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Postpartum Acute Renal Failure: Experience of the Maternity Ward at the Ziguinchor Regional Hospital Center over a 3-Year Period

Mamadou Aw Ba, Cheikh Ahmed Tidjiane Koulibaly, Yaya Kane

Nephrology and Hemodialysis Department, Ziguinchor Regional Hospital Center, Assane Seck University of Ziguinchor, Ziguinchor, Senegal
Email: mmadouaw.ba19@gmail.com

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Abstract

Introduction: Postpartum acute renal failure (PP-AKI) is responsible for significant maternal and fetal morbidity and mortality. It remains very high in developing countries, where it is around 15% to 20%. The objectives of our study were to determine the prevalence and the epidemiological, clinical, therapeutic, and evolutionary aspects of Postpartum acute renal failure. **Patients and Methods:** This was a retrospective descriptive and analytical study covering a three-year period (January 1, 2019, to December 31, 2021) conducted at the maternity ward of the Ziguinchor Regional Hospital. The study included all records of patients admitted to the maternity ward in the postpartum period who presented with acute renal failure. The KHI2 test or FISHER test was used to study the correlation of each element with mortality. **Results:** Eighty-one patients were included during the study period, representing a hospital prevalence of 5.08%. The average age of the patients was 28.19 years. High blood pressure was noted at 50.6%, and herbal medicine was used at 25.9%. The average number of pregnancies and births was 3 each. Prenatal consultations were performed in 28.9% of cases. The average blood urea level was 0.87 g/L, and the average creatinine level was 35.5 mg/L. Retroplacental hematoma was the most common etiological factor in 27.2% of cases, followed by preeclampsia in 24.7%. The outcome was favorable, with complete recovery in 66.7%, partial recovery in 8.7%, and no recovery in 2.5%. Death occurred in 24.6% of cases. Preeclampsia, altered consciousness, respiratory distress, and anuria were significantly associated with maternal mortality. **Conclusion:** The prevalence of PP-AKI remains low in our study. It is a factor in maternal and fetal morbidity and mortality. The factors associated with this mortality have been identified. Hence, the importance of good prevention.

Keywords

AKI, Postpartum, Ziguinchor

1. Introduction

Postpartum acute renal failure (PP-AKI) is defined as the onset of renal failure in the period from delivery to three months postpartum [1]. It is caused by several factors, including preeclampsia (with or without HELLP syndrome), following an obstetric catastrophe (such as retroplacental hematoma (RPH), intrauterine fetal death (IUFD), placenta previa, uterine rupture, amniotic fluid embolism, postpartum hemorrhage), pyelonephritis, or pregnancy-related hepatic steatosis [2].

It is responsible for significant maternal and fetal morbidity and mortality. Its prevalence varies from year to year, but it also depends on the socioeconomic status of countries. This prevalence has fallen dramatically over the past 20 years in developed countries with improvements in care, particularly resuscitation. However, it remains very high in developing countries, where it is around 15% to 20% [3].

Globally, prevalence data cannot be interpreted without taking into account the geographical context in which they were collected [4].

In France, PP-AKI has become an exceptional complication of pregnancy. It now accounts for only a tiny percentage of AKI in adults (less than 1.5% in the 1990s and 2000s, compared with 20% - 50% in the 1950s and 1970s) [2]. In Brazil, the prevalence in 2009 was 0.08%.

In Africa, although the prevalence of PP-AKI remains high, few studies have been conducted. In South Africa, Randeree *et al.* found a prevalence of 16% [5]. In Niger, Tondi *et al.* found a prevalence of 14.95% in 2016 at the ISSAKA GAZOBY maternity hospital in Niamey [6]. In Senegal, two studies at HALD and Ziguinchor found prevalences of 4.65% [7] and 13.54% [8].

2. Patients and Methods

This was a retrospective descriptive and analytical study covering a three-year period from January 1, 2019, to December 31, 2021, at the maternity ward of the Ziguinchor Regional Hospital Center. The records of patients admitted to the maternity ward in the postpartum period and presenting with acute renal failure, with a usable record, were included in the study. A data collection form was created, and data were collected from the hospitalization registry, medical records, biological monitoring sheets, and prescription forms. The form provided information on identity (age, geographical origin, etc.), comorbidities (high blood pressure (HBP), diabetes, herbal medicine use, gestation, parity, number of abortions, eclampsia, preeclampsia, HRP, placenta previa, etc.), clinical signs (clinical anemia, acute uremic syndrome, anuria, jaundice, etc.), biological data (hemoglobin level, creatinine level with GFR calculation according to MDRD, 24-hour proteinuria, etc.), radiological data (renal ultrasound to assess size and differentiation, etc.),

etiological data (postpartum hemorrhage, infection, etc.) and therapeutic data (conservative treatment, dialysis, etc.) and evolutionary data (maternal and fetal prognosis with favorable (partial or total recovery) or unfavorable (progression to chronicity) or death).

The definition of AKI according to the 2012 KDIGO classification was used, taking into account creatinine levels and urine output.

