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Research Article

## A retrospective analysis of outcome of pregnancy with acute renal failure during a period of one year at Geetanjali medical college & hospitals, Udaipur, Rajasthan, India

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### ABSTRACT

**Background:** Acute kidney injury (AKI) is a life threatening complication of pregnancy. Pregnancy related Acute Renal Failure is usually a consequence of obstetric complication like pregnancy induced hypertension, pre eclampsia, eclampsia, septic abortion, HELLP, antepartum hemorrhage, and puerperal sepsis.

**Methods:** ARF was diagnosed when there was a history of sudden oliguria (urinary output < 400 ml over 24 hrs or less than 20ml/hour) or anuria with a sudden increase in serum creatinine to more than 1.5mg/dl or an increase in serum creatinine of > 0.5mg/dl/day from baseline. All patients with obstetrical ARF, antepartum as well as postpartum, were included in this study.

**Results:** From 256 patients, 15 patients (5.8%) had pregnancy related ARF. Maternal outcome was assessed according to grading of AKI. The causes of ARF were pre eclampsia and eclampsia (40%), HELLP (13.33%), APH (13.33%), PPH (20%) and puerperal sepsis (6.66%). Maternal mortality was 13.33%. Neonatal outcome, amongst 14 patients, was noted and analyzed. Intrauterine deaths amongst them were 4/14 (28.57%). Amongst 10 neonates which were admitted in neonatal ICU, 6/10 (60%) survived and 4/10 (40%) of them died.

**Conclusions:** Multidisciplinary services at tertiary level may reduce mortality due to Pregnancy related Acute Renal Failure. Most common etiological factor was pre eclampsia and eclampsia. Disappearance of illegal abortion, improvement in ANC with effective management of complicated pregnancy, the facility for safe early elective delivery whenever indicated, the improvement in resuscitation of obstetric hemorrhage and increased preparation of hospital birth had all contributed to the prevention of this devastating complication of pregnancy.

**Keywords:** Pregnancy related Acute renal failure, Acute kidney injury, Obstetric ARF

### INTRODUCTION

Acute kidney injury (AKI) is a life threatening complication of pregnancy. Incidence of pregnancy related AKI has decreased, nearly 15-20% of AKI in India between 1970 and 1980 was attributable to obstetric complication.<sup>1</sup> The current scenario of pregnancy related AKI in developed countries, is only 1-2.8%. However, it is still frequent in developing countries, having incidence of 4.2-15%.<sup>2,3</sup> The declining trend of Pregnancy related

AKI is attributed to legalization of termination of pregnancy and to better antenatal and postnatal care.

Acute tubular necrosis is the most common pathological lesion and has good prognosis as compared to other pathological lesions associated with DIC (Disseminated Intravascular Coagulation), HUS (Haemolytic Uremic Syndrome), severe eclampsia and HELLP syndrome (Haemolysis elevated liver enzymes and low platelet count) in which glomerular involvement is predominant.

Acute bilateral renal cortical necrosis has the worst prognosis in obstetrically induced ARF which is mostly seen after APH and prolonged retention of dead fetus. Management of such patients require close monitoring and a multi-disciplinary approach and surveillance by obstetrician, nephrologist, gastroenterologist, neonatologist and anaesthesiologist.

Preeclampsia, eclampsia, HELLP, abruptio placentae manifest with acute intravascular volume depletion and severe reactive vasospasm which are responsible for decreased renal perfusion leading to AKI.

Severe hypovolemia results in decreased blood flow to renal cortex whereas perfusion to medullary area is preserved. Cortical ischemia results in marked decrease in GFR, concentrating ability and urinary volume. This stage of severe impairment in renal function is recognized as pre renal ARF. If cortical hypo perfusion occurs, or persists, functional changes are followed by ATN or cortical necrosis.

## METHODS

This retrospective, observational study was conducted over a period of 1 year, in the Department of Obstetrics & Gynaecology, Geetanjali Medical College & Hospitals, Udaipur, Rajasthan, India. A total of 256 patients with ARF were admitted at the centre during the period. Out of these 15 patients had pregnancy related ARF and were included in our study.

ARF was diagnosed when there was a history of sudden oliguria ( urinary output < 400 ml over 24 hrs. or less than 20ml/hour) or anuria with a sudden increase in serum creatinine to more than 1.5mg/dl or an increase in serum creatinine of > 0.5mg/dl/day from baseline.<sup>1</sup>

All patients with obstetrical ARF, antepartum as well as postpartum, were included in this study.

### Exclusion criteria

1. Known renal disease prior to pregnancy (Glomerular Nephritis, Renal insufficiency from any cause)
2. History of hypertension / diabetes before gestation
3. History of renal stone diseases
4. History of NSAID abuse or analgesic nephropathy
5. Previous urological surgery
6. Renal scarring on USG
7. Small size of kidneys ( Small echogenic kidneys )
8. Elevated serum creatinine prior to gestation
9. History of reflux nephropathy
10. ESRD (End Stage Renal Disease)

Once enrolled for the study, complete obstetrical history including the details of antenatal care was taken. Thorough clinical examination and relevant investigations were performed. Patients were managed by a team of obstetricians, nephrologist, gastroenterologist, neonatologist & interventionist.

