieved after 20 minutes, the urinary catheterization would be performed immediately. The environmental condition (including room temperature, bed type, room size, and privacy facilities) were same for all patients.

### 3.1. Ethical Consideration

The University Review Research Ethics Committee at Kashan University of Medical Sciences approved this study. We received formal permissions from the Research Council of Kashan University of Medical Sciences and the administrators of the study setting. The study aims and methods were explained to the participants and written informed consent was obtained. Patients were free to withdraw from the study and ask for receiving urinary catheterization at any time during the intervention. Their privacy and anonymity were guaranteed.

### 3.2. Data Analysis

Data analysis was done using the SPSS 11.5 (SPSS Inc, Chicago, Illinois, the United States). Study data were described by using descriptive statistics measures such as mean, standard deviation, and frequency tables. Study groups were compared in variables such as age, BMI, body temperature, administered intravenous opioids and fluids, time to UR relief, percentage of UR relief, type

of surgery, and the underlying condition by using the one-way analysis of variance (ANOVA) and the Chi-square tests.

#### 4. Results

The means of patients' age, BMI, body temperature, and administered intravenous fluids during surgery are summarized in Table 1. The results of the one-way ANOVA test revealed that there were no significant differences among the study groups regarding patients' age, BMI, body temperature, and the amount of intravenous fluids administered during surgery ( $P > 0.05$ ) (Table 1).

Furthermore, the results of the Chi-square test demonstrated that the three study groups did not differ significantly in terms of variables such as the kind of surgery, administration of opioid agents, and patients' underlying

ing conditions ( $P > 0.05$ ) (Table 2).

The percentages of patients in the hot pack, soaked gauze, and control groups who experienced UR relief during the 20-minute period of the study intervention without needing urinary catheterization were respectively 71.4%, 59.5%, 7.1%. The results of the Chi-square test revealed that there was a significant difference among the three groups in terms of the percentage of patients who experienced UR relief ( $P < 0.001$ ). However, the difference between the two experimental groups was not statistically significant ( $P > 0.05$ ) (Table 3).

The means of time to UR relief in hot pack, soaked gauze, and control groups were  $15.45 \pm 3.15$ ,  $13.83 \pm 3.80$ , and  $14.59 \pm 3.29$  minute, respectively. The results of the one-way ANOVA test showed that the three study groups did not differ significantly in terms of the time to UR relief ( $P > 0.05$ ).

**Table 1.** Participants' Characteristics<sup>a</sup>

	Group			P Value
	Hot Pack	Soaked Gauze	Control Group	
Age, y	40.97 ± 15.31	45.28 ± 16.52	43.36 ± 15.96	0.45
BMI, kg/m <sup>2</sup>	26.15 ± 2.86	26.40 ± 2.50	26.67 ± 2.35	0.43
Temperature, °C	37.06 ± 0.25	36.13 ± 5.55	36.99 ± 0.23	0.33
Intravenous fluids, mL	370.29 ± 9.53	293.08 ± 8.53	241.25 ± 8.64	0.26

<sup>a</sup> Data are presented as Mean ± SD.

**Table 2.** The Result of Administration of Opioid Agents and Patients' Underlying Conditions<sup>a</sup>

	Groups			P Value (Chi-square)
	Hot Pack	Soaked Gauze	Control Group	
<b>Kind of Surgery</b>				0.52
Orthopedic	12 (28.6)	8 (19.0)	7 (16.7)	
Urologic	12 (28.6)	16 (38.1)	12 (31.7)	
General surgery	18 (42.9)	18 (42.9)	23 (54.8)	
<b>Other comorbidities</b>				0.38
Hypertension	36 (85.7)	31 (73.8)	34 (80.2)	
Other Diseases	6 (14.3)	11 (26.2)	8 (19.0)	
<b>Administration of opioids</b>				0.87
Yes	40 (95.2)	39 (92.9)	39 (92.9)	
No	2 (4.8)	3 (7.1)	3 (7.1)	

<sup>a</sup> Data are presented as No. (%).

