

## Pregnancy-Related Acute Kidney Injury: Experience of the Nephrology Department at SCB Medical College, Cuttack Odisha

Rudrashis Samal<sup>1</sup>, Chittaranjan Kar<sup>2</sup>, Sashibhusan Rout<sup>3</sup>

<sup>1</sup>post Doctoral Trainee Department Of Nephrology SCB Medical College, Cuttack

<sup>2</sup>Prof & HOD, dept of nephrology SCB medical college, Cuttack, <sup>3</sup>Prof, SCB medical college cuttack

### \*Corresponding Author:

Rudrashis Samal

Post Doctoral Trainee Department of Nephrology SCB Medical College, Cuttack

Type of Publication: Original Research Paper

Conflicts of Interest: Nil

### ABSTRACT

Pregnancy related Acute kidney injury (PRAKI) continues to be common in developing countries. The aim of this paper is to study AKI in pregnancy and determine the etiology and pathophysiology associated with evolution of kidney injury. METHODS: This prospective study was conducted in scb medical college, cuttack, odisha, india between january 2017 to january 2018. All patients presenting with PRAKI were included. Results: 30 cases of PRAKI were identified. Their ages varied from 18 to 46 years old, with an average of  $22.03 \pm 5.7$  years. High blood pressure was the most common symptom (77.33%). the mean creatinine level was  $4.2 \pm 2.4$  mg/L. Sixteen percent were oliguric. PRAKI occurred during the 3rd trimester in 27.27% of the cases and 72.72% in the first and second trimester and 26.6% of the cases in the postpartum. Hemodialysis was necessary in 73.33% of cases. The main causes were sepsis, preeclampsia, hemorrhagic shocks, respectively, in 43.33%, 33.33%, and 3.3% of the cases. The outcome was favorable, with a complete renal function recovery for 24 patients. 16.66% patients remained dialysis dependent. Poor prognosis was related to two factors: age over 35 years and presence of cortical necrosis on biopsy. CONCLUSION: Prevention of PRAKI requires an improvement of the sanitary conditions with the implementation of an obligatory prenatal consultation.

**Keywords:** Pregnancy related acute kidney injury, renal biopsy, hemodialysis, cortical necrosis

### INTRODUCTION

Acute kidney injury represents a challenging scenario when it occurs during pregnancy. The worldwide incidence of pregnancy-related acute kidney injury (PRAKI) has decreased markedly in the past 50 years from 20-40% in 1960 to less than 10% in the present time through the legalization of abortion and improvement of antenatal and obstetric care [1].

In the recent years, the incidence of PRAKI has decreased in developed countries to only 1% to 2.8%. It is a rare complication of pregnancy following the disappearance of septic abortion and a better perinatal care [2, 3]. However, PRAKI is still frequent in developing countries; the incidence is around 4.2-15% [2]. Caring for women diagnosed with acute kidney injury is a real challenge for nephrologists and all the medical team.

PRAKI is usually caused by septic abortion in early pregnancy, by pregnancy toxemia, hemorrhages during pregnancy (antepartum and postpartum), and acute tubular necrosis in late pregnancy [4, 5]. Acute fatty liver is an uncommon cause of PRAKI. It occurs in the third trimester of pregnancy. Puerperal sepsis and thrombotic microangiopathy are seen in the postpartum period.

Acute tubular necrosis (ATN) is the most common condition with a good prognosis compared to other pathology like severe eclampsia, HELLP syndrome, and disseminated intravascular coagulation (DIC) where the glomerular involvement is preeminent [6, 7].

The aim of this study is to investigate the cases of PRAKI and determine the factors associated with evolution of kidney injury.

## Method

This is an observational prospective study conducted in the nephrology department of scb medical college, cuttack odisha, between january, 2017 and January, 2018.

## Criteria of Inclusion and Exclusion

All pregnant and postpartum patients who developed a PRAKI, with or without oliguria were included. Patients with preexisting renal disease or renal insufficiency before pregnancy were excluded.

## Methodology

We studied different aspects. (i) Population: age, sex, history, and pregnancy care. (ii) AKI: clinical, biological, date of occurrence, and etiology. (iii) Changes in the final maternal renal function. (iv) The final maternal outcome.

## Definitions

(i) Preeclampsia: eclampsia was defined by a set of three signs: hypertension (SBP  $\geq$  140 mmHg and/or DBP  $\geq$  90 mmHg), edema, and proteinuria after 20 weeks of gestation. (ii) Eclampsia was defined by the existence of generalized convulsions and/or loss of consciousness occurring during pregnancy or PP in preeclampsia. (iii) HELLP syndrome was defined by the existence of three main features: haemolysis, elevated liver enzymes, and low platelets count. (iv) Postpartum is the period beginning immediately after delivery and extending approximately three months. (v) Acute kidney injury (AKI) was defined and classed according to RIFLE criteria based on changes in serum creatinine or changes in urine output, or both. The RIFLE (risk of renal dysfunction; injury to the kidney; failure of kidney function, loss of kidney function, and end-stage kidney disease) criteria include three levels of renal dysfunction and two clinical outcomes: "loss" and "end-stage renal disease" (ESRD).

