

Causes and Prognosis of Cases of Acute Obstructive Renal Failure Managed at the Donka National Hemodialysis Center

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Abstract

Introduction: Acute obstructive renal failure (AORF) is a frequent clinical situation, secondary to obstruction of the urinary excretory tract. Whatever the cause, urinary tract obstruction suddenly opposes glomerular filtration and is responsible for tubulointerstitial lesions. It accounts for 10% of acute renal failure (ARF). The aim of this study was to identify the causes and prognosis of cases of acute obstructive renal failure managed at the Centre National d'hémodialyse Donka. **Material and Methods:** This was a prospective descriptive study lasting 6 months, from September 1, 2022 to February 29, 2023. All patients undergoing haemodialysis for acute obstructive renal failure who agreed to participate in the study and whose medical records were complete were included. **Results:** During the course of the study, we registered 97 haemodialysis patients, including 20 cases (20.62%) of acute obstructive renal failure. The mean age of the patients was 57.8 ± 10.54 years, with a male predominance of 11 cases (55%) and a sex ratio of 1.22. The reasons for consultation were dominated by physical asthenia 11 cases (55%), lumbar pain 9 cases (50%), vomiting 6 cases (30%) and acute urine retention 6 cases (30%). Arterial hypertension 16 cases (80%) and urinary tract infection 10 cases (50%) were the most common antecedents. The etiologies of RAOI were dominated by lithiasis 10 cases (50%), neoplasia 6 cases (30%) and benign prostatic hypertrophy 3 cases (15%). mean creatinine was 1267.60 ± 710.76 $\mu\text{mol/l}$ with extremes of 243 $\mu\text{mol/l}$ and 2822 $\mu\text{mol/l}$, mean urea was 39.56 ± 18.36 , hyperkalemia in 14 cases (70%) and hyponatremia in 8 cases (40%).

After hemodialysis, 9 cases (45%) recovered renal function, 4 cases (20%) became chronic and 7 cases (35%) died. **Conclusion:** The frequency of AKI remains non-negligible in our department, and early detection and prompt management would considerably reduce the morbidity and mortality associated with this pathology.

Keywords

Acute Obstructive Renal Failure, Hemodialysis, Prognosis, Donka

1. Introduction

Acute renal failure (ARF) is a syndrome characterized by a rapid fall in glomerular filtration rate over a period of hours or days, with the kidneys unable to eliminate the products of nitrogen metabolism and maintain homeostasis [1].

Acute obstructive renal failure (AORF) is a frequent clinical situation, secondary to obstruction of the urinary excretory tract. Whatever the cause, urinary tract obstruction suddenly opposes glomerular filtration and is responsible for tubulointerstitial lesions. It accounts for 10% of the causes of ARF [2]. The presence of oligo-anuria is frequent, but not mandatory [3].

Diagnosis of AKI is based on clinical, biological and imaging findings. Elevated urea and creatinine levels are synonymous with renal failure. The role of imaging is to confirm the obstructive origin of this renal failure and to establish the etiological diagnosis [4].

The severity of ARF results mainly from the abolition of the kidney's capacity to excrete sodium, leading to the risk of hydrosodium overload and acute pulmonary oedema (APO), and potassium, with the risk of threatening hyperkalaemia [4].

Etiologies are dominated by excretory tract tumours, pelvic tumours, retroperitoneal fibrosis and urinary lithiasis [5]. Prolonged duration of obstruction is the main determinant of failure to recover renal function in the short and long term, and of the occurrence of Obstruction Lifting Syndrome (OLSS), requiring early diagnosis and prompt management [4].

Management of IRAO consists in balancing metabolic disorders, and urinary drainage should be performed as a matter of urgency using a double-J catheter, percutaneous nephrostomy, cystostomy or simple bladder catheterization. Recourse to extra-renal purification is indicated in cases of hydrosodium overload, PAO or hyperkalemia threatening short-term vital prognosis [4].

