

Pregnancy Related Acute Kidney Injury; Our Experience at Tertiary Level Hospital

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ABSTRACT

Introduction: Pregnancy-related acute kidney injury (AKI) is a common occurrence and is associated with substantial maternal morbidity and mortality in developing countries. It may comprise up to 25% of the referrals to dialysis centers in developing countries. Acute kidney injury in pregnancy bears a high risk of bilateral renal cortical necrosis and consequently chronic renal failure. Study aimed to evaluate the contributing factors responsible for pregnancy-related Acute kidney injury and to assess the outcome of patients with pregnancy-related Acute kidney injury.

Material and methods: The present study is a prospective study of patients with obstetric complications leading to Acute kidney injury admitted in Obs and Gynae Deptt and nephrology deptt of IGIMS for a period of one year. Pregnant women who are included in the study are those who were healthy previously and had developed Acute kidney injury - oliguria (Urine output <400 ml/d) and azotemia (Serum creatinine >2 mg%) due to pregnancy related complications.

Results: Pregnancy related complications was present in 38 patients admitted in our hospital with acute kidney injury in one year period. Out of these 37% (14) of patients were in early stage of pregnancy while 63% (24) were in later stage of pregnancy and puerperium. Causes of AKI was post abortal sepsis in 23.6%, puerperal sepsis in 26.3%, haemorrhagic shock in 23.6%, eclampsia/pre-eclampsia/HELLP syndrome in 21%, IUD in 2nd trimester with sepsis in 2.6% and acute fatty liver of pregnancy in 2.6% of cases. Sepsis was the major cause accounting upto 52.6% of cases. Approximately 52.6% (20) of patients improved on treatment and dialysis, 21% did not improve (8), 13.15% (5) died and 13.15% (5) left against medical advice. Cause of death in 80% (4 out of 5) of patients was sepsis. Renal biopsy was performed on 62.5% of patients who did not improve (5 out of 8 patients). Renal transplant was done in 1 patients.

Conclusion: Obstetric AKI is still a critical situation in developing countries and rare entity in developed countries. Maternal mortality has decreased but sepsis still accounts for majority of cases. Therefore early diagnosis and treatment is the need of the hour.

Keywords: Acute Kidney Injury, Pregnancy, Sepsis

INTRODUCTION

Acute kidney injury is a clinical syndrome characterised by a sudden decline in glomerular filtration rate leading to decreased excretion of nitrogenous waste products like urea, creatinine and other uremic toxins.¹ Pregnancy-related acute kidney injury (AKI) is a common occurrence and is associated with substantial maternal morbidity and mortality in developing countries.² It may comprise up to 25% of the

referrals to dialysis centers in developing countries. With improvement in antenatal and postnatal care, the incidence of Pregnancy related AKI in India has steadily declined from 22% in 1960s to 9% in 1980³ and further down to 3–7% in 2000s;^{4,5} however, the levels continue to remain higher than the levels seen in developed countries (1 in 20,000 pregnancies.⁶ In developing countries, sepsis and hemorrhage account for >50% of cases of Pregnancy related AKI,^{7,8} in contrast to developed countries where chronic hypertension, renal disease and preeclampsia and eclampsia are important causes.^{9,10} Its incidence has decreased in the developed countries to only 1–2.8% due to better antenatal care and rare cases of septic abortion in these countries.^{7,11} However, in the developing countries it is still frequent and the incidence is around 4.2–15%⁷ High incidence in developing countries is mainly due to limited inaccessibility of antenatal care and emergency obstetric healthcare facilities.⁸⁻¹² Unskilled and septic abortion are the most common cause of Acute kidney injury during the first half of pregnancy. During the second half, Acute kidney injury is most commonly associated with preeclampsia, HELLP syndrome and antepartum haemorrhage.^{13,14} Postpartum renal failure is mostly due to puerperal sepsis and severe degree of PPH.

Acute kidney injury in pregnancy bears a high risk of bilateral renal cortical necrosis and consequently chronic renal failure. Renal cortical necrosis is an uncommon entity and accounts for only 2% of all cases of Acute kidney injury with obstetric complications being the most common etiology.¹⁴

Study aimed to evaluate the contributing factors responsible for pregnancy-related Acute kidney injury and to assess the outcome of patients with pregnancy-related Acute kidney injury.

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MATERIAL AND METHODS

The present study was a prospective observational study of patients with obstetric complications leading to Acute kidney injury admitted in Obs and Gynae Deptt and nephrology dept of IGIMS for a period of one year from october 2015 to september 2016. Ethical approval for the study was obtained from IGIMS Ethical Committee.

This study was done with the objective to assess the causes leading to acute kidney injury during pregnancy and their outcome.

Pregnant women who were included in the study were those who were healthy previously and had developed Acute kidney injury - oliguria (Urine output <400 ml/d)/ anuria and azotemia (Serum creatinine >2 mg%) due to pregnancy related complications.

