

Characteristics of urinary retention in female inpatients managed with medical treatments

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Purpose: We aimed to analyze the characteristics of urinary retention (UR) in female inpatients managed with medical treatments.

Materials and Methods: We retrospectively analyzed the medical records of female inpatients referred to the department of urology for UR at our institution from January 2009, to December 2014. UR was defined as a difficulty in self-voiding despite a sufficient urine volume or >300-mL postvoid residual. The data included patients' age, body mass index (BMI), ambulatory status, medical and surgical history, classes of taking drugs, and urinary tract infection.

Results: A total of 182 women were included as retention group, mean age of 72.64 ± 12.94 years and BMI of 22.94 ± 3.10 kg/m². In the chi-square analysis, cardiovascular disorders ($p=0.000$), diabetes mellitus ($p=0.008$), metastatic malignancy ($p=0.008$), chronic renal disorders ($p=0.028$) were found significantly. In the multiple logistic regression analysis, cardiovascular disorders ($p=0.002$; odds ratio [OR], 0.491), metastatic malignancy ($p=0.013$; OR, 2.616) were found to increase the risk of UR. The most common surgical history was anti-incontinence surgery (7.2%). In term of medication use, the most prescribed agents were nonsteroidal anti-inflammatory drugs (NSAIDs) (53.8%). The patients taking multiple drugs with antimuscarinic effects except of NSAIDs, narcotics and diuretics were 48 (26.4%). Urinary tract infection was identified in 43 patients (23.6%).

Conclusions: UR in females managed with medical treatments could be occurred occasionally. We think that thorough attentions are needed for UR to patients with cardiovascular disorders including diabetes mellitus, metastatic malignancy, chronic renal disorders urinary tract infection, and more careful interests when managing with drugs with antimuscarinic effects.

Keywords: Antimuscarinic agents; Drug therapy; Female; Urinary retention

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INTRODUCTION

Urinary retention (UR) defined as inability to achieve complete bladder emptying by voluntary micturition, resulting in a high postvoid urinary residual volume and categorized as acute UR or chronic UR [1,2]. Incidence of UR in women is estimated at 0.07 per 1,000 inhabitants each year and relatively uncommon compared to incidence

of UR in men [3,4]. UR results from on obstruction of the bladder outlet obstruction and/or decreased bladder contractility. Although various factors can influence bladder outlet resistance and bladder contractility, benign prostatic hypertrophy plays a critical role in men. In contrast, various factors can influence bladder function and the development of UR in women including anatomical disease, medication use, history of surgery, neurologic problems, infection, as well

Received: 14 September, 2015 • **Accepted:** 26 October, 2015

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as psychogenic factors [5,6]. Postoperative UR is a frequent complication of anesthesia and surgery of the lower urinary tract, perineum, anus, and general gynecological interventions, with an estimated incidence rate of 5% to 70% [7-10]. By the way, in an analysis of inpatients referred to Urology Department, urination disorder was the most common problem (61.26%) and UR was 25% among urination disorder [11]. Most commonly, referrals to urology are made by internal medicine. Considering the characteristics of the inpatients, many patients with comorbid show acute aggravation of the chronic diseases or various complications because of the aggravation. Thus, more medical cares are being administered. A number of pharmaceutical agents, which are routinely prescribed to patients by internal medicine services, are associated with UR or obstructive voiding symptoms; these include anticholinergic agents, musculotropic relaxants, calcium channel blockers, anti-parkinson agents, α -adrenergic agonists, and antihistamines [12].

Accordingly, we aimed to analyze the characteristics of UR in female inpatients managed with medical cares and utilize these results for prevention of UR or proper management of UR at an early stage.

MATERIALS AND METHODS

A retrospective analysis based on the medical records of inpatients referred to the Department of Urology, from January 1, 2009, to December 31, 2014. UR was defined as those who had difficulties regardless of symptom duration or bladder pain in self-voiding despite enough volume of urine in the bladder or who had more than 300-mL postvoid residual urine volume checked by ultrasonography or urethral catheterization [1].

