

Pregnancy Related Acute Kidney Injury, Clinical Profile and Outcome of Management: An Experience from 3 Years Retrospective Review in a Specialist Hospital in Gusau, North-Western Nigeria

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ABSTRACT

Introduction: Pregnancy related acute kidney injury (PRAKI) is a clinical syndrome characterised by a rapid decline in glomerular filtration rate occurring during pregnancy or puerperium. It is associated with high morbidity and mortality. We investigated the clinical presentation, management and outcome of PRAKI in our hospital.

Methods: A retrospective review of all women admitted into Ahmad Sani Yariman Bakura Specialist Hospital with PRAKI from June 2013 to May 2016 was conducted with emphasis on clinical profile, management and outcome.

Results: Over the period of 3 years, 26 women with PRAKI were found with age ranging from 17 to 35 years, 12(46%) were from obstetrics haemorrhage; 4(15.4%) puerperal sepsis; 6(23.1%) preeclampsia/eclampsia; 2(7.7%) acute pyelonephritis and 2(7.7%) from hyperemesis gravidarum. Most of the cases 20(77%) occurred in third trimester and puerperium, 4(15.3%) in first trimester and 2(7.7%) in second trimester. The mean serum urea and creatinine at presentation were 27.5mmol/L and 463umol/L respectively.

Seven patients had dialysis (26.9%) out of which 4(15.4%) had complete recovery, 2 (7.6%) died and 1(3.8%) was dialysis dependent. The indications for dialysis were persistent oliguria/anuria in 3(43%), pulmonary oedema with severe metabolic acidosis in 2(28.5%) and uraemic encephalopathy in 2(28.5%). Number of dialysis sessions per patient ranged from 3 to 6.

The remaining 19 cases (73%) were managed conservatively with complete recovery in 13(68.4%) and mortality in 6(31.6%). Maternal mortality of 30.8% from PRAKI was observed.

Conclusion: PRAKI remains an important cause of maternal morbidity and mortality in our environment. There is need to improve our obstetric care to prevent this menace.

INTRODUCTION

Acute kidney injury (AKI) is the abrupt loss of kidney function, resulting in the retention of urea and other nitrogenous waste products and in the dysregulation of extracellular volume and electrolytes[1]. AKI occurring during pregnancy or puerperium is termed PRAKI. It is associated with poor maternal and foetal

outcome². Reported incidence of PRAKI varies widely, while it has declined in the developed countries, it is still a major cause of maternal morbidity and mortality in developing countries [2,3]. Causes of PRAKI are varied with sepsis complicating abortion as the commonest in early pregnancy to pre-eclampsia/eclampsia and obstetric haemorrhage in late pregnancy and puerperium [2,3]. Outcome of PRAKI has been reported in several studies, and mortality has ranged between 20% to 67% [3,4,5].

We investigated the clinical presentation, management and outcome of PRAKI in our hospital.

MATERIALS AND METHODS

Our facility is a new tertiary level hospital located in the North-Western part of Nigeria. It has a bed capacity of 250 and serves a population of four million people. All AKI case files and the dialysis register were reviewed and data obtained included age, sex, cause of AKI, gestational age, duration post partum for those that were delivered, serum urea, electrolytes and creatinine, haematocrit, urine output, indication for dialysis, number of dialysis sessions and outcome of management. PRAKI was defined as sudden-onset oliguria (urine output < 400 mL/day) or anuria (urine output < 100 mL/day) with serum creatinine ≥ 1.5 mg/dl (132.6 μ mol/l) occurring in pregnancy or puerperium. Patients with underlying chronic kidney disease were excluded from the study. The data were analyzed using SPSS software and the results were recorded as median \pm standard deviation (SD). Chi square and Fisher's exact tests were used where appropriate. A value of $P < 0.05$ was considered significant.

RESULTS

Over a period of three years, 132 cases of AKI were managed of which 26 (19.7%) were PRAKI. The age of the patients ranged from 17 to 35 years with a mean of 27.42 ± 4.64 years. Nineteen (73%) were multigravid and 7 (27%) were primigravid. Antenatal care was not supervised in 16 (61.5%). Table 1 below shows the causes of PRAKI in our study.

