

High Urine Retention: Experience in a Series of Patients with Renal Failure Patients

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Abstract

Purpose: High urinary retention (HUR) can negatively impact renal function. Our study aimed to present the epidemiological, diagnostic, and therapeutic aspects of HUR in a Senegalese academic hospital. **Patients and Methods:** We conducted a retrospective study of 70 patients with HUR associated with renal failure from January 2017 to December 2020. Parameters examined included: age, sex, coexisting conditions affecting renal function, clinical symptoms, diagnostic tests, causes of HUR, urinary diversion, and patient outcomes. **Results:** The average age was 66, with a majority of male patients (87%). Twenty-three patients had pre-existing medical conditions. Oligo-anuria was the most common reason for detecting HUR (70%). Half of the patients had an ECOG score ≥ 2 . The mean creatinine level was 50.7 mg/l. Nineteen patients exhibited hydroelectrolytic disorders. Bacterial colonization was observed in 25 patients. Ultrasound and computed tomography were the most frequently performed imaging tests (100% and 62.8%, respectively). Sixty-seven patients had ureterohydronephrosis (UHN), with bilateral UHN in 88.6% of cases. Pelvic cancers (47.1%) were the primary cause of HUR, primarily bladder cancers (27.1%). Nephrostomy was the most common urinary drainage method (50%), particularly for obstructions due to pelvic cancer (88.6%). The majority of patients (52.8%) regained normal renal function after drainage. Nineteen deaths occurred among elderly patients with compromised general health. **Conclusion:** Urinary drainage significantly improved renal function for most patients. Pelvic cancer emerged as the leading cause of HUR. Nephrostomy was the predominant drainage method.

Keywords

Kidney, Urinary Retention, Renal Failure, Urinary Diversions, Senegal

1. Introduction

High urinary retention (HUR) refers to the abnormal accumulation of urine in the upper excretory tract. Dominant causes include lithiasis, tumors within the excretory tract, retroperitoneal fibrosis, and prostatic pathologies [1] [2]. These retentions pose a significant risk of renal failure, the severity of which mainly results from the kidney's impaired ability to excrete sodium, potentially leading to water-salt imbalance, as well as potassium, carrying the risk of severe hyperkalemia [2] [3].

Diagnosing this type of HUR relies on clinical observations and supplementary investigations. Imaging's role lies in confirming excretory tract blockages, pinpointing the underlying causes, and devising suitable urinary diversion strategies. Such diversion interventions must be preceded by or simultaneous with fluid and electrolyte rebalancing, a process that might necessitate extrarenal purification sessions [2] [4].

Effective management entails a multidisciplinary approach, necessitating meticulous coordination among diverse medical and surgical procedures. This collaborative effort proves pivotal in enhancing treatment efficacy. The aims of our study were to report on the epidemiological, diagnostic and therapeutic aspects of HUR in patients with renal failure in a university hospital center in Senegal.

2. Patients and Methods

This retrospective descriptive study followed 70 patients with High urinary retention (HUR) associated with renal failure, spanning from January 1, 2017, to December 31, 2020. All patients with dilatation of the upper excretory tract, regardless of age, sex, or treatment received, were included in our study. The parameters under investigation included age, sex, presence of conditions potentially interfering with renal function, circumstances of discovery, physical examination (evaluated through the ECOG score [5]), biochemical analyses (creatinine level, blood ionogram), cytobacteriological urine examination (CBUE), imaging assessments, obstruction causes, type of urinary diversion, and patient outcomes. Throughout a one-month period, patients' creatinine levels and blood ionograms were monitored every 72 hours. The data were collected from patient files containing a prospective individual survey form. A favorable outcome was defined as the patient's creatinine level returning to normal, while an unfavorable outcome was characterized by patient demise or a lack of creatinine level normalization. Word processing and graphics were carried out using Word 2010 and Excel 2010 respectively. Collected data were sourced from patient observation forms and analyzed utilizing Epi info 6.04 software.