Data entry and processing of tables and figures were performed using MICROSOFT Word and Excel 2013© software. Data analysis was performed using Epi Info version 7.2.5.0 software. The analytical study was performed using cross-tabulation. To study the correlation of each element with mortality, the KHI2 test was used with a significance threshold of 0.05.

3. Results

During the study period, 3367 patients were admitted to the department, of whom 171 had PP-ARF, with 81 cases being analyzed, representing a hospital prevalence of 5.08%. The files of 90 patients were unusable because they lacked a lot of information relating to diagnosis and treatment. The average age of the patients was 28.19 years, with extremes of 16 and 45 years. Of the 81 patients, 5 were from the sub-region (4 from Guinea-Bissau and 1 from Gambia), representing 6.1%, and 76 patients were from the country, representing 93.9%. Regarding medical history, 50.6% of patients had high blood pressure, 2.5% had diabetes, 6.1% had used herbal medicine, 21% had used contraception, and 25.9% had used herbal medicine. The average number of pregnancies was 3, with extremes of 1 and 9, and 55.5% of patients had between 2 and 3 pregnancies. The average parity was 3, with extremes of 0 and 9, and 42% of patients were multiparous. Regarding prenatal care (PNC), 23 patients had at least 4 PNCs, or 28.9%, and 8 had unmonitored pregnancies without any PNCs, or 9.9%. The clinical manifestations were dominated by clinical anemia in 13 patients (16%), followed by anuria in 38 patients (46.9%) and acute respiratory distress in 15 patients (18.5%) (Table 1).

Table 1. Distribution of patients according to sociodemographic data.

Sociodemographic and Clinical Data	Proportions (%)
Comorbidities and medical history	
• High blood pressure	50.6
• Diabetes	2.5
• Heart disease	2.5
• Previous cesarean section	6.1
• Contraception	21
• Herbal medicine	25.9

Continued

Gestation	
• 1 - 2 Gestations	55.5
• 3 - 4 Gestations	23.5
• ≥5 Gestations	21
Parity	
• Nulliparous	4.9
• Primiparous	34.6
• Multiparous	42
• Grand multiparous (more than 5 births)	18.5
Prenatal consultations	
• 0 - 2	14.9
• 2 - 4	83.7
• >4	1.4
Clinical manifestations	
• Clinical anemia	16
• Anuria	46.9
• Jaundice	18.5
• Convulsions	2.5
• Edema of the lower limbs	24.7
• Urinary irritation syndrome	2.5
• Acute uremic syndrome	32.1
• Obnubilation	30.9
• Acute respiratory distress	18.5

Regarding paraclinical data, the average hemoglobin level was 8.7 g/dl, with extremes of 2.9 and 13.6 g/dl. Severe anemia was noted in 23 patients (28.4%) with hemoglobin levels below 7 g/dL. The mean creatinine level was 3.55 mg/dl, with extremes of 16 and 150 mg/L. The mean ASAT level was 163.722 IU/L, the mean ALAT level was 153.869 IU/L, and 18 patients (22.2%) had elevated transaminase levels. The mean potassium level was 4.36 mEq/L, and 26% of patients had hyperkalemia (Table 2).

Table 2. Distribution of patients according to biological data.

Biologicals Data	Means	Proportions (%)
• Hemoglobin	8.7 g/dl (2.9 - 13.6 g/dl)	
• Creatinine	3.55 mg/dl (1.6 - 15.0 mg/L)	
• Blood urea	87 mg/dl (15 - 490 mg/dl)	
• Potassium	4.36 mmol/L (1.10 - 7.50 mmol/L)	
• Sodium	136 mmol/L (115 - 160 mmol/L)	
• Calcium	71 mg/L (60 - 84.1 mg/L)	
AKI KDIGO		
Stage 1		25
Stage 2		30
Stage 3		45

The etiological factors of AKI were dominated by retroplacental hematoma (RPH) in 22 patients (27.2%), followed by preeclampsia in 20 patients (24.7%) and placenta previa in 6 patients (7.1%). Regarding fetal prognosis, 26 newborns were alive and well (32.1%), 17 were premature (21.0%), and 36 neonatal deaths were recorded (44.4%). For treatment, 29 patients were admitted to intensive care (35.8%). Five patients underwent dialysis, representing 6.2%, and the average number of sessions was 5, with extremes of 3 and 7. The indications noted were the isolated or non-isolated onset of acute renal failure, anuria, poorly tolerated uremia, or life-threatening hyperkalemia. The outcome was favorable in 54 patients (66.7%) with resumption of diuresis and normal renal function, unfavorable in 7 patients (8.7%), with partial recovery in 5 patients (6.2%), and progression to chronicity in 2 patients (2.5%). Death occurred in 20 patients (24.6%). The causes of death were septic shock in 8 patients (9.8%), hemorrhagic shock in 7 patients (8.6%), acute pulmonary edema in 3 patients (3.7%), and severe hyperkalemia in 2 patients (2.5%) (Table 3).