Majority of our PRAKI was caused by haemorrhage; of the 12 patients that had bleeding, one was from ante partum cause while another one

Table 1: Cause of PRAKI, n=26

Cause	No	Percentage
Haemorrhage (APH/PPH)	12	46.0
Toxaemia of pregnancy	6	23.1
Puerperal sepsis	4	15.4
UTI	2	7.7
Hyperemesis gravidarum	1	3.9
Septic abortion	1	3.9
Total	26	100.0

APH- Ante partum haemorrhage,

PPH- Post partum haemorrhage,

UTI – Urinary tract infection

was from incomplete abortion. The remaining cases had post partum haemorrhage. Most of our cases occurred in the third trimester 20 (77%), 2 (7.8%) in the second trimester and 4 (15.4%) in the first trimester. Clinical features of patients at presentation are shown in table 2

Table 2: Clinical features at presentation, n=26

Cause	Number	Percentage
Oliguria	23	88.5
Hypotension	20	76.9
Oedema	19	73.1
Dyspnoea	15	57.7
Fever	6	23.1
Encephalopathy	4	15.4
Hypertension	2	7.7
Convulsion	1	3.8

Some patients had more than one feature

Oliguria was the commonest clinical feature followed closely by hypotension and oedema. The laboratory parameters are shown in table 3 below.

Table 3: Laboratory parameters, n=26

<i>Parameter(SI Unit)</i>	<i>Mean±SD</i>
Haematocrit (%)	26±8.4
Urea (mmol/L)	27.5±7.2
Creatinine (μmol/L)	463±18.7
Bicarbonate (mmol/L)	16±9.2
Potassium (mmol/L)	4.2±3.1

Low haematocrit was seen in up to 86.0% of our PRAKI patients, hyperkalaemia in 5 (19.2%) and severe metabolic acidosis in 2 (7.7%). All patients were initially managed conservatively with fluid resuscitation, blood transfusion, antibiotics, correction of hyperkalaemia and acidosis. The four (15.4%) with ante partum eclampsia were delivered via emergency caesarean section.

Seven (26.9%) underwent haemodialysis and the indications for dialysis were persistent oliguria in 3 (11.5%), pulmonary oedema with severe metabolic acidosis in 2 (7.7%) and uraemic encephalopathy in 2 (7.7%). The number of dialysis sessions per patient ranged from 3 to 6.

Of the 19 (73%) patients that were managed conservatively, 13 (50.0%) recovered and 6 (23.1%) died. Cause of death was severe hypovolaemic shock from haemorrhage that did not respond to resuscitation in 4 (15.4%), pulmonary oedema in 1 (3.9%) and DIC complicating puerperal sepsis in 1 (3.9%).

Of the 7 (26.9%) patients that had dialysis, 4 (15.4%) had complete recovery, 2 died (7.7%) and 1 (3.85) was dialysis dependent after discharge from the hospital. These two died of uraemic coma, although they had dialysis, it was rather too late to salvage them.

DISCUSSION

Our PRAKI incidence of 19.7% was lower than the findings from Osogbo [4] where 33.3% was reported, but higher than the reported incidence of 7.02% from Kashmir valley in India. This marked difference in incidence could partly be explained by the fact that Osogbo study looked at dialysis requiring AKI only while the Kashmir incidence may be due to

differences in the racial composition of the study populations. Across the developing world, PRAKI is a disease of young women, our findings of age range of 17-35 years is similar to what was observed by Makusidi *et al* in Sokoto,[3] North-Western Nigeria, Okunola *et al* in Osogbo,[4] South-Western Nigeria, Najar *et al* in Kashmir India[5] and Ansari *et al* in Hyderabad India [6]. This generally showed a culture of early start to childbearing. Majority of our patients were multigravid and their pregnancy was not supervised. Multiple pregnancies and lack of antenatal visits during pregnancy coupled with poorly equipped and manned health care centers in the rural communities are major challenges to curbing this ugly trend.

Haemorrhage occurring in late 3rd trimester and puerperium accounts for the largest proportion of our PRAKI patients. Similar findings were reported in Sokoto[3]. Zamfara and Sokoto States have fairly similar populations and have majority of the populations as rural dwellers with low level education, poor socioeconomic status and poor health seeking behavior. In contrast, toxemia of pregnancy reported as the commonest cause of AKI in Osogbo⁴, only accounted for about 8% in our study. In Kashmir India⁵, sepsis complicating abortion in early 1st trimester was the major cause of PRAKI whereas it ranked fourth as a cause of PRAKI in our setting.

