

Cover letter - Urinary Retention

Dear Editor

We are sending the manuscript titled 'Urinary retention for publication in Foundation Years Journal. It is affirmed that the content of this article "urinary retention" has not been published or is being considered for publication elsewhere. No financial support was taken and no conflict of interest exists. All authors have contributed significantly and that all authors are in agreement about the content of the manuscript.

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Regards

URINARY RETENTION

Abstract

There are several causes of urinary retention. This article focuses on urinary retention in the elderly male patient with benign prostatic hyperplasia (BPH), which represents an important public health and quality of life issue. The incidence of this increases significantly with advancing age, and can have health consequences such as renal impairment and urinary tract infection. Foundation year doctors will come across many patients with urinary retention both in hospital and the community. This article should provide some background into the aetiology, and an initial approach to the management of the patient in urinary retention.

What is urinary retention?

Urinary retention is defined as the inability to completely or partially empty the bladder¹.

General practitioners may see this most commonly in men aged 40 to 83 years, with an incidence of up to 7 per 1000 men per year. The incidence rises dramatically with age, such that a man in his 70's has a 1 in 10 chance of experiencing acute urinary retention within 5 years.

What are the causes of urinary retention?

There are several causes of urinary retention, and these are classified in table one below. This article has particular focus on urinary retention in the elderly male patient with benign prostatic hyperplasia (BPH), which represents an important public health and quality of life issue.

Table 1: A summary and classification of the causes of urinary retention

Cause	Men	Women	Both
Obstructive	Benign Prostatic Hyperplasia, prostate cancer, urethral stricture, meatal stenosis, paraphimosis, phimosis,	Organ prolapse (cystoscocoele, rectocoele, uterine prolapse), pelvic mass (gynaecological malignancy, uterine fibroid), gravid uterus, urethral sphincter dysfunction (Fowler's syndrome)	Bladder neoplasm, urethral neoplasm, faecal impaction,
Infective/inflammatory	Balanitis, prostatitis, prostatic abscess	Vulvovaginitis, Vaginal lichen sclerosis,	
Other	Penile trauma, fractured pelvis rupturing urethra	Postpartum	Drugs: anticholinergics, opiates
Neurological (affects both men and women)	<p>Spinal cord interruption</p> <p>Compressive lesions</p> <ul style="list-style-type: none"> • Trauma • Intervertebral disc prolapse • Tumour • Granuloma • Abscess <p>Non-compressive lesions</p> <ul style="list-style-type: none"> • Vascular: infarction, ischaemia (arteriovenous malformation) • Inflammation: myelitis • Infection: e.g with viruses affecting sensory dorsal root ganglia of S2-4 such as herpes simplex or varicella zoster <p>Other neurological conditions</p>		

	<ul style="list-style-type: none">• Spina bifida• Multiple system atrophy• Multiple Sclerosis or transverse myelitis• Diabetic cystopathy• Guillain-Barre• Conditions associated with dysautonomia, for example pure autonomic failure, autonomic neuropathies• Radical pelvic surgery damaging pelvic parasympathetic plexus, denervating detrusor muscle (e.g post hysterectomy)• Primary detrusor failure
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What is the pathophysiology of urinary retention?

Normal voiding requires a co-ordinated process starting from afferent input from the bladder to the brainstem and cerebral cortex, followed by a controlled relaxation of the external urethral sphincter and a strong detrusor contraction. In addition, all of this must occur in the absence of any anatomical bladder outlet obstruction. Therefore the pathophysiology of urinary retention can include one or more of following [1]. These are depicted in figure one:

1. Increased bladder outlet or urethral resistance (bladder outlet obstruction). This can be a mechanical obstruction e.g BPH or urethral stricture disease, or this can be due to a dynamic obstruction such as with increased alpha-adrenergic activity/tone e.g post anaesthetic
2. Low bladder pressure (impaired detrusor contractility/detrusor failure)
3. Interruption of central nervous system control of co-ordinated bladder contraction with urethral relaxation
4. Interruption of peripheral nerves – including sensory or motor innervation to the bladder

Which are the two main classifications of urinary retention?

The most common classification of urinary retention is acute (AUR) or chronic urinary retention (CUR). International continence society (ICS) has defined them as follows: [2]

- Acute retention of urine is defined as a painful, palpable or percussible bladder, when the patient is unable to pass any urine.
- Chronic retention of urine is defined as a non-painful bladder, which remains palpable or percussible after the patient has passed urine. Such patients may be incontinent.

What are the risk factors for development of AUR due to prostatic enlargement?

