

First Emergency Hemodialysis Session at the Nephrology Department of the Teaching Hospital of Yopougon: About 146 Cases

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Abstract

Context: Due to the late referral of the pads to the nephrologist and the lack of medical follow-up, many patients are admitted with complications from kidney disease requiring the urgent start of hemodialysis sessions. **Purpose:** Study the profile of emergency hemodialysis patients in order to ease their management. **Methods:** This was a retrospective, descriptive and analytical study carried out at the Nephrology Department of the Teaching Hospital of Yopougon from January 1st to December 31st, 2016. This study included all patients who had received a first session of hemodialysis in an emergency context. **Results:** We collected 146 patients with an average age of 39.80 ± 14.55 years and a sex ratio of 0.6 for men. Before admission, patients were known as hypertensives (63.9%), followed by CKD (23.9%) and HIV-infected (8.2%). The main clinical signs were hypertension (64.3%), edema (44.5%) and coma (30.1%). Anemia was observed in 97.2% of cases and it was less than 8 g/dl in 57.5%. Kidney failure was chronic in 75.3% and acute in 24.6%. Chronic nephropathies were glomerular (54.1%), vascular (20.5%). The main indications for hemodialysis were encephalopathy (33.5%), severe uremia (28%), acute pulmonary edema (19.8%), persistent anuria (11.6%) and hyperkalemia (5.4%). The vascular approach was a catheter in 97.2% (femoral site in 53.4% and jugular in 43.8% and arteriovenous fistula in 2.7%). Death was observed in 17.8%. In univariate analysis, age > 65 years ($p = 0.04$), coma ($p = 0.004$) and acute kidney failure ($p = 0.02$) were associated with the risk of death, and in multivariate analysis, only coma ($p = 0.024$, OR = 5.88) seemed to be associated with mortality risk for our patients. **Conclusion:** Hemodialysis in an emergency situation is a common practice in the Teaching Hospital of Yopougon and mainly concerns patients with CKD.

Keywords

Kidney Failure, Hemodialysis, Emergency

1. Introduction

Kidney pathology constitutes a major public health problem in the world due to its frequency, high mortality rate and the costs of its treatment [1] [2].

Nephrological emergencies are not so frequent but they most often deal with management problems [3]. Their treatment often calls for hemodialysis, which can supplement the functions of cleaning uremic toxins and fluid and electrolytes balance, thereby improving their prognosis [4]. Despite these therapeutic advances made over the past 50 years, the mortality of patients with kidney impairment requiring emergency dialysis remains high [5] [6].

In 2010, replacement therapy ensured the survival of nearly 3 million patients worldwide, 78% of whom were on dialysis [7]. The incidence of acute kidney injury requiring hemodialysis is increasing and associated with high mortality [8].

In France, the 2011 REIN report estimated the incidence of dialysis patients at 144/million inhabitants [9]. In the United States of America, the rate of acute renal damage requiring extrarenal purification increased from 3227/million people/year in 1996 to 5224/million people/year in 2003. In Canada, it increased from 0.8% to 3% from 1996 to 2010 [6].

In Senegal in 2016, a hospital study noted that 84.7% of patients in a hemodialysis center had received emergency sessions and that 34.2% of these patients had acute renal failure [10].

Data on emergency dialysis patients are scarce in our practice setting. Our work aims to study the profile of patients who have benefited from a first emergency hemodialysis session in order to facilitate decision-making for their management.

2. Methods

2.1. Type and Scope of the Study

Our study took place in the Nephrology department of the Teaching Hospital of Yopougon in Abidjan, Ivory Coast. This was a retrospective, descriptive and analytical study that took place over a period going from January 1st to December 31st, 2016.

This department includes an inpatient unit with a capacity of 20 beds, an outpatient unit, a hemodialysis unit with 07 generators, one of which is broken.

2.2. Study Population

We included all patients who received a first dialysis session in an emergency setting during the study period. Dialysis patients admitted urgently but who

were not having their first dialysis session at that moment and those whose medical records were incomplete for the parameters sought were not included.

2.3. Variables

For each patient included, the following data were collected using a standardized survey sheet:

- Sociodemographic data: age, sex, profession, level of education;
- Co-morbidities: hypertension, diabetes, HIV, CKD, drug abuse (alcohol, tobacco, NSAIDs, PCI, use of traditional products);
- Clinical data: the department of origin, reasons for hospitalization, state of consciousness, state of hydration, blood pressure; edema, acute lung edema, urine output;
- Blood biological data: hemoglobin level, number of white blood cells and platelets, creatinine, urea, sodium, potassium, calcium, CRP;
- The type of renal failure: acute kidney injury (AKI) or chronic kidney disease (CKD) with the different mechanisms;
- Therapeutic data: hemodialysis with the indication of the session, the vascular access and the number of sessions, other treatments;
- Evolutionary data: duration of hospitalization, recovery or not of renal function, death.