## Statistics

Descriptive and univariate analyses have been conducted, using the SPSS 11 software..

## Result

Total number of women with PRAKI was 30 in scb medical college, Cuttack where 9600 deliveries have been performed in the study's time span. The incidence of PRAKI was near 0.31 percent. The total number of aki during this period was 512. PRAKI makes up for 5.8% of all AKI cases. The patient's age ranged from 18 to 46 years with an average of  $22.03 \pm 5.7$  years. PRAKI occurred during the 3rd trimester in 27.27% and in 72.72% cases in 1st and second trimester. Of the cases, 26.6% in the postpartum period, and 60% in the primigravida (table 2). We noted a normal spontaneous vaginal delivery in 16 cases (53.33%), cesarean section in 5 cases (16.66%), and abortion in 9 cases (30%). Hypertension was a common symptom present in 73.33%; 16% were oliguric. Seizure occurred in 13.33% patients. Renal biopsy was done in 8 cases (table 3)

The average creatinine was  $4.2 \pm 2.4$  mg/L, proteinuria average was  $1.32 \pm 0.6$  gm/dl. . Anemia was reported in 73.33% of patients, thrombocytopenia in 10%, and raised liver enzymes in 13.33% of patients.

Sepsis is the most common cause of PRAKI (43.33%), followed by eclampsia/pre eclampsia (33.33%) placental abruption in 10% and HELLP syndrome in 10% and post partum hemorrhage in 3.33%. (table 1)

Dialysis was required during hospitalization in 73.33%. Complete recovery of renal function was observed in 80% (24 patients). 5 (16.66%) patients remained dependent on dialysis. There was no death in our study.

ETIOLOGY	%
SEPSIS	43.33
PRE ECL/ECLAMPSIA	33.33

PL. ABRUPTION	10
HELLP	10
PPH	3.33

CLINICAL PROFILE	
PRIMI	60%
POST PARTUM	26.66%
3 <sup>RD</sup> TRIM	27.27%
OLIGURIA	53.33%
ANURIA	13.33%
NORMAL OUTPUT	33.33%

BIOPSIED	8
ATN	1
DIFF. CORTICAL NECROSIS	1
PATCHY CORTICAL NECROSIS	6

## Discussion

Acute kidney injury (AKI) occurring during pregnancy is a serious complication, involving the prognosis of the mother and the child [8]. Its specific physiopathology is strongly related to the physiological and hormonal changes occurring in pregnancy.

The PRAKI has become a rare complication of pregnancy in developed countries. For example, in France, the incidence of AKI in pregnancy has decreased from 40% in 1966 to 4.5% in 1978. This striking decline reflects the decrease of postabortion ARF and the better perinatal monitoring [9]. On the other hand, PRAKI is still common during pregnancy

in developing countries, being responsible for a high maternal and fetal morbidity [10,11].

The average age of onset for PRAKI is between 25 and 32 years according to various authors [12]. In our study, the average age was  $22.03 \pm 5.7$  years. In our series, PRAKI was more frequent in the 1st and 2nd trimester (72%) and 26.66% in the postpartum.

In most retrospective studies, preeclampsia/eclampsia was reported to be a major cause of AKI during pregnancy. In our study, the main cause of AKI associated with pregnancy is sepsis (43.33%), with eclampsia in ten cases (33.33%), and HELLP syndrome in 3 cases (10%). HELLP syndrome was described by Weinstein<sup>13</sup> in 1982, as a serious complication of severe PE, accompanied by a significant morbidity and high maternal and perinatal mortality.

Total recovery was obtained in 80% of the cases, which is similar to the results found in some other studies. Arora et al. [9], Goplani et al. [14], and Erdemoğlu et al. [15] reported a total recovery of renal function in 42%, 54.3%, and 61%, respectively.

Renal biopsy was done in 8 cases with acute tubular necrosis in one case and diffuse cortical necrosis in one case and 6 were identified to have patchy cortical necrosis. 5 from this group remained on dialysis.

Currently, maternal mortality due to PRAKI represents less than 10% in Europe and North America but remains high in the developing countries [16]. Recent studies in India have shown a maternal mortality rate around 20% [16]. In Turkey, this rate was 10.6% [15]. In Pakistan, Khalil et al. reported a maternal mortality rate of 15% in 2011 [8] compared to 33.3% of cases reported by Chaudhri et al. [17].

