

## Acute Urinary Retention in Children

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### ABSTRACT

**Purpose:** Acute urinary retention in children is a relatively rare entity. There are a variety of causes that are poorly defined in the literature. We review our cases of acute urinary retention in children at three major pediatrics centers in Iran.

**Materials and Methods:** Between 1996 and 2003, children (up to 14 years old) who had been referred due to acute urinary retention were examined. Urinary retention was defined as inability to empty the bladder voluntarily for more than 12 hours with a urine volume greater than expected for age or a palpably distended bladder. All data from the patients' past medical history, physical examination, and laboratory and radiographic assessments were collected. Also, cystourethroscopy and urodynamic procedures had been carried out according to patient's conditions. Patients with secondary urinary retention, including those with surgical history, immobility or chronic neurological disorders, mental retardation, and drugs or narcotics consumption were excluded from study.

**Results:** There were 86 patients meeting the inclusion criteria, consisting of 58 males with a median age of 4 years (range 1 month to 14 years) and 58 females with a median age of 4 years (range 4 month to 14 years). Etiologies were lower urinary tract stone in 27.9%, neurological disorders in 10.4%, trauma in 10.4%, local inflammatory causes in 9.1%, urinary tract infection in 7.4%, ureterocele in 7.4%, benign obstructing lesions in 5.8%, iatrogenic in 5.8%, constipation in 4.6%, imperforated hymen in 3.5%, and large prostate utricle, urethral foreign body, and rhabdomyosarcoma each in 1 case (1.1%).

**Conclusion:** The most common cause of acute urinary retention was lower urinary tract stone in our pediatric cases. Ureterocele and stone were the main findings in girls and boys, respectively, and urinary retention in boys was twice as prevalent as that in girls.

**KEY WORDS:** urinary retention, children, bladder, urethra

### Introduction

Acute urinary retention (AUR) always requires timely evaluation, management, and occasionally,

hospitalization. Otherwise, it would lead to the damage of kidney and urinary tract. Although AUR in men due to benign prostatic hyperplasia is well known and recognized, but in women and especially in children, it is rare, and as a result, it is not well studied in these populations. AUR in children has mostly been described as few case

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reports.<sup>(1-4)</sup> In this study, we describe the causes of AUR among children in three urology centers in Iran.

## Materials and Methods

In a retrospective study, we reviewed the hospital records of all of the children younger than 14 years old who presented with AUR. Data of the cases referred between 1997 and 2003 were collected from three main urological centers comprising Shaheed Labbafinejad, Pediatrics Medical Center in Tehran, and Razi Hospital in Rasht. AUR was defined as: inability to void and associated suprapubic pain and agitation that lasts more than 12 hours; or distended palpable bladder associated with pain. In all the patients, AUR had been relieved with urethral catheterization or suprapubic cystostomy, and then they had undergone history taking, physical examination, laboratory tests and imaging modalities. If necessary, cystourethroscopy and urodynamic studies had also been done. Patients with secondary urinary retention were excluded from the study, according to the exclusion criteria including surgical history, immobility or chronic neurological disorders, mental retardation, and drugs or narcotics consumption.

## Results

A total of 86 patients were studied, including 58 males with a median age of 4 years (range 1

month to 14 years) and 58 females with a median age of 4 years (range 4 month to 14 years). Causes of AUR, in descending order, were lower urinary tract stone in 24 (27.9%), neurological disorders in 9 (10.4%), trauma in 9 (10.4%), local inflammation in 8 (9.1%), urinary tract infection in 6 (7.4%), and ureterocele in 6 (7.4%) (table 1).

Causes of urinary retention in boys were lower urinary tract stones in 38%, neurological disorders in 12%, and local inflammation in 10%; while in girls, these were ureterocele in 21.4%, trauma in 17.8% and imperforated hymen in 10.7%.

The incidence of lower urinary tract stones was 5.5-fold in boys (38.5% versus 7%). The rates of trauma and constipation were nearly equal in boys and girls. Benign obstructive lesions, prostatic utricle, urethral foreign body, and prune belly syndrome were seen solely in boys, and ureterocele, imperforated hymen, and Hinman syndrome all were seen merely in girls.

In cases with lower urinary tract stone, the locations of stones were bladder neck, penile urethra, meatus, and urethral diverticulum.