3. Results

The mean age was 66 years (ranging from 35 to 88 years). The majority of patients were male (87%), resulting in a sex ratio of 6.5. A specific medical history was noted in 23 patients. High blood pressure (62.5%) and diabetes (21.9%) were

the most common (**Figure 1**). Oligo-anuria and lumbar pain were the most frequent factors contributing to the identification of high urine retention, observed in 70% and 67% of patients, respectively (**Figure 2**). Altered general condition and lumbar tenderness were the most commonly observed physical signs (**Figure 3**). Fifty percent of the patients had an ECOG score ≥ 2 , while the remaining half had an ECOG score < 2 .

The mean creatinine level stood at 50.7 mg/l (ranging from 15 to 260 mg/l). Nineteen patients (27.1%) experienced hydroelectrolytic imbalances, including hyperkalemia and/or hyponatremia. Bacterial colonization was detected in 25 patients (35.7%) based on urine cytobacteriological examination. Imaging tests were predominantly performed using ultrasound (100%) and computed tomography (CT) scans (62.8%). Among the patients, three had dilated pyelocaliceal

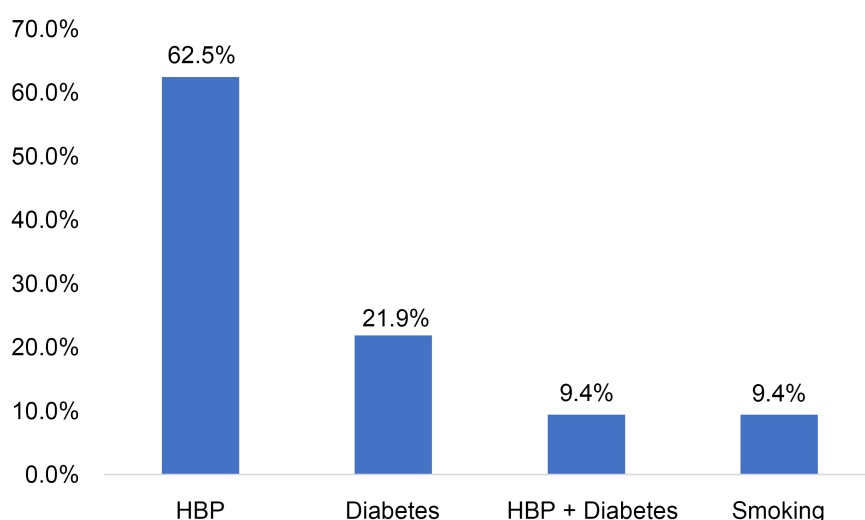


Figure 1. Distribution of patients based on patient's medical history.

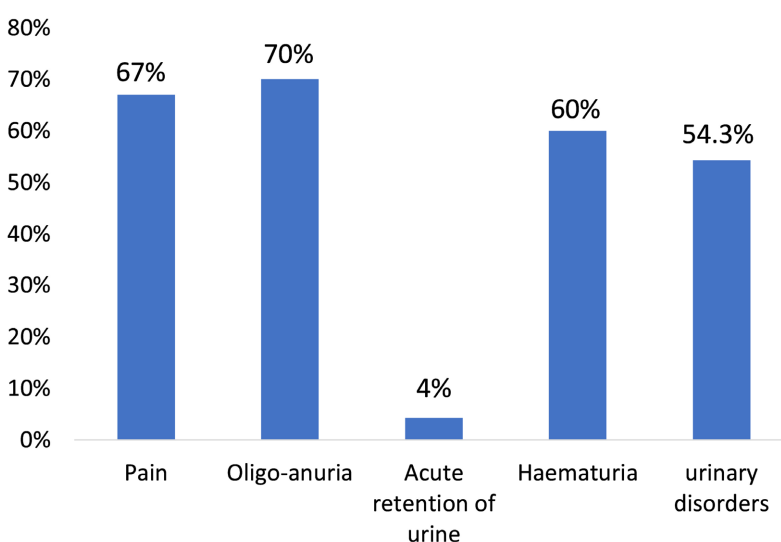


Figure 2. Distribution of Patients based on the circumstances of urinary retention discovery.