- Men > 70 yr with lower urinary tract symptoms (LUTS)
- International prostate symptom score (IPSS) > 7 (moderate or severe)
- Prostate volume > 30 cc or PSA > 1.4 ng/ml
- Urinary maximum flow rate < 12 ml/sec

The IPSS is a standardized and validated questionnaire that quantifies the severity of urinary symptoms and gives an indication of how much it bothers the patient (Score 0-7 = mildly symptomatic; 8-19 = moderately symptomatic; 20-35 = severely symptomatic).

How do you approach the patient with acute urinary retention?

As with most medical complaints, a thorough history, physical examination, and diagnostic investigations can identify the particular cause of urinary retention.

- Patients should be asked about urinary symptoms, as men with large prostates and poor urinary flow are at the greatest risk. The history should evaluate the presence of preceding voiding and storage urinary symptoms, and lower limb neurological symptoms including bowel function, sensory loss or leg weakness. Patients should also be asked about any previous urinary tract infections, drinking habits and whether they experience any incontinence episodes. Usually with AUR, there may be a precipitating or triggering event such as alcohol consumption, post surgery, a urinary tract infection, however the majority of cases will be spontaneous [3].
- The assessment process should also include an abdominal, rectal, and neurological examination. Abdominal examination should evaluate for any palpable bladder and any scars from recent abdominal surgery. A rectal exam is performed to assess prostatic size, the possibility of malignancy, anal tone and peri-anal sensation. If a neurological cause is

suspected, a lower limb neurological examination should also be documented with any suspicion of any signs of cauda-equina syndrome.

- Blood tests, which must be performed include urea and electrolytes and full blood count. Prostate specific antigen may be falsely raised during the acute episode and so usually is not performed. A urine dipstick analysis should be performed to identify the presence of any infection.
- Imaging can be performed to aid diagnosis, however this is primarily a clinical diagnosis (see figure two). An ultrasound of the urinary tract can be of use to assess the kidneys and bladder, give an indication of prostatic size, and identify the presence of any bladder stones or tumours. An MRI of the spine may be urgently indicated if there is clinical evidence of spinal cord compression.

The initial assessment should distinguish whether this is acute or chronic retention. With acute retention, this will usually present as a painful inability to void, with relief of the pain upon catheterization. Also central to the diagnosis is the presence of a large residual volume of urine that drains once catheterized. The definition of what is large has not been standardized, however volumes between 500-800mls can be typical.

Management of AUR

Urethral vs suprapubic catheterization: The bladder must be decompressed by either urethral or suprapubic catheterization. It is routine practice to attempt urethral catheterization first, and if this fails, a urologist should attempt subsequent catheterization. If urethral catheterisation fails, possibly due to the formation of a false passage or a pre-existing urethral stricture, then suprapubic catheterization (SPC) must be performed by a urologist with experience, adhering to the guidelines. Either route of catheterization share the same risk of bacteriuria, however more considerable haematuria is expected with SPC. The most significant risk with SPC is that of bowel injury and peritonitis, which should be suspected and identified promptly if occurred. This may be suspected if the patients complains of feeling unwell, has abdominal pain, or signs of sepsis. The new Seldinger SPC insertion over a guidewire should be used as they are deemed to be safer than

the traditional blind insertion of a trocar. Advantages of SPC, include less risk of urethral and bladder neck trauma, urethral stricture formation, preservation of sexual function as the penis is now catheter free. The SPC also has a functional benefit as a 'safety valve' as it can be spigoted rather than removal during a trial without catheter (TWOC). This avoids re-catherisation in case of a failed TWOC. If SPC is not possible, then the patient may need cystoscopic guidance to place a urethral catheter.

Once catheterised patients can either be admitted into hospital or sent home and reviewed in an outpatient setting. There are variations in practice, however this largely depends on the patients medical and social status. Any evidence of infection should be treated with antibiotics, according to the local hospitals guidance; some may promote the use of prophylactic cover prior to catheterisation. A catheter specimen of urine can be sent for culture and sensitivity. The colour of urine drained and the residual volume 10 minutes after catheterisation must also be recorded.

