Comparison of men with acute versus chronic urinary retention: aetiology, clinical features and complications

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Abstract

Background: The objectives were to investigate the aetiology and clinical features of urinary retention and to analyse differences between acute urinary retention (AUR) and chronic urinary retention (CUR).

Method: We analysed the clinical data of 558 men admitted to our institution with urinary retention between September 1998 and June 2007.Statistical analysis was performed with Student's t-test, Mann-Whitney and Fisher's exact tests, where appropriate.

Results: The mean age of the men was 66.4 years (range 12.8–94.7). AUR was present in 90.7% and CUR in 9.3%. The most common causes were benign prostatic hyperplasia in 36.6%, adenocarcinoma of the prostate (ACP) in 36.0% and urethral stricture in 14.3%. Mean prostate volume was 56.6 cc (range 15–262). Comparing the groups with AUR versus CUR, a positive urine culture was significantly more common in the group with AUR (34.1% vs. 8%), whereas anaemia (15.9% vs. 34.1%), renal failure (9.1% vs. 46.2%) and hydronephrosis (23.9% vs. 53.9%) were significantly more common in the group with CUR. There was no significant difference in prostate volume or the proportion of men with histological prostatitis (29.5% vs. 23.1%).

Conclusion: The prevalence of ACP and urethral stricture as aetiology of retention was higher than reported in the literature. The prevalence of anaemia, renal failure and hydronephrosis was significantly greater in patients with CUR compared to AUR. There was no significant difference in prostate volume or the prevalence of histological prostatitis, indicating that factors other than prostate size or histological prostatitis determine the development of AUR rather than CUR.

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Introduction

The reported causes of urinary retention include benign prostatic hyperplasia (BPH), adenocarcinoma of the prostate (ACP), urethral trauma, urethral stricture, haematuria (clot retention), neurological disorders, constipation and postoperative state, while some cases are idiopathic.[1–4] A distinction is made between spontaneous and precipitated acute urinary retention (AUR): the latter can be triggered by surgery, anaesthesia and sympathomimetic or anticholinergic drugs.[5] These two types of AUR have different outcomes. In a study of men with BPH treated with finasteride, 15% of patients with spontaneous AUR had another episode of AUR and 75% underwent prostatectomy, while only 9% of those with precipitated AUR had another episode and only 26% underwent surgery during four years of follow-up.[5]

Prostatic inflammation is associated with a threefold higher relative risk for AUR.[6] Urinary stasis due to large postvoid residual volumes may induce urinary tract infection (UTI), which leads to prostatic inflammation. There is conflicting evidence with regard to prostatic infarction. Spiro et al found evidence of prostatic infarction in 85% of specimens removed for AUR versus 3% in specimens removed for BPH symptoms only.[7] Anjum et al found infarction in 9% of men with AUR versus 3% in those with symptoms only.[8] Tuncel et al also found no association between prostatic infarction and AUR.[6]

The objectives of this study were to investigate the aetiology, clinical features, complications and management of men hospitalised with urinary retention in a developing African country, and to analyse differences between men with AUR versus chronic urinary retention (CUR).

Method

We performed a retrospective analysis of the clinical data of patients with a diagnosis of urinary retention admitted during the period September 1998 to June 2007 to the urology department of our institution, a tertiary-level academic teaching hospital in the Western Cape province

of South Africa.

Lower urinary tract symptoms (LUTS) were defined as one or more of the following: hesitancy, weak urinary stream, interruption of the stream (intermittency), post-micturition dribbling, a sensation of incomplete bladder emptying, frequency, nocturia, urgency, urge incontinence and dysuria. AUR was defined as inability to pass urine despite the sensation of a full bladder and a strong urge to urinate, with discomfort or pain in the suprapubic area. CUR was defined as a large, non-tender, palpable bladder in a patient with or without LUTS or (overflow) incontinence, but with no sensation of a full bladder and no discomfort or pain over the bladder area.