Exclusion criteria

- Evidence of renal disease prior to pregnancy
- History of hypertension or diabetes before gestation
- History of renal stone diseases
- Renal scarring on ultrasonography
- Small size of the kidneys
- Elevated serum creatinine prior to gestation

Patients were analysed on the basis of demographic data, detailed history, clinical presentation and laboratory investigations i.e; Renal function tests, Complete blood count etc. Each patient underwent complete obstetric examination. Specific inquiries were conducted regarding the mode of delivery, need for blood transfusion and surgical intervention. Curettage was performed in patients with retained products of conception as and when required. Hemodialysis was performed according to standard indications. Outcome was considered favorable as complete recovery if patient became dialysis independent with good urine output and normal renal function. Patients with improved renal function but not to the normal level and who became dialysis independent at the time of discharge were considered to have partial recovery. Progression to either chronic kidney disease or mortality was considered as an unfavorable outcome. Patients requiring dialysis after 3 months of discharge were considered to have chronic kidney disease.

Renal biopsy was performed if a patient remained oliguric or required dialysis even after 4-6 weeks of treatment.

STATISTICAL ANALYSIS

Descriptive statistics like mean and percentages were used to interpret the data with the help of microsoft office 2007.

RESULTS

A total of 1465 patients with renal failure (both acute and chronic renal failure) were admitted in our hospital in a period of one year. Out of these 402 patients were having acute kidney injury and 200 were in the reproductive age group. Out of these 200 patients in reproductive age group 38 patients had pregnancy related acute kidney injury. The incidence of acute kidney injury was 9.45% in our study. Mean age of the patients was 27 years (Bar graph). Out of 38 patients 14 patients were primigravida (37%) and 24

Parity	No. of patients	Percentage%
Primigravida	14	37%
Multigravida	24	63%

Table-1: Distribution according to parity of patients

Stage of pregnancy	No. of patients	Percentage (%)
1 st Trimester	6	16%
2 nd Trimester	8	21%
3 rd Trimester & puerperium	24	63%

Table-2: Distribution according to stage of pregnancy/puerperium at the time of admission

Status at presentation	No. of patients	Percentage
Vaginal delivered	14	37%
Lscs	11	29%
D&E for abortion	8	21%
Laparotomy	2 (for ruptured ectopic pregnancy)	5.25%
Not delivered	2(1- IUD; 1- acute fatty liver of pregnancy)	5.25%
Others	1 (TAH with 9 weeks of pregnancy)	2.5%

Table-3: Distribution according to status at the time of admission of the patients

Symptoms at presentation	No. of patients	Percentage %
Anuria	11	29%
Oligouria	24	63%
Only deranged KFT	03	08%

Table-4: Distribution according to symptoms at presentation

Surgical intervention required	No. of patients	Percentage %
D&E	12	31.6%
Total hysterectomy	1	2.5%
Subtotal hysterectomy	1	2.5%

Table-5: Distribution according to surgical intervention required

Outcome	No. of patients	Percentage
Recovered	20	52.6%
Unrecovered	8	21%
Death	5	13.15%
Lost to follow up	5	13.15%

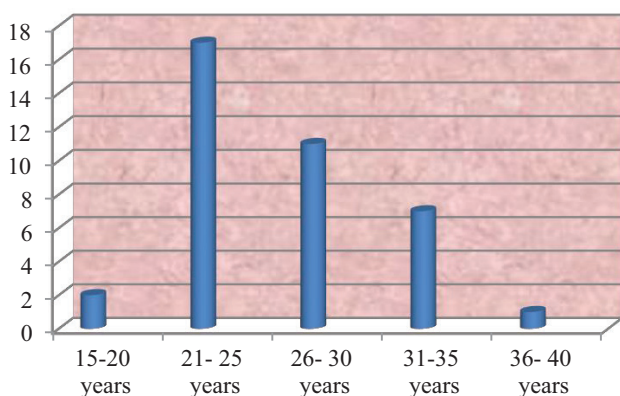
Table-6: Distribution according to outcome of the patients

patients were multigravida (63%)(Table-1). 6 patients (16%) presented in 1st trimester, 8 patients (21%) presented in 2nd trimester while 24 patients(63%) presented in 3rd trimester and puerperium (Table-2).