**Table 3.** Urinary Retention Relief in the Study Groups After the Intervention<sup>a</sup>

Groups	Urinary Retention Relief		P Value (Chi-Square)
	Yes	No	
Hot Pack	25 (59.9)	17 (40.5)	< 0.001
Soaked Gauze	30 (71.4)	12 (28.6)	< 0.001
Control Group	3 (7.1)	39 (92.9)	< 0.001

<sup>a</sup> Data are presented as No. (%).

## 5. Discussion

Study findings revealed that placing both hot pack and lukewarm-water-soaked gauze on the suprapubic region could positively affect POUR. Probably, lukewarm-water-soaked gauze brings UR relief through conveying a sense of exposure with water. Hosseini et al. noted that exposure with water is effective in relieving UR (9). Shafik investigated the effects of warm water bath on 21 patients with POUR after herniorrhaphy surgery and found that 19 patients experienced UR relief (10). In our study, however, only 25 patients in the hot pack group and 30 patients in the soaked-gauze group felt UR relief. This discrepancy between the findings of the two studies can be attributed to patients' direct exposure to warm water by using a warm water basin, which conveyed a greater sense of water exposure, in Shafik's study. Moreover, warm water might have relieved UR through affecting the heat reflex of the bladder sphincter and relaxing it. In contrast, we applied warmth and humidity both separately and locally on the suprapubic region. Shafik's intervention required patients to get out of bed for sitting in a warm water basin while we administered our interventions while patients remained in their beds. Moreover, Shafik only studied the patients who had undergone anorectal surgery while our sample consisted of patients who had had general, orthopedic, or urologic surgeries. In fact, different surgeries might be associated with different levels of POUR (10).

Gonullu et al. also reported that applying hot pack to the suprapubic region relieved 77% cases of POUR after general surgeries (11). However, only 59.5% of our participants who had been treated with hot pack experienced UR relief. This discrepancy between the findings of the two studies can be attributed to several factors. First, while Gonullu et al. investigated both male and female patients, we included only male patients. Second, Gonullu et al. recruited the patients who had undergone general surgeries while our participants had had general, orthopedic, or urologic surgeries. Finally, while Gonullu et al. applied 40°C to 45°C hot pack, the temperature of our hot packs was 50°C (11).

Hosseini et al also compared the effects of onionskin and soaked gauze on 62 male patients' UR after cardiac catheterization. They found that onionskin and soaked gauze relieved respectively 58.1% and 71% of UR cases. Our soaked gauze intervention also was effective in relieving POUR in 71.4% of patients. However, while Hosseini et al. reported that the mean time to UR relief in the soaked gauze group was 16.63 minutes, this value in the soaked gauze group of our study was 13.70 minutes. The difference in the time of urinary relief can be attributed to the fact that Hosseini et al. recruited a sample of patients who had received cardiac catheterization while we studied the patients who had undergone general, orthopedic, or urologic surgeries. The difference in the type of the surgeries might explain the difference in time to UR re-

lief. In extensive search, we did not find any use hot pack or lukewarm-water-soaked gauze in UR for comparison with our results (9).

Study findings indicate that the lukewarm-water-soaked gauze technique is as much effective as the conventional hot pack technique in relieving POUR. Moreover, compared with traditional techniques—such as lying flat and relaxing muscles, getting out of bed and standing in upright position, alleviating anxiety, taking shower, applying ice pack, opening water faucet, and tapping the groin—applying soaked gauze and hot pack is simpler and easier and does not require patient repositioning. Soaked gauze and hot pack techniques can eliminate the need for urinary catheterization and hence, help prevent patients from developing catheterization-related complications such as UTI, trauma, and discomfort. Accordingly, employing the simple and cost-effective techniques of placing hot pack and lukewarm-water-soaked gauze on the suprapubic region is recommended. In this study, some patients avoided of continuing participation that we replaced with new samples. Comparison of soaked gauze with other nursing interventions in relieving UR is recommended.

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## Authors' Contributions

Ehsan Jalali and Mohammad Reza Afazel were responsible for the study conception and design; Hossein Mahmoodi performed the visits and prescriptions; Zohre Sadat did the data analysis, made critical revisions to the paper for important intellectual content, and supervised the study; Ehsan Jalali and Mohammad Reza Afazel helped in visits and follow-ups, data collection, and preparing the first draft of the manuscript.

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