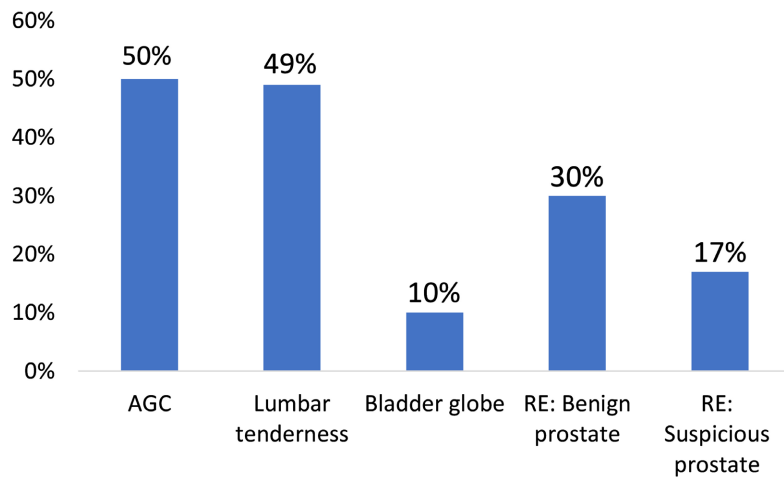


Figure 3. Distribution of patients based on physical examination findings.

cavities, while 67 exhibited ureterohydronephrosis (UHN). Grade 3 UHN (50%) was the most frequent type and UHN was bilateral in 88.6% of patients (**Table 1**). Pelvic cancers (47.1%) emerged as the primary cause of UHN, particularly bladder cancers (27.1%) (**Table 2**). Patients exhibiting ionic imbalances on the blood ionogram (27.1%) underwent hydroelectrolyte rebalancing, with two patients (2.8%) requiring emergency hemodialysis due to severe hyperkalemia. Patients with bacterial colonization detected on ECBU received antibiotic treatment tailored to the antibiogram results. Urinary drainage was achieved through nephrostomy (50%), JJ catheterization (30%), or transurethral bladder catheterization (20%). Percutaneous nephrostomy was primarily employed for obstructions stemming from pelvic cancer (88.6%), while internal drainage using a JJ catheter was more prevalent for upper excretory tract stone cases (76.2%) (**Table 3**). Nephrostomy procedures were performed under ultrasound guidance and local anesthesia, while JJ catheter insertion was carried out under general anesthesia. Creatinine levels were re-evaluated one month after drainage, with a majority of patients (52.8%) experiencing normalized renal function. Other patients witnessed a decline in creatinine levels without normalization. Among the latter group, 19 deaths were recorded. All these individuals were aged over 60 and exhibited poor general condition. The obstruction-causing diseases included pelvic cancer (prostate, bladder, cervix) in 15 patients, an upper excretory tract stone in 3 patients, and hydronephrosis in one patient. Notably, 11 patients had creatinine levels exceeding 100 mg/l, and hyperkalemia was present in 10 patients.

4. Discussion

The average age of patients within our series stood at 66 years. This trend can be attributed to the prevalence of cancer as a leading cause of High urinary retention among our patients. This correlation between cancer incidence and advancing age can be largely attributed to the progressive deterioration of DNA repair mechanisms constituting the nucleus of human cells. Consequently, the

Table 1. Distribution of patients based on upper excretory tract dilatation in imaging.

Anomalies	Number	Percentage
Pyelocalic dilatation	3	4.2%
	67	95.8%
	Types	
	- Bilateral symmetrical	14 20%
	- Bilateral asymmetric	48 68.6%
	- Unilateral	5 7.2%
Ureterohydronephrosis	Grade	
	- Grade I	5 7.1%
	- Grade II	8 11.4%
	- Grade III	35 50%
	- Grade IV	19 27.2%

Table 2. Distribution of patients based on the cause of upper urinary retention.