At the time of admission to our hospital 14 patients (37%) were delivered vaginally, 11 patients (29%) had undergone Lower segment caserean section (LSCS), 8 patients(21%) had undergone dilatation and evacuation for septic abortion,

Causes of AKI	No. of patients	Percentage
Puerperal sepsis	10	26.3%
Septic abortion	9	23.6%
Haemorrhagic shock	9	23.6%
Pre-eclampsia/eclampsia/hellp syndrome	8	21%
Acute fatty liver of pregnancy	1	2.5%
Septicemia during pregnancy (IUD)	1	2.5%

Table-7: Distribution according to causes leading to AKI



Graph-1: Showing distribution of patients according to their age group

2 patients (5.25%) had undergone laparotomy for ruptured ectopic pregnancy, 1 patient (2.5%) had undergone hysterectomy with 9 weeks of pregnancy in situ which had been done outside for causes unknown. 2 patients (5.25%) were undelivered, out of which one patient had intrauterine death who ultimately delivered dead baby in our labour room and the other undelivered patient had acute fatty liver of pregnancy (Table-3).

11 patients (29%) presented with anuria, 24 patients (63%) with oliguria and 3 patients (8%) with only deranged KFT (Table-4). 12 patients (31.5%) required dilatation and evacuation for retained products of conception (RPOC). 1 patient (2.5%) had undergone subtotal hysterectomy because there was profuse bleeding while doing dilatation and evacuation for RPOC. 1 patient (2.5%) had undergone total hysterectomy as there was uterine perforation with multiple septic foci in uterus as a result of criminal abortion (Table-5). 20 patients (52.16%) had recovered completely with kidney function tests coming back to normal limits. 8 patients (21%) did not recover completely ending up into chronic renal failure. 5 patients (13.15%) died and 5 patients (13.15%) left against medical advice (Table-6). Out of 5 deaths the cause of death in 4 patients (80%) was sepsis.

In terms of causes leading to acute kidney injury in pregnancy, 10 patients (26.3%) had puerperal sepsis, 9 patients (23.68%) had septic abortion, 9 patients (23.68%) had haemorrhagic shock, 8 patients (21%) had pre-eclampsia/eclampsia/HELLP syndrome, 1 patient (2.6%) had acute fatty liver of pregnancy and 1 patient (2.1%) had septicemia due to intrauterine death of fetus (Table-7). Overall sepsis accounted to 52.6% of patients with acute kidney injury.

Renal biopsy was done in 5 patients (8%) - 1 patient (2.5%) had adult onset nephrotic syndrome, 3 patients (10.5%) had renal cortical necrosis on biopsy and one patient had minimal change disease (2.5%). One patient (2.5%) had undergone renal transplant. 7 patients (18.4%) required ICU care. Out of 38 patients, 30 patients (79%) required haemodialysis and 29 patients (76.3%) required blood transfusion.

DISCUSSION

Incidence of obstetric AKI in the developed countries is 1–2.8%, and in the developing countries, it remains at 9–25%. Lower incidence in developed countries is due to adequate antenatal care, early diagnosis and timely management of complications. Septic abortion has not been observed any more in these countries. Inadequate antenatal care is a major factor leading to high incidence in developing countries. Our study reported an incidence of 9.45%. This is similar to studies done by Vineet et al (2016), Goplani et al (2008) and Ali et al (2011) who reported an incidence of 9.12%, 9.06% and 10% respectively.^{15,7,16}

Puerperal sepsis (26.3%) was the most common cause of obstetric AKI which is similar to study done by Goplani et al. Overall, sepsis accounted for 52.6% of cause of AKI similar to Goplani et al (61.53%).⁷ This is contrast to study done by Ali et al¹⁶, Rizwan et al¹⁷ and Ansari et al¹⁸ in which the major cause of acute kidney injury was Obstetric hemorrhage.

We found more cases in late pregnancy and puerperium (63%). Percentage of patients presenting during late pregnancy and puerperium in studies done by Vineet et al (2016), Goplani et al (2008), Ansari et al (2008) and Chugh et al (1976) were 90%, 80%, 86% and 40% respectively.^{15,7,17,3}

This is in contrast to a previous study conducted by Chugh et al.³ in India who reported 59.7% patients of AKI in early pregnancy. This major change appears to be due to the legalization of abortion.

We reported complete recovery in 52.7%. This is similar to studies done by Vineet et al (2016), Goplani et al (2008) and Rizwan et al (2011) who reported complete recovery in 55.76%, 54.28% and 53% of patients respectively.^{15,7,18}

Our study has shown 21% incidence of chronic kidney disease which is contrast to a study done by Patel et al.²² with 8.4% incidence of chronic kidney disease.

We reported maternal mortality of 13%. This is similar to study done by Khalil et al (2009) where maternal mortality was 15%.¹⁹ This is contrast to studies done by Goplani et al (2008) and Choudhari et al (2011) where maternal mortality was 18.57% and 33.3% respectively.^{7,20} Recent studies in India have shown a maternal mortality rate around 24%.²¹ This appears to be the result of aseptic delivery practices and early management of obstetric complications.