Conservative treatment included all therapeutic modalities available as management of fluids, electrolytes, blood transfusion and antibiotics. Haemodialysis was done as a part of treatment wherever indicated. Complete recovery from ARF was declared when renal function returned to normal range. Cortical necrosis was diagnosed when patient remained anuric for >3 weeks and renal USG showed bilateral increased echogenicity with small sized kidneys and scattered renal cortical calcification and the patient remained dialysis dependent. All women were followed until they were discharged from hospital. Maternal outcome was recorded as complete recovery, partial recovery, dialysis dependent chronic kidney disease and death. Fetal outcome was recorded as survivors and non-survivors. Descriptive statistics were used in this study and percentages were calculated for qualitative variables like causes of ARF and outcome.

## RESULTS

A total of 256 ARF patients were observed at our institute for one year duration, of these 15 patients (5.8%) had pregnancy related ARF which met the inclusion criterion and were enrolled in the study.

**Table 1: Demographic profile of the patients.**

<b>AGE</b>	<b>29.33 ± 5.31</b>
Gestational age	31.66 ± 7
Gravida	1.66 ± 1.21
Parity	1.26 ± 0.924
Primigravida (%)	3(20%)
Multipara (%)	12(80%)
Without ANC (%)	5(33.33%)
Antepartum (%)	11(73.33%)
Postpartum (%)	4(26.67%)
Rural (%)	8(53.33%)
Urban (%)	7(46.67%)
Normal delivery (%)	10(66.67%)
Caesarean section (%)	4(26.67%)
SERP (Surgical evacuation of retained products of conception)	1(6.67%)

The average age of onset for pregnancy related ARF is between 22-40 years, in our study mean age was 29.33±5.31years. In our study 3 (20%) patients were primigravida and 12 (80%) were multigravida. ARF occurred in 1 (6.66%) patient in early half of their pregnancy and in 14 (93.33%) patients in late pregnancy and in puerperium. Out of these 14 patients 11 (73.33%)

were in antepartum period and 4 (26.66%) were in postpartum period.

7 (46.67%) patients were the residents of urban area, 8(53.33%) of them were from rural background. Majority of patients, 10 (66.66%) had received ANC and 5 (33.33%) of them didn't received ANC at any stage of their pregnancy.

**Table 2: Aetiology of pregnancy related ARF.**

Causes of ARF and death in pregnancy	Number (n)	Percentage (In study)
Hypertensive disorder		
Pre - eclampsia & eclampsia	6	40%
HELLP	2	13.33%
Hemorrhage	2	13.33%
APH	3	20%
PPH	1	6.66%
Uterine perforation (2 <sup>nd</sup> trimester)		
Puerperal sepsis	1	6.66%
DIC (late sequele)	0	

We noted a total of 10(71.4%) patients had vaginal delivery, all delivered at the hospital. 4(28.57%) underwent caesarean section.

**Table 3: Maternal outcome.**

	Grading of AKI			Total
	1	2	3	
Survivors				
Complete recovery	0	1	1	2/10(20%)
Partial recovery	0	1	3	4/10(40%)
Dialysis dependent	1	0	3	4/10(40%)
Total	1	2	7	10/15(66.66%)
Non-survivors	0	0	2	2/15(13.33%)
LAMA 3 (Left against medical advice)	0	0	3	3/15(20%)

Complete recovery of renal functions: Acute Tubular Necrosis & Pre Renal Azotemia; Partial recovery of renal functions: Mild to Moderate Insufficiency; No recovery (dialysis dependent): Irreversible Bilateral Cortical Necrosis.

Main obstetric cause of pregnancy related ARF was hypertensive disorders of pregnancy (i.e. Pre-eclampsia/Eclampsia seen in 6 (40%) patients and their sequele HELLP Syndrome in 2 patients (13.33%), which was the most common etiological factor in the present study.

**Table 3: Neonatal outcome.**

Parameters	N=4	%
Intra-uterine death	4	28.57%
NICU(10)		
(a) Survivors	6	42.85%
(b) Non-survivors	4	28.57%
APGAR (Out of 6 fetal survivors)		
Grade 1 (< 5)	3	50.00%
Grade 2 (> 5 to <7)	1	16.66%
Grade 3 (7 to <9))	2	33.33%
Total deaths	8	57.14%
(a) IUD	4	28.57%
(b) NICU Deaths	4	40.00%

Obstetric hemorrhage due to Postpartum hemorrhage presented in 3 patients (20%) and antepartum hemorrhage 2 patients (13.33%). 1 patient underwent hemorrhage due to Uterine perforation.

**Table 4: Acute kidney injury grade staging.**

Grade of AKI	Serum creatinine criteria	Urine output
1	Serum creatinine increase > 0.3mg/dl Or Increase to 1.5-2.0 fold from baseline	< 0.5ml/kg/h for 6 hrs
2	Serum creatinine increase > 2.0-3.0 fold from baseline	< 0.5ml/kg/h for 12 hrs
3	Serum creatinine increase > 3 fold from baseline Or Serum creatinine >4mg/dl with an acute increase of atleast 0.5mg/dl Or Need for renal replacement therapy	<0.3ml/kg/h for 24 hrs Or Anuria for 12 hrs Or Need for renal replacement therapy

In 1 patient Puerperal Sepsis was the etiological factor leading to ARF while DIC was the later sequele in some of the patients but not the primary cause.