The results of special investigations were obtained from the chemical pathology, microbiology and radiology departments at our institution. Histopathology reports on prostatic tissue specimens obtained by transrectal biopsy, transurethral or open prostatectomy were provided by the Department of Anatomical Pathology.

The data were entered on an Excel™ database for statistical analysis with Student's t-test, Mann-Whitney test and Fisher's exact test where appropriate, using GraphPad InStat™ software. A two-tailed p-value of less than 0.05 was accepted as statistically significant. All values are expressed as mean or median (range).

Results

There were a total of 558 men, 506 (90.7%) with AUR and 52 (9.3%) with CUR (9 patients with acute-on-chronic urinary retention were included in the group with CUR). The mean patient age was 66.4 years (median 69.1, range 12.8–94.7 years). The type of catheterisation was recorded in 548 patients: transurethral in 444 (81%), suprapubic in 97 (18%) and both in seven (1%).

The most common recorded causes of retention were BPH in 204 patients (36.6%), ACP in 201 (36.0%), urethral stricture in 80 (14.3%), clot retention in 37 (6.6%) and neuropathic bladder in 16 (2.9%). Miscellaneous causes included acute prostatitis, prostatic abscess, bladder neck stenosis, bladder stone, bladder tumour, postoperative state, meatal stenosis, penile cancer, gunshot or stab wound of the urethra, UTI, urethritis, ureteric stone and blocked catheter. The cause of retention in some cases remained unknown (idiopathic).

Associated symptoms prior to presentation with retention included LUTS in 346 (62%) patients, macroscopic haematuria in 90 (16%), UTI in 18 (3.2%) and overflow incontinence in 14 (2.5%). The mean duration of LUTS reported by the patient on presentation with retention was 18.5 months (median 10.5, range 0.3–192 months). Associated co-morbidities were present in 237 (42.5%) of the men, the most common being hypertension (30%), ischaemic heart disease (24%) and diabetes mellitus (10.8%).

Findings on digital rectal examination were recorded in 443 patients: BPH in 263 (59.4%) and ACP in 180 (40.6%), with clinical stage T2 in 28 (6.3%), T3 in 39 (8.8%) and T4 in 113 (25.5%). Mean prostate volume measured on transrectal ultrasound in 213 patients was 56.6 cc (median 50.0, range 15–262 cc).

The results of urine culture were recorded in 238 patients: 164 (68.9%) were negative and 74 (31.1%) were positive. The most common organisms were: *Escherichia coli* (8.0%), *Klebsiella* (6.7%), *Enterobacter* (3.4%) and *Proteus* (2.5%).

Haemoglobin (Hb) at presentation was recorded in 374 patients, and anaemia (Hb less than 10 gm/dl) was present in 67 (18%) cases. Serum creatinine at presentation was recorded in 482 men, and renal failure (serum creatinine over 240 µmol/L) was present in 70 (12.5%) of patients.

Serum prostate-specific antigen (PSA) at presentation was recorded in 434 patients. Mean PSA at presentation for the whole group was 397 ng/ml (median 16, range 0.1–35 000 ng/ml). Serum PSA was significantly lower in the group with histological BPH (mean 18.6, median 8.5, range 0.1–588 ng/ml) than in the group with histological ACP (mean 899.5, median 96, range 2–35 000 ng/ml; $p<0.001$). In the group with BPH, serum PSA was over 4 ng/ml in 75.8% and over 100 ng/ml in 1.6%, whereas in the group with ACP, the PSA was over 4 ng/ml in 97.3% and over 100 ng/ml in 47.6% ($p<0.001$).

