Pregnancy Related Acute Kidney Injury: Is Puerperal Sepsis Stills A Major Threat?

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Abstract:

Introduction: Acute kidney injury represents a challenging clinical condition which occurs during pregnancy. Though the worldwide incidence of pregnancy-related acute kidney injury (PRAKI) has decreased markedly it is still frequent in developing countries.

Aim: To study the causes of PRAKI, to determine clinical outcome and predictors of morbidity and mortality.

Materials and methods: A prospective observational study of patients with pregnancy associated acute kidney injury indicated by RIFLE criteria presenting to a tertiary care centre.

Results: Total of 40 patients were included in the study. The most common aetiology for PRAKI was eclampsia/preeclampsia. The duration of oliguria was found to have a significant association with the requirement of dialysis. (P< 0.05). Also the mean urea and creatinine value was found to have a siginificant association with dialysis.

Conclusion:

✓ *Eclampsia/preeclampsia was the most common etiology followed by HELLP syndrome and puerperal sepsis.*

✓ *High blood urea, raised serum creatinine, oliguria for more than 14 days and hypotension was found to have a significant relation to mortality and requirement for dialysis.*

I. INTRODUCTION

Acute kidney injury represents a challenging clinical condition occurring during pregnancy. The worldwide incidence of pregnancy-related acute kidneyinjury (PRAKI) has decreased markedly in the past 50 years from 20–40% in 1960 to less than 10% in the current series 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 .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.

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

II. MATERIALS AND METHODS

The study was conducted from December 2013 to October 2015 in a tertiary care hospital. The study protocol was presented to the institutional ethics committee and clearance was taken.

This was a prospective observational study of patients with PRAKI referred for medical management.

A. INCLUSION CRITERIA

✓ Pregnant or postpartum patients (upto 06 weeks after delivery) with

- Abrupt onset oliguria (urine output < 400ml / day) not responding to volume repletion
- Progressive acute deterioration of renal function with or without oliguria. (Serial rise of blood urea level of 20mg/dl/day, serial rise of serum creatinine of 0.5mg/dl/day.)

B. EXCLUSION CRITERIA

- ✓ Patients of Chronic Kidney Disease.
- ✓ Patients of renal transplantation or on maintenance hemodialysis.
- ✓ Patients who are k/c/o diabetes, SLE and chronic hypertension.
- ✓ Patients on long term nephrotoxic drugs.

III. STATISTICAL ANALYSIS

Descriptive statistical analysis was carried out. Results of continuous measurements were reported as mean +/- SD and results of categorical measurements were presented in numbers (%). Significance will be assessed at 5% level of significance. Student T test was used to find out the significance of study parameters on continuous scale between two groups. 95% confidence interval was computed to find the significant features. Confidence interval with lower limit more than 50% was considered as significant.

IV. RESULTS

A total of 16,208 patients underwent delivery during the study period out of which 40 patients were detected to have acute kidney injury as per KDIGO guidelines. The details of the 40 patients are given in the table below (Table 1).

Parameters		No of patients (%)
Age	<20 yrs	0
	20-25 years	17(42.5)
	25-30 years	20 (50)
	>30 years	03 (7.5)
Habitat	Urban	12(30)
	Rural	28(70)
Duration of amenorrhea	<12 weeks	2(5)
	13-27 weeks	4(10)
	28weeks to delivery	27(67.5)
	postpartum	7(17.5)
Gravida	1st	10(25)
	2nd	17(42.5)
	3rd	9 (22.5)
	4th	3(7.5)
	5th	-
	6th	1(2.5)
Etiology	Eclampsia/Preeclampsia	9(22.5)
	HELLP syndrome	7(17.5)
	Peurperal sepsis	7(17.5)
	Abruptio placenta	4(10)
	Urosepsis	2(5)
	Others	11
Presenting	Edema	31(77.5)
symptoms	Oliguria	28(70)
	GI symptoms	23(57.5)
	Dyspnea	21(52.5)
	Neurological symptoms	21(52.5)
Types of ARF	Oliguric	28
	Non oliguric	12
Modes of therapy	Conservative	20(50)
	Hemodialysis	18(45)
	Peritoneal dialysis	2(5)
Outcome	Total recovery	25(62.5)
	Expired	8(20)
	Irreversible renal damage	6(15)
	Lost to follow up	1(2.5)
Fetal outcome	Living	24(60)
	Dead	16(40)

Table 1

Out of all the parameters, duration of oliguria, blood urea levels and serum creatinine were found to have a significant association with requirement of dialysis. (Table2, 3)

		Dialysed (N=19)	Non dialysed (N=9)	P value
Duration of oliguria	Mean(days)	12.8	3.625	0.0105
	Standard deviation	9.82	1.59	

Table 2

		Dialysed (N=20)	Not dialysed (N=20)	P Value
Urea	Mean (mg%)	174.45	89.35	0.0001
	SD	43.181	34.563	
Creatinine	Mean (mg%)	5.775	2.36	0.0001
	SD	2.734	1.233	

Table 3

Also the blood urea level and serum creatinine levels had a significant association with mortality. (Table 4)

		Mortality (N=8)	Living (N=32)	P Value
Urea	Mean (mg%)	187	118.125	0.0016
	SD	39.5	53.659	
Creatinine	Mean (mg%)	6.775	3.378	0.0008
	SD	2.778	2.260	

Table 4

V. DISCUSSION

Pregnancy related acute kidney injury (PRAKI) still continues to be an important cause of morbidity and mortality in developing countries such as India. It has serious consequences to both mother and child [2]. The pathophysiology of PRAKI, is intimately related to the

physiological and hormonal changes occurring during the course of pregnancy. The worldwide incidence of PRAKI has dropped drastically in the past few years with some studies showing no cases of PRAKI in past 20,000 live births [3]. The recent epidemiological studies in India have also confirmed the decreasing incidence of PRAKI in India.

