

Obstetric Acute Renal Failure: Epidemiological, Clinical, Therapeutic and Evolutionary Aspects in Intensive Care at the Owendo University Hospital Center, Gabon

Arthur Matsanga^{1*}, Arsène Ifoudji Makao², Raphaël Okoué Ondo³, Leslie Vanessa Sagbo Ada¹, Charlène Okome², Fernande Manga², Gérald Mba Edou⁴, Aimé Vemba¹, Nathan Ekegue¹, Bertrand Mpiga Mickoto¹, Ervais Richard Obame¹

¹Department of Anesthesia and Intensive Care, Emergency Department, Owendo University Hospital, Owendo, Gabon

²Department of Anesthesia and Intensive Care, Emergency Department, Libreville University Hospital, Owendo, Gabon

³Department of Anesthesia and Intensive Care, Emergency Department, Libreville Military Teaching Hospital, Owendo, Gabon

⁴Department of Gynecology and Obstetrics, Owendo University Hospital, Owendo, Gabon

Email: *matsangaarthur@yahoo.com

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Abstract

Introduction: Obstetric acute kidney injury (AKI) is a rare but serious complication responsible for significant morbidity and mortality. The objective of this study was to describe the epidemiological, etiological, and evolutionary aspects of AKI in women in labor admitted to the intensive care unit of Owendo University Hospital (CHUO). **Materials and Methods:** This was a retrospective descriptive study conducted over a two-year period. Patients admitted to intensive care for obstetric complications and presenting with AKI according to the KDIGO classification were included. Medical records and treatment reports were used for data collection. Sociodemographic, clinical, biological, therapeutic, and etiological parameters were analyzed. **Results:** One hundred and fifty-three cases of obstetric pathologies were collected, including 20 cases (13%) of acute kidney injury (AKI). The mean age was 29.2 ± 6.2 years. Sixteen women (80%) were multiparous. The main etiologies were severe pre-eclampsia in 14 cases (70%) and hemorrhagic shock in 4 cases (20%). Oliguria/anuria was present in 6 patients. According to the KDIGO classification, 17 patients (85%) were classified as KDIGO 1. Management consisted of fluid resuscitation (70%), diuretic administration (15%), and renal replacement therapy (5%). Seventeen patients achieved complete recovery. The mortality rate was 10%. **Conclusion:** Obstetric AKI accounts for 13% of cases in the intensive care unit of Owendo University Hospital. Severe pre-eclampsia

and hemorrhagic shock are the main causes.

Keywords

Acute Renal Failure, Obstetrics, Intensive Care

1. Introduction

Obstetric acute kidney injury (OAI) is a sudden and transient alteration of kidney function occurring during pregnancy or the perinatal period [1]. It constitutes a diagnostic and therapeutic emergency responsible for significant morbidity and mortality [2]. OAI corresponds to a sudden and reversible drop in glomerular filtration rate, leading to the kidneys' inability to eliminate nitrogen degradation products (creatinine, urea, uric acid) and to regulate acid-base, electrolyte, hormonal, and osmotic balance. Unlike in developed countries, the incidence of OAI in sub-Saharan Africa remains very high, on the order of 20 to 25% [3]. The main causes are septic abortions, poor pregnancy monitoring, and inappropriate management of pregnancy complications [4]. Very few studies have been carried out on this issue in Gabon, hence the interest of this study, which aimed to describe the epidemiological, clinical, therapeutic, and evolutionary aspects of obstetric acute renal failure in patients admitted to the intensive care unit of the Owendo University Hospital Center (CHUO).

2. Materials and Methods

This was a retrospective descriptive data collection study conducted over a 23-month period, from January 1, 2023, to November 31, 2024, in the intensive care unit of Owendo University Hospital. All patients admitted to the ICU for obstetric complications who presented with acute kidney injury according to the Kidney Disease Improving Global Outcomes (KDIGO) classification were included. Patients with pre-existing nephropathy prior to pregnancy and those with incomplete or unusable records were excluded. A data collection form was developed for this study. The hospitalization register, medical records, and patient treatment records were used as data sources. The variables studied were sociodemographic, obstetric history, mode of delivery, reason for admission, clinical and biological data, treatments and outcomes.

Operational definition of terms

Acute kidney injury (AKI) has been defined and classified according to the KDIGO criteria as a sudden or rapidly progressive impairment of renal function [5].

Obstetric acute kidney injury (AKI) is defined as AKI occurring during pregnancy, childbirth, or within six weeks postpartum [6].

Preeclampsia is defined as hypertension occurring after 20 weeks of gestation associated with proteinuria ≥ 300 mg/24 h [7].