In 369 patients with retention, both serum PSA and prostate histology were available. The finding of ACP on histology at different PSA levels in this group is compared to the prostate cancer yield on prostate biopsy in men without retention reported in the literature in Table I.[9]

Table I: Prostate cancer yield at different serum prostate-specific antigen levels (yield = total number of cancers detected divided by total number with available histology in the relevant prostate-specific antigen range)[9]

PSA (ng/ml)	ACP found on histology in present study	ACP yield reported in the literature (approximate)[9]
2–4	20.6% (7/34)	20%
4–10	28.0% (23/82)	35%
10–20	35.6% (21/59)	75%
> 30	84.6% (126/149)	90%
> 60	93.7% (104/111)	98%

An intravenous pyelogram (IVP) was obtained in 47 (8.4%) patients. It showed a filling defect in the bladder in 16 (34%), hydronephrosis in seven (14.9%), bladder stone in three and renal stones in two. Ultrasound was performed in 168 (30.1%) patients, and showed hydronephrosis in 48 (28.6%), bladder filling defect in five, solid renal mass in two and bladder stone in one. Renal failure (serum creatinine over 240 µmol/l) was present in none of the patients who had an IVP, and in 25% of those who underwent ultrasound imaging.

Comparing the groups with AUR and CUR, a positive urine culture was significantly more common in the group with AUR, whereas anaemia, renal failure and hydronephrosis were significantly more common in the group with CUR (Table II). Differences approaching statistical significance were: in the group with AUR the mean age was on average five years younger; the proportion with prior LUTS was greater; and the proportion with urethral stricture was greater compared to the group with CUR. There was no significant difference in prostate volume or in the proportion of men with histological evidence of prostatitis.

Comparing the groups with histologically diagnosed BPH and ACP showed statistically significant differences with regard to age (69.5 vs. 71.9 years), transurethral catheterisation (97% vs. 89%), anaemia (8.8% vs. 26.2%), serum PSA (mean 18.6 vs. 899.5 ng/ml), PSA over 4 ng/ml (75.8% vs. 97.3%) and histological evidence of prostatitis (48% vs. 25%) in the groups with BPH versus ACP respectively ($p<0.05$).

A trial without catheter (TWOC) failed in 98 (17.6%) of the men, and succeeded in 16 (2.9%). The surgical procedures performed in the study patients are shown in Table III. The mean time period between catheterisation and surgery was 94.8 days (median 52.5, range 1–795 days).

Table III: Surgical procedures performed in study cohort

Procedure	n	Percentage of procedures	Percentage of patients
Transurethral resection of the prostate	261	31.5%	46.8%
Prostate biopsy	223	26.9%	40.0%
Bilateral orchidectomy	125	15.1%	22.4%
Retropubic (Millin's) prostatectomy	39	4.7%	7.0%
Internal urethrotomy	29	3.5%	5.2%
Urethroplasty	16	1.9%	2.9%
Transurethral resection of bladder tumour	13	1.6%	2.3%
Urethral dilatation	10	1.2%	1.8%
Radical prostatectomy	6	0.7%	1.1%
Vesicolithotomy	6	0.7%	1.1%
Bladder neck incision	6	0.7%	1.1%

Discussion

In a report from England, published in 1984, the causes of AUR were listed as BPH (53%), constipation (7.5%), ACP (7%), urethral stricture (3.5%), clot retention (3%), neurological disorders (2%), postoperative state (2%) and unknown (16%).[1] In a paper from Nigeria, published in 2007, the aetiology of AUR was BPH (64%), urethral trauma (28%), urethral stricture (6%) and ACP (1.6%).[2] Some older

