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Predictive Factors for Hemodialysis Requirement in Postpartum Acute Kidney Injury

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INTRODUCTION

Acute kidney injury (AKI) remains a serious and potentially life-threatening complication of pregnancy. While it can occur at any stage of the gravido-puerperal period, its occurrence during the postpartum period is particularly alarming due to its association with severe maternal morbidity and mortality. In high-income countries, postpartum AKI is relatively rare, thanks to improved antenatal and obstetric care. However, its incidence remains high in low-resource settings where access to timely and appropriate care is often limited.

Postpartum AKI not only increases the risk of adverse maternal and neonatal outcomes but may also result in long-term renal sequelae, including progression to chronic kidney disease (CKD). The underlying pathophysiological mechanisms are diverse and multifactorial, encompassing hypertensive disorders of pregnancy (notably severe preeclampsia and eclampsia), postpartum hemorrhage, puerperal infections, disseminated intravascular coagulation (DIC), and hypovolemic or septic shock. These conditions may lead to acute renal hypoperfusion, ischemic damage, or bilateral cortical necrosis. The prognosis is primarily determined by early recognition, clinical severity at presentation, and the promptness of therapeutic intervention.

Renal replacement therapy (RRT), particularly hemodialysis, is often required in severe forms of AKI characterized by fluid overload, severe hyperkalemia, or uremic symptoms. Early identification of predictors for hemodialysis initiation could facilitate timely intervention and optimize both therapeutic strategies and clinical monitoring.

This study aims to identify clinical and biological predictors associated with the need for hemodialysis in patients presenting with postpartum AKI, based on a two-year retrospective cohort at Ibn Rochd University Hospital in Casablanca.

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METHODS

Study Design and Setting

This was a retrospective, descriptive, and analytical study conducted in the Department of Nephrology at Ibn Rochd University Hospital, in collaboration with the departments of Obstetrics and Gynecology, Intensive Care, and Clinical Biology.

Study Period

Data were collected over a 24-month period from January 2022 to December 2023.

Study Population

We included all patients admitted for AKI occurring during the peripartum period (defined from the 28th week of gestation to the end of the postpartum period). Only cases with clearly documented clinical and laboratory-confirmed AKI were retained.

Inclusion Criteria

- Women aged 18 to 45 years
- AKI occurring during the peripartum period, defined by a sudden rise in serum creatinine (> 15 mg/L) and/or oligo-anuria (< 500 mL/24 h)
- Availability of a complete medical record

Exclusion Criteria

- History of pre-existing CKD (eGFR < 60 mL/min/1.73 m² prior to pregnancy or serum creatinine > 13 mg/L before 20 weeks of gestation)
- Known underlying nephropathies (e.g., lupus nephritis, hereditary kidney diseases)
- Incomplete or non-exploitable medical records

Data Collection

Patient data were extracted from medical records and included:

- Sociodemographic data: age, parity, obstetric history
- Pregnancy characteristics: gestational age at AKI onset, mode and place of delivery
- Etiological factors: preeclampsia/eclampsia, postpartum hemorrhage, DIC, puerperal infection, etc.
- Clinical and laboratory parameters at admission: urine output, blood pressure, signs of acute pulmonary edema, serum creatinine, serum potassium, complete blood count, coagulation profile
- Management: medical treatment, hemodialysis initiation, length of hospitalization
- Outcomes: complete renal recovery, death, progression to end-stage kidney disease

Statistical Analysis

Data were analyzed using SPSS version 20.0. Quantitative variables were presented as means ± standard deviations, and qualitative variables as frequencies and percentages. Comparisons between patients who required hemodialysis and those who did not were made using Pearson's Chi-square test for categorical variables and Student's t-test for continuous variables. A p-value < 0.05 was considered statistically significant.

RESULTS

A total of 50 patients were included, all presenting with postpartum AKI. The mean age was 25 ± 5 years (range: 18–39 years). Most patients were primigravidae and primiparous (60%), suggesting a possible association with obstetric inexperience or vulnerability.

The mean gestational age at AKI onset was 34 ± 4 weeks. AKI onset was associated with severe hypertensive disorders in 66% of cases (preeclampsia/eclampsia), followed by postpartum hemorrhage (20%) and DIC (20%), often secondary to severe bleeding or hypertensive crises. Severe puerperal infections accounted for 8% of cases. In 3 cases, no clear etiology was identified.

Clinically, 90% of patients presented with oligo-anuria at admission, including 10 cases of complete anuria (< 100 mL/24 h). The mean serum creatinine level was 60 mg/L. Hyperkalemia (> 5.5 mmol/L) was present in 30% of cases, and acute pulmonary edema in 24%, requiring urgent intervention.

Hemodialysis was initiated in 13 patients (26%). All these patients had persistent oligo-anuria for more than 48 hours. Severe hyperkalemia (> 6.5 mmol/L) was noted in 9 patients, and threatening pulmonary edema in 7. Statistical analysis showed a significant association between hemodialysis requirement and prolonged oligo-anuria ($p < 0.001$), hyperkalemia ($p = 0.007$), and pulmonary edema ($p = 0.015$).

Regarding outcomes, complete renal recovery was observed in 74% of patients. However, 26% had an unfavorable course: 10 patients died, most from multiorgan failure (DIC, sepsis, pulmonary edema), and 8 developed end-stage renal disease requiring long-term nephrology follow-up.

CONCLUSION

Postpartum AKI remains a major cause of maternal morbidity and mortality in our context. A considerable proportion of patients require hemodialysis, and the rates of death and progression to chronic kidney disease are concerning. Simple and accessible clinical and biological markers—such as prolonged oligo-anuria, hyperkalemia, and pulmonary edema—may serve as early predictors of the need for dialysis, allowing for better anticipation and management of severe cases.

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