The incidence of PRAKI in the present study was 2.49% which was fairly low as compared to other studies. The average age of onset of PRAKI has been quoted in various studies to be from 25 to 32 years [5]. The mean age of onset in present study was 24.875 +/- 2.73 years.

Aetiology of PRAKI varies from trimester to trimester with few specific causes being responsible in each trimester. In the present study, eclampsia/preeclampsia was the most common cause leading to PRAKI in 22.5%. Other common causes included HELLP syndrome and puerperal sepsis. This pattern is seen in similar studies also with eclampsia / preeclampsia being the most common cause for PRAKI. ARF is known to occur in upto 1% of patients with severe eclampsia. [6] Upto 20% of patients with severe eclampsia will go on to develop HELLP syndrome [7,8]. Severe preeclampsia along with HELLP syndrome accounts for almost 40% of all AKI cases in pregnancy. In literature septic abortion is quoted as one of the most common source of PRAKI. However in the present study puerperal sepsis was found to play a more prominent role.

The most common presenting symptom in this study was edema, which was present in 77.5% of the patients. The next most common complaint was of oliguria. Edema as presenting feature has been mentioned in many publications. In literature the most common presenting complaint is usually oliguria. The study by Najar et al [6] has stated oliguria to be present in 100% of the patients. In our study however oliguria was present in 70% of the patients. Nonspecific GI symptoms in form of nausea, vomiting and anorexia are often present in upto 50% of the patients. This has been proven true in our study also with 57.5% of patients complaining about same. Other symptoms such as fever, convulsions and PV bleeding have been seen to have a similar incidence as of other studies.

Oliguria was present in 28 of the patients with duration of oliguria ranging from 1 to 33 days. Also there was a significant co-relation between the duration of oliguria and the requirement of dialysis. This has not been highlighted in earlier studies, though the co-relation between two is more than obvious.

Blood urea level and creatinine level of the patient was found to be a significant factor associated with both the requirement of dialysis and mortality. With rising level of urea and creatinine more and more patients required intervention in form of dialysis. Also the mortality level in patients with grossly elevated urea and creatinine levels were more.

In relation to other studies the mean value of urea is comparable, though few studies have shown a higher mean like in the study by Najar et al [6]. Also the mean level of creatinine in present study appear to be low as compared to other studies. Mean creatinine level as high as 97 mg% has been reported in studies by Khalil et al [7].

In the present study up to 50 % of the patients required intervention in form of dialysis. Rest 50% improved on conservative management. These figures are in concordance to previous studies published in literature.

Though the maternal outcomes have been improved in the developed countries, fetal outcome still continues to be poor. The situation in developing countries in even worse. A study from China [8] showed adverse fetal outcomes in form of still birth in 36.4% and at the same time maternal death was nil. Another study from Africa [9] quoted fetal loss at a staggering 87.5%. In the present study the rate of fetal loss was 40%. The quoted rate of perinatal mortality is from 36.2 % to 66.6% [7]. This clearly depicts that better health care facilities can improve the fetal outcomes in cases of PRAKI.

The most common cause for maternal mortality in the present study was puerperal sepsis accounting to 62.5% of the deaths. The most common cause of death in the study by Najar et al [6] was ARDS which accounted for 62.5 %. Though there are several other studies about PRAKI the causes of maternal mortality have been mentioned in only very few of them.

The role of puerperal sepsis need to be elaborated a bit more. It was not only one of the most common aetiology of PRAKI but was also the most common cause of mortality in the present study. Several other studies have also demonstrated that puerperal sepsis is a leading cause of PRAKI. The rate of maternal mortality varies between 18% and 30%. As defined by the World Health Organization, puerperal sepsis is a genital tract infection occurring at any time between the rupture of amniotic membrane and labour or 42 days postpartum. Two or more of these conditions have to be presented: fever ($\geq$38.5 °C), pelvic pain, abnormal odour or foul-smelling vaginal discharges, and delayed uterine involution. Major causes are prolonged rupture of membrane, obstructed labour, and frequent vaginal examination. Sources of infection are retained product of conception, urinary tract infection and mastitis. Causative organisms include Gram-positive *Streptococcus pyogenes*, *Staphylococcus aureus*, coliform bacteria, *Chlamydia* spp. and *Clostridium tetani*.

The most common causative organism leading to puerperal sepsis in the present study was E.coli. Coliforms have been known to be one of the most common causes of puerperal infection. A study done by Chaisilwatana et al, published in the Thai medical journal titled 'Causative organism in puerperal infection' identifies E.Coli as the most common offending organism.

VI. CONCLUSION

Pregnancy related acute kidney injury still remains as a very important cause of morbidity and mortality for both mother and child. Early diagnosis and appropriate management has shown to have good outcomes. However, high blood urea, raised serum creatinine, oliguria for more than 14 days and hypotension was found to have a significant relation to mortality and requirement for dialysis. With better prenatal care it is possible to prevent occurrence of PRAKI and have better maternal and foetal outcomes.

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