Table II: Comparison of men with acute versus chronic urinary retention

	AUR	CUR	P value
Number	506	52	
Age: mean; median (range) years	65.9; 68.9 (12.8–94.7)	70.6; 70.5 (47.6–86.6)	0.097
Proportion with prior LUTS	63.2%	50%	0.072
Duration of LUTS: mean (range) months	19.1 (0.3–192)	12.6 (3–24)	0.989
Proportion with at least one comorbidity	41.5%	51.9%	0.185
Urine culture positive	34.1%	8.0%	0.006
Haemoglobin: mean (range) gm/dl	12.1 (2.3–18.6)	11.1 (6.3–14.9)	0.004
Proportion with anaemia (haemoglobin less than 10 gm/dl)	15.9%	34.1%	0.008
Creatinine: mean; median (range) µmol/l)	164.5; 100.0 (19–2550)	430.6; 245.5 (68–2554)	<0.001
Proportion with renal failure (serum creatinine over 240 µmol/l)	9.1%	46.2%	<0.001
Hydronephrosis on ultrasound	23.9%	53.9%	0.004
Prostate volume: mean; median (range) cc	56.8; 50.0 (15–262)	53.8; 50.0 (20–150)	0.734
PSA: mean; median (range) ng/ml	427.4; 15.9 (0.1–35 000)	128.3; 19.3 (0.8–1589.0)	0.811
Catheterisation: transurethral vs. suprapubic	80% vs. 19%	90% vs. 10%	0.199
Duration of catheterisation: mean; median (range) days	110.0; 62.5 (2–795)	78.1; 51.0 (2–247)	0.378
Hospitalisation: mean; median (range) days	8.0; 6.0 (1–99)	7.9; 7.0 (1–35)	0.368
Histological BPH	36.0%	42.3%	0.542
Histological ACP	35.6%	40.4%	0.545
Urethral stricture	15.2%	5.8%	0.064
Histological prostatitis (with BPH or ACP)	29.5%	23.1%	0.422

studies from the 1960s suggested that 13-25% of patients presenting with AUR may have ACP.[3,4] In the present study, the proportions of men with ACP (36%) and urethral stricture (14.3%) were much higher than previously reported in the literature.

The Physicians' Health Study found increasing rates of AUR with increased age and baseline symptom severity.[10] In the present study, the men with AUR were relatively elderly (mean age 65.9 years), whereas the group with CUR was on average five years older (mean age 70.6 years), and this difference approached statistical significance (p=0.09). This suggests that general debility associated with ageing may predispose to CUR rather than AUR.

The Olmsted County Study of men with BPH reported an increased risk for AUR in men with a prostate volume over 30 ml.[11] In the present study, the prostate was relatively large (mean volume 56.6 cc), but there was no significant difference between the groups with AUR versus CUR.

In the Proscar Long-term Efficacy and Safety Study (PLESS), investigating medical treatment of BPH, serum PSA higher than1.4 ng/ml was found to predict an increased risk for AUR.[12] Tuncel et al found a high serum PSA level (over 2 ng/ml) and large prostate volume (over 40 ml) to be the strongest predictors for AUR.[6] In the present study, the mean PSA at presentation was very high (397 ng/ml), but this was largely a result of the high proportion of men with ACP. Mean serum PSA was significantly higher in the group with ACP (899.5 ng/ml) than in the group with BPH (18.6 ng/ml).

AUR may signal the presence of co-morbid disease and is associated with an increased risk of mortality in all age groups, with the relative increase in mortality being highest in the youngest age group.[13] In the present study, co-morbidities were present in 42.5% of patients, mainly hypertension, ischaemic heart disease and diabetes mellitus. The proportion of men with more than one underlying co-morbidity was higher in the group with CUR versus AUR (51.9% vs 41.5%), but this difference was not statistically significant.

Histological evidence of inflammation has been reported in approximately 40% of BPH cases.[14] Potential causes of such inflammation include direct infection, urine reflux, dietary factors, oestrogens, or combinations of these.[15] It has been reported that men with intraprostatic inflammation have a significantly higher risk for AUR.[14] In the Medical Therapy Of Prostatic Symptoms (MTOPS) study of medical treatment for BPH, men with acute or chronic inflammation on prostate biopsy had larger prostates and higher PSA values and were more likely to undergo prostatic surgery.[16] In the placebo arm, the risk of AUR was 5.6% in patients with acute or chronic inflammation, versus nil in men with no evidence of inflammation on biopsy. Mishra et al concluded that intraprostatic inflammation plays an important role in the pathogenesis and progression of BPH. The risk of AUR due to BPH was significantly greater in men with prostatic inflammation, and the association between transurethral resection of the prostate (TURP) and inflammation was stronger than the association with prostate weight.[17] In the present study, a positive urine culture was significantly more common in the group with AUR versus CUR (34.1% vs 8.0%), but the proportion of men with histological prostatitis did not differ significantly between the groups with AUR versus CUR.