Causes	Number	Percentage
Pelvic cancers	33	47.1%
	Bladder cancer	19 27.1%
	Prostate cancer	12 17.1%
	Cervical cancer	2 2.9%
urinary stones	20	28.6%
	Ureteral	9 12.8%
	pyelic	11 15.7%
	Bilateral	5 7.1%
	single functional kidney	2 2.8%
BPH	14	20%
Hydronephrosis	3	4.3%

Table 3. Distribution of patients based on drainage type.

Type of drainage	indications	Number	Percentage
Nephrostomy		35	50%
	Pelvic cancer	31	88.6%
	Upper excretory tract lithiasis	4	11.4%
JJ catheter		21	30%
	Upper excretory tract lithiasis	16	76.2%
	Hydronephrosis	3	14.3%
	Pelvic cancer	2	9.5%
transurethral bladder catheterization		14	20%
	HBP	14	100%

risk of errors during cell division and the likelihood of developing cancer significantly increase beyond the age of fifty [6].

A distinct male predominance was evident in our series (sex ratio of 6.5), stemming from the dominance of prostate tumors and bladder cancers as primary contributors to excretory tract obstruction in our patients. This imbalance is influenced by male subjects' heightened exposure to bladder cancer risk factors, including smoking and occupational contact with aromatic amines and their derivatives [7].

Clinically, among our patients, the predominant scenarios triggering the identification of HUR were oligo-anuria (70%) and lower back pain (67%). Physical examination revealed that a majority of patients displayed altered general conditions (50%). These symptoms were either linked to existing renal insufficiency across all patients or directly tied to the underlying causes of obstruction. In either scenario, these signs could arise due to a delay in seeking hospital care, often associated with patients opting for traditional treatments, seemingly with lower financial implications [8].

A delayed diagnosis fosters the emergence of hydro-electrolytic imbalances, exacerbating clinical symptoms and adversely impacting the patient's prognosis when urgent interventions are lacking [9]. Our study revealed significant metabolic disruptions, highlighting the gravity of obstructive renal failure. Hyperkalemia was detected in 19 patients, signifying its significance as a life-threatening condition within the context of End-Stage Renal Disease. This risk exists independently of the presence or absence of electrocardiogram-based severity signs. The risk of myocardial consequences far surpasses that linked to hyperkalemia in cases of non-obstructive chronic renal failure [2].

Medical imaging assumes a pivotal role in HUR diagnosis, effectively revealing upper excretory tract dilatation and discerning the underlying causes of obstruction. In our study, ultrasound stood as the primary diagnostic tool for all patients, confirming excretory tract dilatation. This radiological approach boasts an 85% sensitivity in identifying obstructive etiologies in acute renal failure [10]. Ultrasound successfully identified the cause of obstruction in 54 patients. On the other hand, Uro-CT proved useful in determining the cause of HUR in the remaining 16 cases. However, within the realm of renal failure, exercising caution during Uro-CT is imperative due to the substantial risk of exacerbating renal lesions [11].

Morphological assessments unveiled a greater prevalence of bilateral ureterohydronephrosis (88.6%), in contrast to unilateral ureterohydronephrosis (7.2%) in our study. Mechanical obstructions within the excretory tract lead to compromised kidney excretory functions when bilateral involvement occurs or when an obstacle arises within a single anatomical or functional kidney [2]. Regardless of the nature of the obstruction, single or bilateral upper excretory tract blockages negatively impact kidney function. The long-term consequences for obstructed kidneys arise from increased pressure in renal tubules, triggering the early activation of multiple pro-inflammatory and profibrotic mechanisms that

continue to impair functional renal parenchyma even post-obstruction removal [2] [12] [13].