The following clinical data were extracted from the medical records: patients' age; body mass index; ambulatory status, noting the origin of the limitation (e.g., neurological, such as spinal cord injury and stroke, and nonneurological, such as arthritis and general weakness); concurrent medical diseases; medication use; and history of surgery at three or more months ago from consultation date to the pelvic area, which carries the probability of affecting bladder function (e.g., neurological, gynecological, anorectal, and anti-incontinence surgery); pelvic bone fracture history. And, the patients having not experienced the surgery under general or spinal anesthesia within recent 3 months were considered to the patients managed with medical cares. We included the unevaluated patients having possible neurogenic bladder by patients' history and neurologic status. In addition,

administered drugs of retention group included medications or injections with known antimuscarinic effects such as antidepressants/antipsychotics, antiemetics, antihistamines, antimotility/antidiarrheal agents, antispasmodics/muscle relaxants, decongestants, dopaminergic agents [13]. In addition, we included the drugs relating to awareness and storage function of bladder such as nonsteroidal anti-inflammatory drugs [14], narcotics and diuretics for bladder filling velocity. All patients were tested by urine analysis and urine culture for urinary tract infection.

Statistical significance was determined by chi-square test. For the identification of the relationship between UR and patients' characteristics, multiple logistic regression analysis was performed. A p-value less than 0.05 was considered statistically significant.

RESULTS

Between January 1, 2009, and December 31, 2014, 6,522 patients were referred to our Urology Department, with 3,995 (61.3%) presenting with complaints of lower urinary tract symptoms (LUTS). Among patients with LUTS, females were 1,593 patients (39.9%) and of this group, 541 patients (34.0%) had been undergoing nonsurgical management due to medical disorders. Among these patients, 182 patients (33.6%) were identified to UR and classified to retention group and the others to nonretention group. The descriptive characteristics of female patients complaining of LUTS managed nonsurgical treatments were: mean age of 70.92 ± 12.64 years (retention group, 72.64 ± 12.94 ; nonretention group, 69.89 ± 12.29), with 73.6% patients older than 65 years; mean \pm standard deviation body mass index of 23.21 ± 3.71 (retention group, 22.94 ± 3.10 ; nonretention group, 23.47 ± 4.06); and limitation in ambulation in 28.5% (retention group, 28.3%; nonretention group, 30.0%) with neurologic abnormalities affecting ambulation and the others in 18.2% (retention group, 16.4%; nonretention group, 19.3%); and presence of comorbid conditions, with cardiovascular diseases (hypertension, atherosclerosis, myocardial ischemia, and cardiomyopathy) and diabetes mellitus being the most common in turn. The medical histories of patients in our study group is summarized in Table 1. Among the patients in retention group, 118 (64.8%) presented with multiple disorders, with 66 patients (36.3%) having two disorders, 42 (23.1%) having three disorders, and 10 (5.5%) having four disorders. In addition, 42 patients (23.0%) in retention group had a positive past history of surgeries, with 7.2% patients having undergone anti-incontinence surgery and 5.9% patients gynecological surgery. Patients' surgical history is

Table 1. Characteristics and comparison of female patients managed with medical care

Characteristic	Study population (n=541)	Retention group (n=182)	Nonretention group (n=359)	p-value
Age (y), mean±SD	70.92±12.64	72.46±12.94	69.89±12.29	
≥65 (%)	73.6	66.4	71.0	0.053
BMI (kg/m ²), mean±SD	23.21±3.71	22.94±3.10	23.47±4.06	
≥25 (%)	24.5	23.7	26.1	0.772
Ambulatory disturbance (%)	28.5	28.3	30.0	0.931
Neurologic problem (%)	18.2	16.4	19.3	0.463
Cardiovascular disorders (%)	57.9	69.7	49.8	0.000
Diabetes mellitus (%)	41.8	50.0	34.3	0.008
Psychogenic disorder (%)	17.1	15.8	18.8	0.570
Pulmonary disorders (%)	15.8	16.4	15.9	0.762
Stroke (%)	13.3	10.5	15.5	0.186
Metastatic malignancy (%)	12.0	6.6	15.0	0.008
Chronic renal disorders (%)	10.3	14.5	7.7	0.028
Liver disorders (%)	9.8	6.6	12.6	0.083
Surgical history (%)	27.2	23.0	29.0	0.134
Anti-incontinence surgery (%)	10.3	7.2	12.1	0.102
Gynecologic surgery (%)	9.2	5.9	12.1	0.065
Spinal surgery (%)	5.7	5.3	5.8	0.758
Brain surgery (%)	3.3	3.9	2.9	0.534
Anorectal surgery (%)	2.7	2.6	2.9	0.932

SD, standard deviation; BMI, body mass index.

