

DOI: <http://dx.doi.org/10.18203/2320-1770.ijrcog20194385>

Original Research Article

A study of pregnancy related acute kidney injury and its outcome at a tertiary care centre, civil hospital, Ahmadabad, Gujarat, India

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Received: 10 July 2019

Accepted: 30 August 2019

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ABSTRACT

Background: Pregnancy related acute kidney injury (PRAKI) is acute kidney injury occurring during pregnancy, labour, delivery, and/or postpartum period. Proper management of PRAKI is challenging because (i) both maternal and fetal health must be considered and (ii) the cardiovascular and renal adaptations of pregnancy add to the complexity of diagnosis and management. A multi disciplinary team is often needed to optimize all aspects of the pregnant women's care.

Methods: To study association and contributing factors in pregnancy related Acute Kidney injury, a retrospective study of 39 cases of acute kidney injury complicating pregnancies was carried out in department of obstetrics and gynaecology, B. J. Medical college over a period of 6 months, and results were studied and analysed. Etiological-factors, associated liver pathology, coagulation abnormality, thrombocytopenia, sepsis, recovery status and fetomaternal outcome were studied and results were tabulated. AKI was analysed in terms of maximal stage of renal injury attained as per risk, injury, failure, loss of function, and end-stage renal disease (RIFLE) criteria.

Results: The incidence of ARF in pregnancy was found to be 0.3%. Hypertension and its related complications were the most common causative factor. 59.5% of cases required hemodialysis and except for 6 cases (14.3%) all had complete or at least partial recovery from failure.

Conclusions: AKI complicating pregnancies are not uncommon in tertiary care centres. If recognized and treated promptly, recovery is assured in majority of 85.7% of cases. Early identification and prompt management of pre-eclampsia and sepsis can prevent majority of ARF cases.

Keywords: Abortion, Feto maternal outcome, Hypertension, Kidney injury, Pregnancy, Recovery

INTRODUCTION

Acute kidney injury is a syndrome characterized by the rapid loss of kidney's excretory function and is typically diagnosed by accumulation of end products of nitrogen metabolism (urea and creatinine) or decreased urine output or both i.e. increase in serum creatinine by 0.3 mg/dl (26.5 µmol/l) within 48 hours or increase in serum creatinine to 1.5 times baseline, which is known or presumed to have occurred within the prior 7 days; or

urine volume of <0.5ml/kg/hour for 6 hours.¹ The renal changes may be only temporary, and resolve within a few weeks postpartum, or may become irreversible leading to a progression of chronic kidney disease (CKD).^{2,3}

Pre-eclampsia/ eclampsia is the most common cause of AKI during pregnancy and puerperium, however, the outcome of pre-eclampsia related AKI is good. Amniotic fluid embolism and postpartum hemorrhage are the leading causes of maternal mortality.^{4,5}

The incidence of AKI in pregnancy declined significantly over the second half of the 20th century in industrialized countries, but is still a significant cause of maternal morbidity and mortality in developing countries. It currently affects 1 per 20,000 pregnancies.^{6,7} Hence, it is essential to focus on the prevention, periodic evaluation of pregnant women and improvement in the care during the peripartum period to improve maternal and perinatal outcomes. Due to advances in contraception, legalizing abortion and more careful monitoring of the perinatal period, the incidence of PRAKI is on decreasing trend.⁸⁻¹⁰

The maternal condition after active treatment was good, whereas the pregnancy outcomes were generally poor.^{11,12}

METHODS

Retrospective observational study conducted in the department of obstetrics and gynaecology, B. J. Medical College, Ahmedabad, Gujarat, India from October 2017 to March 2018 (6 months). Total 39 cases were studied and analysed.

Data collected from cases were analysed, computed and tabulated according to standard performa.

Inclusion criteria

- Sudden oliguria 24 hours UOP <400 ml
- Anuria
- Sr. Creatinine >1.5mg/dl.

Exclusion criteria

- Already known cases of chronic kidney diseases.

The etiological factors, associated liver pathology, coagulation abnormality, thrombocytopenia, sepsis, recovery status and fetomaternal outcome were studied and results were tabulated.

RESULTS

In present study, total 39 patients were studied. As shown in Table 1, pregnancy related acute kidney injury was most common in patients with pre-eclampsia, eclampsia and HELLP syndrome. About 62% of PRAKI cases were due to hypertension related complications in pregnancy. Next most common being septicemia accounting for about 24% of cases.

Table 1: Etiological factors of PRAKI in pregnant study.

Etiological factor	N=39	%
Preeclampsia/ Eclampsia/ HELLP	24	61.9
Abruption	2	4.7
Septicemia	9	23.8
Haemorrhage (APH+PPH)	4	9.5

As described in Table 2, pregnancy related acute kidney injury was more common in patients with age >35 years as chances of hypertension related complications increase with increasing maternal age and pregnancy related hypertensive disorders being the commonest etiological factor of PRAKI.

Table 2: Relationship between maternal age and PRAKI.