Maternal morbidity and mortality is assessed according to grading of AKI. While managing patients with obstetric ARF, majority of patients required haemodialysis as renal replacement therapy. In the present study 8/15(53.33%) patients underwent haemodialysis, of them 3 patients left against medical advice, while 2/15(13.33%) patients were

treated conservatively and 2/15(13.33%) patients were not able to survive. Recovery of renal function found in 6/10(60%), with complete recovery in 2/10(20%) patients. The majority of remaining patients 4/10(40%) had partial recovery and did not require renal replacement therapy. Percutaneous renal biopsy was done in 3 patients which showed diffuse glomerular capillary necrosis. Tubular necrotic changes seen in 2 specimens. One patient who had haemodialysis died due to acute tubular necrosis had immediate renal shutdown. One patient underwent MTP at 16-18 weeks.

Amongst 14 patients, neonatal outcome was noted and analysed. Intrauterine deaths amongst them were 4/14 (28.57%). Amongst 10 neonates which were admitted in neonatal ICU, 6/10 (60%) survived and 4/10 (40%) of them died.

## DISCUSSION

Acute renal failure due to obstetric cause has become rarer entity in developed countries 1-2.8%.<sup>6</sup> In developing countries the incidence still remains 9-25%, mainly due to late referral of pregnancy related to pregnancy related complications.<sup>6</sup> In the present study, the incidence is 5.8% which is similar to result found in other studies from India.<sup>7-11</sup> The reason of lower incidence in developed countries is prevention of pregnancy complications.

Abortion was the principal cause of ARF and a major health problem in developing countries in late seventies.<sup>8</sup> However there was no case of septic abortion in our study. The proportion of ARF secondary to septic abortion has decreased from 33.8% to 1.8% over past 20 years, due to improved antenatal facilities.<sup>12</sup> Its incidence could be reduced further by preventing unplanned pregnancies through increased use of regular contraception and use of emergency contraception.

Main obstetrical cause for ARF was hypertensive disorders of pregnancy (i.e. Pre-eclampsia/ Eclampsia seen in 6 (40%) patients which was similar to the studies reported by other Indian authors (47.41%) and 39.02%.<sup>13,14</sup> Majority of studies have reported eclampsia-pre-eclampsia as a major cause of obstetric ARF in developed countries.

While managing patients with obstetric ARF, majority of patients required hemodialysis as renal replacement therapy. In the present study 8/15 (53.33%) patients underwent hemodialysis, of them 3 patients left against medical advice, while 2/15 (13.33%) patients were treated conservatively and 2/15 (13.33%) patients were not able to survive, whereas similar study of 60 patients showed that 23 (38.33%) patients required hemodialysis while rest 37 patients (61.7%) were treated conservatively.<sup>1</sup> In study by Najjar MS hemodialysis was given to 32.5%.<sup>15</sup>

Total recovery of renal function found in 6/10 (60%), with complete recovery in 2/10 (20%) patients. The majority of remaining patients 4/10(40%) had partial recovery and did not require renal replacement therapy. Goplani et al reported a total recovery of renal function in 54.3%.<sup>5</sup> Maternal outcome was recorded as complete recovery, partial recovery and dialysis dependent cases. One patient who had hemodialysis died due to acute tubular necrosis had immediate renal shutdown.

In our study maternal mortality was seen in one patient (6.66%) while in similar studies it was 15% and 18.57% by other Indian authors.<sup>1,5</sup>

Perinatal mortality in the cases with Acute Renal Failure was observed in the cases of oliguric Acute Renal Failure. It was higher in those who had hypertensive disorder with acute renal failure. High rate of fetal death in our patients was perhaps a reflection of severity and number of insults occurring during pregnancy which not only resulted in fetal death but also caused severe renal failure which required dialysis. Eight in those who remained dialysis dependent and 6 (75%) of those who recovered gave birth to alive baby. In a study conducted by Ali et al there was 45% fetal loss including 20% still birth and 40% live birth.<sup>16</sup> 62% had live birth 31% had still birth in study done by Prakash et al.<sup>17</sup> Celik et al reported that 19% had intrauterine death whereas in our study it was 4/10 (28.57%).<sup>18</sup>

This analysis should provide useful guidelines for counselling women with pre-existing renal insufficiency about their prospects for a successful pregnancy and the effect of pregnancy on underlying disease.

## CONCLUSIONS

Pregnancy related Acute Renal Failure is usually a consequence of obstetric complication. In our study, most common etiological factor was hypertensive disorders. . Prolonged duration of oliguria and hypertensive disorders was strong predictors of poor renal outcome and irreversible renal failure. Antenatal check-up helps in creating awareness among the pregnant mother and thus seek help from trained birth attendants thus should be done regularly.

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