Table 2. Multiple logistic regression analysis for multiple factors of urinary retention

Factor	Odds ratio	95% Confidence interval	p-value
Cardiovascular disorders	0.491	0.311–0.775	0.002
Diabetes mellitus	0.705	0.451–1.102	0.125
Chronic renal disorders	0.509	0.251–1.034	0.062
Metastatic malignancy	2.616	1.222–5.597	0.013

summarized in Table 1. In univariate analysis, there were statistical significance in cardiovascular disorders, diabetes mellitus, metastatic malignancy, and chronic renal disorders (Table 1). In multiple logistic regression analysis with these significant variables, cardiovascular disorders and metastatic malignancy were significantly associated with UR (odd ratio, 0.491; p=0.002 and odd ratio, 2.616; p=0.013, respectively) (Table 2). The patients with pelvic bone fracture were 2 patients in retention group, 1 patient in nonretention group. The patients with urinary tract infection were 43 patients (23.6%) in retention group, 71 patients (19.8%) in nonretention group.

In the investigation of retention group about classes of taking drugs or injections, the most frequent prescribed agents were nonsteroidal anti-inflammatory drugs and the second agents were antidepressants/antipsychotics. The other prescribed agents were summarized in Table 3. Among retention group, 48 patients (26.4%) had been prescribed

Table 3. Classes of taking drugs in retention group (n=182)

Drug class/action	No. (%)
Nonsteroidal anti-inflammatory drugs	98 (53.8)
Antidepressants/antipsychotics	67 (36.8)
Decongestants	48 (26.4)
Diuretics	46 (25.3)
Antispasmodics/muscle relaxants	23 (12.6)
Antihistamines	18 (9.9)
Antimotility/antidiarrheal agents	17 (9.3)
Narcotics	12 (6.6)
Antiemetics	10 (5.5)
Anticholinergics	5 (2.7)
Dopaminergic agents	4 (2.2)

multiple drugs with known antimuscarinic effects, excluding the use of nonsteroidal anti-inflammatory drugs, narcotics, and diuretics. Of these 48 patients, 32 (17.6%) had been prescribed two different agents with antimuscarinic effect

and 16 (88%) three of these agents.

DISCUSSION

UR is caused by impairment in bladder emptying and bladder outlet obstruction, resulting in a high residual postvoid urine volume. Usually, α -blockers and drainage procedures, such as intermittent catheterization or indwelling catheter, are used for the clinical management of UR [5]. When properly treated, UR carries a low risk of morbidity. However, failure to identify and manage UR can result in serious clinical sequelae, including urinary tract infection, detrusor dysfunction and upper tract damage [9,15]. The risk for postsurgical UR has been well documented [7-10]. In female UR, it must be considered various causes. Ramsey and Palmer [5] reported that common causes of female UR are anatomical, drugs, operative, neurological and infective components and Elneil [16] presented the etiologies of UR in women as dividing into mechanical or functional causes. In addition, psychogenic factors have also been associated to UR in women [17].

Detrusor underactivity is defined as a contraction of reduced strength and/or duration, resulting in prolonged bladder emptying within normal time span and patients with detrusor underactivity have urinary frequency, urgency, urge incontinence, weak stream, straining, residual urine sense and related to multifactorial etiopathogenesis [1,18]. A review by Jeong et al. [19] of 1,817 patients with LUTS over the age of 65 years reported a prevalence of detrusor overactivity with impaired contractility in women, of 35.6%, with the prevalence increasing with age. In our study, patients with more than 65 years were 73.6% (retention group, 66.4%; nonretention group, 71.0%; $p=0.053$) and we think that female inpatients with UR may be a little more related to their conditions needed for admission and more medical treatments.