In Europe, ARI accounts for 5% of hospital admissions [6].

In France, RAOI accounts for 10% of patients hospitalized for AKI and 17% of outpatients [6] [7].

In Morocco, in 2016 Es-salmy A in his doctoral thesis in Medicine reported that IRAO represented 8 to 14% of ARI and 8% of patients had benefited from

hemodialysis [8].

In Senegal, in 2017 Zaynab A in her doctoral thesis in Medicine reported that out of 13 patients with RAOI one patient had benefited from hemodialysis [9].

In Mali, in 2021 Sy S *et al.* noted that out of 1133 patients admitted for AKI, 83 (7.3%) had HAI, 18 of whom received hemodialysis [10].

In Guinea, Bah MB *et al.* in 2018 collated 72 cases of RAOI in the Urology Department of the Ignace DEEN National Hospital; none received hemodialysis [11]. Diallo OP, in his doctoral thesis in Medicine in 2022, noted 26.5% of HAI in elderly patients presenting with HAI in the Nephrology Department of Conakry University Hospital [12].

The aim of this study was to identify the causes and prognosis of HAI cases managed at the Donka National Hemodialysis Center.

2. Material and Methods

We conducted a prospective descriptive study lasting 6 months from September 1, 2022 to February 29, 2023.

Patients of either sex and of any age were included if they were diagnosed with RAOI and had at least a creatinine level, a renal or abdominal ultrasound scan, or a CT scan without contrast media injection.

Patients whose medical records were incomplete or unusable were not included.

Sampling:

We carried out an exhaustive census of all patients undergoing haemodialysis for HAI whose paraclinical workup was complete.

For data collection, we interviewed patients and collected data on a pre-established survey form.

Our variables were qualitative and quantitative:

Sociodemographic data: Prevalence, age, gender, occupation.

Clinical data:

Reasons for consultation: Asthenia, physical, back pain, vomiting, anuria, pollakiuria, urine retention, lower limb oedema.

Past history: Hypertension, diabetes, nephrotoxic drugs, benign prostatic hypertrophy, urinary tract lithiasis, malformative uropathies, urinary tract infections.

Etiologies of IRAO: Bilateral urinary tract lithiasis, urinary tract lithiasis on a single anatomical or functional kidney, prostate cancer, cervical cancer, benign prostatic hypertrophy and post-infectious urethral stricture.

Paraclinical data:

Complete blood count, creatininemia, urea, calcemia, kalemia, natraemia and Reno-vesico-prostatic ultrasound, Uroscanner.

Prognostic data: Length of hospital stay, recovery of renal function, progression to CKD death.

Data were collected using a pre-established survey form, then analyzed using EPI INFO 7.4.0 software.

Statistical analysis:

Data were collected using a survey form entered in Excel 2016 and analyzed using EPI INFO 7.4.0. Qualitative variables were expressed as percentages and quantitative variables as means and standard deviations.

Ethical consideration:

Ethical approval was obtained from the Chair of Nephrology at the Donka University Hospital. Medical confidentiality was preserved throughout our study, and the data collected were used anonymously.

3. Result

Sociodemographic data:

During the course of the study, we registered 97 new haemodialysis patients, including 20 cases (20.62%) with acute obstructive renal failure. The mean age of patients was 57.8 ± 10.54 years, with a male predominance of 11 cases (55%) and a sex ratio of 1.22 (**Table 1**).