KDIGO criteria

Stage 1: Plasma creatinine ≥ 26.5 $\mu\text{mol/L}$ or 1.5 to 1.9 times baseline plasma creatinine (Diuresis < 0.5 mL/kg/h for 6 to 12 hours)

Stage 2: Plasma creatinine: 2.0 to 2.9 times baseline plasma creatinine (Diuresis < 0.5 mL/kg/h for ≥ 12 hours)

Stage 3: Plasma creatinine: 3.0 times baseline plasma creatinine or plasma creatinine ≥ 354 $\mu\text{mol/L}$ or initiation of renal replacement therapy (Diuresis < 0.3 mL/kg/h for ≥ 24 hours or anuria for ≥ 12 hours)

Data entry and analysis were performed using SPSS Statistics 23.0 software from IBM. The results were expressed as numbers, means, extremes, and percentages. The significance of the association was verified using Pearson's Chi-squared test with a significance threshold defined as a p-value less than 0.05. Permissions were obtained from the authorities at Owendo University Hospital Center.

3. Results

During the study period, 153 patients were admitted to the intensive care unit for obstetric complications. Among them, 20 patients presented with obstetric acute kidney injury, representing a prevalence of 13%. The mean age of the patients was 29.2 ± 6.2 years, with a range of 18 to 45 years. Ten patients (50%) were between 26 and 35 years old. Unemployed patients represented 55% of the population, and 80% of the women had health insurance (**Table 1**).

Table 1. Sociodemographic data of patients.

Data	Workforce (n)	Percentage (%)
Age ranges		
16 - 25	6	30
26 - 35	10	50
36 - 45	4	20
Occupation		
None	11	55
Students	6	30
Civil servants	2	10
Shopkeeper	1	5
Medical insurance		
None	4	20
Insured	16	80

Regarding medical history, 3 patients (15%) had known hypertension, 2 of whom had previously experienced gestational hypertension. The mean parity was 2.11, ranging from 1 to 6 parities, with a predominance of multiparous women (80%), followed by primiparous women (10%) and pauciparous women (10%).

Concerning the pregnancy in question, 12 patients (60%) had received good prenatal care, with 4 or more prenatal visits. A history of cesarean section was found in 20% of cases and of myomectomy in 5%. Delivery was vaginal in 6 patients (30%) and by cesarean section in 14 patients (70%). Cesarean sections were indicated for severe preeclampsia in 10 patients (50%), for Eclampsia in 3 patients (15%) and retroplacental hematoma in 1 patient (5%). Deliveries were complicated by 6 cases of oliguria/anuria (30%) and 4 cases (20%) of hemorrhagic shock due to uterine atony. Clinically, the main symptoms presented by patients upon admission to the intensive care unit were headaches and blurred vision, in 60% and 20% of cases, respectively. General examination revealed conjunctival pallor in 9 patients (45%) and pitting edema of the lower limbs (45%). Hemodynamically, a systolic blood pressure (SBP) ≥ 180 mmHg was found in 13 patients (65%), and a heart rate (HR) greater than 100 beats per minute in 14 patients (70%). Diuresis was quantified in all patients. It averaged 390 ml/24 h, with a range of 0 - 2100 ml/24 h. Oligo-anuria was noted in 6 patients upon admission. Clinical data are presented in **Table 2**.

Table 2. Clinical data of patients.

Data	Workforce (n)	Percentage (%)
Functional signs		
Headache	12	60
Blurred vision	4	20
Conjunctivae		
Pale	9	45
Normal color	11	55
Systolic blood pressure		
SBP < 90 mmHg	2	10
$100 \leq \text{SBP} \leq 139$ mmHg	0	0
$140 \leq \text{SBP} \leq 159$ mmHg	1	5
$160 \leq \text{SBP} \leq 179$ mmHg	4	20
PAS ≥ 180 mmHg	13	65
Others signs		
Oligoriuria/Anuria	6	30
3+ proteinuria	15	75

Renal function assessment revealed a mean blood urea nitrogen (BUN) level of 8.02 mmol/L (range: 2.16 mmol/L to 65.12 mmol/L) and a mean serum creatinine level of 128 $\mu\text{mol/L}$ (range: 60 $\mu\text{mol/L}$ to 2578 $\mu\text{mol/L}$). Blood electrolytes showed hyponatremia in 15% of cases, and hyperkalemia with a potassium level of 6 mmol/L was found in 5 patients (25%). According to the KDIGO classification, stage 1 represented 85% of the acute renal failure (ARF) cases. Renal ultrasound was performed in 3 patients (15%). Kidney size was normal, with good cortico-

medullary differentiation in all. The patients. The pathologies implicated in the occurrence of obstetric acute renal failure (ARF) were preeclampsia and its complications, including: severe preeclampsia (35%), eclampsia (15%), HELLP syndrome (25%), placental abruption (5%), and hemorrhagic shock (20%). Therapeutically, fluid resuscitation with crystalloids, with a mean volume of 2000 ± 750 ml, was performed in 70% of cases. Antihypertensive treatment with nicardipine via syringe pump combined with beta-blocker was administered to 16 patients (80%). Furosemide was administered at a dose of 40 mg every 8 hours to 6 patients (30%), and packed red blood cell transfusions were also administered. A blood coagulation study was performed in 7 patients (35%). Vasoactive amines were administered in 25% of cases. Extracorporeal renal replacement therapy was performed in 3 patients (15%). The mean length of hospital stay was 4.05 ± 2.62 days. Complete recovery of renal function was achieved in 90% of cases. We recorded 2 deaths, representing a mortality rate of 10%. Hemorrhagic shock ($p = 0.007$) and KDIGO stage 2 ($p = 0.004$) were poor prognostic factors (**Table 3**).