Table 3. Distribution of patients according to etiological data and prognosis.

Etiological Data, Prognoses	Proportions (%)
Etiological data	
• Preeclampsia	24.7
• HRP	27.2
• Placenta praevia	7.4
• Retained dead fetus	1.2

Continued

• Postpartum hemorrhage	4.9
• ROM at 28 weeks of gestation	1.2
• Hemorrhagic abortion	2.5
• Nephrotic syndrome	1.2
Fetal prognoses data	
• Prematurity	21
• Live births	32.1
• Abortions	2.5
• Deaths	44.4
Progressive data maternal	
• Favorable with full recovery FR	66.7
• Partial recovery	6.2
• Chronicity	2.5
• Death	24

Regarding analytical data, preeclampsia was significantly associated with mortality (p = 0.025), as were altered consciousness (p = 0.0001), anuria (p = 0.00001), and OAP (p = 0.048) (Table 4).

Table 4. Statistically significant correlations between data and mortality.

Age + Etiological Factors	Death		Total	P
	No	Yes		
Altered consciousness	11 (44%)	14 (56%)	25 (100%)	**0.0001**
Anuria	3 (7.9%)	35 (92.1%)	38 (100%)	**0.00001**
Preeclampsia	9 (45%)	11 (55%)	20 (100%)	**0.025**
Acute pulmonary edema	7 (46.7%)	8 (53.3%)	15 (100%)	**0.048**

4. Discussion

Several studies on PP-AKI have been conducted in Senegal. Ka in 1996 and Tall in 2011 found prevalences of 3.75% [7] and 4.65% [8], respectively. Another study conducted in 2019 in two hospitals in the Ziguinchor region found a very high prevalence of 13.54% in intensive care units [9].

In developing countries, the prevalence of PP-AKI is very high, varying between

7.8% and 36.20% [10] [11]. In contrast, in developed countries, it is currently low, at around 2% to 3%, compared to 20% to 40% in the 1950s and 1960s [2].

The high prevalence in our regions can be explained by poor pregnancy monitoring with a lack of quality antenatal care, delays in treatment, or a lack of monitoring of women in the immediate postpartum period, and limited medical facilities with a lack of treatment for obstetric complications in developed countries.

Anuria was the most common clinical manifestation of ARF, occurring in 46.9% of cases. This finding is consistent with the majority of studies, notably those by Prakash and Selcuk, in which it was present in 85.88% [12] and 85.88% [13] of cases, respectively. This high rate of oligo-anuria is explained by the very high frequency of post-hemorrhagic ischemic acute tubular necrosis in our series, which is associated with delayed diagnosis.

Hemorrhagic causes were predominant in 44.48% of cases, with HRP accounting for 27.20%, hemorrhagic placenta previa in 7.4%, and postpartum hemorrhage in 9.88%. Among non-hemorrhagic causes, severe preeclampsia was noted in 24.7%. In Senegal, three previous studies had found similar results with a predominance of preeclampsia, notably those by Bennani (92.50%) [14], Tall (56.20%) [8], and Hmima (70.96%) [9]. The figures reported in various African studies confirm the predominance of preeclampsia as the main etiology. Khellaf in Algeria reported a rate of 80% for preeclampsia [15] and Ghezaiel in Tunisia reported a rate of 63% [16].

Hemodialysis was used in 6.2% of patients. These results are consistent with other studies conducted in Senegal, notably those by Bennani and Tall, where dialysis was used in 47.5% [14] and 57% of cases [8], respectively. It should be noted that in the entire Ziguinchor region, there is only one hemodialysis center at the regional hospital with a capacity of eight beds, which can delay treatment and compromise the renal and even vital prognosis of patients.

In our study, 20 patients died, representing 24.6%. The causes of death were septic shock in 9.8%, hemorrhagic shock in 8.6%, acute pulmonary edema in 3.7%, and severe hyperkalemia in 2.5%. Maternal mortality related to ARF-PP varies between series. In Bennani's study, the mortality rate (30%) was similar to ours [14]. This is identical to that of Hmima (22.58%) [10] and Tall (23.2%) [9]. In Khellaf's series, the mortality rate was lower at 7.40% [17], as was Khalil's in Pakistan, who found a mortality rate of 15% [15]. It is similar to the 8% reported by several studies, with a maternal mortality rate of 15% - 46%. This excess mortality is attributed to sepsis and delayed evacuation of postpartum complications, and sometimes to the lack of appropriate technical facilities for high-quality resuscitation.

5. Conclusion

PP-AKI remains a major problem in our regions, unlike in European countries, where this problem has now been resolved. This high prevalence can be explained in part by the limited level of development, with a lack of medical facilities that meet standards for better patient care, but also by a lack of awareness among our

population, especially with regard to pregnancy monitoring. Addressing these factors will lead to improved maternal and fetal outcomes.

Study Limit

The very high number of unusable files is due to a lack of significant information. Failure to conduct a multi-level analysis could lead to residual confusion.

Conflicts of Interest

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

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