Table 1. Socio-demographic characteristics of patients.

| Variables | Number N = 20 | Percentage |
|------------------------------|---------------|-------------------|
| Prevalence | | |
| Obstructive ARF | 20 | 20.62 |
| Other causes of hemodialysis | 77 | 79.38 |
| Age | | |
| 35 - 44 | 2 | 10 |
| 45 - 54 | 6 | 30 |
| 55 - 64 | 8 | 40 |
| 65 and over | 4 | 20 |
| Average: 57.8 ± 10.54 | | Extremes: 35 à 75 |
| Gender | | |
| Male | 11 | 55 |
| Female | 9 | 45 |
| Sex ratio = 1.22 | | |
| Profession | | |
| Civil servant | 4 | 20 |
| Merchant | 4 | 20 |
| House wife | 7 | 35 |

Clinical data:

Physical asthenia 11 cases (55%), lumbar pain 9 cases (50%), vomiting 6 cases (30%) and acute urine retention 6 cases (30%) were the most common reasons for consultation. The etiologies of RAOI were dominated by lithiasis (10 cases, 50%) and neoplasia (6 cases, 30%). Arterial hypertension was noted in 16 cases (80%) and urinary tract infection in 10 cases (50%) (**Table 2**).

Paraclinical data:

Mean creatinine was 1267.60 ± 710.76 $\mu\text{mol/l}$ with extremes of 243 $\mu\text{mol/l}$ and 2822 $\mu\text{mol/l}$, mean urea was 39.56 ± 18.36 hyperkalemia 14 cases (70%) and hyponatremia in 8 cases (40%) (**Table 3**).

Prognostic data:

After hemodialysis, 9 cases (45%) recovered renal function, 4 cases (20%) became chronic and 7 cases (35%) died (**Table 4**).

Table 2. Distribution of patients with RAOI according to clinical data.

| Variables | Number N = 20 | Percentage |
|---------------------------------|---------------|------------|
| Reasons for consultation | | |
| Physical asthenia | 11 | 55 |
| Lumbar pain | 9 | 45 |
| Conjunctival pallor | 9 | 45 |
| Anuria | 8 | 40 |
| Oliguria | 8 | 40 |
| Vomiting | 6 | 30 |
| Urinary retention | 6 | 30 |
| Edema of the lower limbs | 6 | 30 |
| Epigastralgia | 5 | 25 |
| Dyspnea | 5 | 25 |
| Hematuria | 5 | 25 |
| Hiccups | 4 | 20 |
| Dysuria | 4 | 20 |
| Pollakiuria | 3 | 15 |
| History | | |
| HTA | 16 | 80 |
| Urinary tract infection | 10 | 50 |
| Diabetes mellitus | 6 | 30 |
| Malaria | 4 | 20 |
| HIV | 3 | 15 |

Continued

| | | |
|--|---|-------|
| NSAID use | 3 | 15 |
| Transvesical adenomectomy of the prostate gland | 3 | 15 |
| Peptic ulcer disease | 2 | 10 |
| Pyelolithotomy | 1 | 5 |
| Etiology | | |
| Bilateral ureteral lithiasis | 8 | 80 |
| Prostate cancer | 4 | 66.67 |
| Cervical cancer | 2 | 33.33 |
| Benign prostatic hyperplasia | 3 | 15 |
| Ureteral lithiasis in a single anatomical kidney | 1 | 10 |
| Ureteral lithiasis on functional single kidney | 1 | 10 |

Table 3. Distribution of patients according to paraclinical data.

| Variable | Number | Percentage |
|---------------------------------|--------|----------------------|
| Anemia | | |
| Mild Hb 110 - 119 g/dl | 4 | 20 |
| Moderate Hb 80 - 109 g/dl | 8 | 40 |
| Severe Hb < 80 g/dl | 5 | 25 |
| Normal Hb | 3 | 15 |
| Hb Mean: 9.79 ± 2.26 g/dl | | Extremes: 6.2 à 14 |
| Creatininemia (µmol/l) | | |
| 243 - 500 | 2 | 10 |
| 501 - 1000 | 6 | 30 |
| 1001 - 1500 | 5 | 25 |
| >1500 | 7 | 35 |
| Mean: 1267.60 ± 710.76 (µmol/l) | | Extremes: 243 à 2822 |
| Urea (mmol/l) | | |
| 7.5 - 30 | 8 | 40 |
| > 30 | 12 | 60 |
| Mean: 39.56 ± 18.36 | | Extremes: 13 à 61.01 |
| Kalemia | | |