Neurologic diseases were seen in 9 patients including spinal cord injuries with detrusor sphincter dyssynergia (DSD), Ewing sarcoma, and sacrocoxygeal teratoma. Genital and urethral traumas were seen in 9 patients. Local inflammation included balanoposthitis, labial adhesion, and vulvitis, which were the causes of urinary retention in 5 male and 2 female

**TABLE 1.** *Acute urinary retention in children*

Etiology	Boys (No.)	Age range (mean) year	Girls (No.)	Age range (mean) year	Total (%)
Lower urinary tract stones	22	3-14 (7.2)	2	6-11 (8.5)	24 (27.9)
Neurologic problems	7	2.5-6 (4)	2	3-4.5 (3.75)	9 (10.4)
Trauma	4	2-7 (5)	5	4-13 (7.4)	9 (10.4)
Local inflammation	6	1.5-4 (2.5)	2	3-3.5 (3.25)	8 (9.1)
Urinary tract infection	4	0.5-2.5 (1.16)	2	0.5-1 (0.75)	6 (7.4)
Ureterocele	-	-	6	4-13 (7.33)	6 (7.4)
Benign obstructive lesions	6	0.8-1 (0.9)	-	-	5 (5.8)
Iatrogenic	3	1-5 (3.2)	2	4-6 (5)	5 (5.8)
Constipation	2	4-5 (4.5)	2	6	4 (4.6)
Imperforated hymen	-	-	3	12-13 (12.5)	3 (3.5)
Prostatic utricle	2	4-14 (9)	-	-	2 (2.3)
Hinman syndrome	-	-	1	10	1 (1.1)
Urethral foreign body	1	13	-	-	1 (1.1)
Urethral cyst	-	-	1	0.8	1 (1.1)
Prune Belly Syndrome	1	0.8	-	-	1 (1.1)
Rhabdomyosarcoma	1	2.5	-	-	1 (1.1)

patients. Urinary tract infection was seen in 6 patients. Ureterocele and benign obstructive lesions were seen in 6 girls and 6 boys, respectively. Iatrogenic causes including urethral ligation, stiff dressing following circumcision, and VCUG, were seen in 5 patients. Four patients developed urinary retention due to constipation as the only abnormal finding.

Imperforated hymen associated with amenorrhea and abdominopelvic pains were seen in three girls. Large prostatic utricle was seen in 2 boys, associated with urinary tract infection in one. In one boy, intentionally inserted foreign body into the urethra was the cause of urinary retention. Other rare reasons were paraurethral cyst and rhabdomyosarcoma.

## Discussion

Urinary retention is not common in children. In adults, it is defined as inability to void voluntarily despite a full bladder. Children cannot express the sensation of bladder fullness or their inability to void, so that we defined urinary retention as the inability to void for at least 12 hours. In normal children, voiding intervals more than 12 hours is rare. Furthermore, urine volume in the first 48 hours of the infant's life is low. In this study, we defined the full bladder as: extended palpable bladder or a urine volume greater than expected for bladder capacity in that age,<sup>(5)</sup> which was calculated with the using of two formulas:

Bladder capacity in children ( $\leq 2$  years) =

$[2 \times \text{age (year)} + 2] \times 30$

Bladder capacity in children ( $> 2$  years) =

$[\text{age (year)} / 2 + 6] \times 30$

The study population was all of the pediatric inpatients or outpatients with AUR who were referred to three medical centers in Iran. In our study, the most common cause of urinary retention in children was lower urinary tract stones. This finding disagrees with others, in which the most common cause has been reported to be neurological disorders.<sup>(6,7)</sup>

In one study, of 53 children with urinary retention, consisting of 37 boys, only one case of meatus stone was found.<sup>(6)</sup> In our study, of 86 patients, 24 (22 boys and 2 girls) had lower urinary tract stone, in which the most common location was urethral meatus (75%). Often, urethral stone in males are originated from bladder. Primary urethral stones can also be formed in the setting of urethral stricture, urethral diverticula, or urethral pouch.<sup>(8)</sup> Primary

urethral stones may be painless, due to their slow growing nature in the lumen or diverticula, but migratory stones usually have symptoms such as, dysuria, weak urine flow, and urinary retention. Almost two third of urethral stones in adults are located in posterior and one third in anterior urethra.<sup>(9)</sup> In our study, urethral stone had induced urinary retention in 20 patients, most common site of which was meatus. Most of the patients had a history of dysuria, obstructive urinary symptoms, and terminal dribbling. In most of them, the primary site of stone formation was bladder (70%) and the remainder 30% had a passage of ureteral stone.

Neurological disorders and genital trauma were in subsequent ranks after lower urinary tract stones. Neurological causes, due to serious and progressive natures, necessitate special attention. Of 9 patients with neurological etiology, 5 had spinal cord injury with detrusor sphincter dyssynergia manifestations. In 4 of them, no apparent pathology was found, though tethered cord and occult dysraphism had been considered as differential diagnoses.

In our study, 9 patients (4 boys and 5 girls) had genital trauma. In girls, blunt direct trauma to external genitalia had caused urinary retention, of which only one had meatal laceration. In four other girls, urethra was intact and urinary retention was the result of pain and emotional effects, treated with urethral catheterization. The etiology of urinary retention in all the 4 boys was serious injury and urethral rupture, which were managed appropriately. This is contrary to the results of other studies, wherein, trauma as a cause of urinary retention has been seldom reported. This is presumably due to high prevalence of trauma in our country, especially in the north region.

Local inflammation had caused physical obstruction in 7 patients (5 boys and 2 girls), which were diagnosed simply with external genitalia examination. These lesions are often associated with dysuria and frequency, and urinary retention is uncommon. In our study, all of the 5 boys had balanoposthitis associated with sever glans and prepuce edema, which were treated with dorsal slit, urethral catheterization, and subsequent circumcision. Of 2 girls with local inflammation, one had vulvitis and another one had labial adhesion; conservative treatment was successful in both. Urinary tract infection was found as the etiology in 4 boys and 2 girls. Except

for one 2.5-year-old boy, they were younger than one year. In contrary to the textbooks in which cystitis is cited as the cause for urinary retention in patients with urinary tract infection (UTI), in our study all of the patients had severe complicated UTI, associated with purulent urine. The actual mechanism of urinary retention following UTI is not well known. It may result from physical obstruction, impaired contractility due to edema or neuritis, and avoiding from voiding due to dysuria.<sup>(10)</sup> Obstructive lesions, other than lower urinary tract stones, were found in 5 boys. They included 4 neonate boys with posterior urethral valve (PUV) and one with bulbomembranous urethral stricture. Patients with PUV had distended abdomen, resulting from completely full bladder, of which one also had abdominal ascites. In neonates and infants, obstructive symptoms are more common than infectious symptoms. One 5-year-old patient with bulbomembranous urethral stricture had a history of encephalitis and long lasting urethral catheterization 1.5 years ago.

Ureterocele was seen in 6 girls with the age range of 4 to 13 years. One had bilateral ureterocele and 2 had concurrent UTI. In our study, the most common cause of urinary retention in girls was ureterocele. Although the common manifestation of ureterocele after birth is UTI,<sup>(11-13)</sup> prolapsed ureterocele can cause bladder outlet obstruction, and this is the most common reason for urethral obstruction in girls.<sup>(14)</sup>

Iatrogenic etiology was found in 5 patients (3 boys and 2 girls) with urinary retention. In boys the reasons for urinary retention were urethral ligation in 1 and stiff dressing following circumcision in 2. In 2 girls, urinary retention had developed following VCUG. Urinary retention is an early complication of circumcision. It has been reported between 0.2% and 4.3%. It is mostly due to compressive dressing for prevention of bleeding.<sup>(15-17)</sup> Complications of VCUG are UTI, irritative symptoms, and urinary retention.

Association of constipation with voiding dysfunction has been well described,<sup>(18,19)</sup> but its pathophysiology is not clear. Association between constipation and urinary retention is present in the period of achieving voluntary urinary continence in children. Pelvic diaphragm is responsible for stool and urinary continence, and when stool control is obtained, the child can

subsequently control voiding. Also vice versa is right.<sup>(19)</sup> In addition, filled rectum can displace bladder and its trigone anteriorly and impair urinary flow.<sup>(20)</sup> Also, dysfunction in central and urethrovesical reflex in patients with chronic constipation has been proposed.<sup>(21)</sup> In our study, in 4 (4.6%) patients with urinary retention, constipation was the only abnormal finding, while in other reports, constipation comprises 13% of cases with urinary retention.

Imperforated hymen had caused urinary retention in 3, of whom 2 had hydrocolpos and one had hematocolpos with hematometra. These patients mostly complain from vague cyclic lower abdominal pain, but urinary retention is also common. In one report, of 26 patients with imperforated hymen, 12 (46%) manifested with urinary retention.<sup>(22)</sup> Urinary retention in these patients is mostly due to pressure effect on urethra and bladder.<sup>(23)</sup> Ultrasonography is the diagnostic choice to rule out mullerian duct malformations.<sup>(19)</sup>

Of other rare causes of urinary retention in this study were large prostatic utricle, Hinman syndrome, paraurethral cyst, prune belly syndrome, foreign body, and pelvic rhabdomyosarcoma.<sup>(6)</sup> Rare etiologies for urinary retention in other studies are hypomagnesaemia, bladder diverticula, ovarian cysts, appendiceal abscess, and strangulated hernia.

## Conclusion

In conclusion, the most common cause of urinary retention in our study was lower urinary tract stone, while in other studies, neurological problems and occasionally UTI are mentioned as the most common causes. Ureterocele and stone were the main findings in girls and boys, respectively, and urinary retention in boys was twice as prevalent as that in girls.

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