

Renal failure during pregnancy

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Abstract

Introduction: Acute renal failure in obstetric intensive care units is a diagnostic and therapeutic emergency. It is defined by the elevation during pregnancy of serum creatinine to ≥ 1 mg/dL or a rapid increase (in 48 h) of 0.5 mg/dL above the baseline value.

The aim of our study is to describe the cases of renal failure, as well as to identify the factors associated with a poor prognosis.

Patients and methods: This is a retrospective, descriptive and analytical study, covering a period of 3 years, from January 2021 to December 2023. It was carried out in the obstetric intensive care unit of the Mohammed VI University Hospital Center in Marrakech.

Results: Ninety-nine patients were collected during the study period. The mean age of the patients was 30.55 ± 6.47 years (19 to 47 years). AKI in obstetric intensive care occurred more frequently in multigravida (73.8%) and multiparous (68.7%) patients. The etiologies of AKI in obstetric intensive care were, in order of frequency: pre-eclampsia (43.4%) and its complications, hemorrhagic shock (13.1%), acute hepatic steatosis during pregnancy (6.1%). The evolution was favorable with total recovery of renal function in 51.51%. While 37.3% of patients with partial recovery. Chronic kidney disease was observed in 3 patients. We also noted 2 maternal deaths.

Conclusion: ARF in obstetric intensive care remains common in developing countries (4.2-15%). Pre-eclampsia, HELLP syndrome, eclampsia, hemorrhagic shock and sepsis represent its main etiologies

Keywords: Acute renal failure; pregnancy; Obstetric intensive care

1. Introduction

Acute renal failure in the obstetric context is a sudden and temporary alteration of renal function occurring during pregnancy or during the peripartum period. It is one of the preventable causes of maternal-fetal morbidity and mortality in developing countries (1).

It is characterized by the variability of etiologies and the polymorphism of the pathophysiological mechanisms which are often intertwined, due to the physiological and hormonal modifications which appear during pregnancy (2). Obstetric ARF requires multidisciplinary management combining obstetric, pediatric, nephrological and intensive care measures.

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2. Material and methods

2.1. Type and location of study

This is a retrospective, descriptive and analytical study carried out within the Anesthesia Resuscitation department of the Mother and Child Hospital of the Mohammed VI University Hospital in Marrakech including all patients who presented acute renal failure upon admission or during their stay in obstetric intensive care over a period of 3 years, from January 2021 to December 2023.

2.2. Inclusion criteria

We included all patients who presented with acute renal failure upon admission or during their stay in obstetric intensive care.

2.3. Exclusion criteria

- Patients who do not meet the definition of ARF.
- Patients with CKD.
- Non-pregnant women.
- Unusable files.

2.4. Objective

The objective of this study is to describe the current situation and specify the poor prognostic factors of obstetric AKI.

2.5. Data collection methods

The data were collected from patient files archived in the maternal intensive care unit using a pre-established operating sheet including: anamnestic, clinical, biological, therapeutic and evolutionary data.

The data entry and statistical analysis involved:

A descriptive analysis: qualitative variables were represented by percentages and numbers.

However, quantitative variables were represented by means with their standard deviations.

Bivariate analysis: During this analysis, statistical tests were used, including Fisher's exact test for comparing percentages and Student's t test for comparing means.

The software used during the study was IBM SPSS version 26. The significance threshold was set at 5% ($p \leq 0.05$)

3. Results

3.1. . Socio-demographic characteristics

3.1.1. Frequency

From January 2020 to December 2023, 1806 patients were hospitalized in maternal intensive care.

Ninety-nine of them developed ARF (5.48%).

3.1.2. Age

The mean age of the patients was 30.55 ± 6.47 years with extremes ranging from 19 years to 47 years.

3.2. Gestational period of discovery of ARF

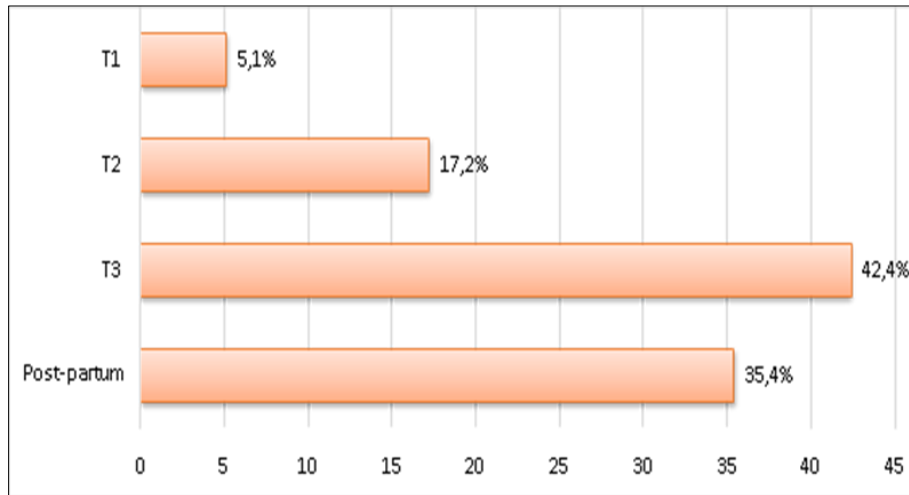


Figure 1 Distribution of patients by trimester

3.3. Causes of hospital admission

The reasons for admission of patients to obstetric intensive care units were dominated mainly by high blood pressure values and convulsive seizures:

- Thirty-eight patients were admitted for high blood pressure (38.4%)
- Twenty-two patients experienced a tonic-clonic seizure (22.2%)
- Twelve patients presented with hemorrhagic shock with Disseminated intravascular coagulation (12.1%)
- Ten patients were hospitalized electrolytic imbalances (10.1%)
- Six patients were admitted for suspected Acute fatty liver pregnancy FLP (6.1%)

3.4. Etiologies

- Severe preeclampsia observed in 43 patients (43.4%).
- HELLP-Syndrome observed in 31 patients (31.3%).
- Eclampsia crisis observed in 26 patients (26.3%).

3.5. Clinical symptoms:

Various clinical signs were observed:

Table 1 Clinical signs

Clinical signs	Number of cases (n = 99)	Percentage (%)
Hypertension	57	57.6
positive urine test	47	47.5
Neurosensory signs (SNS)	36	36.4
Edema	32	32.3
Altered Consciousness	29	29.3
Oligoanuria	28	28.3
Convulsive seizure	18	18.2
Shock state	18	18.2
Cutaneous-mucous jaundice	17	17.2

3.6. Paraclinical Data:

3.6.1. Biology

- The median creatinine value was 46.29 mg/L with extremes from 18.10 to 133 mg/L.
- The median urea value was 1.27 g/L with extremes ranging from 0.22 to 3.93 g/L.
- Hyperuricemia (>5.5 mg/dL) was found in 77 cases (77.8%), with an average of 78.25 mg/L, values ranging between 10 and 195 mg/L.
- The average hemoglobin level in our patients was 9.9g/dL, with a minimum of 3.9g/dL and a maximum of 16.20g/dL.
- Severe anemia (< 8g/dL) was observed in 32 patients representing 32.3%.

3.6.2. Imaging results

In eighty-six of our patients, renal ultrasound revealed no abnormalities (kidneys of normal size with good cortico-medullary differentiation).

3.7. Treatment modalities:

-Thirty-nine patients required extra-renal purification by hemodialysis, their clinical-biological parameters were as follows:

- Oligo-anuria (22.2%)
- Metabolic acidosis (10.1%)
- Hyperkalemia (8.1%)
 - A blood transfusion was necessary in 58.6% of cases.
 - Artificial ventilation was required in 29.3% of cases,
 - In our study, 67 patients were treated with antihypertensive drugs, or 67.7% of cases. The main antihypertensive treatments used were nicardipine and methyldopa.
 - Fifty-one patients were treated with magnesium sulfate (51.5%).
 - Diuresis stimulation by furosemide was used for 40 of our patients (40.40%).

3.8. Evolution

3.8.1. Maternal evolution

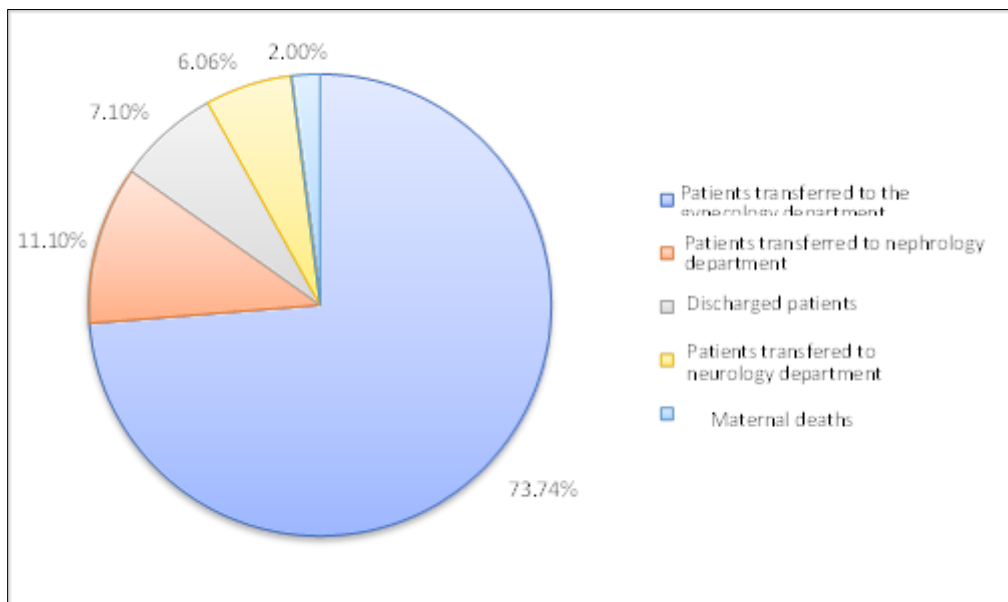


Figure 2 Maternal evolution

3.8.2. Fetal development

The fetal prognosis was favorable in thirty-seven cases. However, twenty-seven intrauterine fetal deaths (31.8%) and twenty-one premature cases (24.7%) were recorded.

3.8.3. Renal evolution

The mean creatinine at discharge was 19.53 mg/L with variations between 2.7 and 89.1 mg/L.

In the 97 surviving patients

- Fifty-one patients completely recovered their renal functions.
- Forty-three patients partially recovered their renal functions.
- However, during the follow-up of some patients in nephrology consultation, 3 patients (3.09%) progressed to CKD.

4. Discussion and literature review:

Worldwide, the incidence of obstetric AKI has declined dramatically over the last five decades from 20-40% to less than 10%. This is due to several factors mainly Preventive: legalization of abortion, reduction of septic complications and improvement of access to care with screening of high-risk pregnancies (5).

However, in developing countries, ARF during pregnancy remains common with an incidence ranging from 4.2 to 15% (7). The absence of systematic screening of high-risk pregnancies and monitoring during pregnancy as well as home births contribute to the occurrence of this condition.

In India, the prevalence of obstetric AKI is 2.78%. This is described despite the promotion and improvement of quality of care (8).

4.1. Clinical features

Almost two thirds of the patients included in this present series were multiparous, in 68.7%. This percentage is in line with the data from the Indian series, which is of the order of 66.67%, and from the Brazilian series (69.2%), compared to a percentage of 52.94 in the Mauritanian series. In our series, the mean gestational age was 29.58 weeks. However, in the Brazilian and French series, it was 32.7 ± 7.6 and 33.5 ± 5.4 , respectively.

As for vaginal delivery: 40.5% of the patients in our study benefited from it. Our results are similar to those of the studies by Abdelkader et al. and Dambal et al. with a percentage of 47.05 and 33.33 respectively.

On admission, hypertension, SNS and edema predominated the clinical picture, they were respectively 57.6%, 36.4% and 32.3%. Physical examination revealed disturbances of consciousness (29.3%), shock (18.2%), jaundice (17.2%) and cutaneous-mucosal pallor (15.2%).

According to Abdelkader et al. in Mauritania, out of 102 cases analyzed, lower limb edema was found in 68.6% of patients, followed by hypertension (66.66%). Shock and impaired consciousness were noted in 7.8% and 6.8% of cases respectively. Jaundice was also encountered with a proportion of 3.9%.

4.2. Biological characteristics

In the present work, the mean creatinine level was of the order of 46.29 mg/L with a maximum value of 133 mg/L and a minimum value of 18.10 mg/L. These results are comparable to those published by Randeree (10), but significantly lower than those published in the Pakistani series (9). This is explained by the variability in the definition of AKI in these studies.

4.3. Imaging

Imaging plays an essential role during renal failure, participating in the differential diagnosis between acute and chronic forms as well as in the etiological diagnosis. In the present work, all patients underwent renal ultrasound. Kidney size was normal in 86.9% of cases. No obstructive cause was revealed. Our results are consistent with those reported by Konate et al., Sqalli et al. and Abdelkader et al., in whom normal renal ultrasound represented a percentage of 97, 91.66 and 83 respectively (9).

4.4. The terms of support

Medical treatment of obstetric ARI remains mainly symptomatic. In the patients in our series, it was based mainly on: extra-renal purification, blood transfusion, mechanical ventilation, antihypertensives, magnesium sulfate, diuretics and vascular filling.

Hemodialysis remains the most widely used method in the replacement treatment of AKI in pregnant women. Other studies have reported the use of continuous ambulatory peritoneal dialysis with satisfactory results (14).

In our series, 39 patients (39.4%) benefited from extra-renal purification by hemodialysis. This percentage is consistent with the data from the Mauritanian study (38.2%).

The Indian study by Prakash et al. showed that 47% of patients also benefited from extra-renal purification. As for the Senegalese study by Lemrabott et al., hemodialysis was used in 57.5% of patients.

4.5. Evolution:

In our series, 51 patients had completely recovered their renal functions when they were discharged from the hospital, in 51.51%. Prakash et al., Dambal et al., Ferreira et al., Lemrabott et al. and Abdelkader et al. reported complete recovery of renal function in 89.5%, 73.3%, 61.5%, 45.9% and 39.21% respectively. Maternal mortality remains a scourge to be combated in developing countries, even if it has clearly decreased in industrialized countries. Currently, it represents less than 10% in Europe and North America (16).

In our present work, the maternal mortality rate was 2%, significantly lower than that of the various studies carried out in underdeveloped countries such as Brazil (38.5%), Senegal (23.3%), Mauritania (9.8%), but higher than that observed in France as a developed country being 9 per 100,000 live births.

The spectacular progress made in developed countries is due to better management of obstetric complications, early management of obstetric haemorrhages, improvement in the quality of care as well as early transfer to intensive care units in so-called tertiary centres and the rapid institution of resuscitation and extra-renal purification measures.

The factors of poor renal prognosis found in our series are represented by: low gestational age, multiparity, low educational level, SNS, cutaneous-mucosal jaundice and recourse to hemodialysis. In addition, other factors have been found in the literature namely: edematous syndrome, severe anemia, oligoanuria on admission, severity of renal damage and abortion.

5. Conclusion

Acute renal failure is a critical situation in obstetrics. It is still common in developing countries, unlike in developed countries. According to our analyses, the main factors of poor renal prognosis were: low gestational age, multiparity, low educational level, presence of SNS, cutaneous-mucosal jaundice and recourse to hemodialysis. Optimizing the maternal-fetal prognosis involves a multidisciplinary approach, with patient care in an experienced obstetrics unit with an adjoining neonatology unit, in close cooperation with the resuscitation and nephrology team. The consequences of ARI in pregnancy strongly encourage us to think about a new reorganization of our resources. They make it essential to implement preventive strategies, in particular the fight against clandestine abortions, better management of obstetric complications, prenatal consultations and, above all, the education of patients by all available means, so that they can become aware of the risks incurred by their fetuses and by themselves.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

Statement of informed consent

Informed consent was obtained from all individual participants included in the study.

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