2.4. Definition of Operational Terms

Renal function was assessed using the MDRD formula. Renal failure was defined by a glomerular filtration rate (GFR) of less than 60 ml/min for 1.73 m². The chronic nature was defined by the length of renal failure (more than 3 months) and/or normochromium are generative normocytic anemia and/or hypocalcemia and/or associated renal atrophy. The IRC was said to be terminal (or stage 5) when it was less than 15 ml/min.

In the absence of renal biopsies, the etiological research of renal failure was based on a set of clinical and paraclinical arguments. Thus, chronic glomerular nephropathy (CGN) has been evoked by the presence of proteinuria greater than 2 g/d or proteinuria associated with hematuria. Chronic vascular nephropathy nephroangiosclerosis type was retained due to the existence of hypertension, low flow proteinuria (<1 g/d), and renal failure associated with signs of hypertensive retinopathy in the fundus. Nephropathy associated with HIV has been evoked in the presence of massive proteinuria without arterial hypertension or hematuria, in any patient infected with HIV and of recent discovery (<3 months), diabetic nephropathy in the presence of proteinuria greater than 500 mg/24 hours associated with diabetic retinopathy on fundus examination, chronic tubulointerstitial nephropathy (CTIN) before the existence of proteinuria (<1 g/24 h) associated with leukocyturia without germ and kidneys with irregular and dented outlines.

Functional acute kidney failure (AKI) was retained in the presence of renal

hypoperfusion factor (diarrhea, vomiting, low cardiac output) or in front of signs of extracellular dehydration. Obstructive AKI was retained in the presence of bilateral dilation of the pyelocalicular cavities. Organic AKI was retained after exclusion of functional and obstructive AKIs.

Arterial hypertension was defined by the observation of blood pressure levels greater than or equal to 140 mmHg systolic-wise and/or greater than or equal to 90 mmHg diastolic-wise. The arterial pressure was divided into three grades: grade 1 or mild hypertension between 140 and 159 mmHg systolic-wise and between 90 and 99 mmHg diastolic-wise; grade 2 or mean hypertension between 160 and 179 mmHg systolic-wise and between 100 and 109 mmHg diastolic-wise; grade 3 or severe hypertension for blood pressure greater than or equal to 180 mmHg systolic-wise and greater than or equal to 110 mmHg diastolic-wise.

Anemia was defined as a hemoglobin level less than 12 g/dl. It was said to be severe when the hemoglobin level was less than 8 g/dl and moderate between 8 and 12 g/dl.

2.5. Statistical Analysis

The data were entered using Excel software and analyzed using SPSS software in version 22. The statistical test used was the exact chi-square test with a significance level $p < 0.05$.

3. Results

During the study period, 213 patients received emergency dialysis in the ward. Of these, 146 met the inclusion criteria. The patients' medium age was 39.80 ± 14.55 years with the extremes of 13 and 85 years. The age group of [35 – 65] years was the most represented with 54.7%. We observed 59.5% of male subjects and 40.4% of female subjects.

Patients' medical history was dominated by hypertension (63.9%), CKD (23.9%) and HIV-infection (8.2%). The main clinical signs were hypertensive surge (64.3%), edema (44.5%) and coma (30.1%) (**Table 1**). This hypertension was grade 3 in 42.5% of cases.

Anemia was observed in 97.2% of cases and it was less than 8 g/dl in 57.5%. The other laboratory abnormalities were hyperkalemia (28%), hypocalcemia (70.1%), hyponatremia (68.7%) and elevated C Reactive Protein (CRP) (93.3%) (**Table 1**).

Kidney failure was chronic in 75.3% and acute in 24.6%. Chronic nephropathies were glomerular (54.1%), vascular (20.5%).

The main indications for hemodialysis were encephalopathy (33.5%), severe uremia (28%), acute lung edema (19.8%), persistent anuria (11.6%) and hyperkalemia (5.4%).

The vascular access was a catheter in 97.2% (femoral site in 53.4% and jugular in 43.8%) and an arteriovenous fistula in 2.7%.

Table 1. General characteristics of the patients.