Age	N=39	%
<35	13	33.3
>35	26	66.7

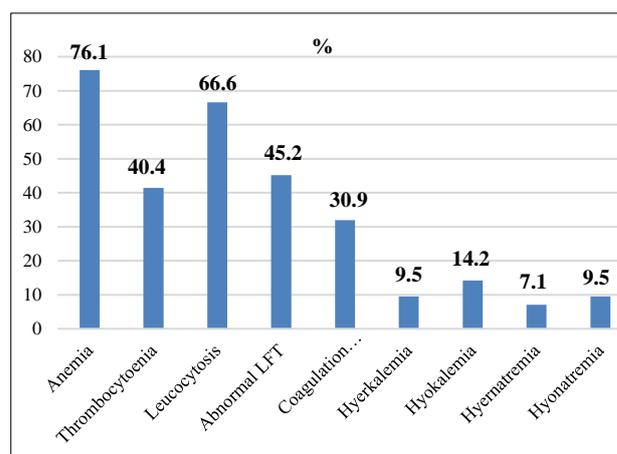


Figure 1: PRAKI and associated laboratory abnormalities.

As shown in following Figure 1, pregnancy related acute kidney injury usually is associated with various laboratory abnormalities and majority of the patient had more than 1 abnormality. Anaemia, leucocytosis and abnormal liver function test were present in about two-third of cases. Hypertension related complications are frequently associated with abnormal liver function tests and also leucocytosis is a common laboratory abnormality in such patients. Electrolyte abnormalities were relatively less common.

Table 3: Renal recovery in patients with acute kidney injury.

Recovery	N=39	%
Complete	32	81
Partial	2	4.8
Death	5	14.3

Results mentioned in Table 3 show that, complete renal recovery was seen in 32 (81%) cases, partial recovery in 2 (4.8%) cases and maternal death occurred in 5 (14.3%) cases. From 5 cases of maternal death, all cases were referred case, diagnosed during intrapartum and postpartum period. Admission to delivery time was 3 to 12 hours in cases of maternal death. 3 cases delivered vaginally and other 2 cases delivered by cesarean section.

Out of 5 one case had severe and other 4 cases had moderate severity of renal failure.

Table 4: Maternal and fetal outcome in patients with PRAKI.

Maternal or fetal	Outcome	N=39	%
Maternal	Recovery	34	85.7
	Death	5	14.3
Fetal	Stillbirth/IUD	28	71.4
	Live	11	28.6

Table 4 shows that, 85.7% of cases had recovery and maternal death occurred in 5 cases. PRAKI was associated with poor fetal outcome. Only 11 out of 39 had live birth, rest 12 were stillbirth and 16 were intrauterine death.

Table 5: In comparison to Huang C et al, study and Rao S et al, study in terms of recovery and commonest cause.^{13,14}

	Huang C et al,	Rao S et al,	Present study
Incidence (%)	0.81%	0.45%	0.31%
Most common cause	PIH	PIH	PIH
Recovery (%)	94%	93%	85.7%

As we can see in Table 5, comparing present study with other studies relating to acute kidney injury in pregnancy, gave similar results. Incidence of PRAKI has reduced in developed countries but is still a significant cause of maternal morbidity and mortality in developing countries. Hypertensive disorders of pregnancy (pre-eclampsia, eclampsia and HELLP syndrome) are the commonest causes of PRAKI. Though maternal outcomes are good, intensive management is required for good recovery rates. PRAKI due to hypertensive disorders usually have better outcomes than those occurring secondary to haemorrhage or septicaemia.

DISCUSSION

ARF is an infrequent but life threatening complication. Though PRAKI accounts for 17-43% of total ARF cases, the worldwide incidence of pregnancy-related acute kidney injury (PRAKI) has decreased in developed countries through legalization of abortion and improvement of antenatal and obstetric care.¹⁵ In the recent years, the incidence of PRAKI in developed countries is only 1 to 2.8%. However, PRAKI is still frequent in developing countries and the incidence is around 4.2-15%.¹⁶

Hypertension and its related complications were most common causes of PRAKI in present study followed by sepsis. Incidence is more in females of age >35 years of age. This is due to increased risk of hypertensive complications with increasing age. Though maternal

outcome is good if early diagnosis and prompt management is done but neonatal outcome is usually poor in pregnancies associated with acute kidney injury. Also, PRAKI is associated with number of laboratory abnormalities and majority of patients have more than one laboratory abnormalities requiring intensive management. Prevention, early recognition and prompt treatment are ideal. Avoiding nephrotoxic drugs, ensuring volume status/perfusion pressure, functional haemodynamic monitoring and monitoring of serum creatinine and urine output is must.¹⁷

The reported mortality rate of PRAKI in present study was 5/39 (14.3%). Comparing results with other studies, similar outcome was obtained. Huang C et al study on pregnancy related acute kidney injury at china had similar results showing decreasing incidence of PRAKI in developed countries but still a matter of concern for developing countries, hypertensive disorders being the commonest cause of PRAKI, poor neonatal outcomes and intensive management required for good recovery rates. As shown above, similar were the results obtained from Rao S et al study.

CONCLUSION

AKI complicating pregnancies are not uncommon in tertiary care centres. If recognized and treated promptly, recovery is assured in majority of cases (85.7%). Early identification and prompt management of pre-eclampsia and sepsis can prevent majority of ARF cases. Prolonged duration of oliguria and antepartum haemorrhage were strong predictors of poor renal outcome and irreversible renal failure. Multidisciplinary care is required for PRAKI including obstetrician /ICU /nephrologist /neonatologist.

Funding: No funding sources

Conflict of interest: None declared

Ethical approval: Not required

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Cite this article as: Agrawal KK, Jain M. A study of pregnancy related acute kidney injury and its outcome at a tertiary care centre, civil hospital, Ahmadabad, Gujarat, India. *Int J Reprod Contracept Obstet Gynecol* 2019;8:4020-3.