## Conclusion

PRAKI remains a critical situation in developing countries where sepsis is the most frequent etiology, followed by eclampsia and hemorrhagic shock. Patient with cortical necrosis usually remain dialysis dependent.

In this context, prevention is the best and least expensive solution. Preventing abortions, assuring a good perinatal care and a better management of obstetrical complications, are the crucial tools to implement this purpose.

## References:

1. K. S. Kumar, C. R. Krishna, and V. S. Kuma, "Pregnancy related acute renal failure," *Journal of Obstetrics & Gynecology of India*, vol. 56, no. 4, pp. 308–310, 2006.
2. K. R. Goplan, D. N. Gero et al., "Pregnancy related acute renal failure: a single center experience," *Indian Journal of Nephrology*, vol. 18, no. 1, pp. 17–21, 2008.
3. P. U. Rani and G. Narayan, "Anuradha. Changing trends in pregnancy related acute renal failure," *Journal of Obstetrics & Gynecology of India*, vol. 52, pp. 36–38, 2002.
4. M. B. Beaufils, "Pregnancy," in *Clinical Nephrology*, A. M. Davidson, J. S. Cameron, J. P. Grunfeld et al., Eds., pp. 1704–1728, Oxford University Press, New York, NY, USA, 3rd edition, 2005.
5. J. Prakash, K. Tripathi, L. K. Pandey, S. R. Gadela, and Usha, "Renal cortical necrosis in pregnancy-related acute renal failure," *Journal of the Indian Medical Association*, vol. 94, no. 6, pp. 227–229, 1996.
6. N. Pertuiset and J. P. Grünfeld, "Acute renal failure in pregnancy," *Bailliere's Clinical Obstetrics and Gynaecology*, vol. 8, no. 2, pp. 333–351, 1994.
7. R. W. Schrier, *Diseases of Kidney & Urinary Tract*, Lippincott Williams & Wilkins, Philadelphia, Pa, USA, 2001.
8. B. M. Sibai, M. A. Villar, and B. C. Mabie, "Acute renal failure in hypertensive disorders of pregnancy. Pregnancy outcome and remote prognosis in thirty-one consecutive cases," *American Journal of Obstetrics and Gynecology*, vol. 162, no. 3, pp. 777–783, 1990.
9. C. Utas, C. Yalcindag, H. Taskapan, M. Guven, O. Oymak, and M. Yucesoy, "Acute renal failure in Central Anatolia," *Nephrology Dialysis Transplantation*, vol. 15, no. 2, pp. 152–155, 2000.
10. B. Moulin, A. Hertigb, and E. Rondeaub, "Rein et pré-éclampsie," *Annales Françaises d'Anesthésie et de Réanimation*, vol. 29, no. 4, pp. 83–90, 2010 F.
11. Guillibert, M. Varlet, B. Hammel et al., "Troubles hydro-électrolytiques pendant la grossesse : complications maternelles et

- foetales,” *Journal de Gynécologie Obstétrique et Biologie de la Reproduction*, vol. 38, no. 1, pp. 94–97, 2009.
12. C. Colmant and T. R. Frydman, “Y a-t-il des grossesses et des accouchements à bas risque?” *Gynécologie Obstétrique & Fertilité*, vol. 37, no. 2, pp. 195–199, 2009.
13. L. Weinstein, “Syndrome of hemolysis, elevated liver enzymes, and low platelet count: a severe consequence of hypertension in pregnancy,” *American Journal of Obstetrics and Gynecology*, vol. 142, no. 2, pp. 159–167, 1982.
14. M. Erdemoğlu, U. Kuyumcuoğlu, A. Kale, and N. Akdeniz, “Pregnancy-related acute renal failure in the southeast region of Turkey: analysis of 75 cases,” *Clinical and Experimental Obstetrics and Gynecology*, vol. 37, no. 2, pp. 148–149, 2010.
15. M. R. Ansari, M. S. Laghari, and K. B. Solangi, “Acute renal failure in pregnancy: one year observational study at Liaquat University Hospital, Hyderabad,” *Journal of the Pakistan Medical Association*, vol. 58, no. 2, pp. 61–64, 2008.
16. S. Ben Hamouda, H. Khoudayer, H. Ben Zina et al., “La morbidité maternelle grave,” *Journal de Gynécologie Obstétrique et Biologie de la Reproduction*, vol. 36, no. 7, pp. 694–698, 2007.
17. N. Chaudhri, G. U. But, I. Masroor et al., “Spectrum and short term outcome of pregnancy related acute renal failure among women,” *Annals of Pakistan Institute of Medical Sciences*, vol. 7, no. 2, pp. 57–61, 2011.