Table 3. Prognostic factors.

Variables	Dead	Survive	p-value
Preeclampsia and complications	0	15	-
Hemorrhagic shock	4	1	0.007
KDIGO 1	0	17	-
KDIGO 2	2	0	0.004
KDIGO 3	0	1	-

4. Discussion

This study has some limitations, namely its single-center design and its implementation in the intensive care unit of a hospital specializing in trauma. But also the lack of kidney function assessment during prenatal monitoring of pregnancies. Despite these limitations, obstetric acute kidney injury (AKI) is a serious and frequent complication in developing countries, as evidenced by this study where the prevalence is 13%. This prevalence is similar to that found by Beye SA *et al.* in Mali (12.4%) [8], Tondi *et al.* in Niger (14.95%) [9], and is significantly higher than that reported by Fatimetou Abdelkader *et al.* in Mauritania (6.09%) [10]. The high frequency of AKI found in this study could be explained by delayed management of preeclampsia and inadequate prenatal care, which in our country is primarily provided by midwives in maternal and child health centers. and referring women to University Hospitals only at the last minute. The study population had a mean age of 29 ± 6.23 years. The 26 - 35 age group was the most affected. This result is consistent with those reported in studies conducted in Mauritania [9] and Brazil [10], where the authors reported mean ages of 29.52 years, $30.55 \text{ years} \pm 6.47$ years, and 30 ± 7.4 years, respectively. The explanation would be related to the ages at which procreation is most prevalent. The majority of patients in this

study were multiparous (80%). This percentage is higher than the data from the Brazilian (69.2%) [11] and Malian (54.1%) [12] series. The variations between these different studies can be explained by the sociocultural characteristics specific to each population and the early age of marriage in Africa. Hypertension (80%), lower limb edema (45%), and oliguria/anuria (30%) were the main signs found in this study. These data are consistent with those found in the literature [13]-[15]. Severe preeclampsia (35%) was the main cause found in this work. It remains the main cause of obstetric acute renal failure reported by several authors, with frequencies varying across studies. Acute kidney injury (AKI) has been associated with obstetric hemorrhage in 19% of cases according to Miguil *et al.* and in 60.7% of cases according to Mahamat Abderraman *et al.* [15] [16]. In this study, prolonged renal hypoperfusion and acute tubular necrosis were implicated in the development of AKI. The biological markers of renal function measured were blood urea and creatinine. The mean serum uric acid level was 0.48 g/L, lower than that reported by some authors [13]-[15]. The mean serum creatinine level was 27 mg/L (range: 11 to 114 mg/L), comparable results. to those published by Beye SA *et al.* (24.8 mg/L) [8], but significantly lower than those published in the Mauritanian study (46.29 mg/L) [10]. Medical treatment of AROI remains primarily symptomatic. It has relied mainly on fluid resuscitation (70%) and a Intermittent administration of diuretics (15%) to stimulate diuresis. Furosemide, although widely used to stimulate diuresis to overcome the oliguria of acute renal failure, does not accelerate the recovery of renal function or reduce maternal mortality or the need for hemodialysis [10]. Its use can even be dangerous by inducing forced diuresis, which may lead to renal hypoperfusion due to hypovolemia and sodium depletion that was adjusted to the hemodynamic profile [16]. Favorable outcomes toward recovery and complete renal function restoration were observed in 90% of patients. This result is comparable to that of Beye SA *et al.* [8] with 75.4% and significantly higher than that of Fatimetou Abdelkader *et al.* [10] with 40.2%. The mean length of hospital stay was 4.05 ± 2.62 days, with a range of 1 to 16 days, which is lower than reported in the literature [17] and could be explained by the early diagnosis and management, and especially by the patients' KDIGO stage. The mortality rate (10%) was high, as in most studies. KDIGO stage 2 and hemorrhagic shock were the poor prognostic factors identified, with a statistically significant association ($p = 0.004$).

5. Conclusion

Obstetric acute kidney injury (AKI) is a frequent peripartum complication. It constitutes a diagnostic and therapeutic emergency. Young, multiparous women are most affected. Severe preeclampsia and hemorrhagic shock are the main etiologies identified in this study. Management of AKI includes, among other things, etiological treatment, administration of volume replacement fluids to restore blood volume, and sometimes hemodialysis. Obstetric AKI is responsible for significant morbidity and mortality in our setting. Rapid, multidisciplinary management im-

proves renal prognosis.

Conflicts of Interest

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

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