There were several reports related to the association between disorders and LUTS. The association of LUTS with risk factors commonly linked to cardiovascular disease has previously been reported [20,21]. Pinggera et al. [22] reported an association between arterial occlusive disease and chronic bladder ischemia, while Kupelian et al. [23] identified an association between a history of heart disease and voiding symptoms, such as weak stream and straining, in women. A history of diabetes mellitus has also been associated to impairments in bladder function, including: paralysis of the detrusor muscle, leading to voiding difficulties; impairments in detrusor muscle strength and function, structure of the urothelium; and impairments in the innervation and/or

central neurological control of bladder function [24,25]. In our study, the most common medical conditions associated to UR were cardiovascular disorders and diabetes mellitus, noting that about 65% of patients had multiple medical comorbidities. In these patients, UR presented as either a chronic component of an ongoing medical condition or as an acute complication of the disease process. Based on our results, we propose that evaluation of bladder function and bladder care should be included as a core component of the clinical management of patients with cardiovascular disorders, diabetes mellitus, metastatic malignancy, chronic renal disorders particularly.

Temporary postoperative URs were relatively frequent adverse event [7-10]. In our study, the patients with surgical histories in retention group were 23.0% and the most common surgical history was anti-incontinence surgery with 7.2%. In our study, we could not find the significant surgical histories, thus surgical history may not be an important factor of UR. But, based on previous studies, prolonged retention lasting 4 weeks or longer after a transvaginal mesh sling is 2%–4%, higher rates in traditional pubovaginal facial slings and the Burch urethropexy [26,27]. Therefore, we think that way of surgical operation may be more important than surgery itself for surgical indication in aspect to bladder dysfunction.

The association between LUTS and prescribed medication use has been well described [2,12,28]. In particular, use of antimuscarinics for the treatment of overactive bladder has been associated with an aggravation of voiding difficulty, which can result in acute or chronic UR in patients with detrusor overactivity or underactivity. In general, elderly patients are more susceptible to the adverse effects of antimuscarinics on bladder function. Studies by Oelke et al. [13] and Verhamme et al. [29] identified a variety of medications, which are commonly prescribed to patients with chronic medical diseases and for the management of pain and/or inflammation, to be associated with the development of chronic UR; these include antidepressants, antiemetics, antihistamines, antispasmodics and dopaminergic agents, nonsteroidal anti-inflammatory drugs, anesthetics, α -adrenoceptor agonist, benzodiazepines, and calcium channel antagonists. In retention group, nonsteroidal anti-inflammatory drugs were the most frequently prescribed medications, but with 26% of our patients taking multiple drugs with known antimuscarinic effects, excluding nonsteroidal anti-inflammatory drugs, narcotics and diuretics. Although we could not compare with nonretention group about prescribed drugs, we propose that prescription of multiple medications may increase the risk

for UR based on our results. Further research is required to determine dose-effects of these medications on the risk for UR or compare between retention group and nonretention group.

Although infection and/or inflammatory disease of the urinary tract have been reported as causative factors of UR, it is unclear up to the present [5,16]. In addition, urinary tract infection can be occurred as a complication of large postvoid residual urine volume and cause storage symptoms such as frequency, urgency rather than voiding symptoms. In our study groups, a urinary tract infection was identified in 24% of retention group and 19.8% of nonretention group. Therefore, we think that female inpatients with urinary tract infections should be evaluated for bladder dysfunction having concept of complication by UR.

This study has several limitations. First, our findings were derived from a single tertiary center using retrospective design. Second, UR was not classified to acute or chronic UR. Finally, female UR may be associated with more various factors. However, studies related to female UR were rare compared with postoperative UR or male UR. We think that a multicenter, prospective study with more detailed factors would be required to identify our result.

CONCLUSIONS

In our study, UR in females managed with medical cares could be occurred occasionally and almost patients were elderly. If patients with UR were noticed at early state and managed with proper maneuvers, serious clinical sequelae from UR may be prevented. Especially, we think that thorough attentions are needed for UR to patients with cardiovascular diseases, metastatic malignancy including diabetes mellitus, chronic renal disease, and urinary tract infection. In addition, we think that more careful interests are needed for LUTS when we manage patients using drugs with antimuscarinic effects.

CONFLICTS OF INTEREST

The authors have nothing to disclose.

ACKNOWLEDGMENTS

This study was supported by research funds from Chosun University Hospital, 2012.

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