Variables	Total (n = 146)	Deceased (n = 26)	alive (n = 120)	P	OR (IC = 95%)
Sex					
Male	59.6% (87/146)	61.5% (16/26)	59.1% (71/120)	0.8	
Female	40.4% (59/146)	38.6% (10/26)	40.8% (49/120)	0.8	
Age (years)					
<35	39.7% (58/146)	23.0% (6/26)	43.3% (52/120)	0.05	
[35-65]	54.7% (80/146)	61.5% (16/26)	53.3% (64/120)	0.4	
≥65	5.4% (8/146)	15.3% (4/26)	3.3% (4/120)	0.04	4.18 (1.04 - 16.8)
Comorbidities					
Hypertension	63.6% (93/146)	53.8% (14/26)	65.8% (79/120)	0.24	
CKD	23.9% (35/146)	15.3% (4/26)	25.8% (31/120)	0.25	
HIV	8.2% (12/146)	38% (1/26)	9.1% (11/120)	0.3	
Clinical Signs					
Hypertension	64.3% (94/120)	46.1% (12/26)	68.3% (82/120)	0.1	
Edema	44.5% (65/146)	42.3% (11/26)	45.5% (54/120)	0.3	
Coma	30.1% (44/146)	57.6% (15/26)	24.1% (29/120)	0.008	7.14 (1.6 - 30.8)
Dehydration	12.3% (18/146)	23.1% (6/26)	10% (12/120)	0.06	
Lung edema	6.8% (10/146)	3.8% (1/26)	7.5% (9/120)	0.8	
Blood pressure grade					
1	14.9% (14/94)	19.2% (5/26)	13.2% (9/68)	0.06	
2	42.5% (40/94)	11.5% (3/26)	54.4% (37/68)	0.05	0.29 (0.08 - 1.03)
3	42.5% (40/94)	15.3% (4/26)	52.9% (36/68)	0.13	
Biology					
Elevated CRP	93.3% (127/136)	92.3% (24/26)	85.8% (103/120)	0.7	
Hypocalcemia	70.1% (54/146)	26.9% (7/26)	39.1% (47/120)	0.6	
Hyponatremia	68.7 (99/144)	65.3% (17/26)	39.1% (47/120)	0.51	
Hb < 8	57.5% (84/146)	50% (13/26)	59.1% (71/120)	0.61	
Hyperkalemia	28.1% (41/146)	42.3% (11/26)	25% (30/120)	0.06	
Acute Kidney Injury	24.6% (36/146)	42.3% (11/26)	20.8% (25/120)	0.02	2.7 (1.1 - 6.8)

The outcome was favorable in 82.2% and death observed in 17.8%. Kidney function stabilized in 71.9% and normalized in 10.2%. In univariate analysis, age > 65 years (p = 0.04), coma (p = 0.004) and acute acute kidney injury (p = 0.02) were associated with the risk of death (**Table 1**).

In multivariate analysis, only coma seemed to be associated with the risk of mortality in our patients (**Table 2**).

Table 2. Risk factor for death after multivariate logistic regression analysis.

Variables	<i>P</i>	OR	IC (95%)
Age > 65 ans	0.2	0.4	0.07 - 1.8
AKI	0.2	0.5	0.18 - 1.3
Coma	0.02	5.8	1.2 - 33.3

4. Discussion

This work describes the profile of patients undergoing their first hemodialysis session in an emergency situation. The majority of these were young adults. Our results are similar to those found by Yaya Kane *et al.* in Senegal [10] who noted an average age of 41.3 years. On the other hand, our patients seemed younger than those of Dali Youcef *et al.* in Algeria [11] who had found a medium age of 57.8 ± 16 years. This difference could be explained by the difference in life expectancy which seems to be higher in Maghreb.

The male predominance observed in our work is found in all the African series [11] [12]. This could be explained by the predominance of Kidney disease in men.

The comorbidities were dominated by hypertension found in one out of ten patients, followed by HIV infection. Fayrouz Zemed *et al.* observed hypertension in 46% of cases in Morocco in 2017 [13]. In our context, hypertension followed by HIV infection is the two main risk factors for chronic renal failure [14].

Almost one in four patients (24%) had a known CKD. The fact that the latter begin their hemodialysis sessions under emergency conditions could be explained by the high cost of treatment and/or the availability of centers. This would be added the refusal to accept the disease in some cases.