Continued

| | | |
|---------------------------------------|----|---------------------------|
| Hypokalemia < 3,5 mmol/l | 1 | 5 |
| Normal | 5 | 25 |
| Hyperkalemia [threatening] > 5 mmol/l | 14 | 70 |
| Mean: 6.27 ± 1.59 mmol/l | | Extremes: 2.66 à 9.66 |
| Natraemia | | |
| Hyponatremia Na+ < 135 mmol/l | 8 | 40 |
| Normal Na+ 135 – 145 mmol/l | 11 | 55 |
| Hypernatremia Na+ > 145 mmol/l | 1 | 5 |
| Mean: 136.30 ± 11.07 mmol/l | | Extremes: 115.00 à 156.40 |
| Calcemia | | |
| Hypocalcemia (calcemia < 2.2 mmol/l) | 14 | 70 |
| Normal (calcemia 2.20 - 2.60 mmol/l) | 6 | 30 |
| Mean: 2.05 ± 0.28 mmol/l | | Extremes: 1.69 à 2.60 |
| Ultrasound | | |
| Right kidney | | |
| Normal | 13 | 65 |
| Decreased | 4 | 20 |
| Increased | 3 | 15 |
| Left Kidney | | |
| Normal | 12 | 63.16 |
| Increased | 5 | 26.32 |
| Decreased | 2 | 10.53 |
| Cortico-sinus differentiation | | |
| Preserved | 12 | 60 |
| Little preserved | 7 | 35 |
| Not preserved | 1 | 5 |
| Echo-structure | | |
| Echogenic | 18 | 90 |
| Hyperechoic | 1 | 5 |
| Hypoechoic | 1 | 5 |
| Dilation of urinary tract | | |
| Hydronephrosis | 6 | 30 |
| Uretero hydronephrosis | 14 | 70 |

Table 4. Distribution of patients according to prognosis.

| Prognosis | Number N = 20 | Percentage |
|---------------------------------------|------------------------------|------------|
| Length of hospital stay (days) | | |
| 4 - 9 | 6 | 30.00 |
| 10 - 19 | 12 | 60.00 |
| 20 - 40 | 2 | 10,00 |
| Average: 13.65 ± 6.56 | Extremes: 4.0 à 30.00 | |
| Causes of death | | |
| Septic shock | 3 | 42.85 |
| Prostate cancer | 1 | 14.28 |
| Uremic coma | 1 | 14.28 |
| Pulmonary embolism | 1 | 14.28 |
| Acute lung edema | 1 | 14.28 |
| Evolution of renal function | | |
| Recovery of renal function | 9 | 45 |
| CKD | 4 | 20 |
| Died | 7 | 35 |

4. Discussion

In the course of this study, we recorded 97 cases of renal failure from all causes, of which 20 cases (20.62%) underwent haemodialysis for acute obstructive renal failure. Our result is close to that of Sy S *et al.* in Mali in 2021, who found 22% cases of acute obstructive renal failure in their study [10]. On the other hand, our result is higher than that of Es-Salmy in Morocco in 2016 in his doctoral thesis in medicine had reported a frequency of (8%) [8].

Male sex was the most represented 11 cases (55%) with a sex ratio of 1.22. This result corroborates that of Mabrouk K et al in Morocco in 2015, who found 57% male patients [13].

The mean age of our patients was 57.8 ± 10.54 years. Our result differs from that reported by Fellah E et al in Tunisia in 2018 who found a mean age of 63.6 ± 15 years [14].

Physical asthenia 11 cases (55%), back pain 9 cases (45%), anuria (40%) were the most frequent reasons for consultation. These results are similar to those reported by Dembélé S in his medical doctorate thesis in Mali in 2008, who found a predominance of physical asthenia (73.9%), back pain and fever in 62.2% and 17.5% respectively [15]. This could be explained by the fact that lower back pain is one of the clinical manifestations of excretory tract obstruction during the course of the disease.