TWOC: Catherisation is the temporary solution, and a TWOC should be planned as the next stage of management. In a UK survey the majority of men (74%) usually had a TWOC two days after catherisation [4]. Catheterisation for longer than three days can be associated with an increased risk of morbidity such as urosepsis, haematuria and bypassing of urine around the catheter. The factors that have been suggested to influence the success of a TWOC include

- Young age (<65years)
- Higher detrusor pressures (>35cm H₂O)
- A drained volume of <1L at catheterisation, and
- Precipitated AUR (AUR in the absence of previous urinary symptoms)

Alpha blockers can improve success of TWOC: Alpha blockers are indicated for patients with BPH and bladder outflow obstruction. The rationale for this is that the bladder outlet is controlled by alpha1-adrenergic activity. By using alpha-adrenergic blockers, such as alfuzosin, this can reduce the bladder outlet resistance. A large double blind placebo controlled study examining the use of Alfuzosin in AUR (ALFAUR), showed that this significantly increased the rate of a successful TWOC compared with placebo [5]. The use of alpha-blockers should hopefully reduce

the need for urgent BPH surgery, which is associated with higher risks such as bleeding, and prolonged urinary catheterisation that can risk septicaemia due to bacterial colonization.

Management of a patient who fails TWOC: Ultimately if a patient fails the TWOC, they may require BPH surgery. In the ALFAUR study, 17% of the patients with the Alfuzosin arm ultimately needed BPH surgery, by 6-months follow up, for recurrent AUR. Commonest BPH surgery is trans-urethral Resection of the Prostate (TURP). TURP is an operation to remove the obstructing prostatic tissue that is pressing the urethra. It is performed through a cystoscopy and a heated wire loop is used to resect overgrowing areas of the prostate. There are alternatives to TURP, such as Holmium laser prostatectomy, known as a Holmium Laser Enucleation of the Prostate (HoLEP), traditionally for men with large prostates. Another technique being evaluated is a photoselective vapourisation of the prostate using the GreenLight laser.

The patients identified to be at risk of an unfavourable outcome after an initial successful TWOC included

- High post-void residual
- High PSA level and
- Lack of symptomatic improvement with Alfuzosin.

The assessment of men in acute urinary retention is illustrated in figure three.

How is chronic urinary retention classified?

Chronic urinary retention can be divided into high-pressure chronic retention (HPCR) and low-pressure chronic retention (LPCR) [6].

- With HPCR, the bladder pressure is constantly raised, both during the storage and voiding phases of the micturition cycle, which causes vesico-ureteric reflux, resultant bilateral hydronephrosis and renal failure.
- Patients with LPCR, will exhibit a highly compliant bladder with large volume urinary retention, and no hydronephrosis or renal failure. A urodynamic study may show low

detrusor pressures, reduced flow rates and high residual volumes (sometimes many litres of urine).

LUTS may not be significant in patients with CUR, and some patients can be completely asymptomatic, however patients can develop nocturnal enuresis or 'night time bed wetting' which occurs from a reduction of urethral resistance during sleep.

How do you investigate and manage a patient with chronic urinary retention?

The patients may have painless urinary retention, as opposed to the painful presentation with AUR. Persistent post-void residual volumes of >500mls is sometimes considered as evidence of CUR.

- If LUTS are present, patients may complain of urinary frequency, hesitancy, or nocturnal incontinence.
- A palpable bladder may be identified on examination and urea and electrolytes should be checked as they may reveal renal impairment or a raised potassium level.
- Urinalysis should be performed and a CSU sent if there are signs of infection.
- An ultrasound should be performed to look for renal dilatation.

HPCR: Patients should be catheterized and if HPCR is suspected, they must be monitored for post-obstructive diuresis. This can lead to the production of many litres of urine in the first 48hours post catheterization. This diuresis is usually due to:

1. The 'off-loading' of retained salt water that has been accumulating in the preceding weeks before presentation
2. Loss of the cortico-medullary gradient caused by reduction of urinary flow through the nephron
3. An osmotic gradient created by elevated urea levels

Patients may experience a postural drop in blood pressure and may require intravenous fluid replacement. Daily weighing can accurately quantify the fluid output. After the first 24 hours fluid

input should not necessarily match the fluid output as this can stimulate further diuresis. Following catheterisation, decompression haematuria can also occur and usually settles after 48 hours. Patients should be considered for early TURP and those with HPCR should not undergo a TWOC until this definitive procedure takes place.

LPCR: Success of TURP for those with LPCR is limited, due to the development of detrusor failure over time. Clean intermittent self-catheterisation (CISC) can then be considered for this group. This is an alternative to having an indwelling catheter and may result in the development of fewer UTI's. Maintenance of sexual function is also therefore possible and is well-accepted. In patients with LPCR, a period of CISC may even allow recovery of some bladder contractility before a TURP, as opposed to having an indwelling catheter [6].

The assessment of men with chronic urinary retention is illustrated in figure four.