The clinical signs vary according to the departments in which the studies are carried out. Thus, the hypertensive surge observed in six out of ten patients in our study is a common situation in nephrology. In intensive care settings, neurological disorders are frequent and may affect eight out of ten patients as observed by Fayrouz Zemed *et al.* [12].

CKD was predominant and found in over two-thirds of our patients. In Algeria, Dali Youcef [11] noted a predominance of AKIs with 65%. This difference could be explained by the difficulty of access to hemodialysis by patients in our context. This difficulty could be attributable not only to the high cost of dialysis in private centers but also to the availability of public centers, which remains limited.

The probable etiologies of CKD were dominated by CGN with 70.91% of cases. Our results corroborate with those of the numerous studies that show a high proportion of CGN in the aetiologies of especially in our context [14].

In our study, the indications for hemodialysis were dominated by uremic encephalopathy and severe uremia. Other authors [11] [15] have reported hyperkalemia and anuria as the main indications for emergency dialysis. This difference could be explained by the predominance of CKD cases in our study

versus a predominance of AKIs in these studies.

The catheter is the main vascular access for emergency hemodialysis, as reported by various authors [11] [12] [13] [15]. The installation site varies according to the habits of the services. Thus, the femoral catheter was the most used followed by the jugular catheter in our patients. Dali Youcef *et al.* [11] reported the femoral catheter in 72.5%, the site in 15% and the AVF in 12.5%.

The mortality of 17.80% in our series was lower than that observed in the Moroccan series, respectively 32.2% [13] and 70% [15].

The high proportion of CKD cases in our work and the comorbidities of the patients could explain this difference. When analyzing the cases of AKI in our patients, mortality was in the order of 30.55%. In the sub-Saharan African series, mortality varies between 34.1% [16] and 42.1% [10] in the event of AKI. Globally, AKI-related mortality can reach 50% according to some meta-analyses and this mortality could be higher in the absence of hemodialysis [6] [17].

On univariate analysis, age > 65 years, coma, and AKI appeared to be risk factors for mortality. But in multivariate analysis, only coma was significantly linked to death. Talbi Sofia *et al.* [13] reported that hyperkalaemia was significantly associated with death in emergency hemodialysis AKIs. In the study by Suter Mendonça *et al.* [18], age \geq 65 years was a risk factor for death in AKI.

5. Conclusions

Hemodialysis in an emergency is a common practice at the Yopougon University Hospital. Our patients were predominantly young with a predominance of men. Almost all of the patients were hospitalized for various reasons dominated by neurological disorders and edema. The main physical signs were hypertension, edema and coma. Apart from very high urea levels and serum creatinine, anemia and inflammatory syndrome were found in almost all of our patients.

CKD cases were predominant and found in three out of four patients with CGN as the main initial nephropathy. Uremic encephalopathy dominated the indications for the hemodialysis session. The femoral catheter was the most widely used vascular access.

Mortality was 17.80% and higher in AKI cases. Coma seems to be a factor of poor prognosis.

It turns out that emergency hemodialysis is a critical situation especially for AKI cases. It is therefore imperative to be prompt in performing hemodialysis.

Limitations of the Study

Our study had limitations due to its retrospective nature. The information sought in the clinical records of patients was sometimes not complete.

Conflicts of Interest

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

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Appendix

Standardized Survey Sheet

Hospitalization file number:

1) DEMOGRAPHIC DATA

Age: Years Sex: M F

Level of study: primary secondary University illiterate

Profession:

2) CLINICS

Reason for admission

Antecedents

Hypertension: Yes No

Diabetes: Yes No ; CKD: Yes No ; HIV: Yes No

Taking toxic substances: Tobacco: Yes No ; alcohol: Yes No ;

Traditional medicines: Yes No ; NSAIDs: Yes No ,

Exams

State of consciousness: State of hydration:

Blood pressure:mmHg

3) BLOOD BIOLOGY

WBC /mm³, Hb: g/dL, Platelets: ×10³/mm³, Urea g/L

Creatininemg/L, CRP:mg/L, Na⁺:mEq/L, Ca²⁺:mg/L,

K⁺:mEq/L

4) DIAGNOSTIC

Acute Kidney Injury: Yes No if yes type:

Chronic Kidney Disease: Yes No if yes type:

5) TREATMENT

Hemodialysis

HD indication:

Vascular access:

Number of sessions:

Other treatments

Blood Transfusion: Yes No

Antibiotic therapy: Yes No

6) EVOLUTION

Healing: Yes No

Stabilization: Yes No

Death: Yes No if Yes cause:

Duration of hospitalization: