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Observational Study

Obstetric Renal Failure: Causes, Prognosis, and Evolution

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Abstract

The incidence of obstetric acute renal failure remains significant in developing countries. The aim of our study is to define the risk factors involved in the occurrence of ARF during pregnancy or during the immediate postpartum period and to evaluate its evolutionary profile in terms of epidemiology, etiopathogenesis, and therapeutic management over the years in Morocco. This is a retrospective study conducted in the maternal-infant resuscitation service of the Ibn Rochd University Hospital of Casablanca, over the period from January 2020 to August 2023, including 95 patients. The current incidence in our series over this period was 22.2%. The mean age of our population was 33 ± 7.74 years [18-43 years], 67.3% of patients were in the gestational period, compared to 33.7% in the immediate postpartum period. Fourteen patients were primiparous (8.6%), 27.4% had a history of miscarriage, and 10.7% had a history of pre-eclampsia. Oligo-anuria was initially identified in 24 patients. The most frequent etiology was pre-eclampsia (56.7%), followed by hemorrhage (27%) and sepsis (19.3%). The evolution was marked by recourse to hemodialysis in 62% of cases, with a maternal mortality of 26%. The existence of heart disease, the context of pre-eclampsia, and the use of diuretics and vasoactive drugs were significantly correlated with maternal survival. No factor was correlated with secondary recovery from ARF. The development of health structures and the optimization of screening strategies are the keywords for prevention.

More Information

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Introduction

Obstetric Acute Renal Failure (ARF), occurring during pregnancy or in the immediate postpartum period, is currently a declining entity, although persistent in developing countries, and provider of a significant morbi-mortality [1], so much so that it is the subject of many writings in the literature, and represents a real public health problem. Maternal mortality from all causes in Morocco was 72.6% in the period 2015-2016 [2]. Direct obstetric causes are mainly dominated by hemorrhage (36%) in the first place, followed by pre-eclampsia (19%), reflecting thus, a possible failure of antenatal monitoring systems.

Acute Kidney Injury (AKI) during pregnancy is classified into 3 groups, the 1st half, 2nd half, and postpartum acute kidney failure. Septic and unskilled abortions are the most frequent cause of AKI during the first half. During the second half and postpartum period, eclampsia or preeclampsia, antepartum hemorrhage, placental abruption, puerperal sepsis, postpartum hemorrhage, hemolytic uremic syndrome, elevated liver enzymes, disseminated intravascular coagulation, low platelet levels (HELLP) syndrome, and hemolysis are found to be related to acute kidney failure [3]. Hemolytic uremic syndrome, acute bilateral cortical necrosis, and HELLP syndrome have a poor prognosis in pregnancy, leading to higher mortality rate.

In our study, we are interested in the risk factors involved in the occurrence of ARF during pregnancy, to evaluate its incidence, as well as its evolutionary profile, both temporally and geographically.

To avert major problems, this study would help to improve prenatal and obstetric care. The objective of the study was to evaluate the factors, causes, and outcomes of AKI among pregnant females admitted to a tertiary care Hospital.

Methods

We have retrospectively gathered, by means of hospitalization registers within the maternal-infantile intensive care units of the IBN ROCHD University hospital of Casablanca, 95 patients who developed AKI during their pregnancy or in the immediate postpartum period (< 03 months). These cases were identified over the period from January 2020 to August 2023 and were followed by the Nephrology Department of the IBN ROCHD University Hospital Casablanca. We included in this study, any patient aged over 18 years, who presented an AKI according to the definition of the KDIGO recommendations (2017) [4], based

on baseline creatinemia (rise > 3 mg/l, or > 1.5 times the baseline creatinemia), and urine output (< 0.5 ml/kg/6h). We have substantially retained a cut-off of 12 mg/l to define AORF in the absence of the previous history. Patients with a history of renal failure or previous nephropathy were excluded from this study.

Data collection

Numerous data were retrospectively collected in terms of:

- **Sociodemographic:** Age, history of miscarriage, IUFD or pre-eclampsia, number of pregnancies/ parities, primiparity, presence of associated comorbidities (diabetes, hypertension, heart disease...), reasons, and duration of hospitalization.
- **Clinical and biological:** Blood pressure, the occurrence of seizures, volemic evaluation, hemoglobin rate, white blood cell count, platelet count, LDH, Haptoglobin, CRP, transaminases (ASAT, ALAT), albuminemia, urea, creatinemia.
- **Histological (renal biopsy):** Performed in cases of rapidly progressive renal failure with no obvious retained cause, or in the absence of complete renal recovery beyond six weeks.

Statistical analysis

The statistical analysis in unit and multivariate was carried out in collaboration with the epidemiology department of IBN ROCHD University Hospital of Casablanca, using the SPSS software. We established risk factors correlated with renal evolution, considering a significance index of $p < 0.05$. We compared in logistic regression, based on composite criteria, two groups: the first one presenting a favorable evolution marked by a normalization of the renal function, and a second unfavorable group defined either by the persistence of the renal insufficiency or the occurrence of a maternal-fetal death.

Results

Socio-demographics

Of the 492 hospitalizations reported over the period of our study in the materno-fetal resuscitation unit, 371 patients were admitted either during pregnancy or in the immediate postpartum period. Among them, 95 patients were selected as having renal failure meeting our inclusion criteria, i.e. a prevalence of 20.2%. The mean age of our patients was 31.09 ± 6.74 years [18-43 years], of which 65.3% (n = 49) were in the pregnancy period with a mean term of 31 +/-6 [6-38SA] against 34.7% (n = 26) parturient. 16 patients were primiparous (21.3%), against 16% for whom parity could not be determined. 27.4% had a history of miscarriage and 10.7% had a history of pre-eclampsia. Oligo-anuria was initially identified in 22 patients (29.3%). The average length of hospitalization was 7 days ±7 [0-44]. All socio-demographic and clinical characteristics were summarized in (Table 1).

Biological: Based on the KDIGO 2017 classification, 45.3% of patients with renal failure were classified as stage 3, compared with 26.5 and 28% for stages 1 and 2, respectively. The mean creatinemia was 27.8 mg/l ± 18.7 [12-129]. Anemia (Hb<10 g/l), thrombocytopenia, and hepatic cytolysis were noted in 61.3%, 82.6%, and 12% of cases respectively.

Causes of acute renal failure: The most common etiology was preeclampsia (46.7%), followed by hemorrhage (24%) and sepsis (13.3%) (Figure 1). The main complications associated with pre-eclampsia were mainly eclampsia, followed by HELLP syndrome with respective rates of 41.3% and 31%. A renal biopsy was performed in one patient, indicated in the face of persistent renal failure, after a delay of 169 days, revealing acute post-infectious glomerulonephritis (APIG).

Therapeutic management: The therapeutic management was focused on volemic optimization mainly by vascular filling using crystalloids (50.6%), followed using loop diuretics at significant doses (> 500 mg/d) as well as vasoactive drugs respectively in 32% and 30% of cases. Hemodialysis was started in 16% of cases, mostly indicated for anuria (66%), and overload (16.7%).

Evolution: 36 patients (48%) progressed to normalized renal function at discharge, with a mean time to normalization of 5.66 Days. Of the 39 remaining patients, two progressed to chronic disease at 03 months (one of them was put on long-term hemodialysis), and the others had renal failure at discharge but were subsequently lost to follow-up. Maternal mortality was24% (n = 18). Fetal mortality was 20%.

Table 1: Socio-demographic and biological characteristics of obstetric ARF in our series.

	Our study
Mean of age	33 +/- 7.74 years
Length of hospitalization	7 days
Primiparity	21.3 %
History of Pre-eclampsia	10.7%
Heart disease	4%
Thrombopenia	82.6%
Anemia under 10g/dl	61.3%

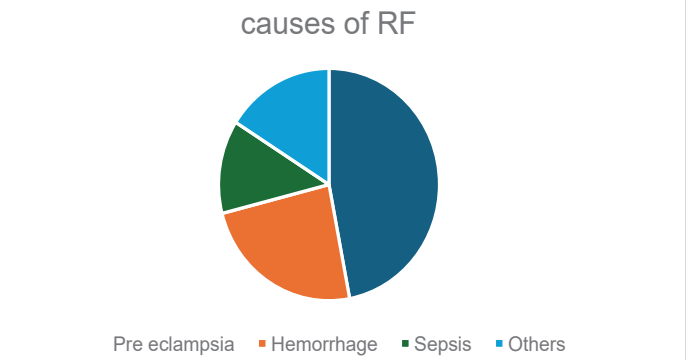

Figure 1: Etiology of acute renal failure in the setting of pregnancy or postpartum.

Discussion

Obstetric ARF, although becoming rarer in developing countries, especially in Europe, continues to persist in an ad hoc and periodic manner [5]. Numerous theories have been put forward to explain this persistence, which is still minimal, and seem to focus on the re-emergence of certain etiologies such as hemorrhagic causes due to changes in obstetrical practices involving the use of fibrinolytics (tranexamic acid and its implication in the occurrence of renal cortical necrosis [6]), and the predisposition of a certain category of patients (diabetics, hypertensives or patients with chronic renal insufficiency) to pre-eclampsia. It would also be partly explained by the legalization of abortion since the 1970s. In Morocco, the downward trend in maternal mortality from 112 (2009-2010) to 72.6 (2015-2016) per 100,000 births (i.e., a reduction of 35%) argues in favor of strengthening antenatal care structures, which nevertheless remain quite inadequate [2]. In comparison with the data from our series, the average age of onset of ARF (during pregnancy or in the post-partum period) seems to be comparable with that found in the literature, whether in other Maghreb countries [6-11], in Asia [12-14], or in South Africa [14] not exceeding 30 years on average. Only the works of Kabbali et al. [8] and Arrayhani and Al [10] have significantly associated age with an unfavorable evolution. In the other papers [15], age is associated with many perinatal complications, including preterm delivery. The results concerning primiparity seem to be more variable, with rates not exceeding 48% in the Maghreb countries, and exceeding 50% in China. In the studies compared, AORF was mainly diagnosed during pregnancy, particularly during the 3rd trimester. Only in the study conducted by the Kabbali team [8] did we note a clear predominance of ARF in the postpartum period (52.3%). The prevalence of oligo-anuria is variable from one study to another, not exceeding on average 50%. The main causes of ARF across different studies are pre-eclampsia, sometimes representing 75% of all causes, followed closely by hemorrhagic causes, while infectious causes remain less significant. From a temporal point of view, limiting ourselves to the etiological profile of ARF in the regions of Morocco, we note a downward trend in the frequency of pre-eclampsia, although it remains the predominant etiology. Sepsis was significantly correlated with unfavorable outcomes in the work of Kabbali (p = 0.06) [8], whereas in our series, pre-eclampsia as an etiology was correlated with complete renal recovery (p = 0.018). Therapeutic management is focused on volume control to improve renal hemodynamics. In our series, there was a clear predominance of the use of vasoactive drugs with a rate of 30.6% compared to other Moroccan studies where the respective rates were 11 and 5.4% [9-12]. This could be due to a selection bias possibly related to the exclusive recruitment of our patients in intensive care settings. The use of intermittent hemodialysis in our country seems to be less important with a current rate of 10.6% compared to 72.6% [12] in 2001 and 38.6% [9] in 2011, which could argue in favor of an earlier and optimized management of AKI complications. The rates in Egypt [9] and India [12] seem significantly higher at 35 and 47% respectively. The rate of complete renal recovery in our series is 48%, whereas it is around 60% in other studies. The work of Liu [16] has retained many factors as being associated with the occurrence of renal failure, namely sociodemographic parameters (gestational age, rural origin), biological parameters (platelet count, blood urea, creatinemia, LDH), and related to the unfavorable evolution of the pregnancy (MFIU, prematurity, IUGR, and Apgar score at 01min). Maternal mortality in the studies remains variable between 6 and 12%, against 24% in our series. The Egyptian teams [8] have retained the occurrence of shock, hepatic cytolysis, and coagulopathy as factors incriminated in unfavorable maternal evolution. Other studies [17] were interested in the identification of blood markers involved in the renal evolution in preeclampsia, retaining SDF-1 as significantly associated with renal recovery.

A few limitations of the current study consist of a single-center study and a non-probability sampling method. Another limitation was the small sample size. Therefore, the findings cannot be generalized to the whole population.

Conclusion

Obstetric ARF, although rare, remains a subject of interest because of its implication for maternal mortality in developing countries. Primary prevention based on early detection, close monitoring of pregnancies, and delivery in a medical environment, remains the most effective and least expensive solution.

Ethical consideration

Informed consent was obtained from patients to publish the data.

References

1. Ministry of Health and Social Protection. Publications [Internet]. Available from: https://www.sante.gov.ma/Publications/Pages/default.aspx
2. High Commission for Planning of Morocco. National Survey on Population and Family Health [Internet]. Available from: https://www.hcp.ma/Enquetenationale-sur-la-population-et-la-sante-familiale_a2614/.
3. Bokhari SRA, Inayat F, Jabeen M, Sardar Z, Saeed S, Malik AM, et al. Characteristics and outcome of obstetric acute kidney injury in Pakistan: A single-center prospective observational study. Cureus. 2018;10(9):e3362. Available from: https://doi.org/10.7759/cureus.3362
4. Kellum JA. KDIGO clinical practice guideline for acute kidney injury. Kidney Int Suppl. 2012;2:11. Available from: https://kdigo.org/wp-content/uploads/2016/10/KDIGO-2012-AKI-Guideline-English.pdf
5. Fakhouri F, Deltombe C. Pregnancy-related acute kidney injury in high income countries: still a critical issue. J Nephrol. 2017;30:767-771. Available from: https://doi.org/10.1007/s40620-017-0440-8

6. Peter C, Dereu D, Casini A, Boulvain M, Savoldelli G. Acide tranexamique dans la prise en charge de l'hémorragie du postpartum: connaissances actuelles. Rev Med Suisse. 2018;4:1861-1865. Available from: https://pubmed.ncbi.nlm.nih.gov/30329233/

7. Bouaziz M, Chaari A, Turki O, Dammak H, Chelly H, Ammar R, et al. Acute renal failure and pregnancy: A seventeen-year experience of a Tunisian intensive care unit. Ren Fail. 2017;35:121-1215. Available from: https://doi.org/10.3109/0886022x.2013.819767

8. Gaber TZ, Shemies RS, Baiomy AA, Aladle DA, Mosbah A, Abdelhady EA, et al. Acute kidney injury during pregnancy and puerperium: An Egyptian hospital-based study. J Nephrol. 2022;34:1611-1619. Available from: https://doi.org/10.1007/s40620-021-01133-8

9. Kabbali N, Tachfouti N, Arrayhani M, Harandou M, Tagnaouti M, Bentata Y, et al. Outcome assessment of pregnancy-related acute kidney injury in Morocco: A national prospective study. Saudi J Kidney Dis Transpl. 2015;26:619-624. Available from: https://doi.org/10.4103/1319-2442.157426

10. Bentata Y, Housni B, Mimouni A. Acute kidney injury related to pregnancy in developing countries: Etiology and risk factors in an intensive care unit. J Nephrol. 2012;25:764-775. Available from: https://doi.org/10.5301/jn.5000058

11. Arrayhani M, El Youbi R, Sqalli T. Pregnancy-related acute kidney injury: Experience of the nephrology unit at the University Hospital of Fez Morocco. ISRN Nephrol. 2013;2013:109034. Available from: https://doi.org/10.5402/2013/109034

12. Hachim K, Badahi K, Benghanem M. Insuffisance rénale aiguë obstétricale: L'expérience du service de néphrologie du CHU Ibn Rochd, Casablanca. Nephrologie. 2001;1:29-31. Available from: https://pubmed.ncbi.nlm.nih.gov/11284465/

13. Prakash J, Ganiger VC, Prakash S, Iqbal M, Kar PD, Singh U, et al. Acute kidney injury in pregnancy with special reference to pregnancy-specific disorders: A hospital-based study (2014-2016). J Nephrol. 2018;31:79-85. Available from: https://doi.org/10.1007/s40620-017-0466-y

14. Liu Y, Bao H, Jiang Z, Huang JY, Wang SN. Pregnancy-related acute kidney injury and a review of literature in China. Intern Med. 2015;54:1695-1703. Available from: https://doi.org/10.2169/internalmedicine.54.3870

15. Colmant C, Frydman R. Are there any pregnancies and deliveries at low risk? Gynecol Obstet Fertil. 2009;37:195-199. Available from: https://doi.org/10.1016/j.gyobfe.2008.12.001

16. Cooke WR, Hemmila UK, Craik AL, Mandula JC, Mvula P, Msusa A, et al. Incidence, aetiology and outcomes of obstetric-related acute kidney injury in Malawi: A prospective observational study. BMC Nephrol. 2018;19:25. Available from: https://doi.org/10.1186/s12882-018-0824-6

17. Shemies RS, Gaber TZ, Baiomy A, Aladle AD, Mosbah A, El-Said A, et al. Angiogenic markers predict kidney injury and obstetric complications in women with preeclampsia and pregnancy-related acute kidney injury. Ther Apher Dial. 2022;26:306-315. Available from: https://doi.org/10.1111/1744-9987.13633