Oliguria and hypotension were the commonest physical findings in our patients; this is expected as blood loss from haemorrhage accounts for the main cause of PRAKI. Typically our patients present to the hospital after several levels of delay starting from the home, on transit and finally at our institution. First aid is hardly ever instituted before reaching the hospital either in terms of fluid resuscitation or blood transfusion. While in the hospital, the process of getting blood is lengthy and can sometimes span several hours to few days. Oliguric AKI is reported as the commonest form of AKI and is seen in situations of volume depletion from any cause[7,8].

Outcome of management was variable between those managed conservatively and those dialyzed. Fluid resuscitation, correction of anaemia, acidosis, hyperkalaemia and administration of antibiotics was successful in the majorities that were conservatively managed. Of the six that died with conservative management, four were from irreversible shock from haemorrhage; one each from

disseminated intravascular coagulopathy and pulmonary oedema. Among those dialyzed, renal recovery occurred in four, while the two mortalities were from uraemic coma, which did not benefit from dialysis that was started too late. However, among the dialyzed patients one became dialysis dependent.

The study of acute renal failure in pregnancy among north Indian population by Munna *et al* [9] showed comparable outcome between those managed conservatively and those dialyzed.

Maternal mortality of 30.8% observed in this study was higher than the two studies from India [5, 9] but lower than the reported mortality in Sokoto[3] (45.0%) and Osogbo[4] (66.7%) respectively. Reason for this could be that Sokoto patients were all dialyzed and were more likely to have had a more advanced renal failure not likely to respond to conservative measures. The higher mortality reported from Osogbo could be explained by the difference in aetiology, whereas majority of our PRAKI was caused by haemorrhage, that in Osogbo was by toxemia of pregnancy. Outcome of toxemia has been reported by several authors to be dismal in the setting of renal failure[10, 11].

In conclusion, PRAKI occurring in our environment is due largely to haemorrhage that occurs in remote rural areas with poor access to health care and antenatal services. This dangerous trend is both preventable and treatable if identified early. Provision of health care facilities with adequately trained personnel in our rural communities will go a long way in curtailing this ugly trend.

REFERENCES

1. Mehta RL, Kellum JA, Shah SV, *et al*. Acute kidney injury network: Report of an initiative to improve outcomes in acute kidney injury. *Crit Care* 2007;11: R31.
2. Stratta P, Besso L, Canavase C, Grill A, Todros T, Benedetto C, *et al*. Is pregnancy related acute renal failure a disappearing clinical entity? *Ren Fail* 1996; 18: 575-584.
3. Makusidi AM, Liman HM, Yakubu A, Hassan M, Isah MD and Chijioke A. Hemodialysis among pregnancy related acute kidney injury patients: A single center experience in North-Western Nigeria. *Indian J Nephrol* 2016; 26: 340-342
4. Okunola OO, Ayodele OE and Adekanle AD. Acute kidney injury requiring hemodialysis in the tropics. *Saudi J Kidney Dis Transpl.* 2012 Nov; 23(6):1315-1319.
5. M Saleem Najar, A Rashid Shah, I. A Wani, A Rashid Reshi, K A Banday, M. Ashraf Bhat *et al*. Pregnancy related acute kidney injury: A single center experience from Kashmir valley. *Indian J Nephrol.* 2008 Oct; 18(4): 159–161.
6. Ansari MR, Laghari MS and Solangi KB. Acute renal failure in pregnancy: one year observational study at Liaquat University Hospital, Hyderabad. *J Pak Med Associa.* 2008 Feb; 58(2): 61-64
7. Tonelli M, Manns B and Feller-Kopman D. Acute renal failure in the ICU: a systematic review of the impact of dialytic modality on mortality and renal recovery. *Am J Kidney Dis.* 2002 Nov; 40(5): 875-885
8. Lameire N, Van Biesen W and Vanholder R. Acute renal failure. *Lancet.* 2005 Jan 29-Feb 4; 365(9457): 417-430
9. Munna LP, Rekha S and Radheshyam, Pushpalata S. Acute Renal Failure in pregnancy: Tertiary centre experience from north Indian population. *Niger Med J.* 2013 May-June; 54(3): 191-195
10. Oladokun A, Okewole AI, Adewole IF and Babarinsa IA. Evaluation of cases of eclampsia in the University College Hospital, Ibadan over a 10 year period. *West Afr J Med.* 2000; 19: 192–194.
11. Odum CU and Eclampsia: An analysis of 845 cases treated in the Lagos University Teaching Hospital, Nigeria over a 20-year period. *J Obstet Gynaecol East Cent Africa.* 1991; 9: 16–20