Arterial hypertension 16 cases (80%), urinary tract infection 10 cases (50%), diabetes 6 cases (30%) and HIV 3 cases (15%) were the antecedents found in our study. These results could be explained by the fact that, on the one hand, hypertension is a major risk factor for kidney disease and, on the other hand, the urinary tract infection encountered is merely the direct consequence of prolonged urinary stasis.

The etiology of acute obstructive renal failure was dominated by bilateral ureteral lithiasis in 8 cases (80%), prostate cancer in 4 cases (66.67%) and benign prostatic hypertrophy in 3 cases (15%).

Mean creatinine was 1267.60 ± 710.76 $\mu\text{mol/l}$ with extremes of 243 $\mu\text{mol/l}$ and 2822 $\mu\text{mol/l}$, mean urea was 39.56 ± 18.36 mmol/l . This result is similar to that of Assal O *et al.* in Morocco in 2021, who found a mean creatinine level of 1256.7 ± 675.25 $\mu\text{mol/l}$ [16]. This rise in creatinemia could be related to a delay in diagnosis. Hyperkalemia was noted in 14 cases (70%). This may be explained by the fact that urinary tract obstruction plays an important role in the occurrence of hyperkalemia in renal failure. We recorded 8 cases (40%) of hyponatremia. This result could be explained by the occurrence of obstruction lifting syndrome in some of our patients.

Most of our patients were severely anemic, with 8 (40%) having hemoglobin levels below 8 g/dl. Anemia was moderate in 5 cases (25%). The mean hemoglobin level was 9.79 ± 2.26 g/dl; this result could be explained by the inflammatory syndrome due to infection, on the one hand, and by the fact that the kidneys participate in the production of red blood cells through the production of Erythropoietin, on the other.

Abdomino-pelvic ultrasonography was carried out in all patients, and we noted uretero-hydronephrosis in 14 cases (70%) and hydronephrosis in 6 cases (30%). We recorded 2 cases (10.53%) of diminished kidney size and 5 cases (26.32%) of increased kidney size.

The etiologies of RAOI were dominated by lithiasis in 10 cases (50%) and neoplasia in 6 cases (30%). Our data corroborate those of Assal O *et al.* in Morocco in 2021 [16], but also those described in the literature [17].

The average hospital stay was 13.65 ± 6.56 days, with extremes ranging from 4.0 to 30.00 days.

The evolution after hemodialysis was marked by 9 cases (45%) recovering renal function, 4 cases (20%) progressing to chronicity and 7 cases (35%) dying. This high mortality rate in our series could be explained by the associated cardiovascular comorbidities, which aggravate the vital prognosis, on the one hand, and by the delayed diagnosis and treatment of most of our patients, on the other.

The presumed cause of death was dominated by septic shock in 3 cases (42.85%), followed by pulmonary embolism and acute lung oedema in 1 case (14.28%) each.

5. Conclusion

Acute obstructive renal failure is a uro-nephrological emergency, and its preva-

lence remains frequent in our hospital center at 20.62%. The male sex was the most represented, the mean age was 57.8 ± 10.54 years. Clinical symptoms were dominated by physical asthenia, back pain, vomiting and acute urine retention. The etiologies of RAOI were dominated by lithiasis and neoplastic pathologies. Systematic screening and early management would considerably reduce the morbidity and mortality associated with this pathology.

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What We Know about It

Acute obstructive renal failure is a medical and surgical emergency, and its diagnosis is based on clinical and para-clinical arguments. It is a major public health problem worldwide, and in Guinea in particular.

What Is New in Our Study

This study constitutes the first experience in our Donka hospital center, Out of 97 hemodialysis patients during our study, 20 cases (20.62%) were hemodialysed for acute obstructive renal failure.

Authors' Contributions

All authors participated in data collection, analysis and drafting of the manuscript.

The final manuscript was read and accepted by all authors.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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