CONCLUSION

Obstetric AKI is still a critical situation in developing countries and rare entity in developed countries. Maternal mortality has decreased but sepsis still accounts for majority of cases. There will be dramatic decrease in Irreversible renal damage due to obstetric complication in developing

countries like India with early diagnosis and treatment of complication; taking aseptic precautions in all procedures and better prenatal/ postnatal care and by preventing septic abortions.

REFERENCES

1. Jefferson A, Thurman JM, Schrier RW. Pathophysiology and etiology of acute kidney injury. In: Floege J, Johnson RJ, Feehally J, editors. *Comprehensive clinical nephrology*. New York: Elsevier Saunders; 2010. pp. 806–807.
2. Pertuiset N, Grunfeld JP. Acute renal failure in pregnancy. *Baillieres Clin Obstet Gynaecol*. 1994;8:333–51
3. Chugh KS, Sakhuja V, Malhotra HS, Pereira BJ. Changing trends in acute renal failure in third-world countries – Chandigarh study. *Q J Med*. 1989;73:1117–23.
4. Kumar KS, Krishna CR, Siva Kumar V. Pregnancy related acute renal failure. *J Obstet Gynecol India*. 2006;56:308–10.
5. Najjar MS, Shah AR, Wani IA, Reshi AR, Banday KA, Bhat MA, et al. Pregnancy related acute kidney injury: A single center experience from the Kashmir Valley. *Indian J Nephrol*. 2008;18:159–61.
6. Gammill HS, Jeyabalan A. Acute renal failure in pregnancy. *Crit Care Med*. 2005;33:S372–84.
7. Goplani KR, Shah PR, Gera DN, Gumber M, Dabhi M, Feroz A, et al. Pregnancy-related acute renal failure: A single-center experience. *Indian J Nephrol*. 2008;18:17–21.
8. Pahwa N, Bharani R, Kumar R. Post-partum acute kidney injury. *Saudi J Kidney Dis Transpl*. 2014;25:1244–7.
9. Mehrabadi A, Liu S, Bartholomew S, Hutcheon JA, Magee LA, Kramer MS, et al. Hypertensive disorders of pregnancy and the recent increase in obstetric acute renal failure in Canada: Population based retrospective cohort study. *BMJ*. 2014;349:g4731.
10. Gurrieri C, Garovic VD, Gullo A, Bojanic K, Sprung J, Narr BJ, et al. Kidney injury during pregnancy: Associated comorbid conditions and outcomes. *Arch Gynecol Obstet*. 2012;286:567–73.
11. Rani PU, Narayen G, Anuradha G. Changing trends in pregnancy related acute renal failure. *J Obstet Gynecol India*. 2002;52:36–38.
12. Khanal N, Ahmed E, Akhtar F. Factors predicting the outcome of acute renal failure in pregnancy. *J Coll Physicians Surg Pak*. 2010;20:599–603.
13. Beaufile MB, et al. Pregnancy. In: Davidson AM, Cameron JS, Grunfeld JP, et al., editors. *Clinical nephrology*. New York: Oxford University Press; 2005. pp. 1704–1728.
14. Prakash J, Tripathi K, Pandey LK, et al. Renal cortical necrosis in pregnancy-related acute renal failure. *J Indian Med Assoc*. 1996;94:227–229.
15. V. Mishra Vineet, A. Goyal Preeti, S. Aggarwal Rohina, S. Choudhary, Tanvir Tanvir, D. Dharaiya Nisarg, and A. Gaddagi Rashmi. A Single-Centre Experience of Obstetric Acute Kidney Injury. *J Obstet Gynaecol India*. 2016; 66: 207–211
16. Ali A, Zaffar S, Mehmood A, et al. Obstetrical acute renal failure from Frontier province: a 3 years prospective study. *J Postgrad Med Inst*. 2011;18:109–116.
17. Ansari MR, Laghari MS, Solangi KB. Acute renal failure in pregnancy: one year observational study at Liaquat University Hospital, Hyderabad. *J Pak Med Assoc*. 2008;58:61–64.
18. Rizwan N, Uddin SN. Obstetrical acute renal failure: a challenging medical complication. *J Ayub Med Coll Abbottabad*. 2011;23:66–68.
19. Khalil MA, Azhar A, Anwar N, et al. Aetiology, maternal and foetal outcome in 60 cases of obstetrical acute renal failure. *J Ayub Med Coll*. 2009;21:46–49.
20. Chaudhri N, But GU, Masroor I, et al. Spectrum and short term outcome of pregnancy related acute renal failure among women. *Ann Pak Inst Med Sci*. 2011;7:57–61.
21. Kumar KS, Krishna CR, Siva Kumar V. Pregnancy related acute renal failure. *J Obstet Gynecol India*. 2006;56:308–310.
22. Patel ML, Sachan R, Radheshyam PS. Acute renal failure in pregnancy: tertiary centre experience from north Indian population. *Niger Med J*. 2013;54:191–195.

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