Conclusions

Retention of urine is a significant health and quality of life burden for patients and this should be recognised as early as possible. Those at risk should be offered medical therapy to reduce the prospects of urinary retention. Patients should be categorized into either having AUR or CUR, and evidence of renal impairment should be sought for. Early scheduled surgical intervention should be carried out for those who may benefit. The use of supra-pubic catheters and CISC can be considered to allow some recovery of bladder contractility, however the risks of these should also be kept in mind.

Figures

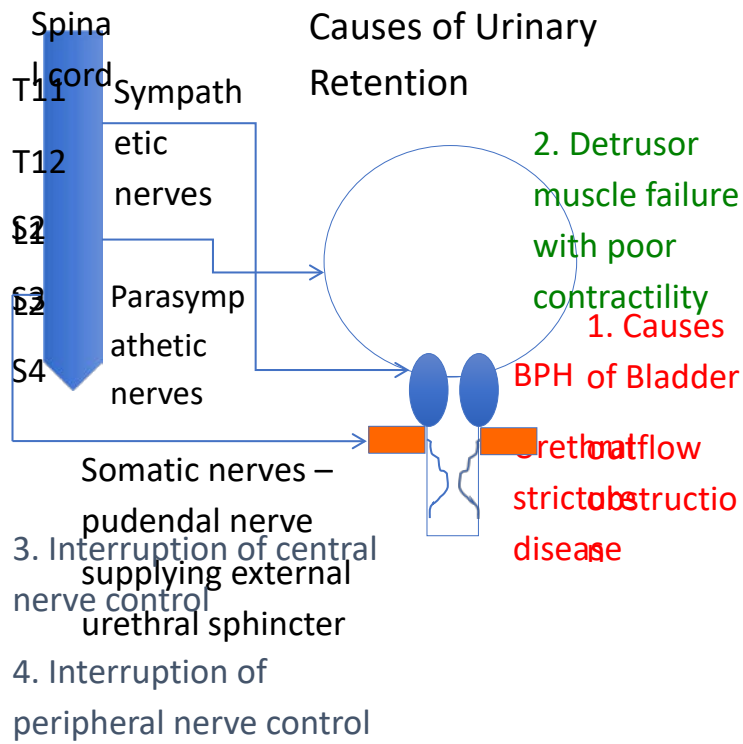
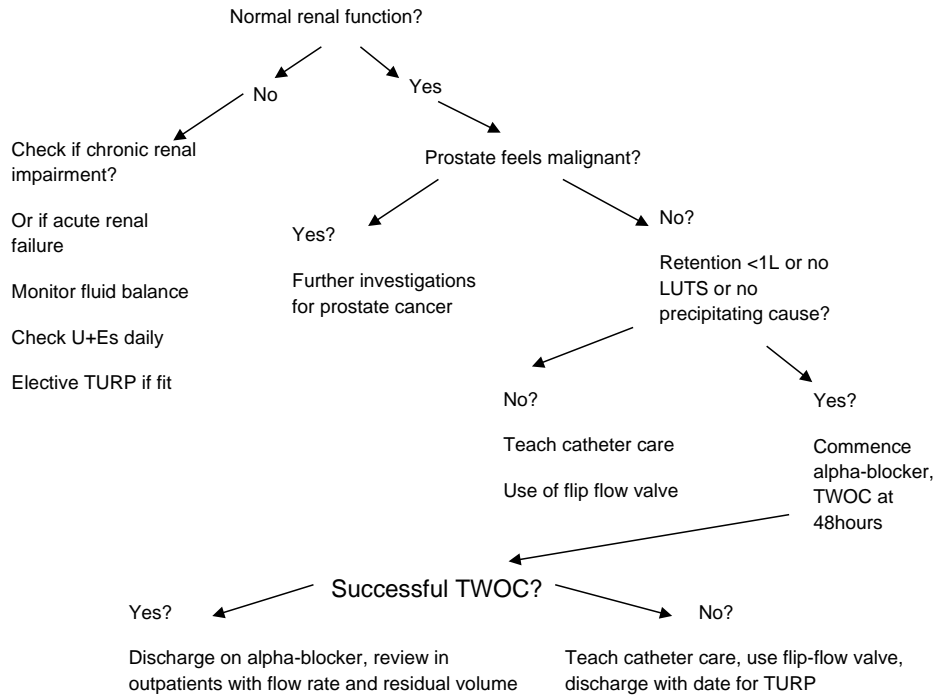