A TWOC after short-term treatment with an alpha blocker is recommended in most men with AUR. Successful TWOC was reported in 55% of patients after alfuzosin treatment for 24 hours, compared with 29% on placebo, and in 48% of patients after eight doses of tamsulosin, compared with 26% on placebo.[18,19] Although some studies reported no benefit with alpha-blocker treatment after AUR, a recent meta-analysis concluded that alpha blockers increase the success rates of TWOC.[20–22] Djavan et al found that a residual volume of less than 1 litre after catheter removal was associated with a higher success rate for TWOC.[23] Daly et al found that patients with elevated PSA (higher than 2.9 ng/ml), large prostate size and urine volume over 1000 ml drained at catheterisation are more likely to fail a TWOC.[24]

Shah et al reported an elevated serum creatinine in 10% of patients with AUR, but hydronephrosis detected on bedside ultrasonography did not correlate with elevation in creatinine.[25] In our study, renal failure was present in 12.5% of cases, and hydronephrosis was present in 28.6% of ultrasound studies. The prevalence of hydronephrosis, renal failure and anaemia (probably due to renal parenchymal damage with decreased erythropoietin secretion) was significantly higher in the group with CUR compared to the group with AUR.

An indwelling catheter after AUR, while the patient awaits surgery, is associated with significant cost and morbidity. In a Nigerian study, the mean catheter time was 23 months, with 85% of patients reporting that they were unhappy.[2] In a study from England, the mean period of catheterisation was 23 days, and only 12% of patients felt a catheter was very inconvenient.[26] The Reten-World survey showed that the risk of catheter-related complications is related to the duration of catheterisation, with a significantly higher incidence of haematuria, infection, urine leak and catheter obstruction associated with catheterisation lasting longer than three days.[27] In the present study, the mean and median time between catheterisation for retention and surgery were 94.5 and 52.5 days respectively. This long delay is most probably due to long waiting lists, resulting from limited hospital beds and theatre lists.

PSA values may be increased up to sixfold in men with AUR and decrease by 50% within 48 hours after catheterisation.[28] Kravchick et al found that cancer detection rates were low on biopsy in patients with an elevated PSA after catheterisation for AUR. They suggested that such patients could be operated on safely without delay, but should be

followed up, with PSA starting six months postoperatively.[29] In the present study of men with retention, the PSA was higher than 4 ng/ml in 75.8% of those with BPH, and in 97.3% of those with ACP on histology. The ACP detection rates at different PSA levels in these men were not much different from those reported in men without retention (Table I).[9] The ACP yield on histology was only about five percentage points lower, except in the PSA range 10–20 ng/ml, where it was about half the rate in men without retention (35% vs. 75%; Table I). This indicates that, in men with BPH and retention, the PSA is elevated from the 4–10 ng/ml to the 10–20 ng/ml range in a substantial proportion of cases, but PSA elevation above 30–60 ng/ml indicates the presence of ACP in more than 85% of cases.

This study had certain limitations. Only men admitted to the urology wards were included; those who passed a TWOC or were treated as outpatients were excluded. Thus, the prevalence of BPH and urethral stricture was possibly underestimated. Data collection was retrospective and therefore partially incomplete for the various parameters studied. The patients were treated by different registrars and consultant urologists, thus introducing undefined selection biases. Histological examination of prostatic tissue was not performed by a single pathologist. However, there is no reason to suspect that data recording was biased or influenced *a priori* by any of the parameters analysed in this study.

Conclusion

In the present study, the prevalence of ACP and urethral stricture relative to BPH as cause of urinary retention was higher than previously reported in the literature. Comparing the groups with AUR and CUR, a positive urine culture was significantly more common in the group with AUR, whereas hydronephrosis, renal failure and anaemia were significantly more common in the group with CUR. There was no significant difference in prostate volume, or in the proportion of men with histological evidence of prostatitis, between the groups with AUR and CUR. This indicates that factors other than prostate size or histological prostatitis determine the development of AUR rather than CUR.

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Conflict of interest

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