Addressing the obstruction within the excretory tract remains the sole approach capable of swiftly and durably rectifying the abnormalities associated with kidney damage. Urinary drainage forms a pivotal facet of this process, offering temporary or permanent bypassing of obstructions. This can be achieved through natural or external routes. Within our series, percutaneous nephrostomy emerged as the primary drainage method (50%), predominantly suitable for obstructions due to pelvic cancer (88.6%). In contexts involving pelvic neoplastic processes, internal bypass might prove exceedingly challenging or even unfeasible due to ureter invasion or compression [8] [14] [15]. Among our patients, four individuals underwent nephrostomy as an obstructive stone treatment in the upper excretory tract, complicated by acute pyelonephritis. The decision was dictated by the non-functional state of our operating theater at the time these patients presented as emergencies. Remaining patients with upper excretory tract stones underwent emergency JJ catheter insertion. Both nephrostomy and JJ catheterization proved effective renal drainage methods in cases of upper excretory tract obstruction, with no significant difference between the two in terms of infectious complications and patients' quality of life immediately postoperatively. However, JJ catheterization appears to be associated with greater long-term deterioration in patients' quality of life due to risks of haematuria or post-traumatic urethral stricture [16].

Within our series, we observed that renal function returned to normal in 37 patients (52.8%) following therapeutic interventions. The restoration of robust renal function is heavily reliant on the duration of obstruction. Generally, patients recovering their previous renal function within less than seven days of obstruction are common. However, recovery of renal function after freeing the urinary tract following days or weeks of obstruction is often delayed and incomplete, owing to the presence of renal fibrosis lesions [2] [3] [17].

A mortality rate of 27.1% was noted within our series, predominantly among patients aged over 60 with deteriorated general conditions (ECOG score ≥ 2) and ongoing impaired renal function post-drainage. Among this group of deceased patients, pelvic cancer (78.9%) emerged as the leading cause, with hyperkalemia (52.6%) as the most common metabolic abnormality. The majority of urinary diversions performed for neoplastic HUR are geared towards palliative cancer treatment, entailing a considerable risk of mortality due to the extent of the cancer and the patients' overall condition [18]. Moreover, persistent hyperkalemia, despite appropriate medical interventions and urinary diversion, warrants urgent renal purification due to the significant risk of arrhythmia-induced cardiac arrest stemming from this electrolyte imbalance [2] [19]. Regrettably, access to emergency renal replacement is challenging in our country due to insufficient haemodialysis units in public hospitals. Our study has a number of limitations, in particular a very small cohort of patients and its retrospective nature.

5. Conclusion

Nephrostomy was the most frequently employed method of urinary drainage among our patients, for whom pelvic cancers were the predominant causes of High Urinary Retention. Urinary drainage led to an improvement in renal function in the majority of our patients. HUR was linked to a significant mortality rate, particularly among elderly patients with compromised overall health. Nevertheless, we believe that a prospective, multicenter study with a larger patient cohort than ours would be imperative to provide a better assessment of these outcomes.

Data Sharing Statement

Although the data of the study are not available to the public due to privacy or ethical restrictions, it can be obtained from the corresponding author if requested.

Statement of Ethics

This study was approved by the ethical committee of Aristide Le Dantec University Hospital Centre, Faculty of Medicine, Cheikh Anta Diop University, Dakar, Senegal. In our study with human participants, ethical standards of the 1964 Helsinki Declaration were complied with, as well as the ethical standards of the national research association at the procedural stages. All authors gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work. We obtained informed consent from patients included in the study.

Author Contributions

All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis and interpretation, or in all these areas; took part in drafting, revising or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

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Conflicts of Interest

The authors report no conflicts of interest in this work.

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Abbreviations

HUR: High Urine Retention; UHN: Ureterohydronephrosis; DNA: Deoxyribonucleic Acid; BPH: Benign Prostatic Hyperplasia; HBP: High Blood Pressure; AGC: Altered General Condition; RE: Rectal Examination