Figure one: The causes of urinary retention



Figure two: The ultrasound and CT appearances of a full-distended bladder



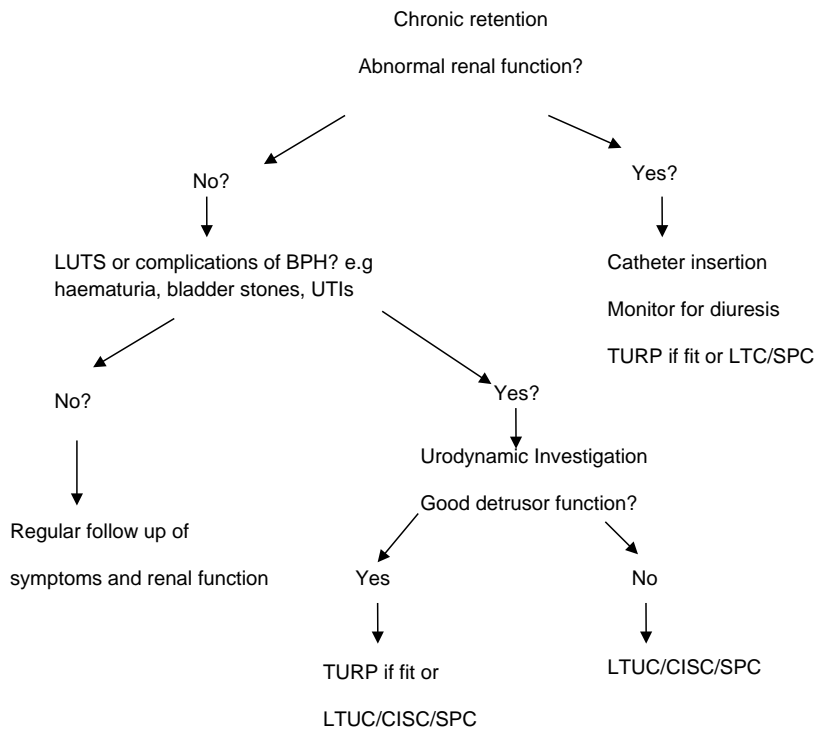
U+Es: Urea and electrolytes

TURP: Trans-urethral resection of the prostate

LUTS: lower urinary tract symptoms

TWOC: Trial without catheter

Figure three: Management of acute urinary retention (modified from Kalejaye et al, 2009)



TURP: Trans-urethral resection of the prostate

LUTS: lower urinary tract symptoms

LTUC: Long term urethral catheter

SPC: Suprapubic catheter

CISC: Clean intermittent self catheterisation

Figure four: Management of chronic retention (modified from Kalejaye et al, 2009)

Multiple choice questions;

1. Which of the below is not a risk factor for acute urinary retention
 - a. Men > 70 yr with lower urinary tract symptoms (LUTS)
 - b. International prostate symptom score (IPSS) > 7 (moderate or severe)
 - c. Prostate volume > 30 cc or PSA > 1.4 ng/ml
 - d. Nodular feeling prostate on DRE
 - e. Urinary maximum flow rate < 12 ml/sec

Answer D

A, B, C and D have been shown from large population studies to be risk factors for developing urinary retention.

2. Which of the following is inappropriate management for HPCR?
 - a. SPC insertion
 - b. Long term urethral catheter
 - c. TWOC
 - d. TURP
 - e. Ultrasound scan

Answer C

A patient with HPCR, after a TWOC, will likely go back into urinary retention and risk further damage to renal function. A definitive solution is required which relieves the obstruction and reduces the intravesical pressure.

3. Which factor is not one of those identified to favour a successful TWOC?
 - a. Young age (<65years)
 - b. Higher detrusor pressures (>35cm H₂O)
 - c. A drained volume of <1L at catheterisation, and
 - d. Prostate volume > 30cc
 - e. Precipitated AUR.

Answer D

An enlarged prostate suggests that it is likely for urinary retention to re-occur.

4. Which of the following is not appropriate for the management of post obstructive diuresis?
 - a. Daily weights
 - b. Emergency TURP
 - c. Strict fluid input and output monitoring
 - d. Intravenous fluid replacement
 - e. Daily urea and electrolytes

Answer B

Patients with post obstructive diuresis need close monitoring and are at risk of hypovolaemia. A TURP at this time is inappropriate.

5. Which form of imaging is helpful in the initial assessment of a patient with urinary retention?
- a. MRI Spine
 - b. CT Urogram
 - c. Plain abdominal X-Ray
 - d. Ultrasound of the urinary tract
 - e. Intravenous Urogram

Answer: D

An ultrasound scan is a quick non-invasive simple tool that can be performed initially to assess the prostate, bladder and kidneys.

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